

NAPA 2040
GENERAL PLAN

CITY OF NAPA

GENERAL PLAN UPDATE

Draft Environmental Impact Report

Public Review Draft
March 2022
SCH# 2021010255

PREPARED FOR:

City of Napa

Community Development Department

1600 First Street

Napa, CA 94559

Contact: Michael Walker, Senior Planner

(707) 257-9530

PREPARED BY:

ICF, Jones & Stokes, Inc.

980 9th Street, Suite 1200

Sacramento, CA 95814

Contact: James Alcorn, Project Manager

(916) 737-3000



Cover Photo: Dyett & Bhatia

City of Napa
GENERAL PLAN UPDATE

Draft Environmental Impact Report

PUBLIC REVIEW DRAFT

MARCH 2022

ICF, Jones & Stokes, Inc. 2022. City of Napa General Plan Update Draft Environmental Impact Report. March. (ICF 00494.18) Sacramento, CA. Prepared for the City of Napa, Napa, CA.

Contents

Page

List of Tables vi
List of Figures viii
List of Acronyms and Abbreviations ix

Executive Summary ES-1
ES.1 Purpose ES-1
ES.2 Project Overview ES-1
ES.2.1 Guiding Principles ES-2
ES.2.2 Key Strategies ES-2
ES.2.3 General Plan Update ES-4
ES.3 Project Impacts and Mitigation Measures ES-4
ES.4 Project Alternatives ES-4
ES.5 Potential Areas of Controversy/Issues to be Resolved ES-5
ES.6 How to Comment on this Draft EIR ES-5

Chapter 1 **Introduction 1-1**
1.1 The California Environmental Quality Act 1-1
1.1.1 Purpose of this Environmental Impact Report 1-1
1.1.2 Preparation of an Environmental Impact Report 1-2
1.1.3 Level of Detail in this Environmental Impact Report 1-2
1.1.4 Document Format 1-3
1.2 Intended Use of this Environmental Impact Report 1-4
1.3 Reviewing an Environmental Impact Report 1-5
1.3.1 Making Effective Comments 1-5
1.3.2 Submitting Comments 1-5
1.4 Final EIR 1-5

Chapter 2 **Project Description 2-1**
2.1 Project Setting 2-1
2.1.1 Background 2-1
2.1.2 Location 2-1
2.1.3 Existing Conditions and Land Uses 2-4
2.1.4 Existing General Plan 2-5
2.2 Guiding Principles 2-5
2.3 Key Strategies 2-5
2.3.1 Changes to the General Plan 2-7

2.3.2 Growth Forecasts 2-7
2.4 General Plan Elements 2-8
2.4.1 Land Use and Community Design Element 2-8
2.4.2 Transportation Element 2-13
2.4.3 Community Services, Parks and Recreation Element 2-14
2.4.4 Historic and Cultural Resources Element 2-15
2.4.5 Climate Change and Sustainability Element 2-16
2.4.6 Natural Resources Conservation Element 2-17
2.4.7 Safety and Noise Element 2-18
2.4.8 Public Health and Equity Element 2-18
2.4.9 Economic Development Element 2-19
2.5 Required Approvals 2-20
2.6 References Cited 2-20
Chapter 3 **Impact Analysis 3-1**
3.1 Aesthetics 3.1-1
3.1.1 Existing Conditions 3.1-1
3.1.2 Environmental Impacts 3.1-12
3.1.3 References Cited 3.1-23
3.2 Air Quality 3.2-1
3.2.1 Existing Conditions 3.2-1
3.2.2 Environmental Impacts 3.2-20
3.2.3 References Cited 3.2-46
3.3 Biological Resources 3.3-1
3.3.1 Existing Conditions 3.3-1
3.3.2 Environmental Impacts 3.3-44
3.3.3 References Cited 3.3-54
3.4 Cultural Resources 3.4-1
3.4.1 Existing Conditions 3.4-1
3.4.2 Environmental Impacts 3.4-11
3.4.3 References Cited 3.4-18
3.5 Energy 3.5-1
3.5.1 Existing Conditions 3.5-1
3.5.2 Environmental Impacts 3.5-8
3.5.3 References Cited 3.5-13
3.6 Geology and Soils 3.6-1
3.6.1 Existing Conditions 3.6-1
3.6.2 Environmental Impacts 3.6-17

3.6.3 References Cited 3.6-22
3.7 Greenhouse Gas Emissions 3.7-1
3.7.1 Existing Conditions 3.7-1
3.7.2 Environmental Impacts 3.7-17
3.7.3 References Cited 3.7-32
3.8 Hazards and Hazardous Materials 3.8-1
3.8.1 Existing Conditions 3.8-1
3.8.2 Environmental Impacts 3.8-10
3.8.3 References Cited 3.8-16
3.9 Hydrology and Water Quality 3.9-1
3.9.1 Existing Conditions 3.9-1
3.9.2 Environmental Impacts 3.9-16
3.9.3 References Cited 3.9-25
3.10 Land Use and Planning 3.10-1
3.10.1 Existing Conditions 3.10-1
3.10.2 Environmental Impacts 3.10-9
3.10.3 References Cited 3.10-15
3.11 Noise 3.11-1
3.11.1 Existing Conditions 3.11-1
3.11.2 Environmental Impacts 3.11-14
3.11.3 References Cited 3.11-28
3.12 Population and Housing 3.12-1
3.12.1 Existing Conditions 3.12-1
3.12.2 Environmental Impacts 3.12-5
3.12.3 References Cited 3.12-14
3.13 Public Services 3.13-1
3.13.1 Existing Conditions 3.13-1
3.13.2 Environmental Impacts 3.13-13
3.13.3 References Cited 3.13-23
3.14 Recreation 3.14-1
3.14.1 Existing Conditions 3.14-1
3.14.2 Environmental Impacts 3.14-10
3.14.3 References Cited 3.14-18
3.15 Transportation 3.15-1
3.15.1 Existing Conditions 3.15-1
3.15.2 Environmental Impacts 3.15-11
3.15.3 References Cited 3.15-20

3.16 Tribal Cultural Resources 3.16-1
3.16.1 Existing Conditions 3.16-1
3.16.2 Environmental Impacts 3.16-4
3.16.3 References Cited 3.16-7
3.17 Utilities and Service Systems 3.17-1
3.17.1 Existing Conditions 3.17-1
3.17.2 Environmental Impacts 3.17-22
3.17.3 References Cited 3.17-36
3.18 Wildfire 3.18-1
3.18.1 Existing Conditions 3.18-1
3.18.2 Environmental Impacts 3.18-4
3.18.3 References Cited 3.18-7
Chapter 4 **Alternatives Analysis 4-1**
4.1 Land Use Strategies and Impacts 4-1
4.1.1 Land Use Strategies 4-1
4.1.2 Significant Impacts 4-2
4.2 Methodology and Screening Criteria 4-2
4.3 Alternatives Considered but Rejected 4-3
4.4 Alternatives Analyzed in this Draft EIR 4-3
4.4.1 Alternative 1—No Project Alternative 4-3
4.4.2 Alternative 2—Higher Infill Alternative 4-11
4.5 Environmentally Superior Alternative 4-25
4.6 References Cited 4-27
Chapter 5 **Other CEQA Considerations 5-1**
5.1 Cumulative Impacts 5-1
5.1.1 Aesthetics 5-2
5.1.2 Air Quality 5-2
5.1.3 Biological Resources 5-2
5.1.4 Cultural Resources 5-4
5.1.5 Energy 5-4
5.1.6 Geology and Soils 5-4
5.1.7 Greenhouse Gas Emissions 5-5
5.1.8 Hazards and Hazardous Materials 5-5
5.1.9 Hydrology and Water Quality 5-5
5.1.10 Land Use and Population 5-6
5.1.11 Noise 5-6
5.1.12 Public Services and Recreation 5-6

5.1.13 Transportation 5-7
5.1.14 Tribal Cultural Resources 5-7
5.1.15 Utilities and Service Systems 5-8
5.1.16 Wildfire 5-8
5.2 Growth-Inducing Impacts 5-9
5.3 Significant and Unavoidable Impacts 5-9
5.4 Significant Irreversible Environmental Changes That Cannot Be Avoided if the Project is Implemented 5-10
5.5 Future Use of this Environmental Impact Report 5-10
Chapter 6 **Report Preparers 6-1**
6.1 City of Napa 6-1
6.2 ICF 6-1
6.3 Dyett & Bhatia 6-2
6.4 DKS Associates 6-2
6.5 West Yost Associates 6-2

Appendices

Appendix A Notice of Preparation and Comments on Notice of Preparation

Appendix B Air Quality and Greenhouse Gas Emissions

Appendix C Transportation Evaluation

Appendix D Water, Wastewater and Stormwater Technical Memorandums

Tables

		Page
ES-1	Summary of Impacts and Mitigation Measures	ES-6
2-1	Regional Location	2-2
2-2	Planning Area	2-3
2-3	Citywide Growth Projections	2-8
3.1-1	Visual Character Elements of the Affected Environment	3.1-5
3.1-2	Visual Character Element of the Project Environment	3.1-13
3.2-1	Federal and State Ambient Air Quality Standards	3.2-2
3.2-2	CARB Recommendations on Siting New Sensitive Land Uses	3.2-4
3.2-3	BAAQMD Construction Best Practices	3.2-7
3.2-4	Ambient Air Quality Monitoring Data from Project Area (2018-2020)	3.2-13
3.2-5	Existing Permitted Stationary Sources within approximately 1,000 feet of the Planning Area	3.2-14
3.2-6	Federal and State Ambient Air Quality Attainment Status for Napa County Portion of the SFBAAB	3.2-19
3.2-7	BAAQMD Project-Level Air Quality Thresholds of Significance for Regional Criteria Pollutants and Precursors	3.2-28
3.2-8	Population and Transportation Projections, 2015-2040	3.2-32
3.2-9	Proposed Policies that Support 2017 Clean Air Plan Control Measures	3.2-34
3.2-10	Estimated Maximum Daily Project Operational Emissions	3.2-40
3.3-1	Crosswalk for CWHR Land Cover Types and the Napa County's Natural Communities in the Study Area	3.3-8
3.3-2	Special-Status Plants Identified as Occurring in or Near the Study Area	3.3-17
3.3-3	Special-Status Wildlife Species Identified as Occurring in or Near the Study Area	3.3-29
3.3-4	Special-Status Fish Species Identified as Occurring in or Near the Study Area	3.3-40
3.3-5	Life Stage Timing and Distribution of Special-Status Fish Species Potentially Affected by the General Plan Update	3.3-42
3.6-1	Paleontological Sensitivity Ratings	3.6-16
3.6-2	Society of Vertebrate Paleontology's Recommended Treatment for Paleontological Resources	3.6-18
3.7-1	Atmospheric Lifetimes and Global Warming Potentials of Key Greenhouse Gases	3.7-13
3.7-2	Global, National, and State GHG Emissions Inventories	3.7-14
3.7-3	City of Napa 2005 Community Greenhouse Gas Emissions Inventory (metric tons CO_2e)	3.7-14

3.7-4 City of Napa GHG Emissions Targets Pursuant to AB 32 ..... 3.7-24
3.7-5 Estimated Project Operational GHG Emissions 3.7-27
3.7-6 City of Napa, Regional, and State GHG Emissions Efficiency Metrics 3.7-28
3.7-7 Project Implementation of Plan Bay Area 2050 Strategies 3.7-29
3.10-1 Existing Land Uses in the Planning Area 3.10-6
3.11-1 Definition of Sound Measurements 3.11-2
3.11-2 Typical A-weighted Sound Levels 3.11-3
3.11-3 Vibration Source Levels for Construction Equipment 3.11-4
3.11-4 Vibration Damage Potential Threshold Criteria Guidelines 3.11-5
3.11-5 Vibration Annoyance Potential Criteria Guidelines 3.11-5
3.11-6 Typical Levels of Groundborne Vibration 3.11-6
3.11-7 Groundborne Vibration Impact Criteria 3.11-7
3.11-8 Existing General Plan Noise Compatibility Standards 3.11-9
3.11-9 Long-Term and Short-Term Noise Measurement Data 3.11-10
3.11-10 Noise Levels of Key Construction Phases at Distances of 50, 100, 200, and 400 feet 3.11-16
3.11-11 Traffic Noise Modeling Results for City Roadway Segments 3.11-18
3.11-12 Traffic Noise Modeling Results Relative to Compatibility Standards 3.11-23
3.12-1 City of Napa Regional Housing Need Allocation for 2015–2023 ..... 3.12-3
3.12-2 Existing and Projected Development 3.12-4
3.13-1 City of Napa Fire Stations 3.13-7
3.13-2 Napa Valley Unified School District Enrollment and Capacity 3.13-10
3.14-1 Existing Parks and Recreational Facilities in the Planning Area (2021) 3.14-5
3.15-1 Level of Service Criteria—Intersections 3.15-3
3.15-2 Classification of Roadway System in the City of Napa 3.15-7
3.15-3 Study Intersection Level of Service 3.15-10
3.15-4 Future Peak Hour Intersection Level of Service 3.15-16
3.15-5 CEQA VMT Metrics for No Project Conditions 3.15-18
3.17-1 Population and Water Demand Projections 3.17-16
4.4-1 Comparison of Vehicle Trips and Population, 2015-2040 4-5
4.5-1 Comparison of Key Project Characteristics 4-26
4.5-2 Comparison of Alternatives' Environmental Impacts 4-27

Figures

		Page
3.2-1	PM2.5 Sources and Sensitive Receptors	3.2-16
3.2-2	Existing Stationary Sources Risk and Hazards	3.2-17
3.2-3	Existing Mobile Sources and Sensitive Receptors	3.2-18
3.3-1	Existing Land Cover in Study Area	3.3-10
3.3-2	Wildlife Movement Corridors	3.3-45
3.6-1	Soil Associations in the Planning Area	3.6-7
3.6-2	Seismic Hazards in the Planning Area	3.6-8
3.6-3	Shrink/Swell Potential in the Planning Area	3.6-13
3.6-4	Water Erosion Hazard in the Planning Area	3.6-14
3.6-5	Wind Erosion Hazard in the Planning Area	3.6-15
3.10-1	Existing Land Uses in Planning Area	3.10-7
3.10-2	General Plan Land Use Diagram	3.10-12
3.11-1	Noise Measurement Locations in the Planning Area	3.11-11
3.11-2	Existing Transportation Noise Contours	3.11-12
3.14-1	Existing Parks and Recreational Facilities	3.14-8

Acronyms and Abbreviations

2017 Scoping Plan	California's 2017 Climate Change Scoping Plan
AB	Assembly Bill
ABAG	Association of Bay Area Governments
ADA	Americans with Disabilities Act
AF	acre-feet
AFVs	alternative fuel vehicles
AFY	acre-feet per year
APA	American Planning Association
APE	area of potential effect
AST	aboveground storage tank
AVE	area of visual effect
Basin Plan	San Francisco Bay Basin [Region 2 Water Quality Control Plan]
Bay Area	San Francisco Bay Area
BGEPA	Bald and Golden Eagle Protection Act
BIOS	biogeographic information and observation system
BMP	best management practice
BO	biological opinion
BRWL	blue-rich white light lamps
Business Plan Act	Hazardous Materials Release Response Plans and Inventory Act
C&D	construction and demolition
CAFE	Corporate Average Fuel Economy
CAL FIRE	California Department of Forestry and Fire Protection
Cal/OSHA	California Division of Occupational Safety and Health
CalARP	California Accidental Release Prevention Program
Cal-EPA	California Environmental Protection Agency
CALGreen	California Green Building Standards Code
CalRecycle	California Department of Resources Recycling and Recovery
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CBC	California Building Code
CBIA v. BAAQMD	California Building Industry Association vs. Bay Area Air Quality Management District

CCAs	Community Choice Aggregations
CCR	California Code of Regulation
CDFW	California Department of Fish and Wildlife
CEC	California Energy Commission
CEHC	California Essential Habitat Connectivity
Central Valley Water Board	Central Valley Regional Water Quality Control Board
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1980
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
CH_4	methane
CHP	California Highway Patrol
CIP	Capital Improvement Program
City	City of West Sacramento
CNDDB	California Natural Diversity Database
CNEL	community noise equivalent level
CNPPA	California Native Plant Protection Act
CNPS	California Native Plant Society
CO_2	carbon dioxide
Construction General Permit	General NPDES Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities
Cortese	Hazardous Wastes and Substances Site
CPUC	California Public Utilities Commission
CRHR	California Register of Historical Resources
CSMP	Corridor System Management Plan
CUPA	Certified Unified Program Agency
CWA	Clean Water Act
CWHR	California Wildlife Habitat Relationships
dB	decibel
DBH	diameter at breast height
DPSs	distinct population segments

DTSC	California Department of Toxic Substances Control
DWR	California Department of Water Resources
EAP	Energy Action Plan
ECAs	Essential Connectivity Areas
EFH	essential fish habitat
EIR	environmental impact report
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EPAct	Energy Policy Act of 1992
ESA	Endangered Species Act
ESPs	energy service providers
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRMs	Flood Insurance Rate Maps
FR	Federal Register
FTA	Federal Transit Administration
GHG	greenhouse gas
GSA	Groundwater Sustainability Agencies
GSPs	groundwater sustainability plans
GWP	global warming potential
HCD	California Department of Housing and Community Development
HCD	Department of Housing and Community Development
HCPs	habitat conservation plans
HI	hazard index
HSC	California Health and Safety Code
HSWA	Hazardous and Solid Waste Amendments of 1984
HWCA	Hazardous Waste Control Act
IBC	International Building Code
IEPR	Integrated Energy Policy Report
IOUs	investor-owned utilities
IPCC	Intergovernmental Panel on Climate Change
JPA	joint powers authority
Ldn	day-night sound level

LED	light-emitting diode
L_{eq}	equivalent sound level
LID	Low Impact Development
Lmin and Lmax	minimum and maximum sound levels
LOS	level of service
MAP-21	Moving Ahead for Progress in the 21st Century Act,
MBTA	Migratory Bird Treaty Act
MEI	maximum exposed individual
mg/m^3	milligrams per cubic meter
MGD	million gallons per day
MPOs	metropolitan planning organizations
MS4	Municipal Separate Storm Water Sewer System
MS4 Permit	General Permit for Municipal Separate Storm Sewer Systems
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MTP/SCS	Metropolitan Transportation Plan/Sustainable Communities Strategy
MWELO	Model Water Efficient Landscape Ordinance
N_2O	nitrous oxide
NAHC	Native American Heritage Commission
NapaSan	Napa Sanitation District
NCCP	Natural Community Conservation Plan
NCSPPP	Napa Countywide Stormwater Pollution Prevention Program
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NO	nitric oxide
NOI	notice of intent
NOP	Notice of Preparation
NPDES	National Pollutant Discharge Elimination System
NPDES	Pollutant Discharge Elimination System
NPL	National Priorities List
NRHP	National Register of Historic Places
NRNCFPP	Napa River-/Napa Creek Flood Protection Project

NRWS	Napa Recycling and Waste Services
NVUSD	Napa Valley Unified School District
NWIC	Northwest Information Center
OES	California Office of Emergency Services
OSHA	Occupational Safety and Health Administration
PG&E	Pacific Gas and Electric Company
Plan Bay Area	regional transportation plan/sustainable communities strategy
Porter-Cologne Act	Porter-Cologne Water Quality Control Act of 1969
PPV	peak particle velocity
PRC	Public Resources Code
project	City of Napa General Plan update
RCRA	Resource Conservation and Recovery Act of 1976
RHNA	Regional Housing Needs Allocation
RHNP	Regional Housing Needs Plan
RMP	Risk Management Plan
RMS	root-mean-square
RPS	Renewables Portfolio Standard
RTP	Regional Transportation Plan
RUL	Rural Urban Limit
RWQCB	Regional Water Quality Control Boards
SAF Plan	State Alternative Fuels Plan
SB	Senate Bill
SCS	sustainable communities strategy
SF6	sulfur hexafluoride
SGMA	Sustainable Groundwater Management Act of 2014
Small MS4	Phase II
SOI	Sphere of Influence
SR	State Route
SRA	shaded riverine aquatic
SRAs	State Responsibility Areas
State	State of California
State Water Board	State Water Resources Control Board
SVAB	Sacramento Valley Air Basin

SVP	Society of Vertebrate Paleontology
SWP	State Water Project
SWPPP	stormwater pollution prevention plan
SWRCB	State Water Resources Control Board
TAM	Transportation Authority of Marin
the District	Napa County Flood Control and Water Conservation District
TMDLs	Total Maximum Daily Loads
TSDFs	treatment, storage, and disposal facilities
U.S.C.	United States Code
USACE	U.S. Army Corps of Engineers
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish and Wildlife Service
UST	underground storage tank
UWMP	Urban Water Management Plan
VdB	level in decibel units
VMT	vehicle miles traveled
WSA	Water Supply Assessment
WSFD	West Sacramento Fire Department
WTP	Water Treatment Plant
WWTP	wastewater treatment plant

Executive Summary

ES.1 Purpose

This draft environmental impact report (Draft EIR) has been prepared to evaluate and disclose the significant environmental impacts associated with implementation of the proposed City of Napa General Plan update (Project). This is an update of the City of Napa's existing General Plan, with the exception of the housing element that was adopted in 2015. Impacts are evaluated on the basis of the Project's 2040 planning horizon. The General Plan and accompanying Project documents are available online at https://napa2040.com/.

The Draft EIR is a "program" EIR, meaning that it is expected to be used in the future, after approval of the Project or part of the Project, when considering future development projects. To the extent that such future actions are within the scope of the EIR, their California Environmental Quality Act (CEQA) analysis can be streamlined.

This Draft EIR has been prepared in accordance with CEQA and the CEQA Guidelines. Accordingly, it discusses the existing physical and regulatory settings for each of the resources analyzed here, describes the Project, and examines the Project's potential to result in significant impacts on the physical environment. In addition to disclosing significant environmental impacts, the Draft EIR also proposes mitigation measures, where feasible, to minimize or otherwise avoid significant environmental impacts and reviews two Project alternatives.

The purpose of this Draft EIR is to inform the City's Planning Commission and City Council, other affected or responsible agencies, the public, and other interested parties of the potential environmental effects that are associated with the Project. As authorized under CEQA Guidelines Section 15146, the General Plan update's impacts are analyzed on a general scale, in keeping with the broad level of detail found in the General Plan itself. Accordingly, the reader should not expect to find parcel-specific analyses here. This Draft EIR is an informational document. It neither approves nor disapproves the Project.

ES.2 Project Overview

The City is updating its General Plan to address changes in state and federal law, to reflect new policies and issues of interest to the City, and to address changes in the City since the current General Plan was last updated, including demographic, technological, economic, and transportation conditions; the completion of flooding infrastructure and open space projects; and new development downtown and city-wide.

The City of Napa is located in southern Napa County. The City is located about 10 miles north of San Pablo Bay, 50 miles from San Francisco, and 40 miles from Oakland. State Route (SR) 29, SR 121, and SR 221 run through Napa, connecting the City to other communities throughout the region. Figure 2-1 in Chapter 2, *Project Description*, shows its location in relation to the larger region.

ES.2.1 Guiding Principles

The Vision of the General Plan update reflects the community's aspirations for Napa's future. It is a summary of the shared goals to be achieved by the General Plan. The Guiding Principles elaborate upon the Vision and provide guidance to detailed policies. The guiding principles below are based on input from the community, gained through community workshops and pop-up outreach, an online community survey, stakeholder interviews, General Plan Advisory Committee meetings, and a focused joint City Council and Planning Commission workshop.

The guiding principles for the Project are as follows.

1. Foster Napa as a community of connected neighborhoods, with vibrant, walkable districts, and revitalized corridors.
2. Increase travel options through enhanced walking, bicycling, and public transportation systems, and promote mobility through increased connectivity and intelligent transportation management.
3. Balance tourism and local needs.
4. Promote housing and support a diverse array of housing types to meet the needs of all segments of the population.
5. Foster connections to nature and open space.
6. Emphasize environmentally sustainability.
7. Achieve a healthy and safe community for all.
8. Promote continued downtown revitalization.
9. Celebrate culture, arts, and history.
10. Achieve an economically diverse and resilient community.

ES.2.2 Key Strategies

The Vision and Guiding Principles are supported by key strategies that provide a bridge to the detailed goals and policies in each element:

Compact Growth Patterns. The General Plan seeks to achieve the City's 20-year growth needs within the existing Sphere of Influence. Thus, the Plan emphasizes infill development in Downtown, aging commercial areas, and where underutilized or outmoded uses offer opportunities to accommodate new housing, employment, and commercial development. The General Plan also provides direction for development of remnant vacant land at City edges within the existing Sphere of Influence. Increased densities and mixed-use development are targeted in selected areas, balanced with preservation of the City's rich historical and cultural heritage.

Corridor Revitalization. To further the guiding principles, key portions of Soscol Avenue, Jefferson Street, Imola Avenue, and Trancas Street have mixed-use designations, and policies that seek to foster development of these areas as pedestrian-oriented community spines. The General Plan outlines varied approaches to land uses and mixes, and transportation improvements, reflecting each corridor's location and community role.

Accessible and Walkable City. The General Plan emphasizes walking and bicycling through a multi-pronged strategy that fosters pedestrian-oriented development; new pedestrian and bicycle connections; increased densities; and greater mix of uses to enable shorter trips. Corridors would provide amenities and services for adjacent neighborhoods, and include high- and medium-density housing surrounding retail uses or integrated in mixed-use buildings.

Diversity of Housing Choices. The General Plan provides a range of residential densities wider than previously permitted in the city, as well as several areas with mixed residential and commercial designations to facilitate production of a range of housing types to meet the needs of people of all incomes, abilities, and stages of life, with a focus on workforce housing and improved community-wide jobs/housing balance. The housing growth is focused in locations with access to services, amenities, and open spaces.

Connection to the Napa River. Trails and open space networks along the Napa River will be enhanced to enable residents and visitors to recreate along the river, and enjoy dining and shopping along the waterfront. Sites undergoing development adjacent to the Napa River will be encouraged or required to facilitate public access to the waterfront, and orient buildings toward the river.

Improved Streetscape Design. The City's corridors are envisioned as community spines that provide community gathering spaces and facilitate multi-modal mobility. Streetscapes, including along Soscol Avenue, Trancas Street, and Jefferson Street, will be improved as feasible, with consistent street trees, ample and continuous sidewalks, pedestrian-scale lighting, and bikeways to enhance corridor and community character and identity, and improve pedestrian and bicycle comfort and safety.

Flexibility in Residential Neighborhoods. By carefully expanding the types of new housing allowed in existing residential neighborhoods, the existing character of traditional neighborhoods can be preserved while allowing for more housing options and expanded use of historic properties. Residential areas would remain in residential use, but with opportunities to build a greater diversity of housing types. Home-based businesses and small-scale businesses would be permitted to enhance economic opportunity.

Economic Diversity. The General Plan promotes diversification of the economy by identifying locations for a diverse range of employment-generating uses with an emphasis on "maker spaces"/production uses, health and wellness, arts and entertainment, business incubation, and small-business promotion and retention. Land use designations around the Queen of the Valley hospital on Trancas Street focus on medical, technology, health and wellness, and professional services to enable business incubation with linkages to medical uses and technology. Existing light industrial areas, such as along Lincoln and Soscol avenues and the business park at Napa Valley Commons, are to remain, with limitations on conversion to other uses. Policies supporting downtown retail diversity and the "auto row" are outlined.

Climate Change and Environmental Resiliency. The General Plan envisions the City as a leader in reducing greenhouse gas emissions, and in adapting the community to climate change. The Land Use Diagram identifies location for open space, and goals and policies in the elements that follow emphasize conservation of riparian habitats, nurturing and growing the urban forest, integrated recreation/open space/flooding improvements along Napa River, sustainable site planning and development practices, and increased emphasis on recycling and reuse.

ES.2.3 General Plan Update

The City is proposing to comprehensively update its General Plan for the first time since it was last updated in 1998. The Housing Element, one of seven state-required general plan elements, is updated on a statutorily-prescribed schedule and was last updated in 2015 and does not need to be updated again until 2023. The proposed General Plan update has all elements required by state law plus additional elements to incorporate strategies for achieving the plan vision and addressing emerging trends and new technologies. It includes the following elements: Land Use and Community Design; Transportation; Community Services, Parks, and Recreation; Historic and Cultural Resources; Climate Change and Sustainability; Natural Resources Conservation; Safety and Noise; Public Health and Equity; and Economic Development.

The basic direction and policies of the General Plan update elements are characterized by the proposed General Plan goals summarized in Chapter 2, Section 2.4, *General Plan Elements*.

The full text of the General Plan update and associated documents, including the specific goals and policies for each of the elements, is available for review online at https://napa2040.com/resources. These materials can also be reviewed during business hours at the Planning Division of the City of Napa at 1600 First Street in Napa.

The General Plan update is subject to consideration by the City's Planning Commission and City Council at public hearings. The role of the Planning Commission is to review and make a recommendation on the General Plan update to the City Council. After a public hearing, the Council will deliberate and take action on and the proposed update.

ES.3 Project Impacts and Mitigation Measures

Implementation of the Project could result in significant impacts on the environment; however, the Project contains many policies that are intended to minimize or mitigate these potential impacts. The analysis in this Draft EIR considers the policies set forth in the General Plan update when determining whether the Project would result in a significant environmental impact. Where the policies are insufficient to avoid a potential impact, additional mitigation is identified. Table ES-1 at the end of this summary lists the potential impacts and mitigation measures that have been identified in this Draft EIR. Because the policies and mitigation measures have been determined to reduce most of the Project's potential environmental impacts to less-than-significant levels, the only significant and unavoidable impacts associated with the General Plan update are for the resource categories of Air Quality and Greenhouse Gas Emissions.

ES.4 Project Alternatives

CEQA requires that an EIR analyze a reasonable range of alternatives to the project that (1) meet most or all of the project's objectives; (2) substantially reduce one or more of its significant impacts; and (3) are potentially feasible. The City has examined two alternatives in this Draft EIR in addition to the Project: the No Project Alternative, and the Higher Infill Alternative.

Chapter 4, *Alternatives Analysis*, provides a more complete description of each alternative and a qualitative comparison of the alternatives' potential impacts. As required under CEQA, the range of

alternatives includes the No Project Alternative, which—as authorized under Section 15126.6 of the CEQA Guidelines—is examined at a lesser level of detail than the project. The environmentally superior alternative is the Project as it meets the Project objectives and is less impactful than the No Project Alternative and Higher Infill Alternative.

ES.5 Potential Areas of Controversy/Issues to be Resolved

Pursuant to Section 15123 of the CEQA Guidelines, the summary identifies areas of controversy known to the lead agency, including issues raised by agencies and the public. In addition, the summary also identifies issues to be resolved. Each of these issues is discussed below.

A Notice of Preparation (NOP) for the Draft EIR was distributed to the State Clearinghouse, responsible agencies, and other interested parties for a 30-day public review period from January 22, 2021, through February 22, 2021. In addition, a public scoping meeting was held via Zoom on January 27, 2021, at 5:30 p.m. Comments were received on the NOP from the California Department of Fish and Wildlife, Native American Heritage Commission, and California Department of Conservation.

ES.6 How to Comment on this Draft EIR

The Draft EIR will be available for public review for 45 days, beginning March 10, 2022, and ending April 25, 2022. During that time, members of the public and agencies can submit written comments on the Draft EIR to the following address.

Michael Walker, Senior Planner
Planning Division
City of Napa
1600 First Street, Napa, CA 94559
West Sacramento, CA 95691
mwalker@cityofnapa.org

After the end of the public review period and as part of preparing the Final EIR, the City will prepare written responses to all environmental issues raised in the comments received during the comment period on the Draft EIR. The Final EIR will consist of the Draft EIR, comments received, written responses to comments, and a list of commenters. It may also contain additional information necessary to respond to the comments. All public agencies that submit comments will be sent a copy of the City's response to their comment at least 10 days prior to the public hearing at which the Final EIR will be considered for approval by City Council.

The City Council will certify the Final EIR prior to taking action on the General Plan update. At that time, the council will adopt findings regarding the disposition of any significant impacts identified in the Final EIR, as well as a statement of overriding considerations, if necessary, describing the specific benefits that outweigh the Project's significant and unavoidable impacts.

Table ES-1. Summary of Impacts and Mitigation Measures

Impact	Level of Significance	Proposed Mitigation Measure(s)	Level of Significance after Mitigation
Aesthetics			
Impact AES-1: Conflict with applicable zoning and other regulations governing scenic quality in an urbanized area	Less than significant		
Impact AES-2: Creation of a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area	Less than significant		
Air Quality			
Impact AQ-1: Conflict with or obstruction of implementation of the applicable air quality plan	Significant	Mitigation measures are incorporated in Project policies such that impacts are reduced to the maximum extent feasible	Significant and Unavoidable
Impact AQ-2: Potential to result in a cumulatively considerable net increase of any criteria pollutant for which the project region is a nonattainment area for an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors)	Significant	Mitigation measures are incorporated in Project policies such that impacts are reduced to the maximum extent feasible	Significant and Unavoidable
Impact AQ-3: Exposure of sensitive receptors to substantial pollutant concentrations	Significant	Mitigation measures are incorporated in Project policies such that impacts are reduced to the maximum extent feasible	Significant and Unavoidable
Impact AQ-4: Creation of objectionable odors affecting a substantial number of people	Less than significant		
Biological Resources			
Impact BIO-1: Potential for land use changes to result in the loss of special-status plants	Less than significant		
Impact BIO-2: Potential for land use changes to result in the loss or disturbance of special-status wildlife and their habitats	Less than significant		
Impact BIO-3: Potential for land use changes to result in the loss or disturbance of special-status fish and their habitats	Less than significant		

Impact	Level of Significance	Proposed Mitigation Measure(s)	Level of Significance after Mitigation
Impact BIO-4: Potential for land use changes to result in the loss of oak woodland and valley foothill riparian habitat	Less than significant		
Impact BIO-5: Potential for land use changes to result in the loss of state-protected and federally protected wetlands and nonwetland waters through direct removal, filling, hydrological interruption, or other means	Less than significant		
Impact BIO-6: Potential for land use changes to interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites	Less than significant		
Impact BIO-7: Potential for updates to the General Plan biological resource policies to conflict with existing local policies or ordinances protecting biological resources, such as the City of Napa Tree Preservation Standards	No impact		
Impact BIO-8: Potential for land use changes to conflict with the provisions of an adopted habitat conservation plan, natural community conservation plan, or other approved local, regional, or state habitat conservation plan	No impact		
Impact BIO-9: Potential for land use changes and subsequent development to introduce or spread invasive plant species	Potentially significant	Mitigation Measure BIO-9: Add a policy to the General Plan to avoid the introduction and spread of invasive plants	Less than significant
Cultural Resources			
Impact CUL-1: Potential to cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5	Less than significant		
Impact CUL-2: Potential to cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5	Less than significant		
Impact CUL-3: Disturbance of any human remains, including those interred outside of formal cemeteries	Less than significant		
Energy			

Impact	Level of Significance	Proposed Mitigation Measure(s)	Level of Significance after Mitigation
Impact ENE-1: Result in wasteful, inefficient, or unnecessary consumption of energy resources during Project construction or operation	Less than significant		
Impact ENE-2: Conflict with or obstruct a state or local plan for renewable energy or energy efficiency	Less than significant		
Geology and Soils			
Impact GEO-1: Exposure of people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving fault rupture; strong seismic ground shaking; seismic-related ground failure, including liquefaction; or landslides	Less than significant		
Impact GEO-2: Potential to result in substantial soil erosion or the loss of topsoil	Less than significant		
Impact GEO-3: Location on a geologic unit or soil that is unstable or that would become unstable as a result of the Project and potentially result in an onsite or offsite landslide or subsidence	Less than significant		
Impact GEO-4: Location on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property	Less than significant		
Impact GEO-5: Presence of soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems in areas where sewers are not available for the disposal of wastewater	No impact		
Impact GEO-6: Direct or indirect destruction of a unique paleontological resource or site or unique geologic feature	Less than significant		
Greenhouse Gas Emissions			
Impact GHG-1: Generation of GHG emissions, either directly or indirectly, that may have a significant impact on the environment	Significant	Mitigation measures are incorporated in Project policies such that impacts are reduced to the maximum extent feasible	Significant and Unavoidable

Impact	Level of Significance	Proposed Mitigation Measure(s)	Level of Significance after Mitigation
Impact GHG-2: Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs	Significant	Mitigation measures are incorporated in Project policies such that impacts are reduced to the maximum extent feasible	Significant and Unavoidable
Hazards and Hazardous Materials			
Impact HAZ-1: Creation of a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials	Less than significant		
Impact HAZ-2: Creation of a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment	Less than significant		
Impact HAZ-3: Release of hazardous emissions or handling of hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school	Less than significant		
Impact HAZ-4: Location on a site that is on a list of hazardous materials sites and the resultant creation of a significant hazard to the public or the environment	Less than significant		
Impact HAZ-5: Location in an airport land use plan area or within 2 miles of a public airport or public use airport, resulting in a safety hazard or excessive noise for people residing or working in the Planning Area	Less than significant		
Impact HAZ-6: Impairment of or physical interference with implementation of an adopted emergency response plan or emergency evacuation plan	Less than significant		
Impact HAZ-7: Exposure of people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires	Less than significant		

Impact	Level of Significance	Proposed Mitigation Measure(s)	Level of Significance after Mitigation
Hydrology and Water Quality			
Impact WQ-1: Violate any water quality standards or waste discharge requirements	Less than significant		
Impact WQ-2: Substantially deplete groundwater supplies or interfere substantially with groundwater recharge, resulting in a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted)	Less than significant		
Impact WQ-3: Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner that would result in substantial erosion or siltation on or off site; substantially increase the rate or amount of surface runoff in a manner that would result in flooding on or off site; create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or impede or redirect flood flows	Less than significant		
Impact WQ-4: In flood hazard, tsunami, or seiche zones, risk release of pollutants due to Project inundation	Less than significant		
Impact WQ-5: Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan	Less than significant		
Land Use and Planning			
Impact LU-1: The Project would have a significant impact if future development would physically divide an established community	Less than significant		

Impact	Level of Significance	Proposed Mitigation Measure(s)	Level of Significance after Mitigation
Impact LU-2: The Project would have a significant impact if it conflicted with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the Project adopted for the purpose of avoiding or mitigating an environmental effect	Less than significant		
Noise			
Impact NOI-1: Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies	Less than significant		
Impact NOI-2: Generation of excessive groundborne vibration or groundborne noise levels	Less than significant		
Impact NOI-3: For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, the Project would expose people residing or working in the Planning Area to excessive noise levels	Less than significant		
Population and Housing			
Impact POP-1: The Project would have a significant impact if future development would induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)	Less than significant		
Impact POP-2: The Project would have a significant impact if future development would displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere	Less than significant		
Public Services			
Impact PS-1: Potential to result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities	Less than significant		

Impact	Level of Significance	Proposed Mitigation Measure(s)	Level of Significance after Mitigation
Recreation			
Impact REC-1: Potential to increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated	Less than significant		
Impact REC-2: Construction or expansion of recreational facilities that might have an adverse physical effect on the environment	Less than significant		
Transportation			
Impact TRA-1: Conflict with transportation program, plan, ordinance or policy	Less than significant		
Impact TRA-2: Conflict with CEQA Guidelines Section 15064.3, subdivision (b)	Less than significant		
Impact TRA-3: Increase transportation hazards	Less than significant		
Impact TRA-4: Result in inadequate emergency access	Less than significant		
Tribal Cultural Resources			
Impact TCR-1: Potential to cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074	Significant	Mitigation Measure TCR-1: Implement mitigation measures recommended in Public Resources Code Section 21084.3 to avoid damaging effects on tribal cultural resources	Less than significant
Impact TCR-2: Potential to cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074, that is a resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1	Significant	Mitigation Measure TCR-1: Implement mitigation measures recommended in Public Resources Code Section 21084.3 to avoid damaging effects on tribal cultural resources	Less than significant

Impact	Level of Significance	Proposed Mitigation Measure(s)	Level of Significance after Mitigation
Utilities and Service Systems			
Impact UT-1: Potential to require or result in the relocation or construction of new or expanded water, wastewater treatment, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects or expansion of existing facilities	Less than significant		
Impact UT-2: Potential to require or result in the relocation or construction of new or expanded stormwater drainage facilities or expansion of existing facilities	Less than significant		
Impact UT-3: Potential to result in insufficient water supplies available to serve the Planning Area and reasonably foreseeable future development during normal, dry, and multiple dry years	Less than significant		
Impact UT-4: Potential to result in a determination by the wastewater treatment provider that serves or may serve the Project that it has inadequate capacity to serve the Planning Area's projected demand in addition to the provider's existing commitments	Less than significant		
Impact UT-5: Solid waste generation in excess of state or local standards, in excess of the capacity of local infrastructure, or that otherwise impairs the attainment of solid waste reduction goals	Less than significant		
Impact UT-6: Failure to comply with federal, state, and local statutes and regulations related to solid waste	Less than significant		
Wildfire			
Impact WF-1: Substantially impair an adopted emergency response plan or emergency evacuation plan	Less than significant		
Impact WF-2: Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose Project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire	Less than significant		

Impact	Level of Significance	Proposed Mitigation Measure(s)	Level of Significance after Mitigation
Impact WF-3: Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts on the environment	Less than significant		
Impact WF-4: Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes	Less than significant		

Chapter 1
Introduction

The City of Napa (City) is updating its General Plan to address changes in state and federal law, to reflect new policies and issues of interest to the City, and to address changes in the City since the current General Plan was last updated, including demographic, technological, economic, and transportation conditions; the completion of flooding infrastructure and open space projects; and new development downtown and city-wide. This draft environmental impact report (Draft EIR) has been prepared to evaluate and disclose the significant environmental impacts associated with implementation of the proposed City of Napa General Plan update (Project).

1.1 The California Environmental Quality Act

This Draft EIR has been prepared in accordance with the California Environmental Quality Act (CEQA) California Resources Code Section 21000 et seq. and the Guidelines for the California Environmental Quality Act (Title 14 California Code of Regulations [CCR] Chapter 3). It evaluates the potential environmental impacts associated with implementation of the Project. The text of the General Plan update and other information and resources are available on the City's General Plan update website at https://napa2040.com/.

1.1.1 Purpose of this Environmental Impact Report

According to Section 15002 of the CEQA Guidelines, the basic purposes of CEQA are to accomplish the following.

- Inform government decision makers and the public about the potential significant environmental effects of proposed activities.
- Identify ways that environmental damage can be avoided or significantly reduced.
- Prevent significant, avoidable damage to the environment by requiring changes in projects through the use of alternatives or mitigation measures when the governing agency finds the changes to be feasible.
- Disclose to the public the reasons why a governmental agency approved the Project in the manner the agency chose if significant environmental effects are involved.

The purpose of this Draft EIR is to inform City decision makers, representatives of other affected/responsible agencies, the public, and other interested parties of the potential environmental effects that may be associated with the Project; identify mitigation measures to reduce those effects; and analyze a range of alternatives to the Project that would reduce one or more of its significant effects.

1.1.2 Preparation of an Environmental Impact Report

The process of preparing an EIR involves the following discrete steps.

- Notice of preparation (NOP). Prior to preparing the Draft EIR, the lead agency releases an NOP to solicit the comments of public agencies and interested organizations and individuals regarding the scope and content of the Draft EIR. The NOP is available for comment for at least 30 days. An NOP was distributed for this Draft EIR on January 1, 2021. The comments to the NOP received from agencies and the public are included in Appendix A, *Comments on the Notice of Preparation*, of this Draft EIR.
- Scoping meeting. A scoping meeting to offer an additional opportunity for input prior to preparation of the Draft EIR. A scoping meeting was held for public agencies and members of the public via Zoom on January 27, 2021, at 5:30pm.
- Preparation and release for public review and comment of the Draft EIR. The Draft EIR must be available for 45 days for review and comment by public agencies and interested organizations and individuals.
- Preparation of the Final EIR. The Final EIR will present the comments received during the public review period (and a complete list of commenters), written responses to the comments related to environmental issues, and any revisions that are made to the Draft EIR in response to the comments. The City Council must certify the Final EIR prior to taking action on the Project.
- Adoption of findings and a statement of overriding considerations. The City Council will adopt findings that describe how each significant effect is being addressed. If a project will result in significant and unavoidable impacts, the City will also adopt a statement of overriding considerations that explains the specific benefits of adopting the project and why such benefits override the effects of the project's significant impacts.

1.1.3 Level of Detail in this Environmental Impact Report

The most common type of EIR, the project-level EIR, analyzes the impacts of an individual activity or specific project. Like all EIRs, it must include the contents required by CEQA and the CEQA Guidelines. Project EIRs are generally prepared for specific site-development projects, such as subdivisions, commercial centers, highway interchanges, and so on. Where the project consists of a series of actions or activities, that are related or connected in a single plan a *program EIR* can be prepared (CEQA Guidelines Section 15168). Once it is adopted, the program EIR will be used to streamline the later environmental analysis of these activities. Typically, because not all the components of the program are known in detail, the program EIR will not be detailed enough to analyze all aspects of the later activities. If the later proposal would have effects that were not analyzed in the program EIR or is an activity not included in the program EIR, either a new EIR or a new negative declaration would be prepared to analyze that project.

On the other hand, if the agency finds that no new or more severe effects could occur that had not been analyzed in the program EIR, the agency can approve the activity as being within the scope of the activities described in and analyzed by the program EIR, and no new environmental document would be required. If a specific project is within the scope of the program EIR but would result in a new or more severe impact, then a subsequent or supplemental EIR or mitigated negative declaration would be prepared, its analysis focused on the new or more severe effects.

This Draft EIR is a program Draft EIR that presents program-level analysis of the General Plan update. Specifics of the General Plan update are described in Chapter 2, *Program Description*.

This Draft EIR considers the potential environmental effects of implementing the General Plan update. The CEQA Guidelines provide that "[t]he degree of specificity required in an EIR will correspond to the degree of specificity involved in the underlying activity which is described in the EIR" (CEQA Guidelines 15146). The General Plan update is a broad statement of policies not proposing any specific development project. Accordingly, this Draft EIR "need not be as detailed as an EIR on … specific construction projects" (CEQA Guidelines Section 15146). Further actions or procedures necessary to implement the updated General Plan may include the processing of zoning plans, specific plans, tentative tract maps, site design plans, building permits, and grading permits.

When determining whether the Project would result in a significant environmental impact, the Draft EIR also considers the extent to which updated General Plan policies would act to reduce its effects. Where the General Plan policies would not be sufficient to reduce impacts to a less-than-significant level, and there is feasible mitigation that would do so, the Draft EIR identifies that mitigation. For purposes of this Draft EIR, *mitigation* means specific policies that can be adopted to avoid the impact or reduce it to a less-than-significant level.

Environmental impacts cannot always be mitigated to a level that is considered less than significant. In accordance with Section 15093(b) of the CEQA Guidelines, if a lead agency approves a project that has significant impacts that cannot be mitigated (i.e., significant and unavoidable impacts), the agency cannot approve the project without specifying in writing the project benefits that justify its approval. No significant and unavoidable impacts have been identified for this Draft EIR.

This Draft EIR addresses potential significant adverse environmental impacts associated with development pursuant to adoption of the General Plan update. The potential impacts of the Project are analyzed in comparison to existing conditions, except as noted.

1.1.4 Document Format

This program Draft EIR is organized into the following sections.

- The *Executive Summary* presents an overview of the contents and findings presented in this document. It also contains a brief description of the Project, the alternatives, areas of known controversy, and summary tables listing all Project impacts and comparisons between alternatives.
- Chapter 1, *Introduction*, describes this Draft EIR's purpose and legal requirements, as well as its intended use. It contains an outline of the document and a list of the environmental issues that are discussed in this Draft EIR.
- Chapter 2, *Project Description*, describes the General Plan update and the Project objectives. The full General Plan update and other information and resources are available on the City's General Plan update website at https://napa2040.com/.
- Chapter 3.0, *Impact Analysis*, presents the environmental analysis by environmental topic. Discussion of existing setting, thresholds of significance for determining the severity of potential environmental impacts, and mitigation measures for potentially significant impacts are described in each topic area, as follows.
    - 3.1, *Aesthetics*

- 3.2, *Air Quality*
- 3.3, *Biological Resources*
- 3.4, *Cultural Resources*
- 3.5, *Energy*
- 3.6, *Geology and Soils*
- 3.7, *Greenhouse Gas Emissions*
- 3.8, *Hazards and Hazardous Materials*
- 3.9, *Hydrology and Water Quality*
- 3.10, *Land Use and Planning*
- 3.11, *Noise*
- 3.12, *Population and Housing*
- 3.13, *Public Services*
- 3.14, *Recreation*
- 3.15, *Transportation*
- 3.16, *Tribal Cultural Resources*
- 3.17, *Utilities and Service Systems*
- 3.18, *Wildfire*

- Chapter 4, *Alternatives Analysis*, describes the alternatives screening process, assesses the impacts of Project alternatives, and compares the potential impacts of the project alternatives to the potential impacts of the Project.
- Chapter 5, *Other CEQA Considerations*, presents discussions of additional topics required by CEQA, including cumulative impacts, growth-inducing impacts, significant and unavoidable impacts, and significant irreversible environmental changes.
- Chapter 6, *List of Preparers*, identifies the people who prepared the Draft EIR.
- The appendices contain copies of the NOP and comment letters received on the NOP and technical reports.

1.2 Intended Use of this Environmental Impact Report

The City of Napa Planning Commission and City Council will use the EIR to inform themselves of the potential impacts of the Project before taking action on the General Plan update. They will also consider other information and testimony submitted during deliberations on the Project. After weighing this information, the Planning Commission will make a recommendation to the City Council on whether to approve or disapprove the General Plan update, and the City Council will either approve or disapprove the Project. .

This Draft EIR is prepared for the purpose of analyzing, at a broad scale, the environmental impacts of the General Plan update. Accordingly, this Draft EIR does not take a parcel-specific view or provide a parcel-specific analysis of potential impacts.

The City may implement the following discretionary actions based on this Draft EIR.

- Adoption of the City of Napa General Plan update.
- Future zoning actions necessary to make zoning consistent with the updated General Plan.

1.3 Reviewing an Environmental Impact Report

1.3.1 Making Effective Comments

The City will accept written comments during the review period described in Section 1.3.2, *Submitting Comments*. Please focus comments on the adequacy of the Draft EIR with regard to the analysis of environmental impacts, mitigation measures, and alternatives, not on the General Plan Update itself.

1.3.2 Submitting Comments

The Draft EIR will be available for public review for the statutory 45-day public review period, beginning **March 10, 2022,** and ending on **April 25, 2022**. During that time, agency representatives and members of public will have the ability to submit written comments on the Draft EIR to the address provided below.

City of Napa Community Development Department
1600 First Street
Napa, CA 94559
Contact: Michael Walker, Senior Planner
Phone: 707.257.9530
mwalker@cityofnapa.org

1.4 Final EIR

After the end of the public review period and as part of preparing the Final EIR, the City will prepare written responses to all environmental issues raised through the public review process. The Final EIR will present the comments received, written responses to comments, a complete list of commenters, and revisions made to the Draft EIR in response to comments received. It may also contain additional information necessary to respond to the comments. All public agencies that submit comments will be sent a copy of the City's response to their comments at least 10 days prior to the public hearing at which the Final EIR will be considered for approval by the City Council.

The City of Napa City Council must certify the Final EIR prior to approving the Project. At that time, if they elect to certify the Final EIR, they must adopt findings regarding the disposition of any significant effects identified in the Final EIR, as well as a statement of overriding considerations describing the specific benefits from the Project that outweigh its significant and unavoidable impacts.

Chapter 2
Project Description

The Project consists of the proposed comprehensive update to the City of Napa's (City's) General Plan.

2.1 Project Setting

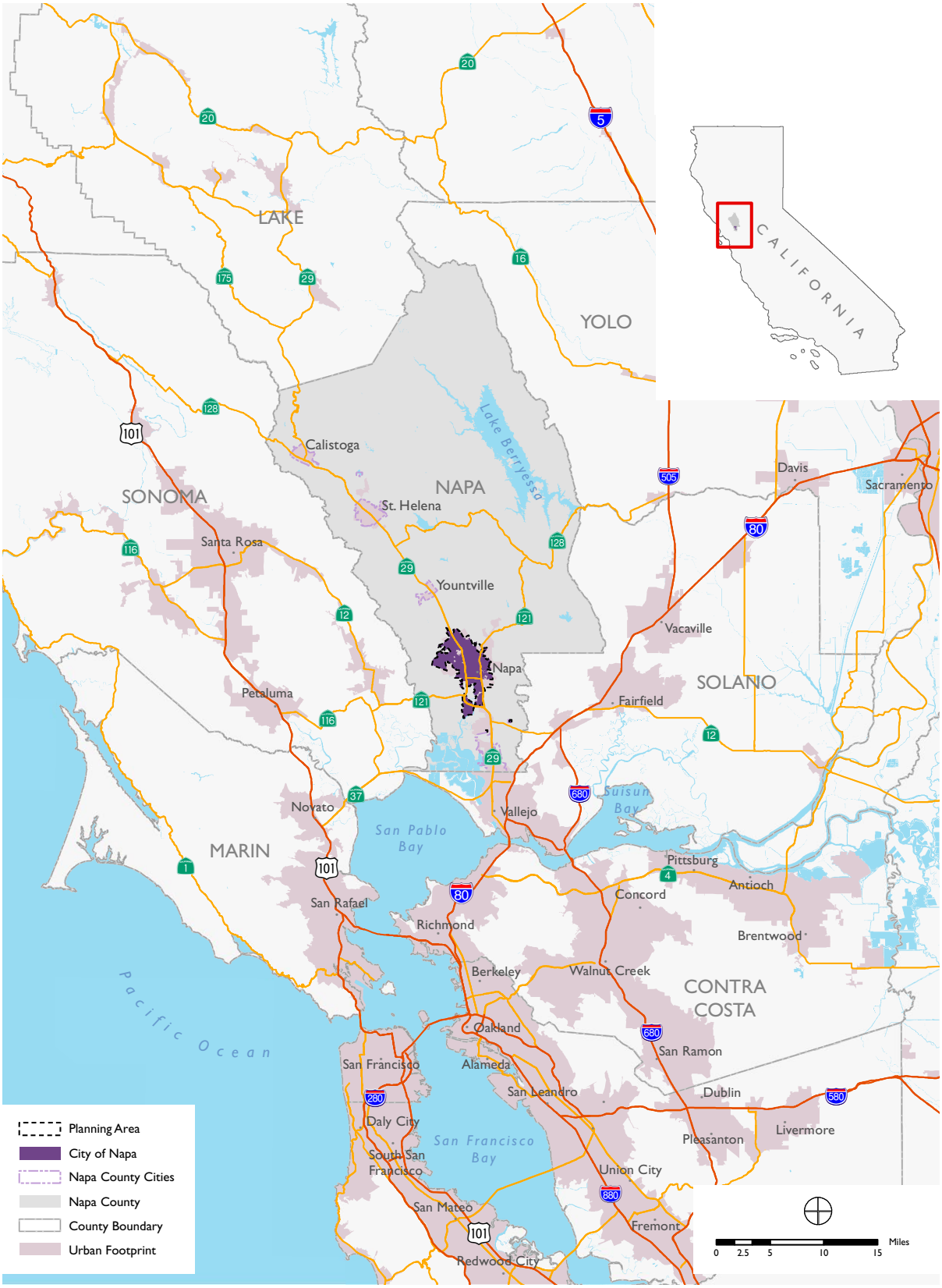
2.1.1 Background

The City's current General Plan dates to 1998 and needs to be updated to reflect opportunities, challenges, and approaches that have emerged in recent years. The Housing Element, one of seven state-required general plan elements, was last updated in 2015, and does not need to be updated again until 2023. The General Plan expresses that "the vision of Napa embodied in this General Plan is that of a City that builds upon its defining attributes of small-town character, historic neighborhoods, and a picturesque setting along the Napa River, to establish a long-term, sustainable future for the City. A city that meets the needs of residents first, while developing and maintaining a vibrant, thriving economy befitting its position as a global destination in the heart of a premier wine-producing region. Napa will be a City that is inclusive, family-friendly, balanced, sustainable, and flexible to adapt to changing future circumstances."

The City of Napa is still Napa Valley's population center but is a very different place than it was in the nineteenth and early twentieth centuries. Since its initial growth in the Gold Rush and Victorian eras, Napa has been transformed from a blue-collar town into a service-based, majority-crop (i.e., vineyards/grapes) community. With an estimated population of 80,416 in 2016 and an area of 18.15 square miles, Napa's economy today remains keyed to wine and tourism, but many residents are nostalgic for old Napa. The Association of Bay Area Governments (ABAG) projects a population increase within the City of about 10,000 people by 2040.

2.1.2 Location

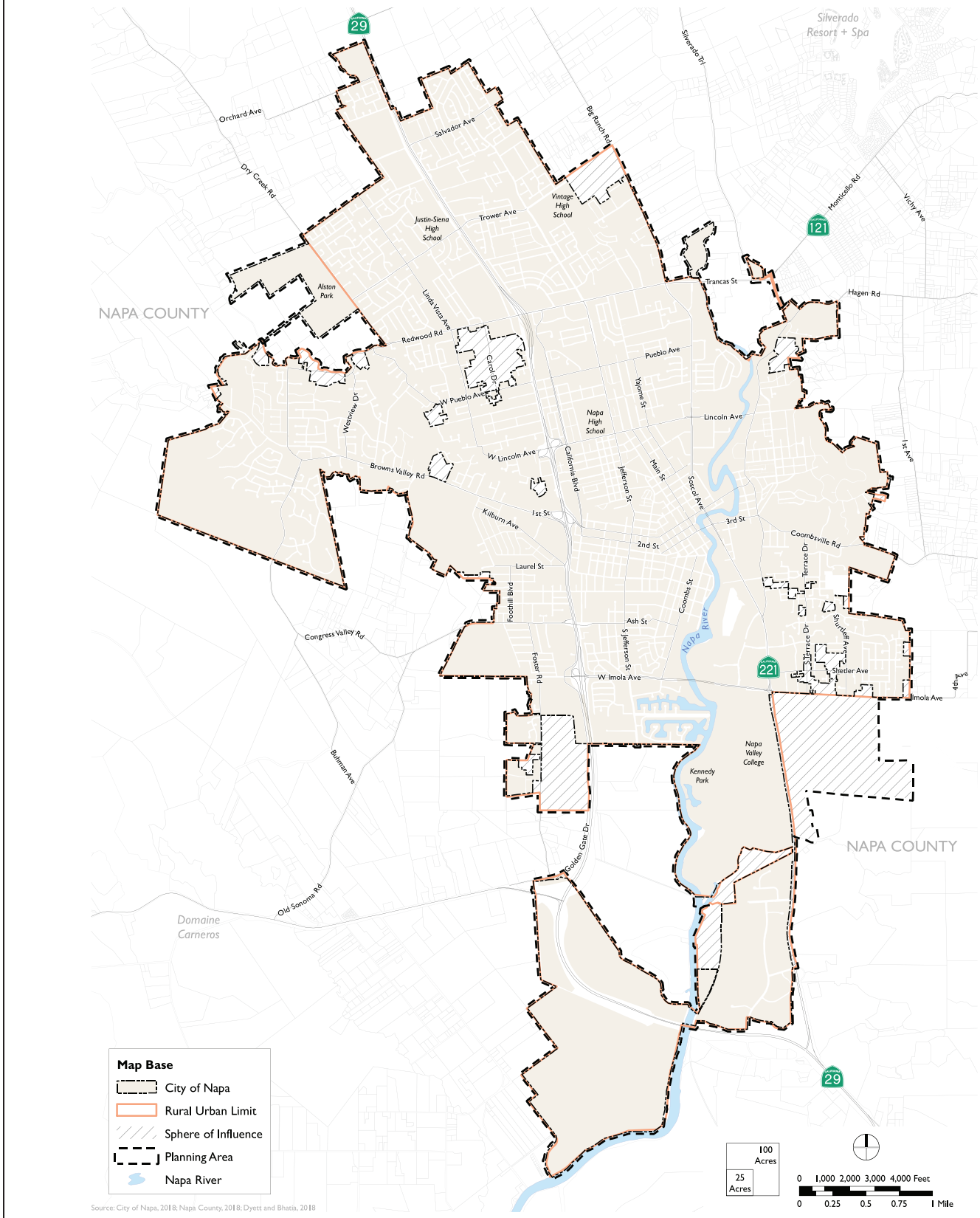
Napa is located in southern Napa County. The City is located about 10 miles north of San Pablo Bay, 50 miles from San Francisco, and 40 miles from Oakland. State Route (SR) 29, SR 121, and SR 221 run through Napa, connecting the City to other communities throughout the region. In addition, Napa is accessible via public transportation, including the Vine bus and shuttle. The regional setting is depicted in Figure 2-1 and the Planning Area in Figure 2-2.



Sources: City of Napa, 2021.

Graphics ... 00494.18 (7/13/21) AB

Figure 2-1
Regional Location



Sources: City of Napa, 2018; Napa County, 2018; Dyett & Bhatia, 2018.

Graphics ... 00494.18 (7/13/21) AB

Figure 2-2
Planning Area

2.1.3 Existing Conditions and Land Uses

Existing conditions and land uses within the General Plan Planning Area (i.e., the Napa City limits, Sphere of Influence [SOI] and areas outside City and SOI boundaries that are within the City's Rural Limit Line or owned and controlled by the City) are discussed in Chapter 3, *Impact Analysis*. Additionally, the City owns Lake Hennessey and Millikin Reservoir, which are outside City Limits and encompass nearly 4,600 acres collectively, and serve major open space functions in addition to providing water to the City. These are not included in the Planning Area. With few exceptions, the existing conditions constitute the baseline against which future development proposed in the 2040 General Plan is compared. The extent of the change between existing conditions and future planned uses determines the significance of the change for CEQA purposes.

For most purposes, the study area of this Draft EIR corresponds to the Planning Area. Exceptions are the study areas for air quality, greenhouse gas emissions, traffic, and cumulative impacts, all of which extend beyond the Planning Area.

Residential uses are far and away the most common land use within the Planning Area (49.5 percent of land area). Single-family residential is the most common type of residential development, comprising about 40.8 percent of the Planning Area, followed by multifamily residential (7.3 percent), and mobile homes (1.5 percent).

Commercial uses occupy 7.8 percent of the Planning Area. Most commercial uses—including retail, lodging, and offices—are located along major corridors, including SR 29, SR 221, Trancas Street, and Soscol Avenue. Downtown Napa, approximately centered along Third Street to the west of the Napa River, contains a mixture of primarily general commercial uses. Most automobile commercial uses are located along Soscol Avenue. Major commercial retail centers include Bel Aire Plaza, at the northeast corner of Trancas Street and SR 29; Silverado Plaza, at the southeast corner of Trancas Street and Soscol Avenue; South Napa Marketplace, on the northwest corner of Imola Avenue and SR 221; Napa Premium Outlets, at the southwest corner of First Street and SR 29; and Jefferson Square, at the southwest corner of Trancas Street and Jefferson Street.

Parks and open spaces account for 15.5 percent of current land uses. The Planning Area includes many public facilities, including City and County offices and facilities, schools, and hospitals. Altogether, public facilities make up 10.3 percent of the Planning Area. Napa State Hospital is located at the southeast corner of Imola and Soscol Avenues and is the largest public/institutional use in the Planning Area. Napa Valley College is located across Soscol Avenue from Napa State Hospital. Elementary, middle, and high schools are distributed throughout the Planning Area. Most City and County offices are in downtown Napa, with a few facilities, including the Napa County Health and Human Services Department and the Napa County Social Services Department, located outside of downtown.

Less common land uses include agriculture, industrial, and office uses. Agricultural land uses—including vineyard and winery uses—are generally located at the edges of the Planning Area, within the City of Napa. Industrial uses comprise 3.8 percent of land in the Planning Area and are generally located to the south of Imola Avenue. Office commercial uses (0.4 percent of the Planning Area) are mostly located along Jefferson Street and Trancas Street. Approximately 9.5 percent of the land in the Planning Area is vacant.

2.1.4 Existing General Plan

The City of Napa General Plan (1998) consists of the following elements: Land Use; Housing; Transportation; Community Services; Parks and Recreation; Historic Resources; Natural Resources; Health and Safety; and Economic Development. These elements reflect the City's concern for its environment and people, in addition to policies guiding future development. The City's development policies are also expressed in several other plans that are subordinate to the General Plan. These include the Downtown Specific Plan (2012), City of Napa Bicycle Plan (2012), Heritage Napa Program (2008 and 2010), and Big Ranch Specific Plan (1996).

2.2 Guiding Principles

The Vision of the General Plan update reflects the community's aspirations for Napa's future. It is a summary of the shared goals to be achieved by the General Plan. The Guiding Principles elaborate upon the Vision and provide guidance to detailed policies. The guiding principles below are based on input from the community, gained through community workshops and pop-up outreach, an online community survey, stakeholder interviews, General Plan Advisory Committee meetings, and a focused joint City Council and Planning Commission workshop. The guiding principles for the Project are as follows.

1. Foster Napa as a community of connected neighborhoods, with vibrant, walkable districts, and revitalized corridors.
2. Increase travel options through enhanced walking, bicycling, and public transportation systems, and promote mobility through increased connectivity and intelligent transportation management.
3. Balance tourism and local needs.
4. Promote housing and support a diverse array of housing types to meet the needs of all segments of the population.
5. Foster connections to nature and open space.
6. Emphasize environmentally sustainability.
7. Achieve a healthy and safe community for all.
8. Promote continued downtown revitalization.
9. Celebrate culture, arts, and history.
10. Achieve an economically diverse and resilient community.

2.3 Key Strategies

The Vision and Guiding Principles are supported by key strategies that provide a bridge to the detailed goals and policies in each element:

Compact Growth Patterns. The General Plan seeks to achieve the City's 20-year growth needs within the existing Sphere of Influence. Thus, the Plan emphasizes infill development in Downtown,

aging commercial areas, and where underutilized or outmoded uses offer opportunities to accommodate new housing, employment, and commercial development. The General Plan also provides direction for development of remnant vacant land at City edges within the existing Sphere of Influence. Increased densities and mixed-use development are targeted in selected areas, balanced with preservation of the City's rich historical and cultural heritage.

Corridor Revitalization. To further the guiding principles, key portions of Soscol Avenue, Jefferson Street, Imola Avenue, and Trancas Street have mixed-use designations, and policies that seek to foster development of these areas as pedestrian-oriented community spines. The General Plan outlines varied approaches to land uses and mixes, and transportation improvements, reflecting each corridor's location and community role.

Accessible and Walkable City. The General Plan emphasizes walking and bicycling through a multi-pronged strategy that fosters pedestrian-oriented development; new pedestrian and bicycle connections; increased densities; and greater mix of uses to enable shorter trips. Corridors would provide amenities and services for adjacent neighborhoods, and include high- and medium-density housing surrounding retail uses or integrated in mixed-use buildings.

Diversity of Housing Choices. The General Plan provides a range of residential densities wider than previously permitted in the city, as well as several areas with mixed residential and commercial designations to facilitate production of a range of housing types to meet the needs of people of all incomes, abilities, and stages of life, with a focus on workforce housing and improved community-wide jobs/housing balance. The housing growth is focused in locations with access to services, amenities, and open spaces.

Connection to the Napa River. Trails and open space networks along the Napa River will be enhanced to enable residents and visitors to recreate along the river, and enjoy dining and shopping along the waterfront. Sites undergoing development adjacent to the Napa River will be encouraged or required to facilitate public access to the waterfront, and orient buildings toward the river.

Improved Streetscape Design. The City's corridors are envisioned as community spines that provide community gathering spaces and facilitate multi-modal mobility. Streetscapes, including along Soscol Avenue, Trancas Street, and Jefferson Street, will be improved as feasible, with consistent street trees, ample and continuous sidewalks, pedestrian-scale lighting, and bikeways to enhance corridor and community character and identity, and improve pedestrian and bicycle comfort and safety.

Flexibility in Residential Neighborhoods. By carefully expanding the types of new housing allowed in existing residential neighborhoods, the existing character of traditional neighborhoods can be preserved while allowing for more housing options and expanded use of historic properties. Residential areas would remain in residential use, but with opportunities to build a greater diversity of housing types. Home-based businesses and small-scale businesses would be permitted to enhance economic opportunity.

Economic Diversity. The General Plan promotes diversification of the economy by identifying locations for a diverse range of employment-generating uses with an emphasis on "maker spaces"/production uses, health and wellness, arts and entertainment, business incubation, and small-business promotion and retention. Land use designations around the Queen of the Valley hospital on Trancas Street focus on medical, technology, health and wellness, and professional services to enable business incubation with linkages to medical uses and technology. Existing light

industrial areas, such as along Lincoln and Soscol avenues and the business park at Napa Valley Commons, are to remain, with limitations on conversion to other uses. Policies supporting downtown retail diversity and the "auto row" are outlined.

Climate Change and Environmental Resiliency. The General Plan envisions the City as a leader in reducing greenhouse gas emissions, and in adapting the community to climate change. The Land Use Diagram identifies location for open space, and goals and policies in the elements that follow emphasize conservation of riparian habitats, nurturing and growing the urban forest, integrated recreation/open space/flooding improvements along Napa River, sustainable site planning and development practices, and increased emphasis on recycling and reuse.

2.3.1 Changes to the General Plan

The City is proposing to comprehensively update its General Plan for the first time since 1998. The Housing Element, one of seven State-required general plan elements, was last updated in 2015 and does not need to be updated again until 2023. The Napa General Plan update will have all elements required by State law plus additional elements to incorporate strategies for achieving the plan vision, complying with new State laws enacted since the Napa General Plan was last comprehensively updated, and addressing emerging trends and new technologies. The General Plan update includes the following elements: Land Use and Community Design; Transportation; Community Services, Parks, and Recreation; Historic and Cultural Resources; Climate Change and Sustainability; Natural Resources Conservation; Safety and Noise; Public Health and Equity; and Economic Development.

The basic direction and policies of the proposed General Plan elements are characterized by the proposed General Plan goals summarized in Section 2.4, *General Plan Elements*.

The full text of the proposed General Plan update and associated documents, including the specific goals and policies for each element, is available for review online at https://napa2040.com/resources. The proposed General Plan update and associated documents can also be reviewed during business hours at the Planning Division of the City of Napa at 1600 First Street in Napa. The proposed General Plan update Land Use Diagram is shown in Figure 3.10-2.

The proposed General Plan update will be subject to consideration by the City's Planning Commission and City Council at public hearings. The role of the Planning Commission is to review and recommend action (approval, approval with modifications, or disapproval) on the General Plan update to the City Council. After a public hearing, the Council will deliberate and take action on the General Plan update.

2.3.2 Growth Forecasts

Development of the General Plan update and analysis of its effects were built on certain assumptions pertaining to future growth. Based on recent detailed analysis conducted by the City, Napa is estimated to have a job/employed residents' ratio of 1.19—that is, the City has more jobs than employed residents. General Plan projections indicate that this ratio will be maintained at the General Plan horizon. Table 2-1 provides more detail on existing and projected jobs/employed residents' ratio. The General Plan provides for significant increase in housing capacity in the community; thus, jobs/housing balance ratio in the City could improve in the future were there to be an adequate market for housing.

Table 2-3. Citywide Growth Projections

	Existing[2]	Change[3]	2040 Total	Percent Growth
Commercial Building Area (square feet)[1]				
Retail	4,712,000	666,000	5,378,000	14%
Office	2,463,000	891,000	3,354,000	36%
Industrial	7,979,000	1,992,000	9,971,000	25%
Total	15,154,000	3,549,000	18,703,000	23%
Jobs[4]	**51,200**	**11,500**	**62,700**	**22%**
Housing Units	**30,700**	**7,800**	**38,500**	**25%**
Jobs/Housing Ratio	1.19		1.19	0%
Population[5]	**79,300**	**17,900**	**97,200**	**23%**

Source: Dyett & Bhatia 2021.

[1] Building area rounded to the nearest 1,000. Other values rounded to the nearest 100. Totals may not add up due to rounding.

[2] Existing numbers sourced from State Department of Finance, State Employment Development Department, and CoStar/EPS, Inc. Hotel data provided by the City of Napa.

[3] Change includes net new development and major projects that are currently in the pipeline, including 1,000 hotel rooms.

[4] Jobs calculated based on job density plus proportional growth in other categories including construction, public/education, and transportation.

[5] Population calculated based on household size (2.5), vacancy rate (5%), and group quarters proportion (1.3%).

2.4 General Plan Elements

The basic direction and policies of the updated General Plan elements are characterized by the proposed General Plan goals summarized in this section. These goals provide an overview of the General Plan's direction.

2.4.1 Land Use and Community Design Element

The proposed Land Use and Community Design (LUCD) Element focuses on enhancing Napa's defining attributes, including its blend of small-town character, historic neighborhoods, and picturesque setting along the Napa River. The LUCD element fuses together interrelated topics of land use and community design and seeks to strengthen downtown and provide guidance for evolution of key corridors, including Soscol Avenue, Jefferson Street, and Trancas Street as community spines with a vibrant mix of uses. Areas and centers in Napa that have been historically designated by previous general plans, such as at Foster Road/Golden Gate Drive and Big Ranch Road properties near Vintage High School, remain a valuable resource for future development with potential for a mix of uses, including housing, employment, and neighborhood-commercial uses. The General Plan provides clear direction for development in these areas. Connections between centers, corridors, and neighborhoods would be enhanced to improve mobility and access, and create a more vibrant, connected community. The LUCD Element would include the following goals (supported by related policies).

LUCD-1: Maintain a compact urban form to promote a distinct community identity and protect open space and natural and agricultural resources surrounding the community.

LUCD-2: Enhance the urban form and visual quality of the City's overall urban structure – Downtown, corridors, and neighborhoods.

LUCD-3: Enhance Napa's community character by promoting walkability, inclusivity, and connections between neighborhoods, key centers, and the Napa River.

LUCD-4: Promote flexibility in parking and other development requirements, especially in areas targeted for higher-intensity, mixed-use, and pedestrian-oriented development, such as in Downtown and along corridors.

LUCD-5: Support an attractive and welcoming image for major gateways and thoroughfares into the City.

LUCD-6: Promote a balanced land use program and ensure the City remains a "complete community" with a diverse array of uses, housing types, and employment opportunities, while recognizing the City's linkages to the broader Bay Area region.

LUCD-7: Ensure continued economic vibrancy, with land use strategies linked to the City's overall economic objectives, local business needs, and workforce development.

LUCD-8: Support the preservation and enhancement of the City's existing housing stock to be utilized as primary residences and homes.

LUCD-9: Recognize the importance of annexing unincorporated islands as a City services issue.

LUCD-10: Enhance the City's character and image as a desirable residential, active, and sustainable community, and celebrate the diversity of residents.

LUCD-11: Encourage attractive, well-located commercial development to serve the needs of City residents, workers, and visitors.

LUCD-12: Promote diverse industrial opportunities in suitable locations to provide employment for Napa residents and promote economic growth in the City.

LUCD-13: Promote housing and business growth as infill development in Focus Areas in keeping with the City's scale, services, and environment.

LUCD-14: Develop corridor spines of Focus Areas as memorable boulevards. Promote development in Focus Areas that is high-quality and pedestrian-oriented.

LUCD-15: Enhance the Trancas Street corridor as a major medical, commercial, and retail center, while allowing redevelopment and use flexibility.

LUCD-16: Establish Jefferson Street as a main street with an emphasis on locally-serving businesses, workforce housing, and storefronts, and enhancing walkability and the pedestrian experience.

LUCD-17: Support greater connectivity and intensification of land uses to enhance the light industrial, maker space, and business character of the Soscol North Focus Area.

LUCD-18: Transform Soscol Avenue south of First Street into a well-designed boulevard that acts as an attractive gateway into the Napa community.

LUCD-19: Support the vibrancy of auto row to the north, and redevelopment of the southern portion with mixed-use development.

LUCD-20: Continue to promote Downtown Napa as an active and vibrant heart of the community.

LUCD-21: Promote a vital Downtown that is healthy, sustainable, and contributes to the City's economic vibrancy, for the enjoyment of residents and visitors.

LUCD-22: Support regular updates to the Downtown Specific Plan (DTSP) and prioritize focused planning for the Oxbow District.

LUCD-23: Promote residential development with supporting commercial uses, integrated with site topography and the natural environments.

LUCD-24: Promote development of the Big Ranch Road area as a cohesive, vibrant neighborhood, integrated with the surrounding uses.

LUCD-25: Transform Napa Pipe into a great neighborhood that is welcoming to, and comfortable for, the broadest range of people and households. Napa Pipe is envisioned as a neighborhood that engages residents and visitors with an inviting environment in which chance interactions among neighbors, and a sense of connectedness to the memorable natural setting and the site's unique history, build an enduring community.

2.4.1.1 Corridor Focus Areas

Napa has many thriving commercial corridors, including Jefferson Street, Trancas Street, and Soscol Avenue. Though each street has a unique identity and urban form, some desirable characteristics, such as street trees, sidewalks, and architectural character are lacking in some portions of the corridors. Many of the commercial properties were developed decades ago during a different era and are reaching the end of their productive life cycle. The General Plan update envisions creating vibrant mixed-use corridors enabling people to live close to stores and services.

Policies in the General Plan seek to unify and strengthen the visual character, and improve the experience of walking, biking, and driving along these corridors. Connecting sidewalks, improving pedestrian crossings, and widening the pedestrian right-of-way will attract more pedestrians and create an active street front. In addition, concentrating infill development along the commercial corridors will enhance the visual qualities of the corridors and attract more patronage. As these corridors build out and attract more residents, frequent public transit will become more feasible.

2.4.1.2 Land Use Classifications

The following summarizes the General Plan update land use classifications. The designations are meant to be broad enough to give the City flexibility in implementation, but clear enough to provide sufficient direction to carry out the General Plan.

Residential

Five residential land use designations are established to provide for development of a range of housing types. Densities are stated as the number of housing units per gross acre.

Traditional Residential

This designation provides for detached and attached single-family homes, live-work housing, and group quarters (e.g., residential facilities and nursing homes). Bed-and-breakfast inns, artist studios, and public and quasi-public uses may be permitted at appropriate locations at the City's discretion. Permitted residential density range is 2.0 to 12.0 units per gross acre, and the overall combined maximum residential and non-residential floor area ratio (FAR) is 0.6.

Very Low Density Residential

This designation is mainly for single-detached homes in rural edges of the City. The density range is up to 2.0 dwelling units per gross acre with the intent that existing parcels remain sparsely built and/or are clustered to preserve natural features and resources.

Low Density Residential

This designation consists of single-family residential development with densities ranging from 3.0 to 8.0 units per gross acre.

Medium Density Residential

This designation provides for housing densities ranging between 8.0 to 18.0 units per gross acre. Housing types would typically encompass single-family detached and attached, but multifamily housing types may be permitted where maximum permitted density is otherwise not attainable due to lot configuration or development constraints.

High Density Residential

This designation consists of housing densities ranging from 18.0 to 40.0 units per gross acre. This designation would permit the full range of housing types, including multifamily, single-family attached, single room occupancy (SRO) facilities, live-work housing, and group quarters (e.g., residential facilities and nursing homes).

2.4.1.3 Mixed Use

These designations are intended to accommodate higher-intensity, active, pedestrian-oriented development. Any single use or combination of allowed uses are permitted to integrate housing with retail, commercial, office, and other compatible uses. Five mixed-use designations are established.

Residential Mixed Use

This designation prioritizes residential development with associated neighborhood-scale retail and office space. In addition to multifamily housing, other uses like live/work units, artist studios, and businesses that are less than 10,000 square feet are permitted. The maximum FAR for all uses, inclusive of residential, shall be 1.0.

Corridor Mixed Use Low

This designation provides for developments that integrate residential and compatible commercial and office uses. It is intended for a mixture of uses in a single building; however, if a mixture of uses is infeasible due to site constraints or costs, single uses are allowed, provided they meet the goals and objectives of the General Plan. The maximum FAR for all uses, inclusive of residential, shall be 1.5.

Corridor Mixed Use High

This designation is intended to promote a vibrant and walkable environment with mid-rise (typically 55 feet or lower), mixed-use development and allows for more intensive development than Corridor Mixed Use Low. Permitted uses include neighborhood and community retail; eating and drinking establishments; commercial recreation; hotels and visitor services; residential; financial, business, and personal services; educational and social services; and office. The maximum FAR for all uses, including residential, shall be 2.0.

Napa Pipe Mixed Use

This designation applies solely to the Napa Pipe site. A range of housing types, retail, hotel, office, and other commercial uses are permitted, with development intensities in accordance with the more detailed City-approved plans for this site.

Foster Road Mixed Use

This designation is specifically for the area located in the south-west portion of the City in between Foster Road and Golden Gate Drive. These parcels are presently (2021) within the City's RUL and SOI and allow for mixed use.

2.4.1.4 Commercial

These designations are designed to foster a mix of business uses resulting in districts with strong urban design, including buildings and landscapes that relate to the surroundings, with a high-level of public-realm amenities, such as tree-lined streets; sidewalks, pedestrian paths, and crossings; and plazas and other gathering spaces for workers and visitors. Three commercial districts are established as follows.

General Commercial

This category includes general and neighborhood commercial uses, including shopping centers and commercial uses adjacent to highways or some major corridors, where residential development may not be desirable. The maximum FAR is 0.7.

Hospitality Commercial

This designation provides for commercial retail and service uses, including lodging, restaurants, and services oriented towards tourists and other visitors to the community. The maximum FAR shall not exceed 1.5.

Business Professional

This designation allows commercial office, including general business, non-nuisance production, professional services, and health and wellness uses. The maximum FAR is 1.2.

2.4.1.5 Industrial

Business Park

This designation provides for manufacturing, warehousing, and office, public and quasi-public uses, and similar compatible uses in a campus-like setting. The maximum allowable non-residential FAR is 0.7 and may be increased by 0.3 with discretionary review and approval, for a total maximum of 1.0.

Light Industrial

This designation provides for small-scale, manufacturing, fabrication, packaging, storage, equipment repair, construction and maintenance yards, trade and technical training facilities, utility plants, and

recycling centers and similar facilities. The maximum allowable non-residential FAR is 0.7 and may be increased by 0.3 up to a maximum of 1.0 with discretionary review and approval.

Flex Industrial

This designation permits a variety of small-scale industrial uses, including small-scale fabrication, packaging, storage, equipment repair, construction and maintenance yards, and trade and technical training facilities without off-site noise, light/glare, and air-quality impacts.

2.4.1.6 Public-Serving

Public serving uses designate areas that are primarily used for public or quasi-public institutions, including schools, government offices, open spaces, parks, and related community service facilities. There are two public-serving designations.

Public-Serving

This designation provides for public and quasi-public sites dedicated to community-serving purposes, such as government offices and related community service facilities, all public schools, private schools with a significant enrollment, and public health facilities. Residential uses are also permitted in appropriate locations as a conditional use.

Open Space and Parks

This designation is applied to future and existing public parks and facilities. Active and passive recreation spaces, greenbelts, natural areas, and other recreation-oriented public facilities—such as youth and senior centers, restrooms, plazas, ballparks, community centers, pools, and concession stands—would be permitted under this designation.

2.4.1.7 Conservation

The conservation designations seek to conserve the City's natural resources and permit a variety of parks, trails, vineyards, and other outdoor active uses as well as limited residential. There are two conservation designations.

Greenbelt

This designation is applied to specific sites at edges of the City that are to remain in open space, agricultural or resource conservation use.

Agriculture

This designation is primarily for private open space uses and low-intensity agriculture for properties along the periphery of the City limits.

2.4.2 Transportation Element

The proposed Transportation Element would seek to enhance transportation options for Napa residents, workers, and visitors as well as improve mobility by increasing connectivity and providing for the efficient management of existing infrastructure. It addresses various modes of transportation—including automobile movement, biking, walking, and public transit—as well as

roadway network performance, the transit system, travel demand management, bicycle and pedestrian systems, truck travel, emergency evacuation routes, and alternative vehicle systems. This element would include the following goals (supported by related policies).

TE-1: Foster a comprehensive network of accessible roads, trails, sidewalks, and pathways that emphasize a Complete Streets approach, while reducing vehicle miles traveled (VMT) and dependence on single-occupancy vehicles.

TE-2: Keep Napa moving with livable streets that provide a balanced, cost-effective, multi-modal transportation system (vehicles, pedestrians, bikes, transit), accommodating the mobility needs of all ages and abilities.

TE-3: Promote active transportation, support active lifestyles, and encourage physical activity by providing, safe pedestrian and bicycle infrastructure Citywide.

TE-4: Work with NVTA to continue to develop and maintain an efficient and convenient transit system providing alternatives to the use of the personal automobile to residents, workers, and visitors within the City, with connections within the City, to elsewhere in the County, and beyond.

TE-5: Maintain levels of traffic service that provide for efficient movement of people, goods, and services within the City, and adequate connections to the region and state.

TE-6: Support policies and programs to reduce automobile mode share, reduce automobile dependency, and encourage alternative forms of transportation.

TE-7: Maintain parking standards that balance parking demand with urban design goals and do not negatively impact pedestrians, bicyclists, and transit users in development areas throughout the City.

TE-8: Coordinate with Napa County and other agencies to continue safe and efficient operation of the Napa County Airport, Napa River waterfront, and railroads and roadways serving freight movement.

TE-9: Provide safe evacuation routes in case of emergencies and natural disasters, including flooding, earthquake, and fire.

TE-10: Reduce reliance on fossil fuels and reduce non-point-source pollution by supporting sustainable infrastructure and promoting alternative modes of travel.

2.4.3 Community Services, Parks and Recreation Element

The Community Services, Parks and Recreation (CSPR) Element would establish the framework to guide decision-making and investment in parks and public services that contribute to a high quality of life for local residents and create an attractive climate for business. The CSPR Element would establish the framework for providing community services, including safety and emergency services, and infrastructure; developing and maintaining a comprehensive system of quality parks, pedestrian, and bicycle trails; and providing recreational facilities and programs, and arts and culture. The CSPR Element would serve as a guide for the City's parks, recreation, and cultural programming through the support of community members' health, entertainment, access to nature, and high quality of life. This element would include the following goals (supported by related policies and implementation programs).

CSPR -1: Maintain safety services that are responsive to community needs and provide a safe and secure environment for people and property in the City.

CSPR -2: Reduce and prevent crime through the use of community-oriented education and involvement programs, including techniques developed through Crime Prevention Through Environmental Design (CPTED).

CSPR -3: Improve disaster preparedness for wildfires, including plans for evacuation routes, meeting spots, wildfire mitigation strategies, and coordination with CAL-FIRE and Fire Protection and Napa County Fire Department.

CSPR-4: Support schools and education-related facilities as contributors to neighborhood quality of life.

CSPR-5: Support utilities and infrastructure to deliver safe and reliable services for current and future residents and businesses.

CSPR-6: Improve programs to conserve water, especially during drought.

CSPR-7: Provide for solid waste and recycling services to meet the needs of current and future residents and businesses.

CSPR-8: Improve programs to reduce waste accumulation in landfills.

CSPR-9: Provide, improve, and maintain a comprehensive system of City parks, trails, and recreational facilities to meet the needs of the City's current and future residents, businesses, property owners and visitors.

CSPR-10: Continue the development of integrated open space and flooding solutions that also result in new recreational open space for the community, building on the momentum and success of Oxbow Commons.

CSPR-11: Design and improve parks and recreational facilities to reflect the community's changing demographics and user needs.

CSPR-12: Prioritize widely accessible parks and recreational facilities.

CSPR-13: Support trail connections to natural areas and the Napa River in order to improve community health, support a high quality of life, and an active lifestyle.

CSPR-14: Seek funding and distribution mechanisms to support the City's existing and future parks and recreational needs.

CSPR-15: Recognize the importance of art and cultural activities as an integral factor in sustaining the community's high quality of life.

CSPR-16: Strengthen Napa's identity as a destination for the visual, performing, and culinary arts, and foster linkages to economic growth and tourism based on arts and culture. Encourage collaboration between local businesses and community organizations to incorporate art into the City's economic development strategies and to promote cultural tourism.

CSPR-17: Enhance cultural and generational diversity and social connections through opportunities for volunteerism and civic engagement; more public gathering places, family-friendly activities, and public art; and more events that connect residents to one another and keep them active in the community.

2.4.4 Historic and Cultural Resources Element

The Historic and Cultural Resources Element would establish a comprehensive framework to foster historic preservation through establishment of programs, community education, and coordination within the City and with historic preservation groups. The Historic and Cultural Resources Element would protect and enhance historically and culturally significant buildings, structures, objects, sites, and districts and includes goals and policies to promote rehabilitating, retrofitting, and adaptively reusing Napa's historic assets to preserve resources, and enhance Napa's sense of place. The Historic and Cultural Resources Element would include the following goals (supported by related policies and implementation programs).

HCR-1: Preserve and enhance Napa's historic resources. Encourage rehabilitation and adaptive reuse, and sensitive context-compatible infill design.

HCR-2: Continue implementation of the City's preservation program in accordance with Certified Local Government (CLG) requirements, including identifying sites, buildings, and landscapes that serve as significant, visible reminders of the City's social, architectural, and agricultural history. This shall include the recognition of historic resources that have been underrepresented, such as those associated with ethnic heritage, cultural landscapes, and the recent past.

HCR-3: Encourage the designation and recognition of properties and districts as local landmarks and on the California Register of Historical Resources and National Register of Historic Places.

HCR-4: Promote community awareness and appreciation of Napa's history and architecture through educational programs.

HCR-5: Promote economic viability of historic and cultural resources through historic preservation and programs to encourage owners of historic resources to preserve or rehabilitate historic properties by providing incentives where feasible.

HCR-6: Encourage retention of historic structures in their original use or conversion back to their original use where feasible and support sensitive, adaptive reuse.

HCR-7: Balance the preservation of historic resources with the desire of property owners of historic structures to sensitively adopt energy efficient strategies.

HCR-8: Promote the economic benefits that historic preservation provides to local economies.

HCR-9: Achieve a vital Downtown that reflects its historic urban form and setting, offering a mix of old and new buildings.

HCR-10: Work with the local tourism industry, businesses, and property owners to support and foster downtown historic resources as a destination, demonstrating that historic resources contribute to the uniqueness of the visitor experience.

HCR-11: Protect the setting of historic resources when providing parking in Napa's historic Downtown.

HCR-12: Maintain historic neighborhoods and encourage retention of the character of existing historic buildings, parks and open spaces, and urban design elements that define the built environment of the City's older neighborhoods.

HCR-13: Retain historic character when Accessory Dwelling Units (ADUs) are built, by taking siting, massing, and design into consideration along with the historic context of the neighborhood and the property's historic architecture.

HCR-14: Protect and preserve important archaeological resources.

HCR-15: Recognize the Tribal Nations who first lived in the Napa area and preserve their identity, culture, and artifacts.

HCR-16: Recognize the endemic traditions of various communities in Napa, including Latinx, Asian American, and African American communities.

2.4.5 Climate Change and Sustainability Element

The Climate Change and Climate Change and Sustainability (CCS) Element would provide goals and policies to combat climate change, and address adaptation and community resiliency. It seeks to protect Napa's natural and human resources while promoting sustainability and reducing impacts due to climate change through addressing topics such as climate change and greenhouse gas (GHG) reduction, land use and mobility, green infrastructure, sustainable energy and security, green building, urban forest, solid waste recycling and water reduction, and water use efficiency and

conservation. The CCS Element would include the following goals (supported by related policies and implementation programs).

CCS-1: Further the City's sustainability initiatives to reduce the community's GHG emissions, and foster green development patterns – including buildings, sites, and landscapes.

CCS-2: Promote Napa as a network of interconnected neighborhoods with compact, walkable development patterns integrated with a sustainable mobility system that emphasizes walking, biking, or taking transit.

CCS-3: Promote cost-effective, natural methods to improve the City's infrastructure and resiliency towards climate change, while furthering Napa's goal of a healthier and more sustainable urban environment.

CCS-4: Further the City's Solid Waste & Recycling Division goals to promote recycling, composting, and source reduction services for residential and commercial uses to divert 75 percent (or more) of waste from landfills by 2035 and maintain diversion at 75 percent or greater through 2040.

CCS-5: Ensure that Napa residents are prepared for climate change-induced drought conditions by reducing water consumption and promoting resilient water supplies.

CCS-6: Considering power shutdowns that affect the Napa community, promote sustainable energy generation practices and further develop energy security that is resilient to wildfire and related climate disasters.

CCS-7: Implement programs and work with jurisdictional partners to increase sustainable energy production and energy security.

CCS-8: Support Napa's vision of a sustainable community by promoting efforts to reduce energy demand and resource conservation through improved building design.

CCS-9: Celebrate Napa as a Tree City USA and focus efforts to maintain and expand the urban forest.

CCS-10: Promote efforts to educate property owners, businesses, and residents about the benefits of trees.

CCS-11: Support efforts for carbon sequestration to help mitigate and reverse the impacts and severity of global warming.

2.4.6 Natural Resources Conservation Element

The Natural Resources Conservation Element satisfies the statutory requirements for the General Plan Conservation and Open Space elements, and contains measures to protect and enhance open space, natural and wildlife habitat, and air and water quality. The Natural Resources Conservation Element would include the following goals (supported by related policies).

NRC-1: Manage natural resources, including riparian corridors, wetlands, and open space areas in and around the City, to preserve and enhance plant and wildlife habitats.

NRC-2: Recognize and support the preservation of rare, endangered, and threatened species.

NRC-3: Develop a balanced and integrated open space network reflecting a variety of considerations—resource conservation, production of resources, recreation, and aesthetic and community identity—as well as connections between various open space components, and compatibility with land use planning.

NRC-4: Support public and private efforts for preserving open spaces and biological environments—particularly unique and fragile biological environments—around the City.

NRC-5: Protect air quality within the City and support efforts for enhanced regional air quality.

NRC-6: Through various sustainability measures, reduce greenhouse gas (GHG) emissions, fine particulate matter, and black carbon emissions into the air.

NRC-7: Seek to reduce mobile sources of air pollution by creating denser and walkable neighborhoods, building transit-oriented development, and improving bicycle infrastructure, with the goal to reduce the number of miles traveled in cars and improve regional air quality.

NRC-8: Protect sensitive receptors from exposure to substantial concentrations of toxic air contaminants (TACs) and associated health risks.

NRC-9: Protect and enhance the City's potable water, surface water, and groundwater quality.

NRC-10: Promote utilization of green infrastructure and Low Impact Development (LID) strategies; water conservation, reuse, and collection; and other sustainability measures to limit pollution runoff.

2.4.7 Safety and Noise Element

The Safety and Noise Element would present a framework for minimizing risks posed by environmental and human-caused hazards that may affect Napa residents' health and welfare. It would aim to protect Napa residents, workers, and visitors from seismic and geologic hazards, fire hazards, hazardous materials, flooding, and other potential hazards that risk life and property, and would address noise resulting from traffic flow conditions and other factors. It addresses seismic hazards, soil erosion and landslide hazards, flooding, dam failure, fire, airport hazards, hazardous materials, emergency preparedness and response, and noise. The Safety and Noise Element would include the following goals (supported by related policies).

SN-1: Minimize the risk to life and property caused by seismic activity, soil erosion, and landslides.

SN-2: Protect Napa residents from health and safety impacts related to the use, storage, manufacture, and transport of hazardous materials.

SN-3: Reduce risk to life and property due to flooding, including inundation resulting from the failure of water supply reservoir dams.

SN-4: Protect public health and welfare by minimizing exposure of sensitive uses to noise and preventing significant degradation of the acoustic environment.

SN-5: Work to prevent urban fires and exposure to wildfires, as well as protect life and property from fire dangers.

SN-6: Help prepare for and mitigate various hazards that affect the Napa community.

2.4.8 Public Health and Equity Element

The Public Health and Equity Element addresses factors that influence physical and mental health and aim to provide an environment where all Napa residents can live, work, and recreate in neighborhoods planned for "people first, which foster active living; are connected to jobs, recreational opportunities, and stores and services; provide mobility choices; and are pollution free. This element, in combination with other elements, satisfies the statutory requirements for the General Plan Environmental Justice Element. This element would include the following goals (supported by related policies).

PHE-1: Incorporate a Health in All Policies framework to center health considerations in policies, programs, and practices that affect all aspects of the civic decision-making process.

PHE-2: Incorporate equity considerations in policies, programs, and practices that affect all aspects of the civic decision-making process and evaluate the impact of these measures to marginalized groups.

PHE-3: Promote clean air and water, a healthy natural environment, and pollution-free neighborhoods to reduce disparate health impacts resulting from environmental pollutants in vulnerable communities.

PHE-4: Promote "complete neighborhoods"—where residents have safe and convenient access to goods and services on a daily or regular basis—that address unique neighborhood needs, and support physical activity, including walking, bicycling, active transportation, recreation, and active play.

PHE-5: Foster a comprehensive community food system by addressing all of its components—including food production, access, and consumption—to enable good health and nutrition and meet the unique cultural needs of the community.

PHE-6: Continue to support stable and integrated communities through housing opportunities that provide safe, high quality, and affordable housing for all segments of the community in locations near amenities, public transportation, parks, and recreation opportunities.

PHE-7: Promote Napa as a community that is inclusive and embraces its diverse, growing populations and provides opportunities to build community and for everyone to feel socially and civically connected, accepted, and safe.

PHE-8: Promote arts-driven and culturally-centered placemaking efforts that reflect the multiple ethnicities and identities of the Napa population.

PHE-9: Foster equity in City planning efforts and decision making by actively engaging communities that historically have had less familiarity or experience with participation in the development and implementation of City policies.

2.4.9 Economic Development Element

The Economic Development (ED) Element presents goals and policies to support a local economy that reinforces the overall vision of the City of Napa General Plan. Although not a State-mandated component of a General Plan, the ED Element plays a critical role in shaping community character through incentives, policies, and initiatives that guide economic activity and private investment. The ED Element includes goals and policies addressing a range of topics, including promoting a diversity of land uses downtown, encouraging local and neighborhood serving commercial uses, promoting, and enhancing the economic viability of key planning areas, increasing the community's benefits from tourism while also preserving Napa's sense of place, and supporting diverse and thriving commercial nodes in the City. The ED Element would include the following goals (supported by related policies).

ED-1: Promote a diversified economic base to foster economic resiliency and vibrancy, as well as a healthy mix of employment opportunities that match the needs and skills of the local workforce.

ED-2: Promote training, education, and labor support programs that enhance the quality of the City's workforce and support more equitable economic opportunities.

ED-3: Strengthen the City as a global viticultural, agricultural, and culinary hub and resource center to foster linkages and innovation along the entire production, distribution, marketing chain.

ED-4: Support growth of jobs and businesses related to healthcare and research innovation in and around existing clusters and encourage healthcare businesses to launch, relocate, and thrive within the City.

ED-5: Reinforce local production, including small-batch, artisanal production—a growing trend in manufacturing—by capitalizing on the City's existing strength as a global destination and brand.

ED-6: Ensure that the local economy reinforces and builds on the City's unique "sense of place," including its cultural diversity and creative sectors, in a manner that serves both residents and visitors in a mutually-supporting fashion.

ED-7: Develop and nurture a small business ecosystem through programs, tools, and incentives to enable them to thrive in the City.

ED-8: Support Downtown Napa as a multi-cultural, event, and food destination, anchored by hospitality uses, and with a supportive mix of civic, office, retail, entertainment, and residential uses to promote vibrancy, authenticity, and cultural diversity.

2.5 Required Approvals

Implementation of the Project would require the following discretionary approvals.

- Certification of the Final EIR by the City Council.
- Adoption of the updated General Plan by the City Council.
- Adoption of a new zoning map by ordinance of the City Council.
- Future actions by the Planning Commission, City Council, and City administrative agencies on specific development projects that are consistent with the General Plan.

2.6 References Cited

Dyett & Bhatia. 2021. *Draft Land Use and Community Design Element*. Prepared for the City of Napa.

Chapter 3
Impact Analysis

The primary purpose of this EIR is to analyze the potential significant impacts of the proposed project. The proposed project, for purposes of the following analyses, consists of the update to the General Plan. The CEQA Guidelines defines a significant environmental impact as "a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project." (CEQA Guidelines Section 15382). Not all the changes that may result from the proposed amendments are significant.

The following impact analysis sections address the potential short- and long-term substantial impacts on the physical (natural and built) environment that could result from implementation of the proposed project. Existing conditions are the baseline against which the potential impacts of the project are evaluated for significance, except where noted. This means that the reasonably foreseeable impacts of the project are compared to the existing environment, not to the provisions of the current General Plan. The analysis is based on a forecast of growth under the General Plan update to the year 2040, when Napa's population could surpass 97,000 people.

Each impact analysis section comprises the following components.

- A description of the regulatory setting (i.e., the federal, state, and local environmental regulations that apply to that resource).
- A description of the environmental setting for the particular resource (i.e., aesthetics, air quality, transportation, etc.).
- An identification of the significance thresholds or criteria that will be used to determine whether the project will have a significant effect on that resource.
- A description of the significant environmental impacts of the Project.
- Specific mitigation measures that will reduce or avoid the identified significant impacts when feasible mitigation exists. The City or other specified agencies will have the responsibility of requiring these measures.

This EIR analyzes and discloses the potential significant adverse impacts on the environment that would result from implementation of the General Plan update. The EIR is an informational document that represents a good faith effort at disclosing these impacts, examining a range of alternatives to the project, and identifying mitigation measures that would reduce the project's environmental impacts. The EIR neither approves nor disapproves the proposed amendments to the General Plan. The Planning Commission and the City Council will consider the findings of the EIR, along with testimony from the public and other interested parties at the hearings prior to taking action on the project.

CEQA Guidelines Section 15146 states, in part, that "[t]he degree of specificity required in an EIR will correspond to the degree of specificity involved in the underlying activity which is described in the EIR." The General Plan update is not proposing any site-specific development projects. Accordingly, this EIR takes a general look at the potential impacts of the General Plan update.

3.1 Aesthetics

3.1.1 Existing Conditions

3.1.1.1 Regulatory Setting

Federal

Federal Scenic Highway Program

No roadways in or near the Planning Area are designated in federal plans as scenic highways worthy of protection for maintaining and enhancing scenic viewsheds. Accordingly, there are no federal regulations related to aesthetic resources that apply to implementation of the General Plan update.

State

State Scenic Highway Program

The City of Napa does not contain any Officially Designated State Scenic Highways. However, the following State Route (SR) segments within the City have been identified as eligible for official scenic highway designation (California Department of Transportation 2019).

- **SR 29:** From Trancas Street in the City of Napa to the Lake County border.
- **SR 121:** From the intersection with SR 221, near the Napa State Hospital, to near Trancas Street in the City of Napa.
- **SR 221:** From the intersection with Soscol Road to the intersection with SR 121 in the City of Napa (the entire duration of SR 221).

State Nighttime Sky-Title 24 Outdoor Lighting Standards

California's Title 24, Part 6 Building Energy Efficiency Standards (Energy Code) require the California Energy Commission (CEC) to adopt energy efficiency standards for outdoor lighting for both the public and private sectors. These standards became effective January 1, 2020 and include requirements for outdoor lighting for residential and nonresidential development. The new standards will likely improve the quality of outdoor lighting and help reduce the impacts of light pollution, light trespass, and glare. The standards regulate lighting characteristics such as maximum power and brightness, shielding, and sensor controls to turn lighting on and off. This includes using luminaires for outdoor residential lighting with a correlated color temperature of no more than 3,000 Kelvin (K) to minimize glare and circadian disruption at night for residential uses. In addition, nonresidential land uses apply different lighting standards that are set by classifying areas by lighting zone. The classification is based on population figures of the 2010 Census. Areas can be designated as LZ0 (very low: undeveloped open space), LZ1 (low: parks and preserves), LZ2 (moderate: rural areas), or LZ3 (moderately high: urban areas). Lighting requirements for dark and rural areas are stricter to protect the areas from new sources of light pollution and light trespass (California Lighting Technology Center 2019a, 2019b). The majority of Napa County is designated as LZ2, while the City of Napa is designated LZ3.

Local

The following local policies of the General Plan and specific plans related to aesthetic resources.

City of Napa General Plan

The City of Napa General Plan (City of Napa 1998) identifies goals and policies that apply to aesthetic resources.

Land Use

Goal LU-1: To maintain and enhance Napa's small-town qualities and unique community identity.

Policy LU-1.4: The City shall recognize the importance of historic properties, districts, and aesthetic resources as contributors to the City's identity.

Policy LU-1.6: The City shall designate SR 29, SR 121, and SR 221 as scenic corridors. The City shall endeavor to improve the scenic character of these roads through undergrounding of utilities, increased landscaping, street tree planting, and other improvements.

Policy LU-6.2: The City shall work with local preservation groups and downtown property owners to improve building facades and exteriors consistent with the historic and visual character of downtown.

Community Services

Policy CS-1.1: The City shall plan and build infrastructure improvements that will: (1) accommodate growth demands without lowering levels of service; (2) support central City revitalization efforts; and (3) provide aesthetic enhancements to the City's major gateways and scenic corridors.

Health and Safety

Policy HS-9.14: The City shall encourage new development to identify alternatives to the use of sound walls to attenuate noise impacts. Appropriate techniques include site planning such as incorporating setbacks, revisions to the architectural layout such as changing building orientation to provide noise attenuation for portions of outdoor yards, and construction modifications. In the event that sound walls are the only practicable alternative, such walls should be designed to be as visually pleasing as possible, incorporating landscaping, variations in color and patterns, and/or changes in texture or building materials.

Parks and Recreation

Policy PR-7.10: The City shall design and construct public improvements that will enhance the aesthetics of pedestrian access to cultural districts.

Downtown Specific Plan

The goal of the City of Napa Downtown Napa Specific Plan (MIG 2012) is to revitalize downtown Napa into a vibrant place where residents and visitors alike come together to work, live, play and actively engage in the community (MIG 2012). The following policies are the most applicable to aesthetics and visual resources.

Chapter 4, Policy 4. Promote the role of Downtown as the primary place where civic buildings are concentrated and where people come together to enjoy public art and culture, open spaces, and public facilities.

Chapter 4, Policy 5. Take advantage of the Napa River as a Downtown amenity and a setting for recreation, residential development, special-event venues and shopping.

Chapter 4, Policy 6. Provide a human-scale, pedestrian-friendly environment that is inviting to residents and visitors.

Chapter 5, Policy 1. Foster a pedestrian environment by orienting buildings to the street.

Chapter 5, Policy 2. Maintain the rhythm and scale of the Downtown environment by designing buildings with articulation and architectural features.

Chapter 5, Policy 3. Strongly encourage the use of stepbacks to reduce the impact of taller buildings on pedestrians.

Chapter 5, Policy 4. Preserve and protect historic resources.

Chapter 5, Policy 5. Use quality materials and façade elements to provide visual interest and durability.

Chapter 5, Policy 6. Enhance the ambiance and safety of Downtown through the use of strategically placed lighting elements.

Big Ranch Specific Plan (City of Napa 1996)

The 430-acre Big Ranch Specific Plan area is in the northeastern portion of the City of Napa, extending from Big Ranch Road on the east to Jefferson Street on the west, from Trancas Street on the south to Trower Avenue on the north. The following policies are the most applicable to aesthetics and visual resources.

Policy LU-9. Buffers, such as walls or landscaping, shall be provided between the existing and prospective Hospital area, and any adjacent residential uses to shield homes from the noise, light and other impacts of an active medical area.

Policy LU-25. The City shall require hooded lights, which would not shine off-site, on all new commercial sites.

Policy LU-26. City landscape guidelines and setback policies shall encourage the use of vegetation between sources and receptors of light and glare.

Policy LU-27. Parking lots shall he designed to minimize vehicle headlights from shining into residential areas or major roads.

Policy LU-28. Housing units shall be designed to shield bedrooms from exposure to sources of artificial nighttime light, such as by orienting buildings so that bedrooms would not face parking lots.

Policy LU-30. Where feasible, project proponents and their contractors shall schedule construction of adjacent sites to occur concurrently in order to minimize the length of time visual impacts will occur.

3.1.1.2 Concepts and Terminology

Aesthetic resources are all objects (artificial and natural, moving, and stationary) and features (e.g., landforms and water bodies) visible on a landscape. These resources add to or detract from the scenic quality of the landscape (i.e., the visual appeal of the landscape). A visual impact is the creation of an intrusion or perceptible contrast that affects the scenic quality of a viewscape. A visual impact can be perceived by an individual or group as either positive or negative, depending on a

variety of factors or conditions, such as, personal experience, time of day, weather, or seasonal conditions.

Identifying a study area's aesthetic resources and conditions involves understanding the visual character of the area's visual features and the regulatory context. Once those parameters are understood, a study area's aesthetic resources are further defined by establishing the *area of visual effect* (AVE) and documenting the *visual character of the affected environment*, including the natural and cultural environments. The *affected population*, or viewers, are defined by their relationship to the AVE, their visual preferences, and the Project changes. Visual preferences, or what viewers like and dislike about the AVE's visual character, define the AVE's *visual quality*. Visual quality serves as the baseline for determining the degree of visual impacts and whether a project's visual impacts would be adverse, beneficial, or neutral.

Area of Visual Effect

The aesthetic resources study area, the AVE, comprises viewsheds, or what people can see in the landscape. The AVE and its viewsheds are defined by the physical constraints of the environment and the physiological limits of human sight. Physical constraints of the environment include landform, land cover, and atmospheric conditions. Landform is a major factor in determining the AVE because it can limit views or provide an elevated perspective for viewers. Similarly, land cover such as trees and buildings can limit views, while low-growing vegetation and the absence of structures can allow for unobscured views. Atmospheric conditions such as smoke, dust, fog, or precipitation can temporarily reduce visibility or be a more regular component of the visual landscape.

The physiological limits of human sight are affected by location, proximity, and light. Location refers to the topographic position of the viewer, such as being level with, above, or below what is being observed. Proximity is categorized into three distance zones: foreground (up to 0.5 mile from the viewer), middleground (0.5 mile to 3–5 miles from the viewer), and background (beyond 3–5 miles). Features in the landscape are more dominant and have a greater importance the closer the feature is to the viewer, whereas importance is reduced the farther away the feature is. In the background, the scale and color of existing landscape elements and project features blend so that only broad forms, large-scale patterns, and muted colors are evident. Light also plays a large role in affecting views, such as during the daytime when views are more readily available than at night when darkness conceals details and color in the landscape in the absence of bright moonlight or artificial light sources. Furthermore, light levels and direction change throughout the day, affecting color and individual forms.

The environment's physical constraints and limits of human sight combine to establish viewsheds that range from restrictive to expansive and AVEs that range from smaller and more confined to larger and wider-reaching (Federal Highway Administration 2015:4-5–4-9, 6-3–6-4; Litton 1968:3–5).

The study area for this analysis is a single AVE—the Planning Area for the General Plan update.

Visual Character of the Affected Environment

The affected environment comprises the natural and cultural environments that constitute the AVE. The natural environment is determined by the visual character of the land, water, vegetation, animals, and atmospheric conditions. The cultural environment is determined by the visual

character of buildings, infrastructure, structures, and other artifacts and art. Table 3.1-1 lists the visual character elements of the affected environment.

Table 3.1-1. Visual Character Elements of the Affected Environment

Feature	Description of Element	Visual Attributes
Natural Environment		
Land	Landform and natural materials (besides water and vegetation) on the land (e.g., rocks, sand, boulders),	Landscape's form, its spatial qualities, and the nature of its materials.
Water	Flowing or impounded, natural or artificial,	Size of the water body, shape and spatial qualities of its perimeter, turbidity, the nature of its littoral or intertidal zones, and any other distinguishing visual attributes.
Vegetation	Presence or absence of vegetation; native, naturalized, or cultivated.	Height and density, artistic description (form, shading, color, and texture), and any other distinguishing visual attributes; seasonal changes (flowers, fruit, and seasonal color).
Animals	Wild or domesticated.	Domesticated farm animals in rural agricultural landscapes, wildlife as a visual indicator of a landscape's vitality and identity (e.g., whale or bird migrations, herds of large mammals, or seasonal flocks of waterfowl).
Atmospheric conditions	Temporal changes; presence or absence of humidity, fog, and dust that reduce or alter visibility.	Predictable amounts of precipitation, either as rain or snow, can change the visibility of the landscape. Rain with its darkened sky and snow covering the ground may change a landscape's luminosity (level of brightness) and key views and distance zones (as discussed later in this section). Noting the frequency, even periodicity, of such obscuring or altering phenomena adds a caveat to description of a landscape's visual character. For instance, the visual quality of the enclosing fogginess of the darker Olympic Peninsula is quite different than the open starkness of the very bright Four Corners area of the desert southwest.
Cultural Environment		
Buildings	Enclosed structures that are or have been used or occupied by people.	Buildings are often the dominant human-constructed objects in a landscape. A building's visual character is determined by its form, scale, massing, materials, and architectural style and detailing. Building orientation; patterns of light and shadow; artistic attributes like color, pattern, and texture; and site-specific setting, particularly if it obstructs views, all affect character. The building's historic status, current and past occupants, the architect that designed the building, the client for whom it was built, or the contractor who constructed it may also be critical to the perception of the building's visual quality. Views of a proposed project from a building are also important.

Feature	Description of Element	Visual Attributes
Infrastructure	Railroads, airports, harbors, roads, canals, dams, electrical and telecommunication utilities, pipelines, sewer and water systems, solar arrays, wind turbines, and other infrastructure.	A major visual attribute of infrastructure is linearity because infrastructure systems can stretch for miles, even across whole states. Extended lines can affect the character of the natural and cultural landscapes. Infrastructure also provides a special set of buildings, structures, and associated artifacts that are part of an intermodal system (for moving people, goods, and services) that can affect the visual character of an AVE.
Structures	Engineered elements that provide a social function but are not buildings or part of a larger infrastructure system.	Structures may be walls, towers, and other constructed items erected to serve a single utilitarian function. Some structures have architectural treatments but most do not, and form and materials are dictated by functional requirements. A structure's visual character is determined by its form, scale, massing, materials, construction method, and engineering detailing. Structure orientation; patterns of light and shadow; artistic attributes like color, pattern, and texture; and site-specific setting, particularly if it obstructs views, all affect character. The structure's historic status, the architect that designed the structure, the client for whom it was built, or the contractor who constructed it may also be critical to the perception of the structure's visual quality.
Artifacts and art	Items that do not fit neatly into any other category, such as cultural visual resources that are not buildings, infrastructure, or structures. Public art can also contribute to defining the visual landscape.	Artifacts and art are described in a manner similar to that recommended for buildings and structures.

Source: Federal Highway Administration 2015:5-1–5-4.

Affected Population

Two overarching groups of viewers are affected by a project: neighbors and users. *Neighbors* are those people who have views *of* the project site because they are located adjacent to it. *Users* are those people who are located within the project site boundaries and have views *from* the project site. The types of viewers considered for this analysis are listed below (Federal Highway Administration 2015:5-6–5-10).

- **Residential viewers:** Residential viewers can be owners or renters that live within viewing distance of a proposed project or within the project boundaries. Residential viewers generally have a desire to maintain the existing landscape as is, because how their neighborhood looks is a contributing factor for residents choosing to live in a certain location. Therefore, residential viewers tend to be uninterested in change unless they have been able to participate in defining the change.

- **Recreational viewers:** Recreational viewers provide or participate in active and passive recreational uses, such as organized sporting events, indoor and outdoor leisure activities, and cultural events. Recreational viewers are often focused on their recreational activity, and although they tend to be unsupportive of visual changes that would negatively affect the recreational setting, they tend to be supportive of visual improvements that enhance their recreational experience. Recreational services provided for visitors can be permanent, while the visitors are more transitory.
- **Retail viewers:** Retail viewers include merchants that sell goods and services and the shoppers that buy them. Merchants generally want heightened visibility, free of competing visual intrusions, while shoppers need to be able to easily find their destination and, once there, concentrate on the shopping experience. Merchants tend to be more permanent than shoppers, although shoppers often frequent the same stores repeatedly, giving them a sense of permanence.
- **Commercial viewers:** Commercial viewers are those occupying or using office buildings, warehouses, and other commercial structures. Commercial viewers' visual preferences vary depending on the business and may be more aligned with retail, institutional, or industrial viewers' visual preferences than those of residential viewers. Workers are often permanent, while visitors and customers are transitory.
- **Institutional viewers:** Institutional viewers provide or receive services from such places as schools or hospitals that provide social services to the community. Consequently, institutions often promote a public image to adjacent viewers, and the presentation of their buildings and grounds are critical and tend to be well maintained. Signage or orientation and wayfinding are commonly associated with institutional facilities. Workers and employees of the institution are present for longer durations, while visitors are more transitory.
- **Civic viewers:** Civic viewers provide or receive services from a governmental organization, such as a military reservation or a federal, state, or local agency. Views of governmental facilities may or may not be desired, depending on the particular organization and work being performed. Workers and employees of the civic uses are present for longer durations, while visitors are more transitory.
- **Industrial viewers:** Industrial viewers mine or harvest raw materials; manufacture goods and services; or transport goods, services, and people, and often require large amounts of land that has limited exposure to the public. Industrial viewers' visual preference is generally utilitarian unless they want to enhance the public presentation and views of their facility. Industrial viewers tend to be primarily workers with few transitory visitors.
- **Agricultural viewers:** Agricultural viewers are agricultural workers in fields and pastures maintaining crops or herd animals. Cultural order and natural harmony are critical components of the landscape. Some agricultural viewers are permanent, but many are transient, although they may return to the same area seasonally.
- **Travelers (by transportation purpose):** Travelers can be grouped by the purpose for which they are traveling, such as commuting, tourism, and shipping. Commuters travel the same route regularly, have a repeated routine, and are often single drivers, but they may also be passengers; and trips can include commuting to work or to a favorite or frequent destination (e.g., campground, cabin, sports arena, or relative's home). Tourists travel individually or in groups through an area for enjoyment, often with a set destination, on trips that are generally more

adventurous, cover longer distances, and take more time than commuting trips. Shippers are generally single drivers moving goods on routine routes of varying distances.

- **Travelers (by transportation mode):** Travelers can also be grouped by the mode in which they travel and can include pedestrians, cyclists, and motorists. Pedestrians use only their feet (or a wheelchair or other device), most often on a sidewalk or trail. Cyclists use bicycles at greater speeds than pedestrian travel, and may use trails, traffic lanes, and sidewalks. Motorists use vehicles with engines (e.g., cars, trucks, buses, motorcycles, mopeds, or any other technology that is not self-propelled, regardless of fuel source). Motorists move at higher speeds than other groups. Groups of motorists within a vehicle are able to discuss what they see from the vehicle. By necessity, the driver of a motor vehicle focuses less on the view outside the vehicle. The driver's primary interest is in what's coming next down the road, although natural harmony and cultural order also provide resources used for wayfinding. Good natural harmony and cultural order can increase driver attentiveness. Passengers prefer evidence of good natural harmony and cultural order.

Viewer Sensitivity

Viewer sensitivity is based on viewer exposure and viewer awareness. Viewer exposure is a factor of proximity to an object or scene that is affected by elevation and distance (refer to the concepts of foreground, middleground, and background, described under *Concepts and Terminology*); the number of people viewing an object or scene (more viewers equal more exposure); and how long viewers experience an object or scene. Viewer awareness is influenced by how routine a scene is (i.e., lower sensitivity with increased routine), visual features or focal points that help to focus the viewer's attention, and legal or social protection of a resource. Movement also affects viewer sensitivity by creating dynamic viewsheds that change as the viewer moves through the landscape. Speed affects how long or short a view is based on the mode of travel, and the availability of views is affected by the surrounding terrain and vegetation and the presence or absence of built features.

As described earlier, visual sensitivity is also modified by the type of viewer, viewer activity, and visual expectations. For example, people driving for pleasure; people engaging in recreational activities such as hiking, biking, or camping; and homeowners generally have higher visual sensitivity to views. Viewers using recreational trails and areas, scenic highways, and scenic overlooks usually pay more attention to their surroundings, seek views, and have higher regard for the landscape composition. Residential viewers typically have extended viewing periods and are more concerned about and aware of changes in the views from their homes. Sensitivity tends to be lower for people driving to and from work or as part of their work, because commuters and nonrecreational travelers typically have fleeting views and tend to focus on commute traffic, not on surrounding scenery (Federal Highway Administration 2015:6-2–6-4; USDA Forest Service 1995:3-3–3-13; U.S. Soil Conservation Service 1978:3, 9, 12).

Evaluating visual quality and viewer response must also be based on a regional frame of reference (U.S. Soil Conservation Service 1978:3). The same visual resource appearing in different geographic areas could have a different degree of visual quality and associated viewer sensitivity in each setting. For example, a small hill may be a significant visual element on a flat landscape but have very little significance in mountainous terrain.

Visual Quality

Visual quality is affected by aesthetics, the study of pleasing perceptual experiences as seen by humans. These perceptions are remarkably consistent within a society and across cultures, even though an individual's experience of visual quality is unique because of background and previous life experiences. Visual quality is a function of what the viewer wants or expects to see and what is actually seen. If people see what they want or expect to see, then the visual quality is good or high because the viewer is pleased. However, if what is seen is lacking or not what is expected then visual quality is poor or low because the viewer is disappointed. Expectations can be predictable for things like roadways and commercial development within a certain area. However, self-interest factors into visual preferences based on whether the viewer is a neighbor or user of the project site and how they may be personally benefited or affected. Different viewers and viewer groups value visual resources in different ways; therefore, there are different appraisals of visual quality. Regardless, there is a range of viewer responses inherent in all humans that aids in evaluating the overall landscape composition and vividness of both natural and cultural environments.

- **Natural harmony:** The natural environment creates a sense of natural harmony in people. The visual character of the natural environment's visual resources and viewer preferences affect the perception of natural harmony and the viewers inherently evaluate and determine if the composition is harmonious or inharmonious.
- **Cultural order**: The cultural environment creates a sense of cultural order in people. The visual character of the cultural environment's visual resources and viewer preferences affect the perception of order and the viewers inherently evaluate and determine if the composition is orderly or disorderly.

The value placed on visual resources correlates to whether those resources meet the viewer's preferred concepts of natural harmony and cultural order. The greater the degree to which preferences are met, the higher the visual quality; the more they fail to match preferences, the lower the visual quality. Establishing the visual quality of the natural and cultural environments aids in evaluating the overall composition and vividness of the landscape.

- **Landscape composition and vividness:** The natural and cultural environment are elements that make up the overall landscape composition for a complete visual landscape. The more visual preferences and expectations are met by the landscape composition, the more that landscape is revered for its views and the more memorable or vivid it becomes. Visual features do not intrude but belong to a landscape of a harmonious nature in an orderly society.

Viewer preferences are established using a professional observational or public involvement approach. Professional observation is used on projects with average complexity and minimal controversy by identifying standard visual preferences associated with affected viewer groups that are adjusted to reflect state and local regulations protecting visual resources. More complex and controversial projects often engage affected stakeholders (i.e., neighbors and users) through public outreach and involvement to help define visual preferences. This analysis uses the professional observational approach (Federal Highway Administration 2015:5-13–5-14).

3.1.1.3 Environmental Setting

Visual Character of the Planning Area

The City of Napa is located in Napa Valley, which reaches north and east to the foothills and is relatively level and cultivated primarily with vineyards. Significant views available from public vantage points, such as from SR 29 or from the Napa River area, are of rolling hills and mountain ridges to the east and west that serve as a backdrop to the scenic valley floor. These distant views provide a sense of enclosure and a sense of place for the community and are important visual assets. In addition, the texture, pattern, and color of the vineyards outside of the City are dominant visual features, providing a sense of open space, and linking the City of Napa to its agricultural heritage. Riparian corridors are another important visual resource in the Napa area. Riparian corridors occur along the Napa River and its primary, secondary, and tertiary tributaries. These wooded areas extend inland from the riverbanks and function as linear oases among the residential subdivisions. In addition, they serve to define boundaries among neighborhoods and provide visual relief and open space opportunities. In many areas throughout the Planning Area, however, the Napa River and its tributaries are mostly hidden from view, and public access along the banks is discontinuous and unimproved.

While the City of Napa is by most measures a medium-sized City and is considered to be urban in nature, residents and visitors typically think of Napa as a small town. This perception is due in large part to the City's small-town visual qualities. These include the unique visual character of downtown Napa, embodied in the historic architectural elements of Main Street and the pastoral qualities of the riverfront, and the downtown's relative distance from SR 29. Most arterials in Napa are lined by commercial businesses, many of which are organized in lower quality strip-type developments. These developments sometimes occur side by side with little or no architectural character or quality, resulting in a visual chaos of building forms, parking lots and unrelated signs.

The urban structure of Napa is defined by a compact development pattern, with a historic downtown at the City’s core, and the surrounding natural topography of the Mayacamas Mountains to the west and the Vaca Range to the east. The Rural-Urban Limit (RUL), initially established in the 1970s, limits outward growth into some of the world’s most valuable agricultural lands, which define the valley floor landscape. The City structure is further defined by the existing residential neighborhoods, parks and open spaces, commercial centers, and industrial districts along with the transportation corridors and infrastructure that links them. The Napa River and its tributaries weave throughout the City, providing recreational enjoyment, habitat, and scenic views.

The City’s Sphere of Influence (SOI) is the City’s area of probable ultimate physical boundaries and service area. The City’s current SOI includes an area adjacent to but outside of the RUL.

Outside the City limits, the open agricultural lands of Napa Valley—America’s premier wine-growing region—are flanked by the Vaca Range and Mayacamas Mountains, and provide visual open space while driving, hiking, or bicycling, as well as provide habitat and foraging areas for wildlife.

Gateways

Important gateways into the City include SR 29, SR 121, SR 221, Soscol Avenue, and First Street.

Views

Roadways with important scenic qualities within the SOI include SR 29, Dry Creek Road north of Redwood Road; Redwood Road west of the Dry Creek Bridge; Big Ranch Road north of Trancas Street; Coombsville Road east of Silverado Junior High School; Thompson Avenue; El Centro from Jefferson Street to Big Ranch Road; Old Sonoma Road west of the City limits; and Patrick Road. These roadways serve as key vantage points to the open space, rolling hills, ridgelines, and wetlands that define Napa's visual character.

Light and Glare

Light and glare sources within the City are primarily associated with residential, commercial, and industrial land uses. Streetlight, signage, and cars may produce light. Glass and reflective surfaces on buildings, residences, and vehicles traveling in the area and in parking lots contribute to a limited amount of glare. The light and glare that exist in developed areas of the City are typical for an urbanized setting.

Viewer Groups and Viewer Responses

Because the Planning Area consists of the whole City, viewer groups include residential, recreational, retail, commercial, institutional, civic, industrial, and agricultural viewers, and travelers on local roadways. The primary viewer groups in the Planning Area are categorized as people living or conducting business in the City; travelers using the freeways, arterial roads, and smaller local roads; and recreationists (boaters, swimmers, and anglers using the river); trail users; equestrians; bicyclists; joggers; and others). All viewer groups have direct views of the Planning Area.

Residents

Suburban residents, including residents of older parts of the City, and rural residents in the Planning Area have potential exposure to views that would be affected by the General Plan update, and have a sense of ownership over nearby visual resources. These residents are considered to have high sensitivity to changes in the viewshed.

Businesses

Viewers from industrial, commercial, government, and educational facilities situated throughout the Planning Area have semipermanent views of areas that would be affected by the General Plan update. Because business workers and patrons focus on tasks at hand (i.e., working or shopping), these viewers are considered to have moderate sensitivity to changes in the viewshed.

Travelers

Travelers on local roadways pass by areas that would be affected by the General Plan update. Travelers use roadways in the Planning Area at varying speeds; normal highway and roadway speeds differ based on the traveler's familiarity with the route and roadway conditions (e.g., rain). Single views are typically of short duration, except on straighter stretches where views last slightly longer. Viewers who travel these routes frequently generally possess moderate visual sensitivity to their surroundings. The passing landscape becomes familiar to these viewers, and their attention typically is not focused on the passing views but on the roadway, roadway signs, and surrounding traffic. Viewers who travel local routes for their scenic quality generally possess a higher visual

sensitivity to their surroundings because they are likely to respond to the natural environment with high regard and as a holistic visual experience. Furthermore, some scenic stretches of roadway in the Planning Area offer sweeping views of the surrounding area that are of interest to motorists, especially when traveling on levee tops. For these reasons, viewer sensitivity is moderate among most roadway travelers.

Recreationists

Recreationists using parks, waterways, roadways, and trails are likely to seek out natural areas and scenic views that could be affected by the General Plan update. Local recreationists have a high sense of ownership of the waterways and corridors they use for recreation, and these areas are highly valued throughout the greater Napa area. Viewer sensitivity is high among recreationists using the Planning Area because they are more likely to value the natural environment, appreciate the visual experience, have a strong sense of ownership, and be sensitive to changes in views.

3.1.2 Environmental Impacts

3.1.2.1 Methods for Analysis

Visual impacts are measured by the compatibility or incompatibility of the physical changes to the environment that are caused by a project's scale, form, and materials, which are seen by viewers, and the extent to which viewers care about—or how sensitive viewers are to—how a project changes the environment. Visual impacts can result in beneficial, adverse, or neutral changes to the visual environment and visual quality. Viewers have an inherent understanding of what constitutes project cohesion, which aids in determining the type of impact. The degree to which a project meets the preferred concept of project cohesion determines the level of impact.

Neutral impacts reflect little change to the visual environment and visual quality, retaining the existing landscape composition and vividness. Beneficial impacts can result where visual quality is improved through the enhancement of visual resources or where visual experiences are improved through the creation of new or improved views of resources. The level of beneficial impact is determined by how much a project improves the existing landscape composition and vividness and can range from small to very substantial improvements. Adverse impacts can result when visual quality is degraded through visual resource modification or by blocking or altering views in a negative manner. The level of adverse impact is determined by how much a project degrades the visual landscape and ranges from general negative changes to severe declines in the existing landscape composition and vividness (Federal Highway Administration 2015:6-1–6-8).

The type and level of impact for this Project are evaluated in accordance with Appendix G of the CEQA Guidelines.

Visual Compatibility

The Project environment can be affected by the visual character of grading, constructed elements, vegetative cover, infrastructure, and other ancillary visual elements associated with the Project that interact to form a composition. These elements are described in more detail in Table 3.1-2. These changes affect the natural and cultural environments in the Planning Area, and viewers evaluate a project's components to determine if a project's composition is compatible or incompatible with the existing visual landscape. This viewer response determines how the existing landscape composition and vividness would be affected by the Project.

Table 3.1-2. Visual Character Element of the Project Environment

Feature	Description of Element	Visual Attributes
Grading	Alteration of the existing landform, or the grading, required to accommodate the Project.	The visual character of the physical forms generated by grading, such as grading of slopes, the need for cuts and fills, and the presence of rock cuts and retaining walls, all affect visual quality. The surface appearance of rock cuts and retaining walls also affects the visual character of the Project area.
Constructed elements	Buildings, infrastructure, and structures resulting from Project implementation. Buildings can include homes, businesses, institutions, and so on. Infrastructure can include new roads, parking lots, sidewalks, trails, utility lines, and telecommunication towers. Structures can include bridges, viaducts, and culverts; retaining walls; noise walls; and other large-scale visual elements.	The visual character of constructed elements is described in terms of the element's form, scale, massing, and material compared to the existing built and natural environment. The setting and orientation of the structures interplay between light and shadow, and artistic attributes like color, pattern, and texture also affect visual character. Whether a feature obstructs or generates views is also important.
Vegetative cover	Vegetation associated with the Project, such as hydroseeding for erosion control, plantings for habitat enhancement or restoration, and landscaping for aesthetics and shade. Also, vegetative cover may be removed by Project activities.	The visual character of the Project's vegetative cover; its density, distribution, and species composition compared to the existing natural environment. Artistic attributes of the plants (such as seasonal color) and the ecological setting are also important.
Ancillary visual elements	These may include signage, mailboxes, benches, fencing and gates, bollards, plant containers, or other features.	Such features contribute to the Project's appearance as components of the Project's visual character, and existing and proposed elements are described in relation to each other.

Source: Federal Highway Administration 2015:5-1–5-4.

3.1.2.2 Thresholds of Significance

In accordance with Appendix G of the CEQA Guidelines, the General Plan update would be considered to have a significant effect if it would result in any of the conditions listed below.

- Have a substantial adverse effect on a scenic vista.
- Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway.
- Substantially degrade the existing visual character or quality of public views of the site and its surroundings in nonurbanized areas. (Public views are those that are experienced from publicly accessible vantage points). Conflict with applicable zoning and other regulations governing scenic quality in an urbanized area.

- Create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area.

Methodology and Assumptions

Aesthetics and visual resources are generally subjective by nature and, therefore, the extent of visual impacts associated with adoption and implementation of the General Plan update can be difficult to quantify. In addition, it is difficult to estimate the impact future development would have on scenic resources, since individual development projects would have different impacts on the aesthetic quality of an area. Therefore, this analysis was based on the expected changes in aesthetics and visual resources that could result from the policies included in the General Plan update.

Relevant General Plan Update Goals and Policies

Land Use and Community Design Element

Land Use and Community Design Element policies in the General Plan update seek to unify and strengthen the visual character, and improve the experience of walking, biking, and driving in the City. Connecting sidewalks, improving pedestrian crossings, and widening the pedestrian right-of-way would attract more pedestrians and create an active street front. In addition, concentrating infill development along the commercial corridors would enhance the visual qualities of the corridors and attract more patronage. These policies promote development that exhibits visual diversity, improves the views of buildings from the river, unifies design features between adjacent developments and landscaping, and promotes a cohesive neighborhood environment.

The policies also promote inclusion of public art, welcome signage, and landmarks that reinforce the City's identity. They preserve the character of existing neighborhoods, and create active, pedestrian-oriented streets. The policies also preserve artifacts of historic use.

Relevant Land Use and Community Design goals and policies pertaining to aesthetic resources include the following.

GOAL LUCD-1: Maintain a compact urban form to promote a distinct community identity and protect open space, and natural and agricultural resources surrounding the community.

GOAL LUCD-2: Enhance the urban form and visual quality of the City's overall urban structure – Downtown, corridors, and neighborhoods.

GOAL LUCD-3: Enhance Napa's community character by promoting walkability, inclusivity, inclusivity, and connections between neighborhoods, key centers, and the Napa River.

Policy LUCD 3-1: Promote development that fosters a sense of community by providing safe, pedestrian-friendly, tree-lined streets; walkways to everyday destinations such as schools, bikeways, trails, parks and stores; buildings that exhibit visual diversity, pedestrian-scale, and street orientation; central gathering places; and recreational amenities for a variety of age groups.

Policy LUCD 3-2: Promote the community's river orientation by incorporating open spaces as part of flood-improvement projects and supporting development that is oriented toward the river. Limit blank facades, parking garages, parking lots, or imposing fencing along the river.

Policy LUCD 3-3: Enhance public access to the river through trails and linkages to neighborhoods and provide adequate setbacks from the top of the riverbank to allow pedestrian/bike paths and landscaping.

Policy LUCD 3-4: Support development of public amenities such as parks, plazas, and trails along the Napa riverfront.

Policy LUCD 3-5: Support community and public realm design that reflects the community's diversity and meets the needs of persons of all ages and abilities.

Policy LUCD 3-6: Where feasible, incorporate the following design strategies into new development to support multimodal transportation, community cohesion, and connectivity:

- Locate commercial buildings close to the streets with parking tucked behind to present a cohesive street appearance and enable better pedestrian and transit accessibility.
- Provide greater street, pedestrian, and bicycle connectivity with connections to adjacent developments, trails, bicycle and pedestrian paths, and transit stops.
- Share design features between adjacent developments, such as shared parking and cross-access (to reduce curbcuts), shared building design features, shared signing, consistent landscape treatments across frontages, and other integrating features.
- Avoid exclusive development typologies such as gated, walled, or fenced-off developments which do not support a cohesive neighborhood environment.

GOAL LUCD-5: Support an attractive and welcoming image for major gateways and thoroughfares into the City.

Policy LUCD 5-1: Seek to improve the scenic character of important gateways into the City, including SR 29, SR 121, SR 221, Soscol Avenue, Trancas Street, the SR 29/Imola intersection, and First Street, through undergrounding utilities, increased landscaping, street tree planting, and other improvements.

Policy LUCD 5-2: Support the creation of corridor and gateway design guidelines for both public and private development to promote attractive entrances to the City. Specific plans can also be used to coordinate development.

Policy LUCD 5-3: Support inclusion of greenways, open space, riparian corridors, wetland areas, and agricultural land when they exist in gateway locations.

Policy LUCD 5-4: Promote the inclusion of public art, welcome signage, and other landmarks to reinforce Napa's identity and a sense of arrival into the City.

GOAL LUCD-10: Enhance the City's character and image as a desirable residential, active, and sustainable community, and celebrate the diversity of residents.

Policy LUCD 10-1: Preserve the character of existing residential neighborhoods while promoting "complete neighborhoods" with safe and convenient access to the goods and services needed for daily life.

GOAL LUCD-11: Encourage attractive, well-located commercial development to serve the needs of City residents, workers, and visitors.

Policy LUCD 11-1: Allow for a range of goods and services and establishments of a variety of sizes convenient to City residents, while seeking to improve the character and viability of commercial areas.

Policy LUCD 11-2: Require new commercial development to be cohesively integrated with the community fabric through well designed building/street interfaces, and pedestrian and street connections to surroundings, transit stops, and adjacent developments.

Policy LUCD 11-3: Update the City's parking regulations to allow and encourage shared parking between adjacent commercial centers.

GOAL LUCD-14: Develop corridor spines of Focus Areas as memorable boulevards. Promote development in Focus Areas that is high-quality and pedestrian-oriented.

Policy LUCD 14-1: Promote development of Focus Area corridors as tree-lined boulevards. Create inviting streetscapes in Focus Areas that encourage walking and promote a safe, inviting, and lively street environment.

Policy LUCD 14-2: For buildings where active frontages are not required, still require developments to be oriented towards streets through attention to building massing, landscaping, location of entrances from the street, locating residential building stoops and balconies to face the street, to have "eyes on the street" and foster active, walkable, and enjoyable street frontages.

Policy LUCD 14-4: Enhance major urban gateways into the City to create a sense of arrival and reflect the unique character that defines Napa, while addressing considerations such as traffic calming, greenery, public art, and placemaking.

GOAL LUCD-18: Transform Soscol Avenue south of First Street into a well-designed boulevard that acts as an attractive gateway into the Napa community.

GOAL LUCD-20: Continue to promote Downtown Napa as an active and vibrant heart of the community.

Policy LUCD 20-2: Enhance Downtown urban design quality and sense of place through strategies including:

- Incorporate more public art, outdoor dining options, and street trees and plantings.
- Enhance pedestrian comfort and safety, including consideration of pedestrian-only places and streets (generally or at specific times).
- Design inclusive public spaces with family-friendly amenities.
- Preserve and/or adaptively reuse historic buildings.
- Include bike racks, wayfinding signage, public restrooms, and attractive landscaping like trees and flowers.

GOAL LUCD-23: Promote residential development with supporting commercial uses, integrated with site topography and the natural environments.

Policy LUCD 23-3: Promote clustered development to minimize grading, preserve landforms, and minimize visual impacts.

Policy LUCD 23-4: Support site planning and design that reflects the location of the area as a major gateway into the City and Napa Valley. As such, tall, blank retaining or noise barriers are not recommended along the eastern side of the property. A combination of native trees, landscaping, and natural berms should be used to shield freeway noise and to appear bucolic when viewed from the freeway. Public art pieces and/or distinctive architecture should be considered to showcase the uniqueness of Napa and be a landmark for people entering the valley.

GOAL LUCD-24: Promote development of the Big Ranch Road area as a cohesive, vibrant neighborhood, integrated with the surrounding uses.

Policy LUCD 24-1: Prior to allowing new development as part of a subdivision, require preparation of a master street plan for the area, in coordination with the Big Ranch Specific Plan. The street plan should provide for a walkable, connected neighborhood, with easy access to adjacent high schools, stores, and amenities on Trancas Street.

Policy LUCD 24-2: Encourage variations in densities and housing types within the master plan, provided the overall density is within the land use designation for the area. Recognize the existing residential density in the surrounding neighborhood and promote a smooth visual transition to Medium Density development by incrementally increasing building heights and unit types.

GOAL LUCD-25: Transform Napa Pipe into a great neighborhood that is welcoming to, and comfortable for, the broadest range of people and households. Napa Pipe is envisioned as a neighborhood that engages residents and visitors with an inviting environment in which chance interactions among neighbors, and a sense of connectedness to the memorable natural setting and the site's unique history, build an enduring community.

Policy LUCD 25-1: Establish a vibrant, mixed-use neighborhood oriented toward the Napa River with memorable public spaces.

Policy LUCD 25-2: Create a mixed-use neighborhood that is well-connected across the railroad tracks, to existing roadways, and to the Napa Valley Vine Trail and Bay Trail to facilitate vehicular, bicycle, and pedestrian access.

Policy LUCD 25-3: Provide publicly accessible park and other amenities to allow full enjoyment of the Napa River frontage by residents and visitors.

Policy LUCD 25-4: Preserve artifacts of the historic use of the site, including the cranes and dry docks, by incorporating them into the final community design.

Policy LUCD 25-7: As part of site design, incorporate publicly-accessible parks and open spaces that provide a variety of active and passive recreational uses and gathering places.

Policy LUCD 25-8: Promote development that supports an easily walkable environment with pedestrian-scaled buildings and streetscape features, with a network of small block and lot layouts that encourage walking.

Policy LUCD 25-9: Support an active and comfortable public realm by incorporating street trees, shade opportunities, benches, trach receptacles, public restrooms, and other features that contribute to an attractive and enjoyable space.

Policy LUCD 25-10: New development and architectural design should adhere to the Napa Pipe Design Guidelines.

Climate Change and Sustainability Element

The General Plan update supports usage of green infrastructure strategies, such as rainwater harvesting, rain gardens, bioswales, planter boxes, permeable pavers, street trees, and vegetation, as well as green streets, parking lots, and roofs to help promote a healthier and sustainable urban environment.

Relevant Climate Change and Sustainability Element goals and policies pertaining to aesthetic resources include the following.

Policy CCS 5-8: Promote a program to encourage neighborhood tree planting and water-efficient landscaping or xeriscaping strategies.

Policy CCS 6-3: Incentivize solar panel deployment beyond the State's mandates. Establish guidance regarding the placement of solar panels to minimize impacts to aesthetic resources.

GOAL CCS-9: Celebrate Napa as a Tree City USA and focus efforts to maintain and expand the urban forest.

Policy CCS 9-1: Support development of a Citywide Urban Forest Master Plan, or similar document, to provide detailed information, recommendations, and timelines to effectively manage and grow the City's tree canopy.

Policy CCS 9-2: Prioritize planting trees in areas identified in the Urban Forest Master Plan in order to maximize the benefits of urban heat island reduction and pedestrian and bicyclist shade and comfort.

Policy CCS 9-3: Assess locations that would benefit from additional tree coverage and greenery, such as historically marginalized, tree deficient, or neighborhoods with vulnerable populations to provide buffering from air and noise pollution.

Policy CCS 9-4: Utilize trees and vegetation as part of green infrastructure strategies along major roadways and areas with large impervious pavement surfaces to slow rainwater discharge in the Napa River watershed, provide flood-hazard reduction benefits, and help clean the stormwater.

Policy CCS 9-5: Develop a program to finance, manage, and expand the City's street tree canopy as a valuable ecological and public health resource, especially along key corridors with potentially less coverage. Future study areas for a Citywide Urban Forest Master Plan include: Lincoln Avenue between Jefferson Street and Soscol Avenue, Jefferson Street between Claremont Way and Pueblo Avenue, and Soscol Avenue between Lincoln Avenue and Third Street. *See Figure 6-1 and Chapter 9: Public Health and Equity for additional information.*

GOAL CCS-10: Promote efforts to educate property owners, businesses, and residents about the benefits of trees.

Policy CCS 10-2: Recognize the importance and benefits of maintaining and improving the City's urban forest, including community, environmental, and economic benefits that range from increasing property values to providing ecological services such as storm water mitigation, air pollutant removal, and carbon sequestration.

Historic and Cultural Resources Element

The General Plan update seeks to protect and enhance historically and culturally significant buildings, structures, objects, sites, and districts and includes goals and policies to promote rehabilitating, retrofitting, and adaptively reusing Napa's historic assets to preserve resources and enhance Napa's sense of place. Relevant Historic and Cultural Resources Element goals and policies pertaining to aesthetic resources include the following.

GOAL HCR-9: Achieve a vital Downtown that reflects its historic urban form and setting, offering a mix of old and new buildings.

Policy HCR 9-1: Promote the preservation of the historic urban form of the Downtown when rehabilitating historic buildings or designing infill construction. Use techniques such as integrating sensitive massing transitions between new construction and historic buildings, compatibility with historic materials, and characteristic rhythms, solid-to-void ratios, and landscape elements.

Policy HCR 9-2: Maintain and restore or rehabilitate City-owned properties identified as landmarks, within a historic district, or listed on, or eligible for, the California Register of Historical Resources or the National Register of Historic Places.

Policy HR 9-3: Encourage the maintenance and restoration of privately owned Downtown properties listed in the City of Napa's HRI, identified as City landmarks, located within a historic district, or listed on the California Register of Historical Resources or the National Register of Historic Places.

Natural Resources Conservation Element

The General Plan states that protecting and enhancing open space and natural resources located on public land is an important priority for the City. Under the General Plan update, anticipated development in the Planning Area would be focused along corridors and within existing urbanized areas. Existing publicly owned parks and open space would be maintained. Therefore, very little loss of natural habitat or impacts on natural resources on public lands is expected as a result of the General Plan update.

Relevant Natural Resources Conservation Element goals and policies pertaining to aesthetic resources include the following.

GOAL NRC-3: Develop a balanced and integrated open space network reflecting a variety of considerations—resource conservation, production of resources, recreation, and aesthetic and community identity—as well as connections between various open space components, and compatibility with land use planning.

Policy NRC 3-1: Maintain land designated as Open Space in Figure 7-2 in natural and/or recreational use and require that development or grading on hillsides (if allowed) preserves the integrity and appearance of natural hillsides and other landforms wherever possible. Development shall conform to the City of Napa Hillside Overlay District requirements with the goal to prevent cut-and-fill and other destructive developmental practices.

Policy NRC 3-2: Encourage, at the time of any discretionary approval, development in sensitive areas to cluster development, or to build vertically, rather than horizontally, so as to retain natural areas and habitat.

GOAL NRC-4: Support public and private efforts for preserving open spaces and biological environments—particularly unique and fragile biological environments—around the City.

Policy NRC 4-1: Coordinate with Napa County and other agencies to preserve unique and fragile biological environments on unincorporated lands outside the Sphere of Influence (SOI), including areas such as the Napa-Sonoma Marsh.

Policy NRC 4-2: Collaborate with the Napa County Parks and Open Space District to preserve and protect open spaces within and outside of the City, including mutual support in securing resources for open space and habitat preservation.

Policy NRC 4-3: Support the Napa Land Trust or other community or non-profit organizations seeking to purchase privately-held land designated as Agriculture or Greenbelt in the General Plan, or other land for habitat conservation, used to further conservation goals such as protecting riparian habitat, expanding/connecting open space, and preserving, protecting, or restoring wildlife corridors.

Safety and Noise Element

The General Plan update discourages the use of berms and sound walls for noise mitigation and provides guidelines to minimize the aesthetic impacts of such elements if their construction is unavoidable. While it requires adequate nighttime lighting for safety, it also seeks to reduce light pollution.

Relevant safety and noise policies pertaining to aesthetic resources include the following.

Policy SN 4-3: Discourage the use of berms and sound walls for noise mitigation; rather, encourage the use of project design techniques such as increasing the distance between the noise source and the noise sensitive receiver and use non-noise sensitive structures (e.g., a garage) to shield noise sensitive areas. If a berm or wall is determined necessary to mitigate noise, discourage exclusive use of walls in excess of six feet in height and encourage use of natural barriers such as site topography or constructed earthen berms. When walls are determined to be the only feasible solution to noise mitigation, then the walls shall be designed to limit aesthetic impacts.

Policy SN 6-7: Seek to reduce light pollution in Napa by incorporating dark sky initiatives, such as lights that cast little or no light upwards in public areas or roadways and turning off lights in empty buildings at night.

Policy SN 6-8: Address appropriate lighting standards in the City's Municipal Code for street lights and all residential and commercial artificial outdoor lighting, using the Illuminating

Engineering Society's design guidelines, and in compliance with International Dark-Sky Association–approved fixtures.

Transportation Element

Relevant transportation policies pertaining to aesthetic resources include the following.

> **Policy TE 2-4**: As part of streetscape design, incorporate features that enhance safety for all users, and establish effective mode transitions. Examples of these features include bus pullouts and shelters, street lighting, and curbside management features such as pickup/drop-off locations for shared ride/transit network companies and spaces for delivery vehicles to park safely for short durations.

3.1.2.3 Impacts and Mitigation Measures

Development under the General Plan update would result in new suburban, urban, commercial/retail, and recreational development in undeveloped areas and infill development with a similar variety of uses. Depending on the particular projects pursued, new development allowed by the General Plan update could alter topography, remove vegetation, or change land use types in ways that would affect the existing visual character of views, including scenic vistas. Scenic vistas of particular concern include of the Vaca Range and Mayacamas Mountains, as well as views of the agricultural fields and vineyards in the countryside adjacent to the City.

Issues Not Evaluated Further

The Project would be located entirely within an urbanized area. No rural areas would be affected by the Project. In addition, as described in Section 3.1.1, *Existing Conditions, Environmental Setting*, no scenic vistas or officially designated federal, state, or local scenic routes are associated with the Planning Area. For these reasons, the visual character and quality of rural areas, scenic vistas, and scenic routes would not be affected by the Project and these resources are not discussed further. There would be no impact.

Impacts

Impact AES-1: Conflict with applicable zoning and other regulations governing scenic quality in an urbanized area (less than significant)

The majority of the Planning Area is a highly developed urban environment, with some areas of parks and open spaces and a small amount of agricultural land and other undeveloped areas. New development is focused within the urban areas, including downtown, aging commercial areas, or where large vacant lots exist. The General Plan update policies would ensure that degraded existing visual conditions in the City are improved through renovations, infill, and blight reduction (Goals LUCD-1, LUCD-2, and LUCD-3, Policies LUCD 3-1, 3-2, 3-6, 5-1, 5-2, 5-3). Renovations and infill may have the benefit of making aesthetic identity more cohesive, and new development would be relatively small-scale because the area is already developed. Therefore, the General Plan update would not result in large-scale land use changes that would create substantial changes in aesthetics and visual resources (e.g., changing agricultural or open space land to urban uses). Some of the new areas are in the middle of the City, while others are adjacent to the City's outskirts (outside of existing City limits and RUL but within the SOI), where there is already significant development. In addition, the updated policies ensure that new development would be designed in a manner that is aesthetically pleasing and sensitive to adjacent land uses, including the natural and historical

contexts (Goals HCR-9 and NRC-3 and NRC-4, Policies HCR 9-1, 9-2, 9-3, and NRC 3-1, 3-2, 4-1, 4-2, and 4-3). This objective would be achieved through building, infrastructure, and utility placement and design; the use of landscaping and site amenities; and design review to ensure that updated General Plan update policies are addressed in proposed designs for renovations, infill, and new development. The policies also maintain and improve existing, and provide for new, visual access to important features such as the river, open spaces, and parks (Goals LUCD-1, LUCD-3, and LUCD-25, Policies LUCD 3-2, 3-3, 3-4, 25-3, and 25-7).

At some locations, landscape composition and vividness would be improved by beneficial changes resulting from implementing the General Plan update. For example, visual improvements would come from reducing blight in areas, retrofitting existing streets to improve their appearance, and creating aesthetically pleasing recreational access along the river. It is likely that many viewer groups would find such changes to be favorable.

At other locations, however, higher densities for residential, commercial, and mixed-use development would create a visual environment that is more concentrated, with a more urbanized appearance compared to a visual environment that currently contains lower densities (Goals LUCD-1, LUCD-2, LUCD-3, and LUCD-14, Policies LUCD 11-2, 14-1 to 14-4, LUCD 24-2, and HCR 9-1). The visual environment would change from lower density development to more suburban or urban development. Some viewers may prefer the lower density visual environment while others may perceive this transition favorably. However, the General Plan update would ensure that new development would achieve a high standard of visual quality that would be consistent with existing regulations governing scenic quality. In addition, because most of the new development would occur within or adjacent to City limits, in areas that are already developed to some extent, impacts would be less than significant, and no mitigation is necessary.

Impact AES-2: Creation of a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area (less than significant with mitigation)

Development under the General Plan update would result in new suburban, urban, commercial/retail, and recreational development, and infill in existing urban and suburban areas. New development allowed by the General Plan update could increase light and glare in the Planning Area by removing vegetation that provides shade, introducing reflective surfaces, and increasing interior and exterior nighttime lighting that would affect daytime and nighttime views. However, under California's 2019 Building Energy Efficiency Standards, all new or altered residential and nonresidential buildings in California must meet a set of mandatory requirements for lighting systems and lighting controls that are designed to help limit light pollution and ensure light levels are appropriate for the area served (e.g., undeveloped, rural, parks/open space, or urban). These requirements include elements such as controls that turn lights off when buildings are unoccupied, and limitations on backlight, uplight, and glare in nonresidential settings, and motion sensors or timers on outdoor residential lighting (California Lighting Technology Center 2019a,2019b). In addition to these requirements, the General Plan update includes policies that could reduce light and glare.

The policies summarized below pertain to light and glare.

- **Land Use and Community Development Element:** Policy LUCD 20-2 increases street trees, which would reduce light and glare.

- **Transportation Element:** Policy TE 2-4 promotes the use of lighting for sidewalks to enhance safety and establish effective mode transitions and Policy TE 3-1 supports lighted crosswalks to enhance the pedestrian experience in Downtown Napa. These two policies could increase light within the Planning Area.
- **Safety and Noise Element:** Policy SN 6-7 seeks to reduce light pollution in Napa by incorporating dark sky initiatives, such as lights that cast little or no light upwards in public areas or roadways, and turning off lights in empty buildings at night.

While the California standards and these General Plan update policies would act to limit light pollution and glare, proposed land use changes to support higher density development would increase the number of sources of light and glare by increasing the number of units per acre and the number of cars that would be traveling in the Planning Area. New lighting at crosswalks would also increase the number of sources of light in the Planning Area. However, the areas where development is proposed are already built environments, so increases in light and glare would not create substantial changes, and increased numbers of street trees would help to reduce light and glareAlthough little could be done to reduce residential interior lighting, all other development (civic, institutional, commercial, retail) can use interior lighting that greatly reduces light spill compared to traditional interior lighting.

Exterior lighting could negatively affect sensitive receptors if not properly designed. In particular, light-emitting diode (LED) lighting can negatively affect humans by increasing nuisance light and glare, in addition to increasing ambient light glow, if proper shielding is not provided and blue-rich white light lamps (BRWL) are used (American Medical Association 2016; International Dark-Sky Association 2010a, 2010b, 2015). Studies have found that a 4000K white LED light causes approximately 2.5 times more pollution than high pressure sodium lighting with the same lumen output, which would affect sensitive receptors and more than double the perceived brightness of the night sky (Aubé et al. 2013; Falchi et al. 2011, 2016). This would result in a substantial source of nighttime light and glare that would adversely affect nighttime views in the area if lighting were not properly designed and shielding is not employed.

Also, while LED lighting is often recessed and directed downward, replacing existing streetlights with BRWL LED lighting can result in substantial light trespass because the LED light is much brighter than traditional street lighting. Installing LEDs at the same height as traditional street lighting results in lighting a larger area than intended. This can be particularly troublesome in residential areas where LED lighting can spill into living rooms and bedrooms at night, and the nuisance light and glare can negatively affect humans' circadian rhythms and sleep patterns. It would also result in a substantial source of nighttime light and glare that would adversely affect nighttime views in the Planning Area.

Glare would result from increases in reflective surfaces such as building and car windows, lighting, and replacement of vegetation with built features. Glare would be more pronounced if very light and bright or reflective materials are used. Streetscaping and residential landscaping—supported by General Plan update policies—would help by planting trees and shrubs that can help to partially filter light and glare. However, such plantings would not fully offset the increases in light and glare that would occur as a result of the General Plan update. Windows in multi-level and high-rise buildings would introduce large reflective surfaces that could affect passing traffic and nearby viewers. This glare could be dangerous for drivers, especially in late fall and winter when lower sun angles increase the potential for such glare, even though building design may reduce the effects of glare to a degree by using elements such as building overhangs.

Safety and Noise Element policy SN 6-7 seeks to reduce the impacts of lighting by incorporating dark sky initiatives, such as lights that cast little or no light upwards in public areas or roadways and turning off lights in empty buildings at night. Safety and Noise Element policy SN 6-8 addresses appropriate lighting standards in the City's Municipal Code for streetlights and all residential and commercial artificial outdoor lighting, using the Illuminating Engineering Society's design guidelines, and in compliance with International Dark-Sky Association–approved fixtures. Impacts associated with light and glare from future development as a result of the General Plan update would be minimized through implementation of these policies and the impact would be less than significant.

3.1.3 References Cited

American Medical Association. 2016. *Human and Environmental Effects of Light Emitting Diode (LED) Community Lighting (CSAPH Report 2-A-16)*. Presented by: Louis J. Kraus, MD, Chair. Available: http://darksky.org/wp-content/uploads/bsk-pdf-manager/AMA_Report_2016_60.pdf. Accessed: March 31, 2021.

Aubé, M., J. Roby, and M. Kocifaj. 2013. Evaluating Potential Spectral Impacts of Various Artificial Lights on Melatonin Suppression, Photosynthesis, and Star Visibility. July 5. *PLOS (Public Library of Science) ONE*. 8(7). Available: http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0067798. Accessed: March 31, 2021.

California Department of Transportation. 2019. *List of Eligible and Officially Designated State Scenic Highways*. Last updated: July 2019. Available: https://dot.ca.gov/programs/design/lap-landscape-architecture-and-community-livability/lap-liv-i-scenic-highways. Accessed: August 25, 2021.

California Lighting Technology Center, UC Davis. 2019a. *Nonresidential Lighting and Electrical Power Distribution: A Guide to Meeting or Exceeding California's 2019 Building Energy Efficiency Standards*. Available: https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/online-resource-center/lighting. Accessed: August 27, 2021.

———. 2019b. Residential Lighting: A Guide to Meeting or Exceeding California's 2019 Building Energy Efficiency Standards. Available: https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/online-resource-center/lighting. Accessed: August 27, 2021.

City of Napa. 1998. *Envision Napa 2020, City of Napa General Plan Policy Document.* Adopted December 1, 1998.

———. 1996. *Big Ranch Specific Plan.* Adopted October 22, 1996

Falchi, F., P. Cinzano, D. Duriscoe, C.C.M. Kyba, C.D. Elvidge, K. Baugh, B.A. Portnov, N.A. Rybnikova, and R. Furgoni. 2016. The New World Atlas of Artificial Night Sky Brightness. June 10. *Science Advances.* 2(6). Available: http://advances.sciencemag.org/content/2/6/e1600377. Accessed: March 31, 2021.

Falchi, F., P. Cinzano, C.D. Elvidge, D.M. Keith, A. Haim. 2011. Limiting the Impact of Light Pollution on Human Health, Environment and Stellar Visibility. *Journal of Environmental Management* (2011), doi:10.1016/j.jenvman.2011.06.029. Available:

https://www.yumpu.com/en/document/view/6983159/limiting-the-impact-of-light-pollution-on-human-health-environment-. Accessed: March 31, 2021.

Federal Highway Administration. 2015. *Guidelines for the Visual Impact Assessment of Highway Projects*. (FHWA-HEP-15-029.) USDOT (US Department of Transportation). Washington, DC. January 2015.

International Dark-Sky Association. 2010a. Seeing Blue. April 2010. *Nightscape 80*: 8-12. Available: http://darksky.org/wp-content/uploads/bsk-pdf-manager/29_SEEINGBLUE(1).PDF. Accessed: March 31, 2021.

_____. 2010b. *Visibility, Environmental, and Astronomical Issues Associated with Blue-Rich White Outdoor Lighting*. May 4, 2010. Available: http://www.darksky.org/wp-content/uploads/bsk-pdf-manager/8_IDA-BLUE-RICH-LIGHT-WHITE-PAPER.PDF. Accessed: March 31, 2021.

_____. 2015. IDA Issues New Standards on Blue Light at Night. April 2015. *Nightscape, The 2014 Annual Report. 94*: 10. Available: http://darksky.org/wp-content/uploads/2015/06/NS94.pdf. Accessed: March 31, 2021.

Litton, R. Burton, Jr. 1968. *Forest Landscape Description and Inventories – A Basis for Land Planning and Design*. (U.S. Department of Agriculture Forest Service Research Paper PSW-49) Pacific Southwest Forest and Range Experiment Station. Berkeley, CA. 1968.

MIG. 2012. *City of Napa Downtown Napa Specific Plan*. Adopted May 2012.

U.S. Soil Conservation Service. 1978. *Procedure to establish priorities in landscape architecture* (Technical Release No. 65). Washington, DC.

USDA Forest Service. 1995. *Landscape Aesthetics: A Handbook for Scenery Management.* (Agriculture Handbook Number 701).

3.2 Air Quality

This section describes the regulatory and environmental setting for air quality in the Planning Area, analyzes effects on air quality that would result from implementation of the General Plan, and provides mitigation measures, if applicable, to reduce the effects of any significant impacts. This section has been prepared using methods and assumptions recommended in the air quality impact assessment guidelines of the Bay Area Air Quality Management District (BAAQMD). Greenhouse gas emissions and impacts are discussed in Chapter 3.7, *Greenhouse Gas Emissions*. There were no comments related to air quality received during the Notice of Preparation scoping period.

3.2.1 Existing Conditions

3.2.1.1 Regulatory Setting

This section describes relevant federal, State, and local regulations applicable to the Project.

Federal

Clean Air Act and National Ambient Air Quality Standards

Air quality regulation in the United States is administered by the U.S. Environmental Protection Agency (EPA) and governed by the federal Clean Air Act (CAA), which was first enacted in 1963 and amended most recently in 1990. The CAA establishes federal air quality standards, known as National Ambient Air Quality Standards (NAAQS), for six common air pollutants found all over the U.S., referred to as criteria air pollutants (discussed in Section 3.2.1.2, *Environmental Setting*). The CAA also mandates that each state submit and implement a State Implementation Plan (SIP) for local areas not meeting those standards. The SIPs must include pollution control measures that demonstrate how the standards will be met. The 1990 amendments to the CAA identify specific emission-reduction goals for areas that do not meet the NAAQS. These amendments require both a demonstration of reasonable further progress toward attainment and incorporation of additional sanctions for failure to attain or meet interim milestones.

Table 3.2-1 shows the NAAQS currently in effect for each criteria air pollutant. The California Ambient Air Quality Standards (CAAQS) (discussed below) are included for reference.

Table 3.2-1. Federal and State Ambient Air Quality Standards

Criteria Pollutant	Average Time	California Standards	National Standards[a]	
			Primary	Secondary
Ozone	1-hour	0.09 ppm	None[b]	None[b]
	8–hour	0.070 ppm	0.070 ppm	0.070 ppm
Particulate matter (PM_{10})	24-hour	50 μg/m³	150 μg/m³	150 μg/m³
	Annual mean	20 μg/m³	None	None
Fine particulate matter ($PM_{2.5}$)	24-hour	None	35 μg/m³	35 μg/m³
	Annual mean	12 μg/m³	12.0 μg/m³	15 μg/m³
Carbon monoxide	1-hour	20 ppm	35 ppm	None
	8-hour	9.0 ppm	9 ppm	None
Nitrogen dioxide	1-hour	0.18 ppm	0.100 ppm	None
	Annual mean	0.030 ppm	0.053 ppm	0.053 ppm
Sulfur dioxide[c]	1-hour	0.25 ppm	0.075 ppm	None
	3-hour	None	None	0.5 ppm
	24-hour	0.04 ppm	0.014 ppm	None
	Annual mean	None	0.030 ppm	None
Lead	30-day Average	1.5 μg/m³	None	None
	Calendar quarter	None	1.5 μg/m³	1.5 μg/m³
	3-month average	None	0.15 μg/m³	0.15 μg/m³
Sulfates	24-hour	25 μg/m³	None	None
Visibility reducing particles	8-hour	–[d]	None	None
Hydrogen sulfide	1-hour	0.03 ppm	None	None
Vinyl chloride	24-hour	0.01 ppm	None	None

Source: Bay Area Air Quality Management District 2017a

μg/m³ = micrograms per cubic meter.

[a] National standards are divided into primary and secondary standards. Primary standards are intended to protect public health, whereas secondary standards are intended to protect public welfare and the environment.

[b] The federal 1-hour standard of 12 parts per hundred million was in effect from 1979 through June 15, 2005. The revoked standard is referenced because it was employed for such a long period and is a benchmark for State Implementation Plans.

[c] The annual and 24-hour NAAQS for SO_2 only apply for 1 year after designation of the new 1-hour standard to those areas that were previously in nonattainment for 24-hour and annual NAAQS.

[d] CAAQS for visibility-reducing particles is defined by an extinction coefficient of 0.23 per kilometer—visibility of 10 miles or more due to particles when relative humidity is less than 70 percent.

State

California Clean Air Act and California Ambient Air Quality Standards

In addition to being subject to requirements of the CAA, air quality in California is also governed by more stringent regulations under the California Clean Air Act of 1988 (CCAA). The CCAA established a statewide air pollution control program that requires all air districts in the state to endeavor to meet the CAAQS by the earliest practical date. Unlike the federal CAA, the CCAA does not set precise attainment deadlines. Instead, the CCAA establishes increasingly stringent requirements for areas that will require more time to achieve the standards. CAAQS are generally more stringent than the

NAAQS and incorporate additional standards for sulfates, hydrogen sulfide, visibility-reducing particles, and vinyl chloride. The CAAQS and NAAQS are listed together in Table 3.2-1.

California Air Resources Board (CARB) and regional air districts bear responsibility for achieving California's air quality standards through district-level air quality management plans that would be incorporated into the SIP. CARB has traditionally established state air quality standards, maintaining oversight authority in air quality planning, developing programs for reducing emissions from motor vehicles, developing air emission inventories, collecting air quality and meteorological data, and approving SIPs.

The CCAA designates air districts as lead air quality planning agencies, requires air districts to prepare air quality plans, and grants air districts authority to implement transportation control measures. The act gives local air pollution control districts explicit authority to regulate indirect and area-wide sources of air pollution and to establish air traffic control measures (ATCMs).

State Tailpipe Emission Standards

CARB established a series of increasingly strict emission standards, including the Truck and Bus Regulation of 2008, for new off-road diesel equipment, on-road diesel trucks, and harbor craft. New construction equipment used for future projects under the Project, including heavy duty trucks and off-road construction equipment, will be required to comply with the standards.

CARB Air Quality and Land Use Handbook: A Community Health Perspective

In 2005, CARB released the final version of the Air Quality and Land Use Handbook (California Air Resources Board, 2005), which is intended to encourage local land use agencies to consider the risks from air pollution before making decisions that approve the siting of new sensitive receptors, such as homes or day care centers, near sources of air pollution. Unlike industrial or stationary sources of air pollution, siting of new sensitive receptors does not require air quality permits but could result in adverse air quality issues. The primary purpose of the handbook is to highlight the potential health impacts associated with close proximity to common air pollution sources and to have those issues considered in the planning process. CARB makes recommendations regarding the distance of new sensitive land uses near freeways, distribution centers, rail yards, ports, refineries, chrome plating facilities, dry cleaners, and gasoline dispensing stations.

CARB acknowledges that land use agencies have to balance other siting considerations, such as housing and transportation needs, economic development priorities, and other quality-of-life issues. In addition, siting some sensitive receptors, such as residences, near transportation facilities, employment centers, and services would reduce overall emissions from a community.

These "advisory" siting recommendations (or buffer distances), summarized in Table 3.2-2, are based primarily on modeling information and may not be entirely reflective of conditions in the Planning Area. The recommendations were established based on data showing that air pollution exposures (localized) can be reduced as much as 80 percent with the recommended separation. The siting of new sensitive land uses within the identified buffer distances may be possible, but only after site-specific studies are conducted to identify the potential health risks.

Table 3.2-2. CARB Recommendations on Siting New Sensitive Land Uses

Source Category [a]	Advisory Recommendations [b]
Freeways and High-Traffic Roads	Avoid siting new sensitive land uses within 500 feet of a freeway, urban roads with 100,000 vehicles/day, or rural roads with 50,000 vehicles/day.
Dry Cleaners Using Perchloroethylene	Avoid siting new sensitive land uses within 300 feet of any dry cleaning operation. For operations with two or more machines, provide 500 feet. For operations with 3 or more machines, consult with the local air district. Do not site new sensitive land uses in the same building with perc dry cleaning operations.
Gasoline Dispensing Facilities	Avoid siting new sensitive land uses within 300 feet of a large gas station (defined as a facility with a throughput of 3.6 million gallons per year or greater). A 50-foot separation is recommended for typical gas dispensing facilities.

Source: California Air Resources Board, 2005.

[a] Additional Source Categories can be found on Table 1-1 of the Handbook.

[b] Per CARB: These recommendations are advisory. Land use agencies have to balance other considerations, including housing and transporation needs, economic development priorities, and other quality of life issues.

Toxic Air Contaminant Regulations

The California Health and Safety Code defines TACs as air pollutants that may cause or contribute to an increase in mortality or in serious illness, or that may pose a present or potential hazard to human health. TACs are less pervasive in the urban atmosphere than criteria air pollutants but are linked to short-term (acute) or long-term (chronic and/or carcinogenic) adverse human health effects.

California regulates TACs (equivalent to hazardous air pollutants at the federal level) primarily through the Toxic Air Contaminant Identification and Control Act (Tanner Act, AB 1807) and the Air Toxics "Hot Spots" Information and Assessment Act of 1987 (Hot Spots Act, AB 2588). The Tanner Act created California's program to reduce exposure to air toxics and is supplemented by the Hot Spots Act, which requires a statewide air toxics inventory, notification of people exposed to a significant health risk, and facility plans to reduce air toxics exposure risks. The California Office of Environmental Health Hazard Assessment (OEHHA) is required to develop guidelines for health risk assessments under the Air Toxics Hot Spots Program. These guidelines provide the scientific basis for the values used to assess the risk of emissions exposure from facilities and new sources.

The Tanner Act also identified diesel particulate matter (DPM) from diesel-fueled engines as TACs. The Diesel Risk Reduction Plan, approved in September 2000, implements statewide ACTMs designed to reduce emissions from both new and existing diesel-fueled engines and vehicles. Future projects under the Project would be required to comply with applicable diesel control measures.

Vehicle Miles Traveled

The State of California passed Senate Bill 743 (Chapter 386, 2013), directing changes to the California Environmental Quality Act (CEQA) guidelines that established Vehicle Miles Traveled (VMT) as the transportation metric analyzed under CEQA, effective July 1, 2020. VMT measures (in miles) how much automobile travel on roadways is associated with a proposed land use by multiplying the number of automobile trips by the total distance a vehicle travels between trip

origin and destination. Utilization of VMT as the transportation CEQA metric is intended to balance the needs of congestion management with statewide goals related to infill development, transit investments, promotion of public health through active transportation, and reduction of greenhouse gas (GHG) emissions.

Regional

Bay Area Air Quality Management District

At the local level, responsibilities of air quality districts include overseeing stationary-source emissions, approving permits, maintaining emissions inventories, maintaining air quality stations, overseeing agricultural burning permits, and reviewing air quality–related sections of environmental documents required by CEQA. The air quality districts are also responsible for establishing and enforcing local air quality rules and regulations that address the requirements of federal and state air quality laws and for ensuring that NAAQS and CAAQS are met.

The Project falls under the jurisdiction of BAAQMD. BAAQMD has local air quality jurisdiction over projects in the San Francisco Bay Area Air Basin (SFBAAB) including Napa County. BAAQMD developed advisory emission thresholds that are outlined in its *California Environmental Quality Act, Air Quality Guidelines* (CEQA Guidelines) to assist CEQA lead agencies in determining the level of significance of a project's emissions, including ozone, CO, particulate matter, TACs, and odors. (Bay Area Air Quality Management District 2017c)

2017 Clean Air Plan

BAAQMD adopted the *2017 Clean Air Plan: Spare the Air, Cool the Climate* (2017 Clean Air Plan), which updates the prior 2010 Bay Area ozone plan and outlines feasible measures to reduce ozone; provides a control strategy to reduce particulate matter, air toxics, and GHGs in a single, integrated plan; and establishes emission control measures to be adopted or implemented. (Bay Area Air Quality Management District 2017b). The 2017 Clean Air Plan contains the following primary goals.

- **Protect Air Quality and Health at the Regional and Local Scale**: Attain all state and national air quality standards, and eliminate disparities among Bay Area communities in cancer health risk from TACs.
- **Protect the Climate:** Reduce Bay Area GHG emissions to 40 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050; the 2017 Clean Air Plan is the most current applicable air quality plan for the air basin and consistency with this plan is the basis for determining whether the Project would conflict with or obstruct implementation of an air quality plan.

The 2017 Clean Air Plan includes a control strategy comprised of 85 control measures that are aimed at reducing air pollution in the SFBAAB. The control measures are classified for the following nine general sectors: Stationary Sources, Transportation, Energy, Buildings, Agriculture, Natural and Working Lands, Waste Management, Water; and Super-GHG Pollutants. While all of these sectors are relevant to the General Plan, 46 control measures are most applicable to the Project and are discussed under Impact AQ-1.

District Rules and Regulations

In addition to air quality plans, the BAAQMD also adopts regulations and rules to improve existing and future air quality (Bay Area Air Quality Management District 2021). The Project may be subject to the following district rules.

- **Regulation 2, Rule 2 (New Source Review).** This regulation contains requirements for Best Available Control Technology (BACT) and emission offsets.
- **Regulation 2, Rule 5 (New Source Review of Toxic Air Contaminants).** This regulation outlines guidance for evaluating TAC emissions and their potential health risks.
- **Regulation 6, Rule 1 (Particulate Matter).** This regulation restricts emissions of PM darker than No. 1 on the Ringlemann Chart to less than 3 minutes in any 1 hour.
- **Regulation 6, Rule 3 (Wood Burning Devices).** This regulation restricts wood burning devices in all new development constructed after November 1, 2016.
- **Regulation 7 (Odorous Substances).** This regulation establishes general odor limitations on odorous substances and specific emission limitations on certain odorous compounds.
- **Regulation 8, Rule 3 (Architectural Coatings).** This regulation limits the quantity of reactive organic gases (ROG) in architectural coatings.
- **Regulation 9, Rule 6 (Nitrogen Oxides Emission from Natural Gas–Fired Boilers and Water Heaters).** This regulation limits emissions of nitrogen oxides (NO_X) generated by natural gas–fired boilers.
- **Regulation 9, Rule 8 (Stationary Internal Combustion Engines)**. This regulation limits emissions of NO_X and CO from stationary internal combustion engines of more than 50 horsepower.
- **Regulation 11, Rule 2 (Asbestos Demolition, Renovation and Manufacturing).** This rule controls emissions of asbestos to the atmosphere during demolition, renovation, milling and manufacturing and establishes appropriate waste disposal procedures.

Best Management Practices

The following table includes current BMPs identified by BAAQMD for construction equipment and address both dust generated by construction activity (fugitive dust) as well as exhaust from construction equipment. The list is updated as new technologies or strategies become available to further reduce the air quality and health impacts associated with construction activity. All of the best practices applicable to a project should be required at the time grading permits are issued. (Bay Area Air Quality Management District 2016b)

Table 3.2-3. BAAQMD Construction Best Practices

Target	Best Management Practice/Construction Mitigation Measure
Dust - Required	• All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day. • All haul trucks transporting soil, sand, or other loose material off-site shall be covered. • All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping should be done in conjunction with thorough watering of the subject roads. • All vehicle speeds on unpaved roads shall be limited to 15 mph. • All roadway, driveway and sidewalk paving shall be completed as soon as possible. Building pads shall be paved as soon as possible after grading. • All construction sites shall provide a posted sign visible to the public with the telephone number and person to contact at the Lead Agency regarding dust complaints. The recommended response time for corrective action shall be within 48 hours. The Air District's Complaint Line shall also be included on posted signs to ensure compliance with applicable regulations.
Dust - Additional	• All exposed surfaces shall be watered at a frequency adequate to maintain minimum soil moisture of 12 percent. Moisture content can be verified by lab samples or moisture probe. • All excavation, grading, and/or demolition activities shall be suspended when average wind speeds exceed 20 mph. • Wind breaks (e.g., trees, fences) shall be installed on the windward side(s) of actively disturbed areas of construction. Wind breaks should have maximum 50 percent air porosity. • Vegetative ground cover (e.g., fast germinating native grass seed) shall be planted in disturbed areas as soon as possible and watered appropriately until vegetation is established. • The simultaneous occurrence of excavation, grading, and ground-disturbing construction activities on the same area at any one time shall be limited. Activities shall be phased to reduce the amount of disturbed surfaces at any one time). • All trucks and equipment, including their tires, shall be washed off prior to leaving the site. • Site accesses to a distance of 100 feet from the paved road shall be treated with a six- to 12-inch compacted layer of wood chips, mulch, or gravel. • Sandbags or other erosion control measures shall be installed to prevent silt runoff to public roadways from sites with a slope greater than one percent.
Exhaust - Required	• Idling time of diesel-powered construction equipment, trucks and generators shall be limited to no more than 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations). Clear signage shall be provided for construction workers at all access points. • All construction equipment shall be maintained and properly tuned in accordance with the manufacturers' specifications.

Target	Best Management Practice/Construction Mitigation Measure
Exhaust - Additional	• The applicant/general contractor for the project shall demonstrate to the local jurisdiction that all off-road equipment greater than 25 hp that will be operating for more than 20 hours over the entire duration of the construction activities at the site, including equipment from subcontractors meets the following requirement: ○ Be Zero Emissions OR have engines that meet or exceed either EPA or CARB Tier 2 off-road emission standards; and ○ Have engines are retrofitted with a CARB Level 3 Verified Diesel Emissions Control Strategy (VDECS), if one is available for the equipment being used (equipment with engines meeting Tier 4 Interim or Tier 4 Final emission standards automatically meet this requirement, therefore a VDECS would not be required). • Idling time of diesel-powered construction equipment, trucks and generators shall be limited to no more than 2 minutes. • Portable diesel generators shall be prohibited. Grid power electricity should be used to provide power at construction sites; or propane and natural gas generators may be used when grid power electricity is not feasible. • Use low VOC (i.e., ROG) coatings beyond the local requirements (i.e., Regulation 8, Rule 3: Architectural Coatings). • Requiring that all construction equipment, diesel trucks, and generators be equipped with Best Available Control Technology for emissions reductions of NO_X and PM.

Source: Bay Area Air Quality Management District 2016b, 2017.

Local

City of Napa General Plan

The current City of Napa General Plan was adopted in 1998 and has a planning horizon of 2020. The *Land Use, Community Services,* and *Natural Resources* elements of the current General Plan include policies that pertain to air quality. For example, land use policies include incorporation of green building techniques, energy efficiency, and mixed-use designs that to support mass transit; community services policies encourage waste reduction and recycling; and natural resources policies specifically seek to protect air quality in Napa. Additionally, although goals and policies of the General Plan's *Transportation Element* are not specifically focused on reduction of criteria pollutant emissions, they support developing streets that focus on safe travel for all users which would encourage non-automotive travel.

City of Napa Housing Element 2015-2023

The City of Napa Housing Element's current planning period is in effect until 2023, in line with the region's eight-year housing cycle. Goal H-2 and Policy H2.15 encourage mixed use projects and a diversity of housing types at varying densities to achieve sustainable development patterns that foster pedestrian-, bicycle-, and transit-friendly environments. Goal H-3 and Policy H3.9 emphasize provision of "complete neighborhoods" that offer amenities, services, and other community needs within walking distance, complemented by sustainable site and building design guidelines and practices (Green Building program).

3.2.1.2 Environmental Setting

Ambient air quality is affected by climatological conditions, topography, and the types and amounts of pollutants emitted. Atmospheric conditions, such as wind speed, wind direction, and air temperature gradients interact with the physical features of the landscape to determine the

movement and dispersal of air pollutants. Unique geographic features throughout the state define fifteen air basins with distinctive regional climates.

Napa is located within the SFBAAB. The following discussion describes relevant characteristics of the SFBAAB, describes key pollutants of concern, summarizes existing ambient pollutant concentrations, and identifies sensitive receptors.

Regional Climate and Meteorology

The SFBAAB is approximately 6,745 square miles, topographically bounded by the Pacific Ocean to the west and the San Gabriel, San Bernardino, and San Jacinto Mountains to the north and east. The air basin is a coastal plain with connecting broad valleys and low hills and includes all of Alameda, Contra Costa, Napa, Marin, and San Francisco counties, the southern portion of Sonoma County, and the southwestern portion of Solano County.

The Bay Area's climate is dominated by the strength and position of the semi-permanent high-pressure center over the Pacific Ocean. During the summer, dry and subsiding air associated with high pressure off the coast acts as a cap over the cooler marine air near the surface. During the winter, when the high-pressure system has retreated southward, subsidence inversions are less common; however, radiant inversions caused by warmer air radiating back from the land trapped under colder air masses above are frequent. These inversions typically develop overnight and, though they can restrict the vertical dispersion of pollutants emitted at ground level, generally dissipate by afternoon.

The City of Napa is located in a northwest trending valley and is generally flat, with an average elevation of seven feet above sea level throughout the central parts of the City. Elevations rise toward Vaca Range to the east and the Mayacamas Mountains on the west at the edges of the Planning Area. The San Pablo Bay is to the south of the Planning Area, and Napa Valley continues to the north.

The City of Napa has a Mediterranean climate typical for the region with cool, wet winters and warm, dry summers. Temperatures range from an average monthly high of 83 degrees Fahrenheit (ºF) in July to an average monthly low of 40ºF in January. Annual precipitation in the area is 27 inches, with most rainfall happening during the winter months between December and March. Summer temperatures can include extreme high temperatures of over 100ºF.

In general, prevailing winds are moderate in strength, with consistent northwesterly winds that are stronger during the summer months. The average annual wind speed in Napa is 7.1 miles per hour (mph).

Pollutants of Concern

Criteria Air Pollutants

As noted in the *Regulatory Setting* subsection, the federal and State governments have established ambient air quality standards for six criteria air pollutants, including ozone, CO, nitrogen dioxide (NO_2), particulate matter (PM_{10}), fine particulate matter ($PM_{2.5}$), and sulfur dioxide (SO_2). Ozone is considered a regional pollutant because its precursors affect air quality on a regional scale. Pollutants such as CO, NO_2, SO_2, and lead are considered local pollutants that tend to accumulate in the air locally. Particulate matter (PM) is both a regional and local pollutant.

The primary criteria pollutants generated by the Project are ozone precursors (i.e., nitrogen oxides [NO_X] and reactive organic gases [ROGs]), CO, and PM. These are described below.

- **Ozone**, or smog, is photochemical oxidant that is formed when ROG and NO_X—both byproducts of internal combustion engines—react with sunlight. Ozone poses a health threat to those who already suffer from respiratory diseases as well as to healthy people. Additionally, ozone has been tied to crop damage, typically in the form of stunted growth and premature death. Ozone can also act as a corrosive, resulting in property damage, such as the degradation of rubber products.
- **Reactive organic gases** are compounds made up primarily of hydrogen and carbon atoms. Internal combustion associated with motor vehicles is the major source of hydrocarbons. Other sources of ROG are emissions associated with the use of paints and solvents, the application of asphalt paving, and the use of household consumer products such as aerosols. Adverse effects on human health are not caused directly by ROG but rather by reactions of ROG to form secondary pollutants such as ozone. ROG is synonymous with volatile organic compounds (VOC), which is commonly used to describe compound limits for architectural coatings such as paint.
- **Nitrogen oxides** serve as integral participants in the process of photochemical smog production. The two major forms of NO_X are nitric oxide (NO) and NO_2. NO is a colorless, odorless gas formed from atmospheric nitrogen and oxygen when combustion takes place under high temperature or high pressure. NO_2 is a reddish-brown, irritating gas formed by the combination of NO and oxygen. NO_X acts as an acute respiratory irritant and increases susceptibility to respiratory pathogens.
- **Carbon monoxide** is a colorless, odorless, toxic gas produced by incomplete combustion of carbon substances, such as gasoline or diesel fuel. The primary adverse health effect associated with CO is interference with normal oxygen transfer to the blood, which may result in tissue oxygen deprivation and, in extreme cases, death.
- **Particulate matter** consists of finely divided solids or liquids such as soot, dust, aerosols, fumes, and mists. Two forms of fine particulates are now recognized—inhalable coarse particles, or PM_{10}, and inhalable fine particles, or $PM_{2.5}$. Particulate discharge into the atmosphere results primarily from industrial, agricultural, construction, and transportation activities. However, wind on arid landscapes also contributes substantially to local particulate loading. Both PM_{10} and $PM_{2.5}$ may adversely affect the human respiratory system, especially in people who are naturally sensitive or susceptible to breathing problems.

Toxic Air Contaminants

Although ambient air quality standards have been established for criteria pollutants, no ambient standards exist for TACs. Many pollutants are identified as TACs because of their potential to increase the risk of developing cancer or because of their acute or chronic health risks. For TACs that are known or suspected carcinogens, CARB has consistently found that there are no levels or thresholds below which exposure is risk-free. Individual TACs vary greatly in the risks they present. At a given level of exposure, one TAC may pose a hazard that is many times greater than another. TACs are identified and their toxicity is studied by OEHHA. The primary TACs of concern associated with the Project are asbestos and diesel particulate matter (DPM).

Asbestos is the name given to several naturally occurring fibrous silicate minerals. Before the adverse health effects of asbestos were identified, asbestos was widely used as insulation and fireproofing in buildings, and it can still be found in some older buildings. It is also found in its natural state in rock or soil. The inhalation of asbestos fibers into the lungs can result in a variety of adverse health effects, including inflammation of the lungs, respiratory ailments (e.g., asbestosis, which is scarring of lung tissue that results in constricted breathing), and cancer (e.g., lung cancer and mesothelioma, which is cancer of the linings of the lungs and abdomen).

DPM is generated by diesel-fueled equipment and vehicles. Within the Bay Area, BAAQMD has found that of all controlled TACs, emissions of DPM are responsible for about 82 percent of the total ambient cancer risk. (Bay Area Air Quality Management District 2017b) Short-term exposure to DPM can cause acute irritation (e.g., eye, throat, and bronchial), neurophysiological symptoms (e.g., lightheadedness and nausea), and respiratory symptoms (e.g., cough and phlegm). The EPA has determined that diesel exhaust is "likely to be carcinogenic to humans by inhalation." (U.S. Environmental Protection Agency 2003)

Odors

BAAQMD's thresholds for odors are qualitative and based on BAAQMD's Regulation 7, Odorous Substances. This rule places general limitations on odorous substances and specific emission limitations on certain odorous compounds. Odors are also regulated under BAAQMD Regulation 1, Rule 1-301, Public Nuisance, which states that no person shall discharge from any source whatsoever quantities of air contaminants or other materials that cause injury, detriment, nuisance, or annoyance to any considerable number of persons or the public; endanger the comfort, repose, health, or safety of any such persons or the public; or cause, or have a natural tendency to cause, injury or damage to businesses or property. Under this rule, a facility that receives three or more violation notices within a 30-day period can be declared a public nuisance. BAAQMD has established odor screening thresholds for land uses that have the potential to generate substantial odor complaints, including wastewater treatment plants, landfills or transfer stations, composting facilities, confined animal facilities, food manufacturing, and chemical plants.

Existing Air Quality Conditions

Ambient Criteria Pollutant Concentrations

Over 30 ambient air quality monitoring stations located throughout SFBAAB monitor the district's progress toward air quality standards attainment of NAAQS and CAAQS. The Napa Valley College monitoring station—which is located at Magnolia Drive and Highway 221 and has been active since April 1, 2018—is used to assess ambient air quality conditions for the Planning Area.

The Napa Valley College site is a replacement for the Jefferson Street station, which was located at 2552 Jefferson Street and closed in March 2018. According to the BAAQMD 2020 Air Monitoring Network Plan, the current Napa Valley College station is expected to be terminated as of June 1, 2021, due to scheduled construction of the college's student housing project. Relocation for the site, pursuant to 40 CFR 58.14 (c)(6), will be coordinated by the air district and EPA.

Table 3.2-4 summarizes data for criteria air pollutant levels from the Napa Valley College monitoring station for the last three years (2018–2020). Air quality concentrations are expressed in terms of parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$). As shown in Table 3.2-3, the monitoring station has experienced occasional violations of ozone and $PM_{2.5}$ NAAQS and/or

CAAQS. No violations of the CO or NO_2 NAAQS and CAAQS were reported during the monitoring period.

Existing TAC Sources and Health Risks

The health effects associated with TACs are evaluated by their carcinogenic and non-carcinogenic potential and generally are assessed locally rather than regionally. BAAQMD maintains and inventory of stationary sources that emit TACs, which are regulated by BAAQMD's Regulation 2, Rule 5 (See section 3.2.1.1, *Regulatory Setting*). Although carcinogens are assumed not to have a safe level below which health impacts would not occur, BAAQMD CEQA Guidelines provide significance thresholds for both carcinogens and non-carcinogens (see Section 3.2.2.2*, Thresholds of Significance*).

BAAQMD's inventory of permitted stationary sources was last updated in 2020 and is publicly available online. Table 3.2-5 provides a summary of the stationary sources within 1,000 feet of the Planning Area, and Figure 3.2-1 and Figure 3.2-2 maps these facilities. There are 111 stationary sources in total, consisting primarily of generators and gasoline dispensing facilities.

BAAQMD measures $PM_{2.5}$ concentrations of permitted stationary sources as part of its inventory. Figure 3.2-1 shows the locations of existing stationary sources of $PM_{2.5}$ with concentrations greater than zero $\mu g/m^3$. There are six locations greater than 0.3 $\mu g/m^3$ and five greater than 0.8 $\mu g/m^3$, meaning that six stationary sources currently exceed the individual project-level threshold and five that exceed the cumulative threshold, per BAAQMD guidance. While most of these sources are not within 1,000 feet of existing sensitive receptors (see Figure 3.2-1), the effect of clustered or other nearby sources can result in higher concentrations and risk of exposure at greater distances.

Figure 3.2-2 shows stationary sources with their associated cancer risk and hazard index levels. One location exceeds the BAAQMD threshold for non-carcinogenic hazards (1.0), and 31 facilities currently exceed the cancer risk threshold of 10.0 cases in one million. Several of these sources that already exceed BAAQMD thresholds are within 1,000 feet of a sensitive receptor, and many of these locations are clustered together. It is noted that some overlapping locations shown in Figure 3.2-2 are a single facility that has both a cancer risk and hazard index greater than zero.

Aside from stationary sources, emissions of TACs in and around the Planning Area are also generated from mobile sources. BAAQMD considers roadways with greater than 10,000 average daily traffic (ADT) as "high volume roadways" and recommends they be included in the analysis of health risks. Existing roadways located in the immediate proximity of the Planning Area (within 1,000 feet) that have ADT greater than 10,000 vehicles include State Route (SR) 12, SR 29, SR 121, and SR 221 (see Figure 3.2-3). Additionally, First Street, Lincoln Avenue, Trancas Street, Coombsville Road, Soscol Avenue, Big Ranch Road, Imola Avenue, California Boulevard, and Jefferson Street are arterial streets that traverse the Planning Area and have ADT volumes greater than 10,000.

Highways that pass through the Planning Area represent the greatest mobile source of TACs (primarily DPM from diesel-powered vehicles) due to the high volume of vehicles that travel on these roads on a daily basis. The segments of SR 12, SR 29, SR 121, and SR 221 in and near the Planning Area have annual average daily traffic volumes as high as 37,000, 68,000, 15,000, and 41,500, respectively. According to BAAQMD's screening tools, the lifetime cancer risk associated with traffic on SR 29, the highway with the highest average daily traffic in the Planning Area, for a receptor 10 feet west of the roadway in the Planning Area may exceed 57 cases per million.

Off-road mobile sources such as construction equipment and trains are also potential sources of TACs. BAAQMD recommends evaluating cumulative community risk and hazard impacts of these sources. Other influential source types include railyards and truck distribution centers, but these are often more complex and require more advanced modeling techniques beyond those provided by BAAQMD guidance. Railroad activity in the Planning Area is limited to one excursion rail line, the Napa Valley Wine Train, and no freight lines. Four miles of this railroad are located within the Planning Area, though the tracks south of McKinstry Street station in Downtown Napa are less frequently used, as typical operations include only two trains that make a round trip between Downtown Napa and St. Helena per day. However, it is noted that the tracks south of McKinstry Street station could be activated at any time. Because activity along this corridor is limited and there are no large rail yards in the Planning Area, rail is not considered a significant source for air quality impacts in this Draft EIR.

Table 3.2-4. Ambient Air Quality Monitoring Data from Project Area (2018-2020)

Pollutant	2018	2019	2020
Ozone (O_3)			
Maximum 1-hour concentration (ppm)	0.083	0.095	0.091
Maximum 8-hour concentration (ppm)	0.068	0.076	0.077
Number of days standard exceeded[a]			
CAAQS 1-hour (>0.09 ppm)	0	1	0
CAAQS 8-hour (>0.070 ppm)	0	2	1
NAAQS 8-hour (>0.070 ppm)	0	1	1
Carbon Monoxide (CO)			
Maximum 8-hour concentration (ppm)	1.1	1.0	2.7
Maximum 1-hour concentration (ppm)	1.4	1.3	4.4
Number of days standard exceeded[a]			
NAAQS 8-hour (≥9 ppm)	0	0	0
CAAQS 8-hour (≥9.0 ppm)	0	0	0
NAAQS 1-hour (≥35 ppm)	0	0	0
CAAQS 1-hour (≥20 ppm)	0	0	0
Nitrogen Dioxide (NO_2)			
State maximum 1-hour concentration (ppm)	0.043	0.036	0.029
Annual average concentration (ppm)	NA*	0.004	0.004
Number of days standard exceeded			
CAAQS 1-hour (0.18 ppm)	0	0	0
NAAQS 1-hour (0.10 ppm)	0	0	0
Particulate Matter (PM_{10})[b]			
State[e] maximum 24-hour concentration (μg/m^3)	26	39	125
Annual average concentration (μg/m^3)	NA*	NA	19
Number of days standard exceeded[a, c]			
NAAQS 24-hour (>150 μg/m^3)[g]	0	0	0
CAAQS 24-hour (>50 μg/m^3)[g]	0	0	2

Pollutant	2018	2019	2020
Particulate Matter ($PM_{2.5}$)			
State[e] maximum 24-hour concentration (μg/m³)	117.9	21.5	148.5
Annual average concentration (μg/m³)[f]	NA*	6.0	10.4
Number of days standard exceeded[a, c]			
NAAQS 24-hour (>35 μg/m³)	12	0	14
Sulfur Dioxide (SO_2)			
No data available			

Sources: California Air Resources Board 2020a.

ppm = parts per million.
NAAQS = National Ambient Air Quality Standards.
CAAQS = California Ambient Air Quality Standards.
μg/m³ = micrograms per cubic meter.
mg/m³ = milligrams per cubic meter.
> = greater than.
NA = not applicable due to insufficient data.

[a] An exceedance is not necessarily a violation.

[b] National statistics are based on standard conditions data. In addition, national statistics are based on samplers using federal reference or equivalent methods.

[c] Number of exceedance days only include measured days.

[d] State statistics are based on local conditions data, except in the South Coast Air Basin, for which statistics are based on standard conditions data. In addition, State statistics are based on California approved samplers.

[e] Measurements usually are collected every 6 days.

[f] State criteria for ensuring that data are sufficiently complete for calculating valid annual averages are more stringent than the national criteria.

[g] Mathematical estimate of how many days concentrations would have been measured as higher than the level of the standard had each day been monitored. Values have been rounded.

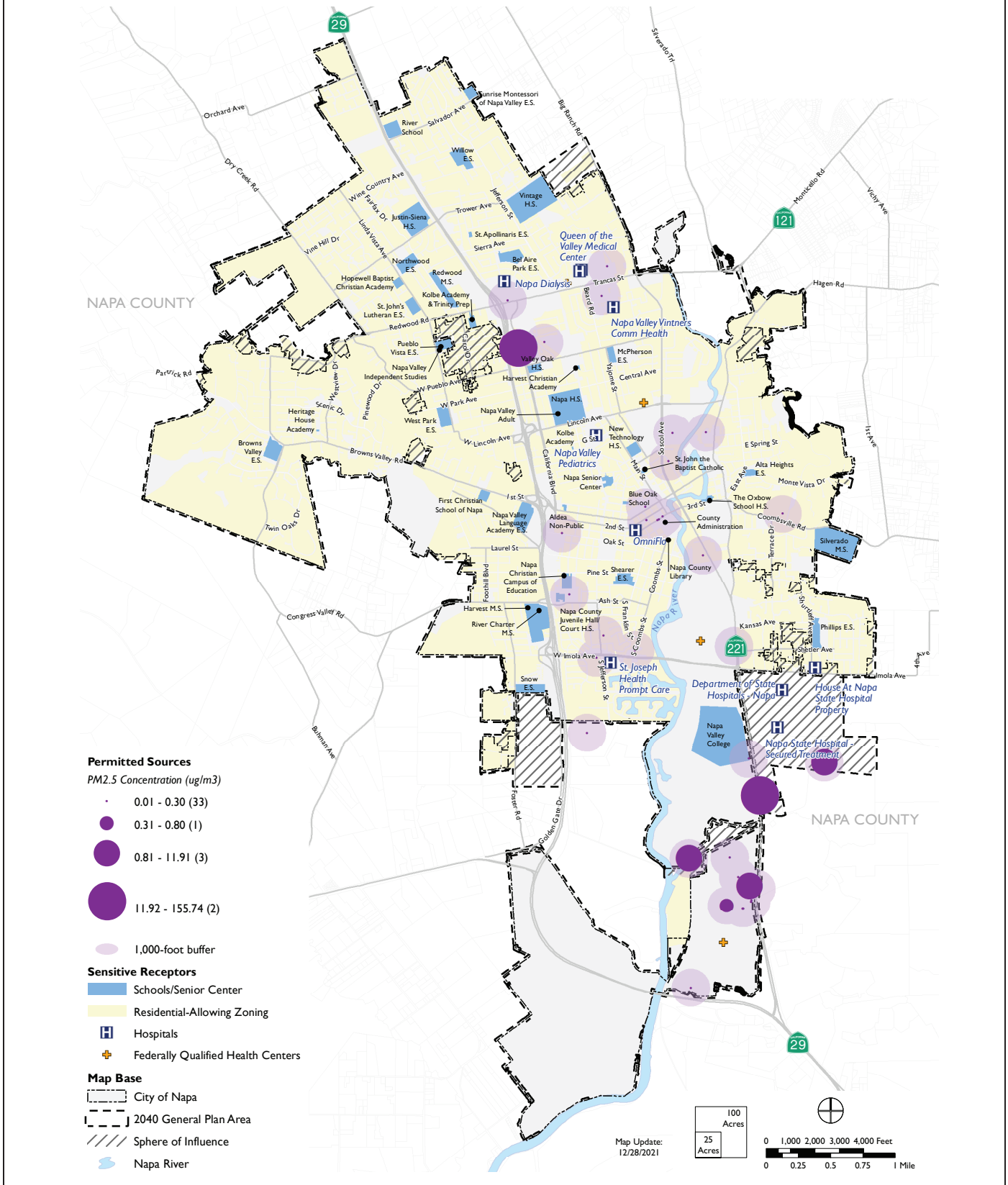
* Air monitoring at the Jefferson Street station in Napa was discontinued on March 31, 2018. Air monitoring at Napa Valley College began on April 1, 2018. Therefore, annual averages for ozone and $PM_{2.5}$, and PM_{10} statistics are not available for this year.

Table 3.2-5. Existing Permitted Stationary Sources within approximately 1,000 feet of the Planning Area

Gas Dispensing Facility	Generator	Other Stationary Source
• Arco Facility #2106 • Beacon • Bel Aire Shell • Browns Valley Chevron • California Highway Patrol • Chevron Inc #9-4820 • Conserv Fuel • CSR Hydro Conduit • Dept of Transportation • Former ARCO #4971 • Ishaq Trading Corp • Jefferson Car Wash Inc • Joe's Chevron • Lincoln Ave Chevron • Mobil SS# 68171 • Napa Ford-Lincoln • Napa Shell	• AT&T California • AUL CORP • California Highway Patrol • City of Napa - Fire Station No. 5 • Collabria Care • Comcast Cable Corporation • Golden Living Center - Napa • Hampton Inn & Suites • Intelsat Corporation • Jamieson Canyon Water Treatment Plant • Judicial Council of California JCC 28-A1 • Kaiser Permanente (multiple) • Lodgeworks • Lucky #730 • Monroe Forsyth Inc. • Napa Ambulatory Surgery Center	• Advanced Auto Body Center • Altissimo Restoration • Bel Aire Plaza, LLC • Black Hawk Body Shop • Boral Stone Products LLC • Caliber Collision Center • CalMat Co dba Shamrock Materials • CertainTeed Gypsum and Ceiling Mfg Inc • Embassy Suites Napa • ExxonMobil Oil Corporation • Hydro Conduit Corporation • Kaiser Permanente • Lito Auto Body Inc • Mike Rose's Auto Body Inc • Myers & Sons Hi-Way Safety Inc • Napa Collision Center

Gas Dispensing Facility	Generator	Other Stationary Source
• Napa Valley College • PG&E Napa Service Center • Redwood Auto Service 76 • Redwood Rd Chevron • Royal Coach Limousine Services • Salvador Chevron • Shell SS#68169 • Shell SS#68172 • Store #58305 • United Rentals • Walsh Vineyards Management Inc	• Napa County • Napa County Animal Shelter • Napa County Public Works (multiple) • Napa Sanitation District (multiple) • Napa Square Owner NY LLC • Napa Valley Plastic Surgery • Napa Valley Unified School District • Napa Valley Vintners Community Health Center • Pacific Bell • Queen of the Valley Medical Center • Regulus • River Front Construction LLC • Target Corporation #1026 • Target Corporation Store #1438 • The Home Depot • The Meadows of Napa Valley* • Verasa Napa Condominium Owner's Association Inc • Verizon Wireless (Coombsville)* • Verizon Wireless (Napa)* • Washington Outpatient Surgery Center	• Napa Redevelopment Partners, LLC • Napa State Hospital • Napa Valley College • Napa-Vallejo Waste Management Authority • Napco Painting Contractors, Inc • North Bay Plywood • Paupaiz Fine Coffees • Pro Tones • Safeway Inc #2449 • Soscol Auto Body Inc • Sunsweet Cabinetry • Syar Industries Inc • Tulocay Cemetery Association • Valley Auto Body

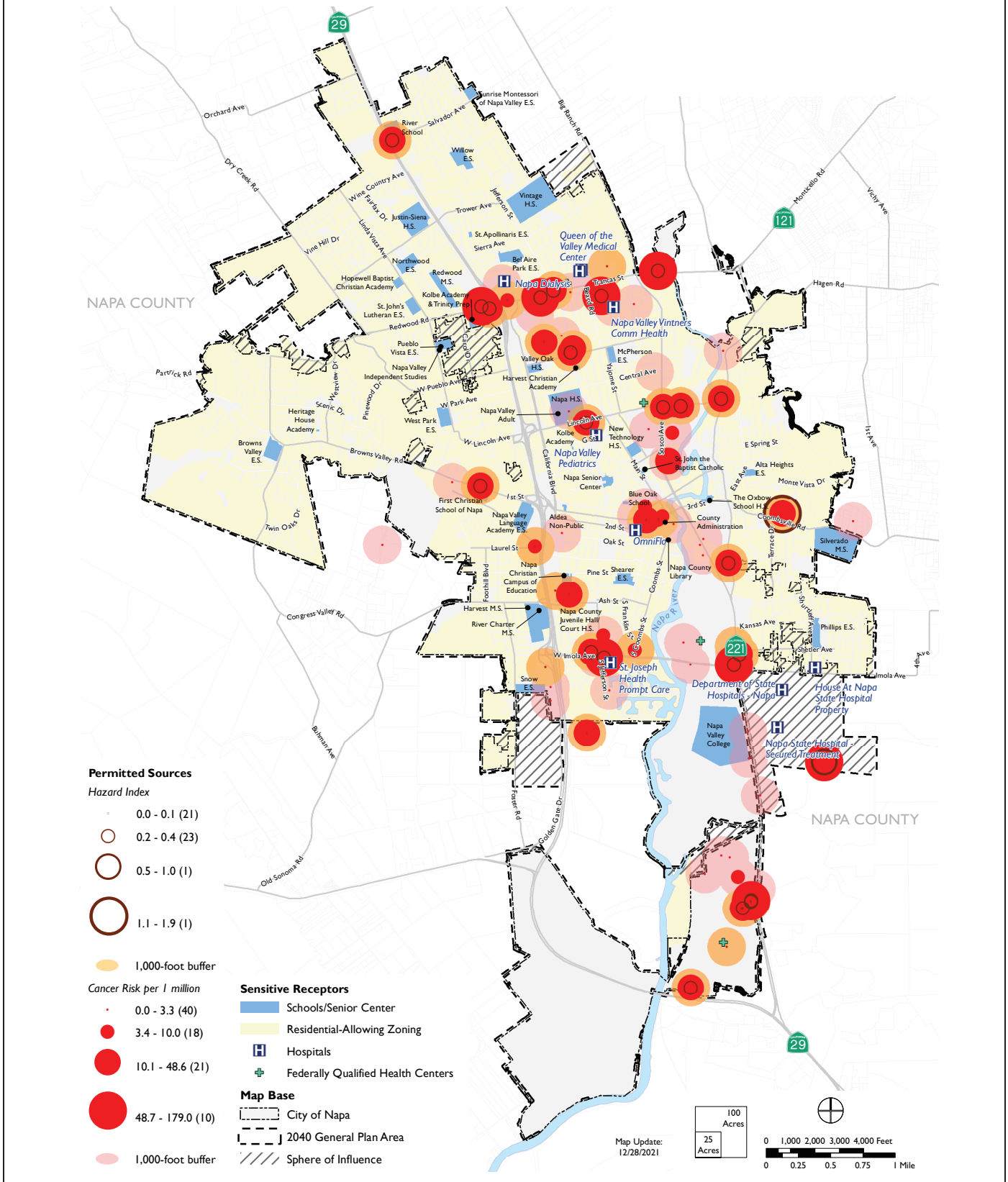
Source: Bay Area Air Quality Management District 2020.
* Indicates source is located outside of Planning Area boundaries but within 1,000 feet.



Source: Bay Area Air Quality Management District, 2020; US EPA, 2020; Napa County, 2018; City of Napa, 2021; Dyett & Bhatia, 2021.

ICF Graphics ... 00494.18 (1/5/22) JC

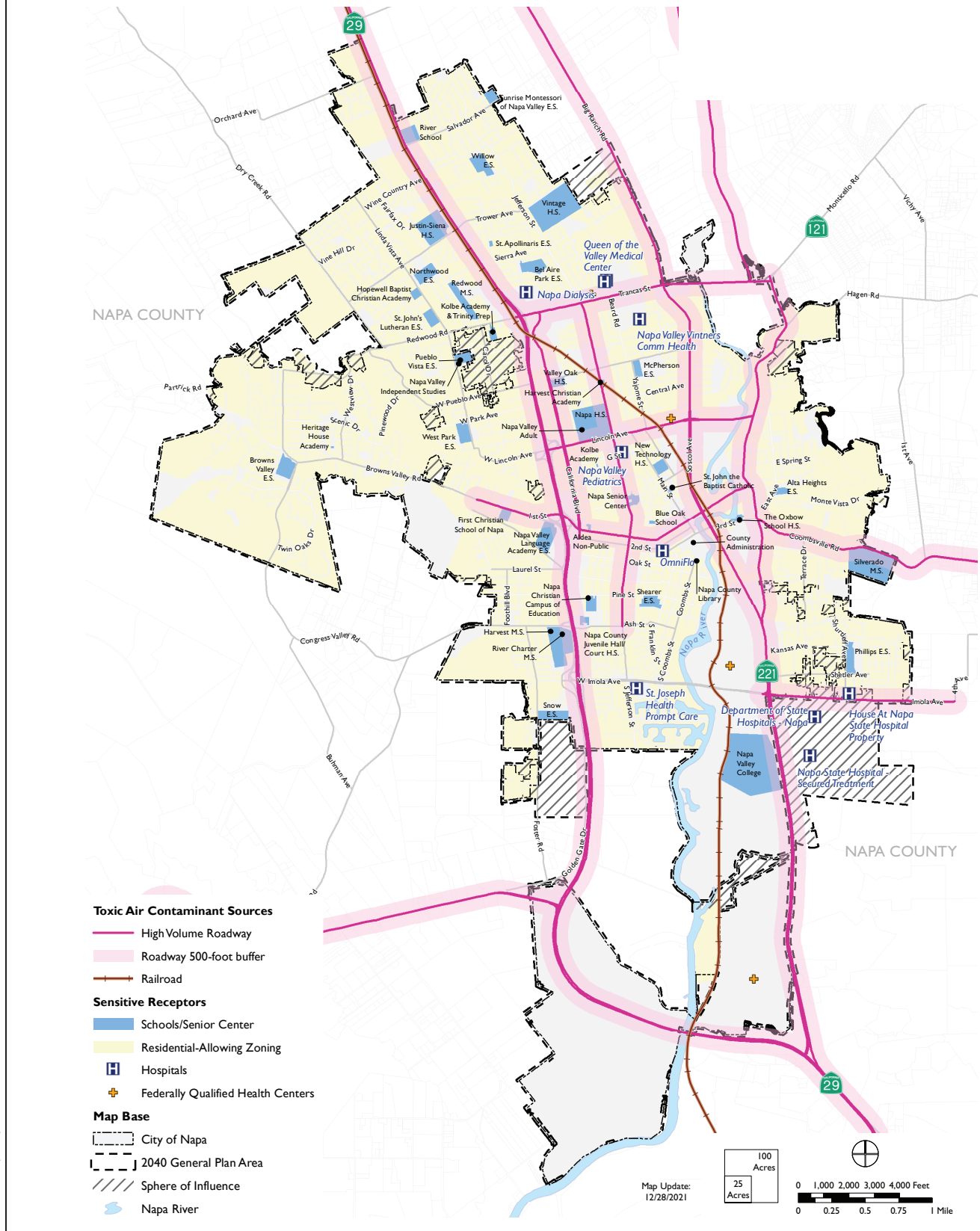
Figure 3.2-1
PM2.5 Sources and Sensitive Receptors



Source: Bay Area Air Quality Management District, 2020; US EPA, 2020; Napa County, 2018; City of Napa, 2021; Dyett & Bhatia, 2021.

ICF Graphics ... 00494.18 (1/5/22) JC

Figure 3.2-2
Existing Permitted Sources Risks and Hazards



Source: US EPA, 2020; Napa County, 2018; City of Napa, 2021; Dyett & Bhatia, 2021.

ICF Graphics ... 00494.18 (1/5/22) JC

Figure 3.2-3
Mobile TAC Sources and Sensitive Receptors

Regional Attainment Status

Local monitoring data (Table 3.2-4) are used to designate areas as nonattainment, maintenance, attainment, or unclassified for the NAAQS and CAAQS, as defined below. Table 3.2-6 summarizes the attainment status of Napa County for ozone, CO, and PM.

- **Nonattainment** is assigned to areas where monitored pollutant concentrations consistently violate the standard in question.
- **Maintenance** is assigned to areas where monitored pollutant concentrations exceeded the standard in question in the past but are no longer in violation of that standard.
- **Attainment** is assigned to areas where pollutant concentrations meet the standard in question over a designated period of time.
- **Unclassified** is assigned to areas were data are insufficient to determine whether a pollutant is violating the standard in question.

Table 3.2-6. Federal and State Ambient Air Quality Attainment Status for Napa County Portion of the SFBAAB

Pollutant	Federal	State
Ozone (8-hour)	Nonattainment - Marginal[a]	Nonattainment
CO	Maintenance (Part)[b]	Attainment
PM_{10}	Unclassified	Nonattainment
$PM_{2.5}$	Unclassified/Attainment[c]	Nonattainment

Sources: California Air Resources Board 2020b; U.S. Environmental Protection Agency 2021.

[a] On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm. An area will meet the standard if the fourth-highest maximum daily 8-hour ozone concentration per year, averaged over three years, is equal to or less than 0.070 ppm. EPA will make recommendations on attainment designations by October 1, 2016, and issue final designations October 1, 2017. Nonattainment areas will have until 2020 to late 2037 to meet the health standard, with attainment dates varying based on the ozone level in the area.

[b] Part of the county is within the boundary of one or more maintenance areas.

[c] In December 2012, EPA strengthened the annual $PM_{2.5}$ NAAQS from 15.0 to 12.0 micrograms per cubic meter ($\mu g/m^3$). In December 2014, EPA issued final area designations for the 2012 primary annual $PM_{2.5}$ NAAQS. Areas designated "unclassifiable/attainment" must continue to take steps to prevent their air quality from deteriorating to unhealthy levels. The effective date of this standard is April 15, 2015.

Sensitive Receptors

Some receptors are considered more sensitive than others to air pollutants. The reasons for greater than average sensitivity include pre-existing health problems, proximity to emissions source, or duration of exposure to air pollutants. Land uses such as schools, children's day care centers, hospitals, and convalescent homes are considered to be more sensitive than the general public to poor air quality because the population groups associated with these uses have increased susceptibility to respiratory distress and other air quality-related health problems. Parks and playgrounds are considered moderately sensitive to poor air quality because persons engaged in strenuous work or exercise also have increased sensitivity to poor air quality; however, exposure times are generally far shorter in parks and playgrounds than in residential locations and schools, which typically reduces overall exposure to pollutants. Residential areas are considered more sensitive to air quality conditions than commercial and industrial areas because people generally spend longer periods of time at their residences, resulting in greater exposure to ambient air quality conditions.

As a programmatic planning document, the Project does not include exact locations, sizes, or land use type for any individual projects that will occur within the City under the General Plan. As such, there are no new sensitive locations specifically identified with respect to the Project; however, Figure 3.2-1 shows the locations of existing sensitive receptors, including schools, hospitals, and residential areas that are likely to be continuing uses in the future. State law restricts the siting of new schools within 500 feet of a freeway, urban roadways with 100,000 vehicles per day, or rural roadways with 50,000 vehicles with some exceptions. CARB has published advisory recommendations on siting new sensitive land uses, with the same guidelines as the state school limitation. As a conservative estimate of impacts, sensitive receptors are anticipated to be located directly adjacent to new development.

3.2.2 Environmental Impacts

3.2.2.1 Methods for Analysis

Impacts of the Project on air quality and criteria pollutant emissions from operations were quantified (where applicable) and assessed using standard and accepted software tools, techniques, and emission factors. Construction emissions were assessed qualitatively due to the availability of data for this plan-level document. The primary assumptions and key methods used to quantify emissions and estimate potential impacts are described below. Model inputs and calculation files are provided in Appendix B, *Air Quality Data.*

Construction

As discussed in Chapter 2, *Project Description*, of this Draft EIR, the proposed General Plan would facilitate development of a mix of uses, including a range of housing options and commercial and retail spaces in Focus Areas, Downtown, and other opportunity sites throughout Planning Area. Implementation of the Project could ultimately result in a net new development of up to 7,800 residential units, 817,000 square feet (s.f.) of office use, 631,000 s.f. of retail use, and 1,799,000 s.f. of industrial use.

The land uses that could be developed under the Project would generate construction-related emissions from mobile and stationary construction equipment exhaust, employee and haul truck vehicle exhaust and fugitive dust, fugitive dust from land clearing and material movement, and off-gassing emissions from paving and application of architectural coatings. Buildout of the Project would take place incrementally over a period of 20 years as individual development projects are proposed. As such, the specific size and location of each future individual development project occurring within the Planning Area from implementation of the proposed General Plan, and the construction techniques and scheduling that would be utilized cannot be known at this time.

With an anticipated buildout year of 2040, development of the various land uses associated with the proposed General Plan would occur over an extended period of time and would depend on factors such as local economic conditions, market demand, and other financing considerations. Without specific project-level details it is not possible to develop a refined construction inventory, so the determination of construction air quality impacts for each individual development project (or a combination of projects) would require the City to speculate regarding such potential future project-level environmental impacts. Thus, in the absence of the necessary construction information required to provide an informative and meaningful analysis, the evaluation of potential

construction-related impacts resulting from implementation of the proposed General Plan is conducted qualitatively in this Draft EIR, consistent with BAAQMD CEQA Guidelines.

Operations

Long-term (i.e., operational) regional emissions of criteria air pollutants and precursors, including mobile-, area-, and energy-source emissions, were quantified for the Project using the most recent version of California Emissions Estimator Model (CalEEMod), version 2020.4.0. Mass mobile-source emissions were modeled based on the daily vehicle trips and vehicle miles traveled (VMT) data provided by DKS Associates, the Project's traffic engineers, for the existing and Project buildout year conditions. For the purposes of this analysis, existing conditions are modeled for 2021, and buildout conditions are for year 2040, which coincides with the Project's planning horizon. It is noted that modeled transportation data (e.g., VMT and daily trips) use an existing baseline year of 2015, consistent with the regional Solano-Napa Activity-Based Model (SNABM). All other inputs to CalEEMod—such as the amount of existing development—use 2021 values or the most recent data available. As such, the transportation inputs (2015) are used primarily to appropriately scale the model's default factors to the Planning Area, and the modeled emissions are intended to reflect baseline conditions for 2021.

Area and energy (natural gas) emissions were modeled according to the amount (i.e., commercial/industrial square footage or number of dwelling units) and type of land uses proposed. Area sources account for direct sources of air emissions, and includes those generated from hearth (e.g., natural gas fireplaces) usage, consumer product use, landscape maintenance equipment, and architectural coatings used for the repainting of buildings. Energy sources account for emissions associated with the combustion of natural gas for building heating and hot water. Emissions were quantified for existing and Project buildout conditions based on current and anticipated land uses. CalEEMod defaults were assumed, with the exception of wood burning stoves and fireplaces, which were assumed to be prohibited for all new development under the Project per BAAQMD Regulation 6, Rule 3. Because operational details for each individual development project proposed under the Project are currently unknown, CalEEMod defaults were assumed based on the anticipated land uses. Land use assumptions and CalEEMod output files are in Appendix B, *Air Quality Data*. Stationary sources such as emergency generators and boilers that would be developed for each individual development project, or a combination of these projects, would be subject to the permitting requirements by the BAAQMD. Stationary sources are discussed qualitatively, because details of future projects and their stationary sources cannot be known at this time.

To evaluate the Project's potential operational air quality impacts, the increase in criteria pollutant emissions resulting from its implementation in the City of Napa over existing conditions is assessed against BAAQMD's project-level thresholds, discussed under Section 3.2.2.2, *Thresholds of Significance.*

3.2.2.2 Relevant General Plan Update Goals and Policies

Climate Change and Sustainability

Goal CCS-1: Further the City's sustainability initiatives to reduce the community's GHG emissions, and foster green development patterns – including buildings, sites, and landscapes.

Policy CCS 1-1: Seek to achieve net zero climate pollutants from public and private operations within the City by 2030 and carbon neutrality by 2040, which is five years sooner than what is established under Executive Order B-55-18.

Policy CCS 1-2: The City should lead by example in managing its local government operations to reduce GHG emissions and promote sustainable environmental practices. Components of this strategy include:

- Develop plans for the reduction of fossil fuel consumption through all aspects of local government operations, including construction, purchasing, and ongoing operations.
- Require new or substantially renovated municipal facilities to incorporate cost-effective strategies for reducing greenhouse gas emissions, conserving energy and water, and utilizing sustainable construction practices.
- Reduce solid waste from City operations.

Policy CCS 1-3: Partner with local, regional, and County agencies and utility companies to achieve GHG reduction targets. Efforts for this include:

- Support local efforts to market programs, and conduct community outreach through schools, non-profit groups, community organizations, and the business community to increase participation in GHG reduction efforts.
- Partner with the Napa Valley Unified School District, private schools, community-based non-profit organizations, and others to undertake public outreach and education efforts that broaden community involvement in reducing GHG emissions.
- Foster and build public/private partnerships that help achieve greater energy efficiency and reduce GHG emissions.

Policy CCS 1-4: Expand local awareness of actions that residents and businesses can take to reduce climate impacts. Actively seek grants, and continue to provide community outreach and robust education through partnership opportunities with City residents. Develop an open data Community Climate Dashboard to engage residents in progress and accomplishments toward goals.

Policy CCS 1-5: Work collaboratively with regional agencies and other partners to develop a Climate Action Plan to address statewide GHG reduction and elimination goals, including those of Executive Order B-55-18, Senate Bill 32, and Executive Order S-03-05.

The Climate Action Plan could serve as a Qualified GHG Reduction Strategy to ensure that Napa is in compliance with State targets for GHG emissions.

Goal CCS-2: Promote Napa as a network of interconnected neighborhoods with compact, walkable development patterns that are integrated with a sustainable mobility system that emphasizes walking, biking, or taking transit.

Policy CCS 2-1: Support programs to reduce auto-dependency and GHG emissions from personal vehicles. Efforts for this include:

- Establish regulations to limit uses of drive-through windows, including limitations on drive-through restaurants.
- Initiate programs that encourage car-free tourism through incentives, outreach, awareness, and by creating a bicycle and pedestrian-friendly environment.
- Establish programs to reduce vehicle miles traveled (VMT), such as transportation demand management.
- Support the expansion of Park and Ride areas and other support facilities to encourage use of public transportation, including Napa Valley Transportation Authority's (NVTA) on-

demand service, and car and van pooling. Expand programs that encourage the installation of electric vehicle charging infrastructure.

- Support programs to install bike racks in new developments, commercial areas, and within Downtown Napa and the Oxbow district.

Policy CCS 2-2: Promote increased transit service and ridership in Napa and connections with County transit services, including by implementing transportation plans in accordance with the NVTA Countrywide Transportation Plan.

Policy CCS 2-3: Study options to transition the City's vehicle fleet, starting with small and mid-size vehicles, to vehicles that are 100 percent electric or powered by clean, renewable energy.

Policy CCS 2-4: Support programs that help businesses and organizations switch from fossil fuel-powered fleet vehicles to vehicles powered by clean, renewable energy sources.

Policy CCS 2-6: Encourage alternatives to City employees' use of single-occupancy vehicles by providing bicycle racks, preferential parking permits for carpools and vanpools, commuter information, and other incentives.

Policy CCS 3-3: Install a BioEnergy system at the City of Napa Materials Diversion Facility to reduce solid waste generation and produce renewable energy through the conversion of biomass.

Goal CCS-4: Further the City's Solid Waste & Recycling Division goals to promote recycling, composting, and source reduction services for residential and commercial uses to divert 75 percent (or more) of waste from landfills by 2035 and maintain diversion at 75 percent or greater through 2040.

Goal CCS-5: Ensure that Napa residents are prepared for climate change-induced drought conditions by reducing water consumption and promoting resilient water supplies.

Policy CCS 5-3: Provide education, technology, and financial incentives to promote efficient indoor and outdoor residential water use, and adoption of best management practices for commercial, industrial, and institutional water users.

Policy CCS 5-7: Encourage responsible and sustainable agricultural and landscaping practices.

CCS 5-8: Promote a program to encourage neighborhood tree planting and water-efficient landscaping or xeriscaping strategies.

Goal CCS-6: Considering power shutdowns that affect the Napa community, promote sustainable energy generation practices and further develop energy security that is resilient to wildfire and related climate disasters.

Policy CCS 6-2: Promote renewable energy generation and storage to decrease reliance on outside sources, and minimize impacts from public safety power shutdowns.

Policy CCS 6-4: Promote renewable energy generation on City-owned sites and the deployment of micro-grids for energy independence and lifeline operations in the event of power shutdowns.

Policy CCS 6-5: Evaluate technologies to reduce reliance on fossil fuel-powered backup generators and study program to transition to more climate-friendly options—including battery storage, solar-powered generators, and small-scale wind turbines—in appropriate areas.

Goal CCS-7: Implement programs and work with jurisdictional partners to increase sustainable energy production and energy security.

Policy CCS 7-7: Increase installation of electric vehicle charging stations with funding from State and federal sources.

Policy CCS 7-10: Incentivize the use of on-site renewable energy generation for new and existing buildings.

Goal CCS-8: Support Napa's vision of a sustainable community by promoting efforts to reduce energy demand and resource conservation through improved building design.

Policy CCS 8-1: Support use of the California Green Building Standards Code (CALGreen) to reduce energy demand and promote resource conservation through improved building design. Encourage existing buildings to adapt to CALGreen sustainability practices.

Policy CCS 8-3: Encourage roofing design and surface treatments (e.g., "cool roofs") that reduce the heat island effect of new development, and support reduced energy use, reduced air pollution, and a healthy urban forest. Connect businesses and residents with cool roof rebate programs for new and retrofitted roofs through City outreach efforts.

Goal CCS-9: Celebrate Napa as a Tree City USA and focus efforts to maintain and expand the urban forest.

Community Services, Parks and Recreation

Goal CSPR-6: Improve programs to conserve water, especially during drought.

Goal CSPR-8: Improve programs to reduce waste accumulation in landfills.

Policy CSPR 9-5: Offer a wide variety of park facilities designed to provide educational benefits, and encourage active and passive participation by users of all ages and interests to existing and future residents, including but not limited to: senior services, health and wellness, and youth sports.

Natural Resources and Conservation

Goal NRC-5: Protect air quality within the City and support efforts for enhanced regional air quality.

Policy NRC 5-1: Coordinate with County, regional, State, and federal jurisdictions on air quality standards and seek to adopt local measures.

Policy NRC 5-2: Require that development projects incorporate all applicable BAAQMD Construction Mitigation Measures to reduce construction and operational emissions for reactive organic gases (ROG), nitrogen oxides (NO_X), and particulate matter (PM_{10} and $PM_{2.5}$).

Policy NRC 5-3: Require contractors to use best management practices (BMPs)— including regular materials and vehicle tire watering, covering of stockpiles, phasing or extension of grading operations, suspension of grading during high wind periods, and revegetation of graded areas—to reduce particulate emissions (including PM_{10} and $PM_{2.5}$) and dust associated with construction activities.

Policy NRC 5-4: Require all construction equipment to be maintained and tuned to meet appropriate EPA and CARB emission requirements, including use of Tier 4 engines in off-road equipment and cleaner heavy-duty trucks to reduce NO_X and PM exhaust emission levels.

Goal NRC-6: Through various sustainability measures, reduce greenhouse gas (GHG) emissions, fine particulate matter, and black carbon emissions into the air.

Policy NRC 6-1: Encourage new developments to incorporate sustainable construction and building practices to reduce their pollutant emissions, carbon footprint, and impact on the environment, as outlined in the Green Buildings Standards Code, BAAQMD rules, and the Napa Municipal Code.

Policy NRC 6-2: Implement regulations that will contribute to an improvement in air quality, and reduction of gases that are harmful to the environment and that cause climate change. Example regulations include eliminating fossil fuels (natural gas) in heating spaces and water for new and significantly renovated buildings.

Goal NRC-7: Seek to reduce mobile sources of air pollution by creating denser and walkable neighborhoods, promoting transit-oriented development, and improving bicycle infrastructure, with the goals to reduce the number of miles traveled in cars and improve regional air quality.

Goal NRC-8: Protect sensitive receptors from exposure to substantial concentrations of toxic air contaminants (TACs) and associated health risks.

Policy NRC 8-1: Where feasible, require new sensitive receptors (e.g., schools, day care centers, hospitals, and retirement homes) to be set back from highways and other high-volume roads, consistent with the Bay Area Air Quality Management District's (BAAQMD) Guidelines and California Air Resource Board (CARB) recommendations, to reduce health risks associated with exposure to TACs, including exhaust emissions or particulate matter from diesel engines (DPM).

Policy NRC 8-2: For new sensitive receptors, require the installation of indoor air quality equipment that meet Title 24 standards such as high-efficiency particulate air (HEPA) filters if the recommended siting distances cannot be attained.

Policy NRC 8-3: Consider proximity to the nearest sensitive receptors when reviewing potential siting of new land uses within the Planning Area that may emit TAC emissions or odors.

Policy NRC 8-4: Seek to expand the citywide network of air quality monitors.

Public Health and Equity

Policy PHE 3-1: Protect sensitive receptors such as schools, childcare centers, senior living facilities, and residences from the impacts of stationary and non-stationary sources of pollution by ensuring adequate buffers or mitigation measures.

Policy PHE 3-2: Regularly measure and assess environmental changes as they pertain to public health, such as by coordinating City air quality monitoring and improvement activities and infrastructure with Napa County and regional programs, including efforts administered by neighboring communities. Coordinate with the County and regional partners when planning for the public health implications of climate change, including wildfire smoke effects.

Policy PHE 4-2: Update the City's zoning regulations pertaining to home-based occupations (including cottage food) in residential areas to support complete neighborhoods and diverse communities that provide opportunities for micro-businesses and entrepreneurship, as well as recognize an increase in remote work.

Policy PHE 4-7: Work with the school district and Napa County's Safe Routes to School program to ensure adequate facilities and culturally competent outreach and engagement encouraging children to walk, bicycle, and use other forms of active transportation to travel to and from school.

Land Use and Community Design

Goal LUCD-13: Promote housing and business growth as infill development in Focus Areas in keeping with the City's scale, services, and environment.

Policy LUCD 13-1: Promote infill development in Focus Areas that makes efficient use of limited land supply, while ensuring compatibility and integration with adjacent uses. Ensure that uses and intensities of infill development support a cohesive development pattern.

Transportation

Goal TE-1: Foster a comprehensive network of accessible roads, trails, sidewalks, and pathways that emphasize a Complete Streets approach, while reducing vehicle miles traveled (VMT) and dependence on single-occupancy vehicles.

Goal TE-2: Keep Napa moving with livable streets that provide a balanced, cost-effective, multi-modal transportation system (vehicles, pedestrians, bikes, transit), accommodating the mobility needs of all ages and abilities.

Policy TE 2-8: Coordinate with NVTA on periodic updates to transportation related Countywide Plans.

Goal TE-3: Promote active transportation, support active lifestyles, and encourage physical activity by providing, safe pedestrian and bicycle infrastructure citywide.

Policy TE 3-4: Promote increased pedestrian and bicycle travel citywide. Opportunity areas include higher-intensity and mixed-use areas, including Downtown and the adjacent traditional neighborhoods, and the Jefferson Focus Area.

Goal TE-4: Work with NVTA to continue to develop and maintain an efficient and convenient transit system providing alternatives to the use of the personal automobile to residents, workers, and visitors within the City, with connections within the City, to elsewhere in the County, and beyond.

Goal TE-5: Maintain adequate levels of traffic service that provide for efficient movement of people, goods, and services within the City, and adequate connections to the region and state.

Policy TE 5-3: Maximize the efficiency of the existing automobile infrastructure and manage the major arterials and boulevards so that they provide shorter travel times than parallel neighborhood streets.

Policy TE 5-4: Maintain the automobile Level of Service (LOS) performance target described herein as a local standard to determine where transportation improvements may be needed or required as part of the development approval process. Automobile LOS should not be below a mid-range LOS D, with some exceptions. A mid-range LOS E is permitted in the Downtown area bounded by Soscol Avenue, First Street, California Boulevard, and Third Street; on Jefferson Street between Third Street and Old Sonoma Road; and on Silverado Trail between Soscol Avenue and First Street. LOS E is also permitted for signalized intersections on State Highway facilities within Napa.

Policy TE 5-5: Continue efforts to reduce VMT—such as through pedestrian and bikeway improvements, streetscape design to promote non-vehicle transpotation, mixed-use developments, flexibility in parking standards, and transportation demand management—to reduce automobile traffic and GHG emissions, while recognizing that the City has limited control over regional economic and travel patterns that influence VMT.

Goal TE-6: Support policies and programs to reduce automobile mode share, reduce automobile dependency, and encourage alternative forms of transportation.

Goal TE-7: Maintain parking standards that balance parking demand with urban design goals and do not negatively impact pedestrians, bicyclists, and transit users in development areas throughout the City.

Goal TE-8: Coordinate with Napa County and other agencies to continue safe and efficient operation of the Napa County Airport, Napa River waterfront, and railroads and roadways serving freight movement.

Policy TE 8-5: Implement the truck routes as shown in Figure 3-4 to serve the shipping needs in the City while considering potential conflicts with preferred modes and sensitive land uses in the City.

Goal TE-10: Reduce reliance on fossil fuels and reduce non-point-source pollution by supporting sustainable infrastructure and promoting alternative modes of travel.

Policy TE 10-1: Promote personal use of electric vehicles by providing or promoting adequate publicly-accessible charging stations and designated parking at City facilities, multi-family housing, and commercial developments.

Policy TE 10-3: Work with NVTA to promote sustainable transportation choices by supporting more efficient and accessible mass transit services to BART and SMART Train, the Vallejo Ferry, San Francisco, and Oakland, with easy bicycle service on all connections.

Policy TE 10-5: Expand sustainably generated electric charging station capacity throughout Napa, including within existing and new parking facilities, to encourage electric vehicle ownership, and to meet the Governor's Executive Order N-79-20 targets and future demand.

Policy TE 10-6: Consider opportunities for City co-funding of residential electric vehicle charging, like rooftop solar programs, and promote the installation of EV charging stations within existing apartment complexes.

3.2.2.3 Thresholds of Significance

In accordance with Appendix G of the CEQA Statute and Guidelines, the Project would be considered to have a significant effect if it would result in:

- A conflict with or obstruction of implementation of the applicable air quality plan;
- A cumulatively considerable net increase of any criteria pollutant for which the project region is a nonattainment area for an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors);
- Exposure of sensitive receptors to substantial pollutant concentrations; or
- Creation of objectionable odors affecting a substantial number of people.

Local Air District Thresholds

This analysis evaluates the impacts of regional emissions generated by the Project using a two-tiered approach that considers both project- and plan-level guidance recommended by BAAQMD in its CEQA Guidelines.

First, this analysis considers whether the Project would conflict with the most recent air quality plan (2017 Clean Air Plan), consistent with BAAQMD's guidance for programmatic analyses. The impact analysis evaluates whether the Project supports the primary goals of the 2017 Clean Air Plan, including applicable control measures from the 2017 Clean Air Plan, and whether it would disrupt or hinder implementation of any 2017 Clean Air Plan control measure.

Second, calculated regional criteria pollutant emissions for Project operations are compared to BAAQMD's project-level thresholds. BAAQMD's thresholds are summarized in Table 3.2-7 and are recommended by the air district to evaluate the significance of a project's regional criteria pollutant emissions. Construction-related emissions have not been quantified and are not evaluated with respect to the thresholds. According to BAAQMD, projects with emissions in excess of the thresholds shown in Table 3.2-7 would be expected to have a significant cumulative impact on regional air quality because an exceedance of the thresholds is anticipated to contribute to CAAQS and NAAQS violations.

Table 3.2-7. BAAQMD Project-Level Air Quality Thresholds of Significance for Regional Criteria Pollutants and Precursors

Analysis Scenario/ Pollutant	Threshold (pounds per day)	
	Construction	Operational
ROG	54 lb/day	54 lb/day
NO_X	54 lb/day	54 lb/day
PM_{10}	82 lb/day (exhaust only)	82 lb/day (includes fugitive and exhaust emissions)
$PM_{2.5}$	54 lb/day (exhaust only)	54 lb/day (includes fugitive and exhaust emissions)

Source: Bay Area Air Quality Management District 2017c.

It should be noted that BAAQMD's project-level thresholds were developed to analyze emissions generated by a single project and do not necessarily translate into an evaluation of emissions from a programmatic land use plan. By nature, large-scale land use plans that consist of numerous individual projects will produce more criteria pollutants than single projects, even if the plans include efficiency measures to reduce future emissions. Use of the project-level thresholds to evaluate land use plans may therefore unfairly penalize the plans, yielding a significant and unavoidable conclusion simply due to scale. Nevertheless, project-level thresholds are included in analysis for informational purposes as a comparison of the Project's impacts to air quality.

Although BAAQMD's CEQA Guidelines are intended to help lead agencies navigate through the CEQA process, BAAQMD indicates that the guidelines for implementation of its significance thresholds are advisory only and should be followed by local governments at their own discretion. Nonetheless, BAAQMD's proposed thresholds are supported by substantial evidence and are well-grounded in air quality regulations, scientific evidence, and scientific reasoning concerning air quality and GHG emissions. BAAQMD's 2010 Justification Report, found in Appendix D of BAAQMD's May 2017 CEQA Guidelines, explains the agency's reasoning and provides substantial evidence for developing and adopting their thresholds.

Health-Based Thresholds for Project-Generated Pollutants of Human Health Concern

The California Supreme Court's 2018 decision in *Sierra Club v. County of Fresno* (6 Cal. 5th 502) ruled that that the project's EIR air quality analysis was inadequate because it failed to provide enough detail "for the public to translate the bare [criteria pollutant emissions] numbers provided into adverse health impacts or to understand why such a translation is not possible at this time." The court's decision notes that environmental documents must attempt to connect a project's air quality impacts to specific health effects or explain why it is not technically feasible to perform such an analysis.

All criteria pollutants generated by the proposed General Plan update would be associated with some form of health risk (e.g., asthma, lower respiratory problems). Criteria pollutants can be classified as either regional pollutants or localized pollutants. Regional pollutants can be transported over long distances and affect ambient air quality far from the emissions source. Localized pollutants affect ambient air quality near the emissions source. Ozone is considered a regional criteria pollutant, whereas CO, NO_2, SO_2, and lead are localized pollutants. Particulate matter can be both a local and a regional pollutant, depending on its composition. The primary pollutants of concern generated by the Project would be ozone precursors (ROG and NO_X), CO, particulate matter, and TACs, including DPM.

The sections that follow discuss thresholds and analysis considerations for regional and local project-generated criteria pollutants with respect to their human health implications.

Regional Project-Generated Criteria Pollutants

Adverse health effects from regional criteria pollutant emissions, such as ozone precursors and particulate matter, generated by the Project are highly dependent on a multitude of interconnected variables (e.g., cumulative concentrations, local meteorology and atmospheric conditions, the number and character of exposed individuals [e.g., age, gender]). Therefore, ozone precursors (ROG and NO_X) contribute to the formation of ground-borne ozone on a regional scale. Emissions of ROG and NO_X generated in an area may not correlate to a specific ozone concentration in that same area. Similarly, some types of particulate pollutants may be transported over long distances or formed through atmospheric reactions. As such, the magnitude and locations of specific health effects from exposure to increased ozone or regional particulate matter concentrations are the product of emissions generated by numerous sources throughout a region, as opposed to a single individual project. Moreover, exposure to regional air pollution does not guarantee that an individual will experience an adverse health effect. Moreover, there are large individual differences in the intensity of symptomatic responses to air pollutants. These differences are influenced, in part, by the underlying health condition of an individual, which cannot be known.

Models and tools have been developed to correlate regional criteria pollutant emissions to potential community health impacts. For example, BAAQMD developed a Multi-Pollutant Evaluation Method (MPEM) to estimate health outcomes and the corresponding social and financial value of health benefits resulting from emissions reductions (Bay Area Air Quality Management District 2016a). However, these tools were developed to support regional planning and policy analysis and have limited sensitivity to small changes in criteria pollutant concentrations induced by individual projects. Therefore, translating project-generated criteria pollutants to the locations where specific health effects could occur or the resultant number of additional days of nonattainment is not possible with any degree of accuracy.

As discussed above, air districts develop region-specific CEQA thresholds of significance in consideration of existing air quality concentrations as well as attainment or nonattainment designations under the NAAQS and CAAQS. The NAAQS and CAAQS are informed by a wide range of scientific evidence that demonstrates that there are known safe concentrations of criteria pollutants. Although recognizing that air quality is a cumulative problem, air districts typically consider individual projects that generate criteria pollutant and ozone precursor emissions that are below the thresholds to be minor in nature. Such projects would not cumulatively contribute to adverse air impacts that would exceed the NAAQS or CAAQS.

Emissions generated by the Project could increase photochemical reactions and the formation of tropospheric ozone and secondary particulate matter (as opposed to direct emissions of pollutants), which could lead to increased incidences of specific health consequences at certain concentrations. These health effects are associated with ozone and particulate pollution and are of particular concern from a cumulative and regional perspective. As a 20-year programmatic plan, the Project's incremental contribution to specific health outcomes is difficult to quantify on a regional scale, especially given the magnitude of the Project's emissions in relation to overall regional emissions. As such, a quantitative correlation of Project-generated regional criteria pollutant emissions to specific human health impacts is not included in this analysis. However, it is foreseeable that unmitigated construction-related and operational emissions of ozone precursors and particulate matter could

contribute to cumulative and regional health impacts. Therefore, exceedance of BAAQMD significance thresholds would be considered a significant cumulative contribution to regional violation of health protective ambient air quality standards.

Localized Project-Generated Criteria Pollutants

Localized pollutants generated by a project can affect populations near the emissions source. Because these pollutants dissipate with distance, emissions from individual projects have the most direct and material health impacts on adjacent sensitive receptors. In this Draft EIR, the analysis of impacts on human health focuses only on those localized pollutants with the greatest potential to result in a significant, material impact on human health: localized CO and TACs. This approach is consistent with the current state-of-practice and published guidance by BAAQMD, California Air Pollution Control Officers Association (CAPCOA), OEHHA, and CARB. BAAQMD guidance and thresholds for each pollutant are identified below. Localized PM is also included in the discussion because PM is considered both a regional and local pollutant.

Carbon Monoxide

BAAQMD considers localized CO emissions to result in significant impacts if concentrations exceed CAAQS (Table 3.2-1). The air district has adopted screening criteria that provides a conservative indication of whether project-generated traffic would cause a potential CO hot spot. Screening criteria adopted by BAAQMD are based on the number of additional vehicles added to affected intersections. These quantitative metrics were established based on local modeling and provide a conservative estimate for the maximum number of vehicles that can be added to an intersection without an exceedance of the CO CAAQS.

If the following screening criteria are met, a quantitative analysis through site-specific dispersion modeling of Project-related CO concentrations would not be necessary, and the Project would not cause localized violations of the CAAQS for CO.

- The Project traffic would not increase traffic volumes at affected intersections to more than 44,000 vehicles per hour.
- The Project traffic would not increase traffic volumes at affected intersections to more than 24,000 vehicles per hour where vertical and/or horizontal mixing is substantially limited (e.g., tunnel, parking garage, bridge underpass, natural or urban street canyon, below-grade roadway).
- The Project is consistent with an applicable congestion management program established by the county congestion management agency for designated roads or highways, regional transportation plan, and local congestion management agency plans.

Localized Particulate Matter

At a regional level, PM_{10} and $PM_{2.5}$ are regulated under the criteria pollutant thresholds listed in Table 3.2-7. However, fugitive dust released during construction activities can also have local impacts. Compliance with BAAQMD's required BMPs, as described in Table 3.2-3, would be considered a less-than-significant impact concerning fugitive dust. Localized $PM_{2.5}$, including diesel and gasoline exhaust, is also assessed using risk and hazards thresholds for TACs, discussed below.

Toxic Air Contaminants

Potential health risks from development supported by the Project are assessed based on BAAQMD's plan-level guidance. BAAQMD requires that overlay zones be established around all existing and planned sources of TACs, including stationary sources, high-traffic roadways, and railways. The overlay zones must identify goals, policies, and objectives to minimize potential TAC impacts to existing and future receptors.

A significant impact would result from implementation of the Project if new sensitive receptors would be located within proximity to mobile or stationary sources of TAC emissions, exceeding BAAQMD project and cumulative receptor thresholds for cancer and non-cancer health hazards. The project-level health risk thresholds defined by BAAQMD define the probability of contracting cancer for the maximally exposed individual (MEI) exceeding 10.0 in one million, the ground-level concentrations of non-carcinogenic TACs resulting in a hazard index (HI) greater than 1.0 for the MEI, and the MEI's exposure to $PM_{2.5}$ exhaust (diesel and gasoline) concentrations exceeding 0.3 $\mu g/m^3$. If an individual project exceeds the identified project-level significance thresholds, its emissions in concert with contributions from all nearby sources (cumulative emissions) may result in a significant adverse air quality impact. Cumulative health risk thresholds, as defined by BAAQMD, assess the probability of contracting cancer for the MEI exceeding 100.0 in 1 million, the ground-level concentrations of non-carcinogenic TACs resulting in a HI greater than 1.0 for the MEI, and $PM_{2.5}$ exhaust concentrations exceeding 0.8 $\mu g/m^3$.

Although asbestos is a TAC, there are no quantitative thresholds related to receptor exposure to asbestos. Rather, BAAQMD considers a project to have a significant impact if it does not comply with the applicable regulatory requirements outlined in Regulation 11, Rule 2, which requires the demolition or renovation of asbestos-containing building materials to comply with the limitations of the National Emissions Standards for Hazardous Air Pollutants (NESHAP) regulations as listed in the Code of Federal Regulations.

Odors

BAAQMD and CARB have identified several types of land uses as being commonly associated with odors, such as landfills, wastewater treatment facilities, and animal processing centers. BAAQMD's CEQA Guidelines recommend that plan-level analyses identify the location of existing and planned odor sources and include policies to reduce potential odors impacts in the plan area.

3.2.2.4 Impacts and Mitigation Measures

Impact AQ-1: Conflict with or obstruction of implementation of the applicable air quality plan. (Significant and Unavoidable)

The CAA requires that a SIP or an air quality control plan (AQCP) be prepared for areas with air quality violating the NAAQS. The SIP sets forth the strategies and pollution control measures that states will use to attain the NAAQS. The CCAA requires attainment plans to demonstrate a reduction of five percent per year in nonattainment air pollutants or their precursors, averaged every consecutive three-year period, unless an approved alternative measure of progress is developed. AQCPs outline emissions limits and control measures to achieve and maintain these standards by the earliest practical date. The current AQCP for the SFBAAB is the 2017 Clean Air Plan.

According to BAAQMD's CEQA Guidelines, the determination of 2017 Clean Air Plan consistency should consider the following for plan-level analyses. Each of these questions is addressed for the Project below.

- Is the increase in projected VMT or vehicle trips (either measure may be used) less than or equal to projected population increase?
- Does the plan support the primary goals of the 2017 Clean Air Plan?
- Does the plan include applicable control measures from the 2017 Clean Air Plan?
- Does the plan disrupt or hinder implementation of any 2017 Clean Air Plan control measure?

Projected Vehicle Trips, VMT, and Population

BAAQMD's CEQA Guidelines require that proposed plans (except regional plans) must show that the plan's projected VMT or vehicle trips (either one) increase is less than or equal to its projected population increase over the planning period of the plan to result in a less than significant impact. Table 3.2-8 shows the projected increase in population, service population, VMT, and vehicle trips resulting from implementation of the Project.

The projected increase in population between 2015 and 2040 is 22.8 percent. The projected increase in resident vehicle trips is 3.9 percent, which is significantly lower than population increase. The projected total increase in vehicle trips, which includes both residential and non-residential trips, is higher at 25.6 percent; however, this growth is still less than the 29.5 percent increase in service population, which includes residents and employees. As such, increase in vehicle trips is projected to be less than population growth, and the Project meets this criteria for compliance with the 2017 Clean Air Plan.

Table 3.2-8. Population and Transportation Projections, 2015-2040

	Existing (2015)[a]	Project (2040)	Percent Increase
Service Population (residents + employees)	113,837	147,422	29.5%
Population	78,458	96,335	22.8%
Employment	35,379	51,087	44.4%
Vehicle Trips	288,160	361,918	25.6%
Resident Vehicle Trips	287,751	299,429	3.9%
VMT	1,516,021	2,286,793	50.8%
Resident VMT	1,504,947	1,465,870	-3.3%

Sources: DKS Associates, 2021

[a] Existing values are based on 2015 to correspond with the SNABM regional transportation model (see Section 3.2.2.1, *Methods for Analysis*). All data was provided by DKS Associates based on model inputs to accurately reflect population changes in comparison with VMT projections for this analysis (Impact AQ-1); therefore, projected population and employment in this table differ slightly from buildout projections detailed in Chapter 2, *Project Description.*

Under BAAQMD CEQA Guidelines, plans may use *either* vehicle trips or VMT in relation to population to determine significance concerning compliance with the district's air quality plan. The following discussion is not required in regard to findings of significance, given that vehicle trips are projected to increase at a slower rate than population growth, but is included for informational purposes.

As shown in Table 3.2-8, resident VMT is projected to *decline* by 3.3 percent, despite a substantial increase in population. However, overall VMT (from population and jobs combined) is projected to increase significantly (by 50.8 percent), meaning that the entirety of the increase is due to non-residential growth.

According to Plan Bay Area 2050, the Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS), most of the growth in South Napa County will be non-residential; the number of households are projected to increase by just 15 percent, whereas jobs are projected to increase by 39 percent between 2015 and 2050 (Association of Bay Area Governments/Metropolitan Transportation Commission, 2021). Project buildout aligns with regional projections, and in effect, the ratio of residential to job growth is higher than regional projections.

The Project recognizes that some of the primary factors that contribute to VMT are out of direct influence of the General Plan. Nonetheless, the Project endeavors to decrease overall VMT by creating linkages between land use and transportation to most effectively reduce VMT (Goal TE-1 and Policy TE 5-5) and by providing opportunity for greater residential growth (within overall service population growth) than projected by Plan Bay Area.

Support of 2017 Clean Air Plan Goals

The primary goals of the 2017 Clean Air Plan are to:

- Reduce emissions and decrease concentrations of harmful pollutants,
- Safeguard public health by reducing exposure to air pollutants that pose the greatest health risk, and
- Reduce GHG emissions and protect the climate.

The Project includes principles, as discussed in Chapter 2, *Project Description*, that will support regional attainment of the CAAQS and NAAQS. For example, new land use designations that increase densities/intensities or allow mixed use in areas that were previously single-use would enable higher intensity, infill development in the Focus Areas along key corridors, including Jefferson and Trancas streets and Soscol and Lincoln avenues as well as Downtown, that would call for pedestrian and bicycle connections that provide an interconnected network of streets, sidewalks, bicycle lanes, and pathways that knit the City together and enable people to more easily and directly travel on foot or bicycle (goals TE-1, TE-3, TE-6). Furthermore, the Project would support green leadership by the City to promote sustainable environmental practices (Policy CCS 8-1), including sustainable water use (policies CCS 5-3 and CCS 5-8), energy use (goals CCS-7 and CCS-8 and Policy CCS 8-3), solid waste generation (policies CSPR 9-5 and CCS 3-3), and construction practices (Goal NRC-5 and policies CCS 1-2 and NRC 6-1).

Together, these land use, transportation, and sustainability policies will lessen the severity of growth-oriented criteria pollutants by minimizing growth in VMT, encouraging transit, fostering bicycle and pedestrian infrastructure, and supporting sustainable land use patterns through mixed-use design and increased density. Focused development along corridors, in conjunction with improved transit, would allow future residents and those who commute to work easier access to quality public transit, thereby reducing single-occupancy vehicle trips and VMT and their associated criteria pollutants and GHG emissions. Additionally, the Project includes a suite of air quality policies (goals NRC-5, NRC-6, NRC-7, and NRC-8 as well as Policy PHE 3-2), which specifically call for reducing emissions and concentrations of harmful pollutants and reducing exposure to air

pollutants, in addition to policies that focus on reducing GHG emissions and protecting the climate (Goal CCS-1 and Policy CCS 1-1).

Although implementation of Project policies would help reduce the impacts to the maximum extent feasible, findings discussed in Impact AQ-2 show that the Project would result in an increase in ROG and PM that exceeds BAAQMD thresholds due to the large amount of growth associated with the Project. As such, the Project would conflict with one of the primary goals of the 2017 Clean Air Plan.

Support Applicable Control Measures

As noted in the Regulatory Setting section, 44 of the 85 measures of BAAQMD's current control strategy apply to the Project. The table below summarizes how the Project complies with each of these control measures.

Table 3.2-9. Proposed Policies that Support 2017 Clean Air Plan Control Measures

Control Measure		Relevant General Plan Goals and Policies
Stationary Sources		
SS16	Basin-Wide Methane Strategy	• Goal NRC-5 and Policy NRC 5-1 specifically seek to protect air quality and support efforts for enhanced regional air quality by coordinating with other jurisdictions such as BAAQMD and adopting local measures. (SS16, SS31) • Goal NRC-6 and policies NRC 6-1 and 6-2 seek to reduce GHG emissions, fine PM, and black carbon emissions through sustainable building practices (e.g. CalGREEN standards) and implementation of regulations that specifically target sources of GHGs and harmful pollutants. (SS17, SS30, SS32, SS33, SS34) • Goal NRC-8 addresses TACs, especially in proximity to sensitive receptors. (SS20, SS21) • Policy NRC 8-4 would enhance regional air quality monitoring efforts. (SS39) • Goal CSPR-8 addresses impacts due to landfills and includes policies that would reduce emissions due to landfill activities. (SS36)
SS17	GHG BACT Threshold	
SS20	Air Toxics Risk Cap and Reduction from Existing Facilities	
SS21	New Source Review for Toxics	
SS30	Residential Fan Type Furnaces	
SS31	General Particulate Matter Emission Limitation	
SS32	Emergency Backup Generators	
SS33	Commercial Cooking Equipment	
SS34	Wood Smoke	
SS36	PM from Trackout	
SS39	Enhanced Air Quality Monitoring	
Transportation		
TR1	Clean Air Teleworking Initiative	• Policy PHE 4-2 updates the City's zoning regulations to support home-based and remote work. (TR1) • Policies CCS 2-1 and CCS 2-6 would support trip reduction through transportation demand management, facilities that support transit use, and encourage alternatives to commuting by single-occupancy vehicles such as by carpooling, vanpooling, or electric vehicle priority parking. CCS 2-4 would support businesses and organizations to switch fossil fuel-powered fleet vehicles to clean, renewable energy sources.(TR2, TR8) • Policy CCS 2-2 and Goal TE-4 call for coordination with Napa Valley Transportation Authority (NVTA)
TR2	Trip Reduction Programs	
TR3	Local and Regional Bus Service	
TR4	Local and Regional Rail Service	
TR5	Transit Efficiency and Use	
TR7	Safe Routes to Schools and Safe Routes to Transit	
TR8	Ridesharing, Last-Mile Connection	
TR9	Bicycle and Pedestrian Access and Facilities	
TR10	Land Use Strategies	

Control Measure		Relevant General Plan Goals and Policies
TR11	Value Pricing	to support local and regional transit service. Policy TE 10-3 works with NVTA to promote sustainable transportation choices by supporting more efficient and accessible transit connections. (TR3, TR4, TR5) • Policy PHE 4-7 supports the Safe Routes to School program. (TR7) • Goal CCS-2 encourages land use patterns that emphasize biking, walking, or taking transit and supports programs that enable sustainable modes of transportation such as by expanding Park and Ride locations and other support facilities. (TR9) • Policy CCS 1-5 would develop a Climate Action Plan in collaboration with regional agencies and other partners. (TR10) • Goal TE-7 assesses and balances parking demands with needs of pedestrians, bicyclists, and transit users and emphasizes strategic urban designs and regular assessment of parking management strategies. (TR11, TR13) • Use of electric vehicles and non-fossil-fueled transportation options are supported by policies TE 10-1, TE 10-5, TE 10-6, and CCS 7-7, which include securing funding for electric vehicle charging stations and other infrastructure development. (TR12, TR14) • Policies CCS 1-3 and CCS 1-4 provides community outreach and education to engage residents and expand local awareness of climate impacts such as by partnering with schools and community-based organizations. (TR15) • Goal TE-8 coordinates freight movement and policies TE 8-5 ensure that these activities are sensitive to air pollution and sensitive receptors. Policies CCS 2-3 and CCS 2-4 target transition of fossil-fueled vehicles to clean, renewable energy sources by the City as well as businesses and organizations. (TR18, TR19)
TR12	Smart Driving	
TR13	Parking Policies	
TR14	Cars and Light Trucks	
TR15	Public Outreach and Education	
TR18	Goods Movement	
TR19	Medium and Heavy Duty Trucks	
Energy		
EN1	Decarbonize Electricity Production	• Policies CCS 1-2, CCS 6-2, and CCS 6-4 would support renewable energy generation particularly at City-owned sites, and CCS 3-3 would install a BioEnergy system at the City Materials Diversion Facility to produce renewable energy through conversion of biomass. Policy CCS 6-5 would reduce reliance on fossil fuel-powered backup generators by establishing a citywide program to transition to renewable energy sources. This is also supported by Goal CCS-7, which works with jurisdictional partners to increase sustainable energy production and energy security. (EN1, EN2)
EN2	Decrease Electricity Demand	
Buildings		

Control Measure		Relevant General Plan Goals and Policies
BL1	Green Buildings	• Policy CCS 7-10 incentives the use of on-site renewable energy generation for new and existing buildings, and Policy CCS 8-1 supports green building (CALGreen) practices for energy efficiency. Goals CCS-6 and CCS-7 and Policy CCS 1-2 also target City-owned buildings and sites for reducing emissions. (BL1) • Policy NRC 6-2 implements regulations to improve air quality such as eliminating fossil fuels (natural gas) in heating spaces and water for new and significantly renovated buildings. (BL2) • Policies CCS 1-3 and CCS 1-4 would engage the local business community and seek financial means to support market-based approaches to reduce GHG emissions. (BL3) • Policy CCS 8-3 encourages roofing design and surface treatments including "cool roofs" that reduce the heat island effect. This policy would also connect businesses and residents with cool roof rebate programs for new and retrofitted roofs through City outreach efforts. (BL4)
BL2	Decarbonize Buildings	
BL3	Market-Based Solutions	
BL4	Urban Heat Island Mitigation	
Agriculture		
AG1	Agricultural Guidance and Leadership	• Goal CCS 5-7 encourages responsible and sustainable agricultural practices, and CCS 1-5 would involve regional agencies to ensure efforts for reducing GHG emissions from agricultural activities are incorporated.
Natural and Working Lands		
NW2	Urban Tree Planting	• Goal CCS-9 would implement urban tree planting efforts by maintaining and expanding the City's urban forest through development of a Citywide Urban Forest Master Plan.
Waste Management		
WA1	Landfills	• Goals CSPR-8 and CCS-4 would reduce waste accumulation by increasing solid waste diversion by recycling and composting, thereby reducing emissions from landfills. Policy NRC 5-1 would support County, regional, State, or federal air quality standards, including more stringent requirements and reduction measures, by adopting local measures. (WA1, WA2, WA3) • Policy CCS 8-1, which affirms adoption of CALGreen building practices, would require new construction to divert construction waste from landfills. (WA4)
WA2	Composting and Anaerobic Digesters	
WA3	Green Waste Diversion	
WA4	Recycling and Waste Reduction	
Water		
WR1	Limit GHGs from Publicly Owned Treatment Works (POTWs)	• Goals CCS-5 and CSPR-6 would implement water conservation strategies that would reduce emissions from POTWs by reducing overall water consumption and corresponding treatment loads. Support of CALGreen (Policy CCS 8-1) would also
WR2	Support Water Conservation	

Control Measure		Relevant General Plan Goals and Policies
		incorporate green building practices into new developments. (WR1, WR2)
Super-GHGs		
SL1	Short-Lived Climate Pollutants	• See first bullet addressed under Waste Management. (SL1, SL2) • Goal CCS-1 would support regional GHG reduction efforts by reducing local GHG emissions, and Policy CCS 1-5 would involve collaboration with regional agencies to develop a City Climate Action Plan to attain regional goals. Further, policies PHE 3-2 and NRC 8-4 call for the City to coordinate air quality monitoring with the County and region and expand the citywide network, which would in turn support the district's air monitoring network. (SL3)
SL2	Guidance for Local Planners	
SL3	GHG Monitoring and Emissions Measurement Network	

Based on the above analysis, the Project would support the applicable control measures identified in the 2017 Clean Air Plan to meet the plan's primary goals.

Disrupt or Hinder Implementation of 2017 Clean Air Plan Control Measures

As discussed above, the Project includes policies that would foster sustainable development practices and would not cause the disruption, delay, or otherwise hinder implementation of any applicable control measure from the 2017 Clean Air Plan; rather, the Project would support and facilitate their implementation. For example, the Project encourages sustainability measures such as use of promotion of sustainable building design and landscaped design and support alternative modes of transportation such as transit, walking, and bicycling.

Summary

In conclusion, the Project would incorporate applicable control measures of the 2017 Clean Air Plan and would not disrupt or hinder implementation of any of these control measures. Also, the increase in vehicle trips associated with resident and service populations is lower than the rate of their projected increases. However, because the Project would result in an increase in criteria pollutant emissions, it would conflict with the primary goals of the 2017 Clean Air Plan. Given that the Project already includes policies that would help reduce impacts to the maximum extent feasible, the Project would have a significant an unavoidable impact, and there are no additional feasible mitigation measures.

Impact AQ-2: Potential to result in a cumulatively considerable net increase of any criteria pollutant for which the project region is a nonattainment area for an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors). (Significant and Unavoidable)

Construction Emissions

As described above, there is no plan-level mass emission threshold for construction. However, construction associated with projects pursuant to the Project would result in the temporary generation of ozone precursors (ROG, NO_X), CO, and particulate matter exhaust emissions that could result in short-term impacts on ambient air quality in the Planning Area. Emissions would originate

from mobile and stationary construction equipment exhaust, employee vehicle exhaust, dust from clearing the land, exposed soil eroded by wind, and ROG from architectural coatings and asphalt paving. Construction-related emissions would vary substantially depending on the level of activity, length of the construction period, specific construction operations, types of equipment, number of personnel, wind and precipitation conditions, and soil moisture content.

The Project is programmatic and does not propose any specific development projects. Rather, construction of development would occur incrementally throughout a 20-year time period. As the timing and intensity of future development projects is not known at this time, the precise effects of construction activities associated with buildout of the Planning Area cannot be accurately quantified at this time. Project-specific details of future development within the Planning Area is currently unknown, and such development would be driven by market conditions, site constraints, land availability, and property owner interest. However, as described in Section 3.2.2.1, *Methods for Analysis*, it is anticipated that in any given year, multiple land use development projects would be constructed within the Planning Area.

As noted previously, the BAAQMD's project-level thresholds were developed to analyze emissions generated by a single project. Although the construction emission impacts associated with each new individual development would be short-term in nature (relative to the buildout year) and limited to the period of time when construction activity is taking place for that particular development, the concurrent construction of a multitude of individual development projects that could occur at any one time in the Planning Area under the Project would generate combined criteria pollutant emissions on a daily basis that would exceed the BAAQMD's project-level thresholds. In addition, depending on the size and scale of an individual development project, along with its construction schedule and other parameters, there may also be instances where the daily construction emissions generated by a single development project within the Planning Area could also exceed the BAAQMD's criteria pollutant thresholds. These emissions could contribute to ozone formation and other air pollution in the SFBAAB, which at certain concentrations, can contribute to short- and long-term human health effects. However, proposed Policy NRC 5-2 would help reduce construction-related emissions of future development projects within the Planning Area by requiring development projects to incorporate the BAAQMD Basic Construction Mitigation Measures, described in Table 3.2-3.

During construction of a development project, the activity that typically generates the highest NO_X and PM exhaust emissions is the operation of off-road equipment, whereas the activity that typically generates the highest ROG emissions is the application of architectural coatings. Policy NRC 6-1 would require future construction to comply with the California Green Building Code and BAAQMD Regulation 8, Rule 3, which contain ROG content limits for architectural coatings, sealants, and adhesives and is one of the additional construction mitigation measures recommended by BAAQMD for projects with construction emissions above the significance threshold (Table 3.2-3). With regards to construction equipment, proposed policy NRC 5-4 would require all construction equipment to be maintained and tuned to meet appropriate EPA and CARB emission requirements, including use of Tier 4 engines in off-road equipment and cleaner heavy-duty trucks to reduce NO_X and PM exhaust emission levels (also a BAAQMD-recommended mitigation measure). Proposed policy NRC 5-3 further reinforces basic mitigation measures by requiring contractors to use all applicable best management practices (BMPs) to reduce particulate emissions and dust associated with construction activities, including use of low ROG coatings beyond local requirements (i.e., Regulation 8, Rule 3) and BACT for all construction equipment, diesel trucks, and generators to reduce emissions of NO_X and PM. BAAQMD considers implementation of these BMPs adequate to

reduce fugitive particulate matter emissions to less-than-significant levels. The implementation of proposed policies and compliance with BAAQMD BMPs would reduce construction-related emissions of ROG, NO_X, and PM exhaust under the Project to the maximum extent feasible by incorporating all additional mitigation measures recommended by BAAQMD for projects that exceed significance thresholds. However, BAAQMD BMPs do not ensure that ROG, NO_X, and PM exhaust emissions would be less-than-significant. In recognition of uncertainty associated with future offset programs, impacts related to air quality due to construction under the Project are significant and unavoidable.

Operational Emissions

Buildout of the Project has the potential to result in air quality impacts from mobile, area, and energy sources. Mobile sources would include vehicle trips generated by land uses proposed within the Planning Area. Area sources would include fireplace and oven usage, landscaping equipment, off-gassing during the reapplication of architectural coatings, and consumer products (e.g., solvents, cleaning supplies, cosmetics, toiletries). Energy sources would include onsite natural gas combustion for space and water heating. Each of these sources was taken into account in calculating the Project's long-term operational emissions, which were quantified using CalEEMod. Land use data used in the modeling and the CalEEMod model outputs are provided in Appendix B, *Air Quality Data*.

Table 3.2-10 summarizes daily mobile, area, and energy source emissions generated under existing baseline and 2040 conditions with implementation of the Project. As noted in Section 3.2.2.1, *Methods for Analysis*, the emissions under the Project at buildout in 2040 are compared to the existing emissions, and the resulting net increase in emissions is compared to BAAQMD's project-level thresholds to evaluate the magnitude of the change in the air quality environment due to implementation of the Project. BAAQMD's project-level thresholds are used as a conservative estimate of the impact of Project-generated emissions. This methodology is not required under BAAQMD CEQA Guidelines.

As indicated in Table 3.2-10, unmitigated operational sources under the Project would result in a net reduction in all criteria pollutants, without assuming implementation of proposed policies that would further improve air quality such as solid waste reduction (Goal CCS-4), water and energy conservation (goals CCS-5, CCS-6, and CCS-7) and green/sustainable design practices (Goal CCS-8). Additionally, some policies would qualitatively contribute to emissions reductions but cannot feasibly be quantified, such as promotion of multi-modal or clean-powered transportation modes (which is primarily dependent on individual behavior) and expanding urban forest resources (information about future tree canopy is unknown). Land use changes and street improvements that would impact VMT are incorporated into the traffic data as scaling factors (see Section 3.2.2.1, *Methods for Analysis*) and are therefore accounted in the modeled emissions. Table 3.2-10 shows that emissions of NO_X and CO under the Project would not exceed BAAQMD's project-level thresholds and therefore would not cumulatively contribute to impact on regional air quality; however, net emissions of ROG, PM_{10}, and $PM_{2.5}$—for which the region is in nonattainment—exceed their respective thresholds.

Table 3.2-10. Estimated Maximum Daily Project Operational Emissions

	Emissions (pounds per day)				
Analysis Condition/Source	ROG	NO_X	CO	PM_{10}	$PM_{2.5}$
Existing (2021)					
Area	26,960	447	30,472	3,842	3,842
Energy	28	242	134	19	19
Mobile	675	1,293	6,711	1,215	337
Total	**27,663**	**1,982**	**37,317**	**5,077**	**4,198**
Project (2040) - Unmitigated					
Area	27,269	454	31,096	3,846	3,846
Energy	34	295	169	23	23
Mobile	447	654	5,164	1,762	474
Total	**27,750**	**1,403**	**36,429**	**5,631**	**4,343**
Project (2040) - with Policies [a]					
Area	27,269	454	31,096	3,846	3,846
Energy	34	295	169	23	23
Mobile	423	607	4,797	1,607	432
Total	**27,726**	**1,356**	**36,062**	**5,476**	**4,301**
Net Increase with Project (vs. Existing)					
Project - Unmitigated	87	(578)	(888)	554	145
Project – with Policies	63	(626)	(1,255)	399	103
Exceeds Threshold? [b]	54	54	-[c]	82	54
Project - Unmitigated	**Yes**	No	**-** [c]	**Yes**	**Yes**
Project – with Policies	**Yes**	No	**-** [c]	**Yes**	**Yes**

Source: Dyett & Bhatia, 2021.

Note: Emission outputs from CalEEMod are generated for both the summer and winter seasons, with emission levels differing slightly for the pollutants in each season. Emission levels of ROG and NO_X tend to be generally higher during the winter while emissions of CO tend to be generally higher in the summer. Emissions of PM_{10} and $PM_{2.5}$ remain the same during both seasons. The maximum emissions for each pollutant over the course of the summer and winter seasons are shown in this table.

[a] Estimated emissions include only policies that can be quantified using CalEEMod.

[b] BAAQMD's project-level thresholds were developed to analyze emissions generated by a single project and so offer an extremely conservative evaluation of emissions from an entire specific plan such as the General Plan update.

[c] CO does not have a project-level threshold, but rather, BAAQMD considers a project to have a significant impact if it would cause a CO hotspot exceeding CAAQS. Quantitative analysis is required for projects that do not meet the screening criteria (traffic volumes at affected intersections less than 44,000 vehicles per hour and less than 24,000 where air mixing is substantially limited, in addition to consistency with an applicable congestion management program, regional transportation plan, and local congestion management agency plans). The Project meets all screening criteria, as discussed in Impact AQ-3.

As discussed in Section 3.2.2.1, *Methods for Analysis*, BAAQMD's project-level thresholds were developed to analyze emissions generated by a single project and not for a programmatic general plan. Similarly, there are limitations to the application of CalEEMod for quantifying plan-level emissions. Table 3.2-10 shows the effect of the Project with implementation of policies that could be quantified by CalEEMod, following guidance from CAPCOA for conservative estimates of quantified GHG reductions. Specifically, commute trip reduction programs (goals CCS-1 and CCS-2) and parking reduction policies (Goal LUCD-4 and policies LUCD 3-6, LUCD 4-1, LUCD 11-3, LUCD 12-5, and LUCD 17-2) were applied. Implementation of these policies led to a reduction in all pollutant emissions,

especially in fugitive PM, compared to unmitigated emissions estimates. Nevertheless, ROG, PM_{10}, and $PM_{2.5}$ emissions continue to exceed BAAQMD thresholds.

Additional policies, such as those discussed in Impact AQ-1 that support 2017 Clean Air Plan control measures, would further reduce Project operational emissions. Given that the Project incorporates policies that meet each of the applicable control strategies intended to achieve regional attainment of NAAQS and CAAQS, all feasible mitigation measures would be applied through implementation of the Project. However, because the effect of these reductions cannot be quantified and in consideration of the extent by which the Project exceeds some of BAAQMD's significance thresholds, the Project's impact on the cumulatively considerable increase in criteria pollutants for which the region is in nonattainment is significant and unavoidable.

Impact AQ-3: Exposure of sensitive receptors to substantial pollutant concentrations. (Significant and Unavoidable)

The air quality impacts of the Project are largely discussed above in Impacts AQ-1 and AQ-2; however, according to State CEQA Guidelines Appendix G, the potential for a project to expose sensitive receptors to substantial pollutant concentrations must also be assessed.

The California Supreme Court has held that lead agencies are not required to analyze the impacts of the environment on a project's future users or residents, unless the project exacerbates existing environmental hazards (see *California Building Industry Association v. Bay Area Air Quality Management District* (2015) 62 Cal.4th 369) or when the legislature has indicated by specific Public Resources Code (21096, 21151.8, 21155.1, 21159.21, 21159.22, 21159.23, and 21159.24) that specifically-defined environmental hazards associated with airport noise and safety, school projects, certain kinds of infill housing, and transit priority projects must be addressed.

As noted in Section 3.2.1.2, *Environmental Setting*, and mapped in Figures 3.2-1, 3.2-2, and 3.2-3, many existing sensitive receptors are located near existing sources of pollutants, including freeways, high-volume roadways, and stationary sources – some of which are within 1,000 feet of one another. The compounded effect of clustered sources of pollutants creates a context that is already cumulatively considerable and exceed BAAQMD's thresholds for local $PM_{2.5}$, cancer risk, and non-carcinogenic hazards.

The Project, which would guide future development in the Planning Area, is intended to support regional goals of integrating transit and land use policies to create opportunities for transit-oriented development (LUCD 13). Some of the focus areas identified by the Project for infill development are high-volume roadways – specifically, Lincoln Avenue, Trancas Street, Soscol Avenue, and Jefferson Street. This means that the Project would bring future land uses and associated sensitive receptors in proximity to roadways that are major sources of TAC emissions. The Project also introduces new mixed-use designations (Residential Mixed Use, Corridor Mixed Use High, Corridor Mixed Use Low, Foster Road Mixed Use, and Napa Pipe Mixed Use) that may allow for residential uses to be developed on the same parcel or as a part of the same project as a commercial or retail use. Commercial and retail activities (e.g., loading docks/trucks idling, diesel generators) could result in excessive air quality emissions and affect a project's on-site residents. Therefore, the Project has potential to exacerbate existing impacts on sensitive receptors and new receptors associated with development under the Project.

CO Hotspots

Areas of vehicle congestion have the potential to create pockets of CO called hotspots. These pockets have the potential to exceed the state one-hour standard of 20 ppm or the eight-hour standard of 9.0 ppm. Because CO is produced in the greatest quantities from vehicle combustion and does not readily disperse into the atmosphere, adherence to AAQS is typically demonstrated through an analysis of localized CO concentrations. Hotspots are typically produced at intersections, where traffic congestion is highest because vehicles queue for longer periods and are subject to reduced speeds.

Under existing and future vehicle emission rates, a plan would have to increase traffic volumes at a single intersection by more than 44,000 vehicles per hour—or 24,000 vehicles per hour where vertical and/or horizontal mixing is substantially limited by bridges or tunnels—to generate a significant CO impact. Buildout of the Project would increase traffic volume and congestion at ten of 26 studied intersections but would not reach the volumes describes above (see Section 3.15, *Transportation*). For example, the projected volume for the intersection with the most traffic (Soscol Avenue and West Imola Avenue) is at most 5,605 vehicles per hour. In addition, buildout of the Project (through goals TE-1, TE-4, TE-5 and policies TE 3-4, TE 5-3, TE 5-4, TE 5-5) and existing regulatory mechanisms such as CARB's Mobile Source Program—which supports replacement of older, higher-emitting vehicles with newer vehicles, and increasingly stringent inspection and maintenance programs, as well as other regulatory requirements, such as AB 1493 (Pavley) of 2002 that mandates regulations to reduce tailpipe greenhouse gas emissions that also improve fuel economy—would significantly decrease daily operational emissions of CO from mobile sources, counteracting a slight increase in CO from area sources in 2040 (Table 3.2-9). Therefore, the Project would not have the potential to substantially increase CO hotspots at intersections in Napa.

BAAQMD considers consistency with the relevant congestion management plans to determine the potential for CO hotspots because congested intersections generate unhealthy concentrations of CO. The Project includes policies that support and ensure consistency with the Countywide Transportation Plan adopted by NVTA, the county's congestion management agency, in April 2021 (policies TE 2-8 and CCS 2-2). Thus, the Project would be consistent with the County's congestion management plan and would not result in CO hotspots.

Regional Criteria Pollutants

As discussed under Impact AQ-2, operational emissions under the Project would result in a net decrease in NO_X and CO. However, ROG, PM_{10}, and $PM_{2.5}$ emissions are estimated to increase in quantities that would exceed BAAQMD's project-level criteria pollutant thresholds. Although ROGs and particulate matter (PM_{10} and $PM_{2.5}$) would be regulated by Project policies that incorporate BAAQMD BMPs and district rules such as Regulation 8, Rule 3 on VOC/ROG content limits, as noted in Impact AQ-1, there is potential for sensitive receptors to be exposed to elevated levels of harmful pollutants due to the overall increase in these regional pollutants.

Localized Particulate Matter

In addition to regional criteria pollutant thresholds, localized PM is assessed by risk and hazards thresholds. Local $PM_{2.5}$ emissions above 0.3 µg/m^3 for an individual project or cumulatively greater than 0.8 µg/m^3 would constitute a significant impact. The Project does not include specific project details (i.e., locations) for new sensitive receptors, but existing sensitive uses such as schools, hospitals, and residential areas may be affected by the increased volume of traffic associated with

the Project. Such traffic could increase vehicle activity near these receptors and increase exposure to $PM_{2.5}$ dust and exhaust. Likewise, construction of future development allowed by the Project may temporarily expose sensitive receptors to localized PM. Construction emissions, discussed in further detail below, are regulated by BAAQMD as well as by Project policies that seek to protect sensitive receptors from substantial pollutant concentrations. However, given that existing levels of $PM_{2.5}$ exceed BAAQMD thresholds in some locations in the Planning Area (see Section 3.2.1.2, *Environmental Setting*), exacerbation of existing conditions by the Project has the potential to result in a cumulatively significant impact.

Toxic Air Contaminants

Construction

The greatest risks from TAC emissions during construction would be diesel particulate emissions from heavy equipment operations and heavy-duty trucks and the associated health impacts to sensitive receptors. As identified in Section 3.2.1.2, *Environmental Setting,* sensitive receptors such as schools, healthcare facilities, and residences are spread throughout the City. Residential uses are especially widespread, and because the Project focuses on infill development that would increase densities and intensities in focus areas and Downtown near these neighborhoods, there is potential for future construction allowed by the Project to expose sensitive receptors to construction-generated TAC emissions.

Off-road diesel construction equipment and heavy-duty diesel trucks (e.g., concrete trucks, building materials delivery trucks), which are sources of DPM, are regulated under three airborne ATCMs adopted by CARB. The ATCM for diesel construction equipment specifies PM emission standards for equipment fleets, which become increasingly stringent over time. Furthermore, most newly purchased construction equipment introduced into construction fleets after 2013-2015 (depending on the engine horsepower rating) are equipped with high-efficiency DPM filters. One of the ATCMs for heavy-duty diesel trucks specifies that commercial trucks with a gross vehicle weight rating over 10,000 pounds are prohibited from idling for more than five minutes, unless the engines are idling while queuing or involved in operational activities. Additionally, heavy-duty truck models from 2008 must be equipped with an automatic shutoff device to prevent excessive idling or meet stringent NO_X requirements. Lastly, fleets of diesel trucks with a gross vehicle weight rating of greater than 14,000 pounds are subject to requirements to replace older vehicles and/or equip them with DPM filters.

Construction activities under the Project would be dispersed intermittently over a 20-year period and would not expose an individual to a continuous source of pollution. However, without specific details on the locations of building footprints or their construction schedules, a quantitative evaluation of potential health risk impacts is not possible. Goal NRC-8 would protect sensitive receptors from exposure to substantial concentrations of TACs and associated health risks through land use considerations (i.e., siting) and design requirements (e.g., setbacks) during the planning process, consistent with BAAQMD requirements, and would also monitor air quality to ensure that this goal is met. Additionally, construction would be subject to BAAQMD's construction control measures and BMPs (policies NRC 5-2 and NRC 5-3) and Policy NRC 5-4 would reduce impacts of TACs generated by equipment. With implementation of these policies and existing regulations discussed above, DPM emissions from off-road construction equipment and trucks will be controlled substantially over the life of the Project. Future projects would also be subject to individual review and CEQA analysis, and additional project-specific requirements and mitigations would be

determined at that time. Nevertheless, it is uncertain whether the cumulative effect of individual projects under the Project would result in significant impacts overall. Therefore, impact due to construction is significant and unavoidable.

Operation

As described in Section 3.2.2.3, *Thresholds of Significance*, the Project would result in a significant impact if new sensitive receptors would be located in proximity to mobile or stationary sources of TAC emissions that exceed BAAQMD project and cumulative receptor thresholds for cancer and non-cancer health hazards.

As noted above, existing mobile sources of TACs in the Planning Area include SR 12, SR 29, SR 121, SR 221, First Street, Lincoln Avenue, Trancas Street, Coombsville Road, Soscol Avenue, Big Ranch Road, Imola Avenue, California Boulevard, and Jefferson Street. The segments of SR 12, SR 29, SR 121, and SR 221 in and near the Planning Area have existing annual ADT volumes as high as 37,000, 68,000, 15,000, and 41,500, respectively. According to BAAQMD's screening tools, the lifetime cancer risk associated with traffic on SR 29, the highway with the highest ADT in the Planning Area, for a receptor 10 feet west of the roadway in the Planning Area may exceed 57 cases per million.[1] CARB recommends avoiding siting new sensitive land uses within 500 feet of a freeway, urban roads with 100,000 vehicles/day, or rural roads with 50,000 vehicles/day. Figure 3.2-3 shows the mobile sources in the Planning Area and the extent of a 500-foot buffer from these roads.

Development under the Project would allow new residential development within areas of elevated risk along these roadways. Additionally, as implementation of the Project would ultimately result in the net new development of approximately 7,800 residential dwelling units, and 3,247,000 s.f. of non-residential development in the Planning Area at buildout in 2040, the increase in vehicle traffic from the Project would generate additional vehicle-related TACs (including DPM and other TACs) on the local roadways located within and near the Planning Area and increase their health risks on nearby sensitive receptors. Consequently, both new and existing sensitive receptors in the Planning Area would be exposed to an increased amount of TAC exposure from roadways as a result of the Project.

The Project includes policies that would reduce the exposure of new sensitive receptors to existing mobile sources of TAC emissions as well as reduce the potential for new TAC emissions from mobile sources to exacerbate existing exposure in the Planning Area for existing and potential new receptors. Policy NRC 8-1 would require new sensitive receptors to be set back from highways and other high-volume roads, consistent with the BAAQMD's Guidelines and CARB recommendations, and where the appropriate siting distances cannot be attained, Policy NRC 8-2 would require installation of air filters that meet Title 24 standards (Section 120.1), which specify that such filters must have a minimum efficiency reporting value (MERV) of 13 or better, corresponding to a particle size efficiency rating of no less than 50 percent in the 0.30-1.0 µm range or no less than 85 percent in the 1.0-3.0 µm range. Filters meeting these criteria would effectively capture $PM_{2.5}$, PM_{10}, and DPM from mobile as well as other sources. Policies NRC 8-3 and NRC 8-4 further reduce risk by proactively seeking to prevent significant exposure to TACs. Additionally, the Project's transportation policies would help reduce speeds and manage traffic through implementation of

[1] BAAQMD currently does not recommend using the stationary source, highway, and roadway screening analysis tools for evaluating sensitive land uses, such as schools, senior centers, daycares, and health centers. A site-specific analysis should be conducted for projects involving these sensitive land uses. This data is included for informational purposes only.

"livable street" designs and transportation demand management programs (goals TE-2 and TE-6), thereby reducing localized concentration of pollutants. Expansion of urban forest resources (Goal CCS-9) would also increase the amount of vegetation that could contribute to pollutant dispersion. Implementation of the Project would therefore substantially reduce community risk due to mobile sources emissions.

Stationary sources of TACs are located throughout the Planning Area (Figure 3.2-2), and existing cancer risks and HIs already exceed BAAQMD's thresholds at several locations. The Project does not include any planned stationary sources; however new stationary sources could be developed under the Project and newly expose or exacerbate existing exposure of sensitive receptors to TACs. Per BAAQMD guidance, where ambient risks already exceed BAAQMD's cumulative thresholds and the cumulative context is already significant, any Project contribution would be cumulatively considerable and potentially significant.

At a plan-level, BAAQMD CEQA Guidelines recommend that land use diagrams identify special overlay zones around existing and planned sources of TACs and PM and special overlay zones of at least 500 feet on each side of all freeways and high-volume roadways. Figure 3.2-1 and Figure 3.2-2 shows the 1,000-foot buffer of existing permitted stationary sources, and Figure 3.2-3 shows existing mobile sources with a 500-foot buffer. Given the scale of the land use diagram and the distribution of TAC sources throughout the Planning Area, the City has determined that establishing these overlays would be inconsistent with the Project's land use framework, which seeks to simplify the palette of uses to facilitate future development. Instead, Policy 8-3 addresses siting of new stationary sources and Policy 8-1 addresses siting of new sensitive receptors at an individual project-level to achieve the appropriate setbacks as established by CARB and BAAQMD. Policy 8-4 further seeks to protect sensitive receptors from exposure to TACs and localized pollutants by expanding the air monitoring network, and the Project goals and policies discussed above (regarding mobile sources) would also help minimize potential effects.

Asbestos

Demolition of existing structures predating the U.S. Consumer Product Safety Commission's ban on use of asbestos in fireproofing and insulating agents in 1977 may result in the dispersion of particulates containing asbestos to adjacent sensitive receptor locations. However, all demolition activities in the Planning Area would be subject to BAAQMD Regulation 11, Rule 2 and EPA's asbestos NESHAP regulations that would minimize release of asbestos fibers if asbestos is present at the existing facilities. Consequently, regulatory mechanisms exist that would ensure that receptors would not be exposed to substantial concentrations of asbestos.

Summary

The Project would allow growth of residential land uses that would be new sensitive receptors and non-residential land uses that are a potential for new emissions sources, as well as increase traffic volumes that exacerbate existing mobile sources. Policies within the Project would establish buffers between potential air pollution sources and sensitive receptors and limit pollution during construction. Other exposure reduction strategies including requirement of air filters, expansion of urban forestry, speed reduction, and traffic management, would minimize the Project's contribution to existing sources as well as protect future sensitive receptors. Future development would be subject to individual review; new sources would be evaluated through the BAAQMD permit process and/or the CEQA process to identify and mitigate any significant exposures. The Project's impact on

sensitive receptors from exposure to substantial pollutant concentrations would thus be minimized to the maximum extent feasible with implementation of the Project. Nevertheless, uncertainty regarding the effects of individual projects allowed under the Project during construction and the cumulative contribution of operational emissions within an already-significant context would make the Project's impact significant and unavoidable overall.

Impact AQ-4: Creation of objectionable odors affecting a substantial number of people. (Less than Significant)

Although offensive odors rarely cause physical harm, they can be unpleasant, leading to distress among the public and often generating citizen complaints to local governments and air districts. According to BAAQMD, land uses associated with odor complaints typically include wastewater treatment plants, landfills, confined animal facilities, composting stations, food manufacturing plants, refineries, and chemical plants. Odor impacts on residential areas and other sensitive receptors, such as hospitals, day-care centers, and schools, warrant the closest scrutiny, but consideration should also be given to other land uses where people may congregate, such as recreational facilities, work sites, and commercial areas.

Potential odor emitters during construction include diesel exhaust and evaporative emissions generated by asphalt paving and the application of architectural coatings. Construction-related activities near existing receptors would be temporary in nature, and construction activities would not result in nuisance odors. As discussed in Chapter 2, *Project Description*, the proposed General Plan's land use designations include residential, commercial, retail, light industrial, public/institutional, and office. These land uses are not associated with the odor-generating land uses discussed above. Potential odor emitters during operations would include exhaust from vehicles and fumes from the reapplication of architectural coatings as part of ongoing building maintenance. However, odor impacts would be limited to circulation routes, parking areas, and areas immediately adjacent to recently painted structures. Although such brief exhaust- and paint-related odors may be considered adverse, they would not be atypical of developed urban areas and would not affect a substantial number of people or rise to the level of a significant impact under CEQA. In addition, proposed General Plan Policy NRC 8-3 would consider proximity of sensitive receptors when reviewing potential siting of new land uses that may emit odors. Because the Project would not result in a new, substantial, or long-term source of odors, this impact would be less than significant and no mitigation measures are required.

3.2.3 References Cited

Association of Bay Area Governments/Metropolitan Transportation Commission. 2021. Final Blueprint Release – Growth Patterns. January. Available: https://www.planbayarea.org/sites/default/files/FinalBlueprintRelease_December2020_GrowthPattern_Jan2021Update.pdf. Accessed: December 2021.

Bay Area Air Quality Management District. 2016a. *Multi-Pollutant Evaluation Method Technical Document (2016 Update).* November. Available: https://www.baaqmd.gov/~/media/files/planning-and-research/plans/2017-clean-air-plan/mpem_nov_dec_2016-pdf.pdf?la=en. Accessed October 2021.

———. 2016b. *Planning for Healthy Places: A Guidebook for Addressing Local Sources of Air Pollutants in Community Planning*. May 20. https://www.baaqmd.gov/~/media/files/planning-and-research/planning-healthy-places/php_may20_2016-pdf.pdf. Accessed: December 2021.

———. 2017a. *Air Quality Standards and Attainment Status.* Last Revised: January 5, 2017. Available: https://www.baaqmd.gov/about-air-quality/research-and-data/air-quality-standards-and-attainment-status. Accessed October 2021.

———. 2017b. *2017 Clean Air Plan: Spare the Air, Cool the Climate.* April 19. Available: https://www.baaqmd.gov/~/media/files/planning-and-research/plans/2017-clean-air-plan/attachment-a_-proposed-final-cap-vol-1-pdf.pdf?la=en. Accessed October 2021.

———. 2017c. *California Environmental Quality Act Air Quality Guidelines*. May 9. Available: https://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en. Accessed October 2021.

———. 2020a. *Permitted Sources Risk and Hazard Map.* March 18. Available: https://baaqmd.maps.arcgis.com/apps/webappviewer/index.html?id=2387ae674013413f987b1071715daa65. Accessed: October 2021.

———. 2020b. Health Risk Calculator Beta 4.0. April 3. Available: https://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/tools/baaqmd-health-risk-calculator-beta-4-0-xlsx.xlsx?la=en&rev=dab7d85a772d45caa9c99e59395bf12d. Accessed: December 2021.

———. 2021. *Current Rules.* Last Reviewed: July 21, 2021. Available: https://www.baaqmd.gov/rules-and-compliance/current-rules. Accessed October 2021.

Bay Area Council Economic Institute. 2019. City of Napa Economic Development Action Strategy. April. Available: https://www.cityofnapa.org/DocumentCenter/View/5398/2019-City-of-Napa-Economic-Development-Action-Strategy. Accessed: December 2021.

California Air Resources Board. 2005. Air Quality and Land Use Handbook: A Community Health Perspective. April. Available: https://www.arb.ca.gov/ch/handbook.pdf. Accessed: December 2021.

———. 2020a. *Air Quality and Meteorological Information System (AQMIS 2).* Last Reviewed: March 12, 2020. Available: https://www.arb.ca.gov/aqmis2/aqmis2.php. Accessed: October 2021.

———. 2020b. *State Area Designations Regulations. Appendix C: Maps and Tables of Area Designations for State and National Ambient Air Quality Standards.* October. Available: https://ww2.arb.ca.gov/sites/default/files/classic/regact/2021/sad20/appc.pdf. Accessed: October 2021.

———. 2021. *Top 4 Summary: Select Pollutant, Years, & Area*. iADAM: Air Quality Data Statistics. Available: https://www.arb.ca.gov/adam/topfour/topfour1.php. Accessed: October 2021.

California Department of Finance. 2021. E-5 Population and Housing Estimates for Cities, Counties, and the State, 2011-2021 with 2010 Census Benchmark. May. Available: https://www.dof.ca.gov/Forecasting/Demographics/Estimates/e-5/documents/E-5-2021_by_Geo_Internet.xlsx. Accessed: October 2021.

California Employment Development Department. 2021. Current Employment Statistics, 1990-Present. EDD-Labor Market Information Division. Available: https://data.edd.ca.gov/Industry-Information-/Current-Employment-Statistics-CES-/r4zm-kdcg. Accessed: February 2021.

DKS Associates. 2021. Napa General Plan Update: Transportation Evaluation of Preferred Plan (Appendix C). December.

U.S. Environmental Protection Agency. 2003. *Diesel Engine Exhaust*; CASRN N.A. February 28. Available: https://cfpub.epa.gov/ncea/iris/iris_documents/documents/subst/0642_summary.pdf#nameddest=woe. Accessed: July 1, 2021.

———. 2021*. Nonattainment Areas for Criteria Pollutants (Green Book).* Last Revised: September 30, 2021. Available: https://www.epa.gov/green-book. Accessed: October 2021.

3.3 Biological Resources

3.3.1 Existing Conditions

The study area for the analysis of biological resources is the Planning Area. This section describes the regulations applicable to biological resources and the vegetation, wildlife, and aquatic resources present in the study area.

3.3.1.1 Regulatory Setting

Federal

Federal Endangered Species Act

The federal Endangered Species Act (ESA) protects fish and wildlife species and their habitats that have been identified by the National Marine Fisheries Service (NMFS) or U.S. Fish and Wildlife Service (USFWS) as threatened or endangered. Endangered refers to species, subspecies, or distinct population segments (DPSs) that are in danger of extinction through all or a significant portion of their range. Threatened refers to species, subspecies, or DPSs that are likely to become endangered in the near future.

ESA is administered by USFWS and NMFS. In general, NMFS is responsible for protection of listed marine species and anadromous fish, and USFWS is responsible for other listed species.

Implementation of any project that may result in take of any species protected by ESA would be subject to approval and oversight by NMFS and USFWS, as relevant, and subject to the terms and conditions of any biological opinion (BO) from that agency. Compliance with the terms and conditions of the BOs would further ensure that no implemented project would jeopardize the continued existence of any threatened or endangered species. Relevant ESA provisions are summarized below.

Section 9: ESA Prohibitions

ESA Section 9 prohibits the take of any fish or wildlife species listed under ESA as endangered. Take of threatened species also is prohibited under Section 9, unless otherwise authorized by federal regulations.[1] Take, as defined by ESA, means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Harm is defined as "any act that kills or injures the species, including significant habitat modification." In addition, Section 9 prohibits removing, digging up, cutting, and maliciously damaging or destroying federally listed plants on sites under federal jurisdiction.

[1] In some cases, exceptions may be made for threatened species under ESA Section 4(d); in such cases, USFWS or NMFS issues a 4(d) rule describing protections for the threatened species and specifying the circumstances under which take is allowed.

Section 7: ESA Authorization Process for Federal Actions

ESA Section 7 provides a means for authorizing take of threatened and endangered species by federal agencies. Under Section 7, the federal agency conducting, funding, or permitting an action must consult with NMFS or USFWS, as appropriate, to ensure that the Project will not jeopardize endangered or threatened species or destroy or adversely modify designated critical habitat.

Section 10: ESA Authorization for Nonfederal Actions

In cases where federal land, funding, or authorization is not required for an action by a nonfederal entity, the take of listed species must be permitted by USFWS and/or NMFS through the Section 10 process. Private landowners, corporations, state agencies, local agencies, and other nonfederal entities must obtain a Section 10(a)(1)(B) incidental take permit for take of federally listed fish and wildlife species that is "incidental to, and not the purpose of, the carrying out of an otherwise lawful activity." Because ESA Section 9 prohibitions for listed plants apply only on lands under federal jurisdiction, Section 10 incidental take permits are necessary only for take of wildlife and fish species. Nonetheless, plants often are included in habitat conservation plans (HCPs) such that USFWS can make findings of no-jeopardy when the Section 7 process is triggered.

To receive an incidental take permit, the nonfederal entity is required under Section 10(a)(2)(A) to prepare an HCP. If submitted in support of an incidental take permit application, the HCP must include the following information.

- Impacts likely to result from the proposed taking of the species for which permit coverage is requested.
- Measures that will be implemented to monitor, minimize, and mitigate impacts.
- Funding that will be made available to undertake such measures.
- Procedures to deal with unforeseen circumstances.
- Alternative actions considered that would not result in take.
- Additional measures USFWS may require as necessary or appropriate for purposes of the plan.

Critical Habitat

Critical habitat, as defined in ESA Section 3, is the specific area within the geographic area occupied by a species at the time it is listed, in which those biological features essential to the conservation of the species are found and that may require special management considerations or protection. Critical habitat also includes specific areas outside the geographic area occupied by a species at the time it is listed upon a determination that such areas are essential for conservation of the species.

Migratory Bird Treaty Act

The federal Migratory Bird Treaty Act (MBTA) (16 United States Code [U.S.C.] 703) enacts the provisions of treaties between the United States, Great Britain, Mexico, Japan, and Russia and authorizes the U.S. Secretary of the Interior to protect and regulate the taking of migratory birds. It establishes seasons and bag limits for hunted species and protects migratory birds, their occupied nests, and their eggs (16 U.S.C. 703, 50 Code of Federal Regulations [CFR] 21, 50 CFR 10). Most actions that result in taking or in permanent or temporary possession of a protected species constitute violations of MBTA. Examples of permitted actions that do not violate MBTA are the possession of a hunting license to pursue specific gamebirds, legitimate research activities, display

in zoological gardens, banding, and other similar activities. USFWS is responsible for overseeing compliance with MBTA, and the U.S. Department of Agriculture's Animal Damage Control Officer makes recommendations on related animal protection issues.

Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. 668) prohibits take and disturbance of individuals and nests. Take permits for birds or body parts are limited to religious, scientific, or falconry pursuits. However, BGEPA was amended in 1978 to allow mining developers to apply to USFWS for permits to remove inactive golden eagle (*Aquila chrysaetos*) nests in the course of "resource development or recovery" operations. With the 2007 removal of bald eagle from the ESA list of threatened and endangered species, USFWS issued new regulations to authorize the limited take of bald eagles (*Haliaeetus leucocephalus*) and golden eagles under BGEPA, where the take to be authorized is associated with otherwise lawful activities. A final Eagle Permit Rule was published on September 11, 2009 (74 Federal Register [FR] 46836–46879; 50 CFR 22.26).

A permit authorizes limited, nonpurposeful take of bald eagles and golden eagles, and can be applied for by individuals, companies, government agencies (including tribal governments), and other organizations to allow disturbance or otherwise take eagles in the course of conducting lawful activities, such as operating utilities and airports. Under BGEPA, *take* is defined as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest or disturb." *Disturb* is defined in the regulations as "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available: (1) injury to an eagle; (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior." Most permits issued under the new regulations authorize disturbance. In limited cases, a permit may authorize the physical take of eagles, but only if every precaution is first taken to avoid physical take. A golden eagle was observed in flight over the study area, and the study area provides suitable foraging habitat for the species and suitable nesting habitat occurs to the west of the study area.

Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) requires all federal agencies to consult with NMFS regarding all actions or proposed actions permitted, funded, or undertaken that may adversely affect essential fish habitat (EFH). EFH is defined as "waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity."

Clean Water Act

The Clean Water Act (CWA) is administered by the U.S. Environmental Protection Agency (EPA) and U.S. Army Corps of Engineers (USACE). The discharge of dredged or fill material into waters of the United States is subject to permitting under CWA Section 404. Certification from the applicable Regional Water Quality Control Board (Regional Water Board) is required when a proposed activity may result in discharge into waters of the United States, pursuant to CWA Section 401 and EPA's Section 404(b)(1) guidelines. CWA Section 402 regulates construction-related stormwater discharges to surface waters through the National Pollutant Discharge Elimination System (NPDES) program, administered by EPA. In California, the State Water Resources Control Board (State Water Board) is authorized by EPA to oversee the NPDES program through the Regional Water Boards.

Section 401: Water Quality Certification

Under CWA Section 401, applicants for a federal license or permit to conduct activities that may result in the discharge of a pollutant into waters of the United States must apply for water quality certification from the state. Accordingly, all projects with a federal component that may affect state water quality (including projects that require federal agency approval, such as a Section 404 permit) must comply with CWA Section 401. Development projects under the General Plan update that would place fill in waters of the United States would require CWA Section 401 certification.

Section 402: Permits for Stormwater Discharge

NPDES permits are required for projects that disturb more than 1 acre of land. The NPDES permitting process requires the applicant to file a public notice of intent to discharge stormwater and to prepare and implement a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP must include a site map, a description of proposed construction activities, and best management practices (BMPs) that will be implemented to prevent soil erosion and discharge of other construction-related pollutants (e.g., petroleum products, solvents, paints, cement) that could contaminate nearby water resources. Permittees are required to conduct annual monitoring and reporting to ensure that BMPs are correctly implemented and effective in controlling the discharge of stormwater-related pollutants.

Section 404: Permits for Fill Placement in Waters of the United States (Including Wetlands)

Waters of the United States (including wetlands) are protected under CWA Section 404. Any activity that involves a discharge of dredged or fill material into waters of the United States, including wetlands, is subject to regulation by USACE. Waters of the United States are defined to encompass navigable waters of the United States; interstate waters; all other waters where their use, degradation, or destruction could affect interstate or foreign commerce; tributaries of any of these waters; and wetlands that meet any of these criteria or are adjacent to any of these waters or their tributaries. Wetlands are defined under Section 404 as those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Jurisdictional wetlands must meet three criteria.

- They support hydrophytic vegetation (i.e., plants that grow in saturated soil).
- They have hydric soil types (i.e., soils that are wet or moist enough to develop anaerobic conditions).
- They have wetland hydrology.

Rivers and Harbors Act

Rivers and Harbors Act Section 10 requires authorization from USACE for the construction of any structure in, over, or under any navigable water of the United States. The law applies to any dredging, excavation, filling, or other modification of a navigable water of the United States, as well as to all structures, including bank protection (e.g., riprap).

Executive Order 11990: Protection of Wetlands

Executive Order (EO) 11990, signed May 24, 1977, directs all federal agencies to refrain from assisting in or giving financial support to projects that encroach on publicly or privately owned

wetlands. It further requires that federal agencies support a policy to minimize the destruction, loss, or degradation of wetlands.

Executive Order 13112: Invasive Species

EO 13112, signed February 3, 1999, directs all federal agencies to prevent and control the introduction of invasive species in a cost-effective and environmentally sound manner. The EO requires consideration of invasive species in National Environmental Policy Act analyses, including their identification and distribution, their potential effects, and measures to prevent or eradicate them.

State

California Endangered Species Act

The California Endangered Species Act (CESA) prohibits the take of endangered and threatened species. Under California Fish and Game Code (CFGC) Section 2081, a permit from the California Department of Fish and Wildlife (CDFW) is required for projects that could result in take of a species that is state-listed as threatened or endangered. Under CESA, take is defined as an activity that would directly or indirectly kill an individual of a species. The definition does not include habitat destruction and harm or harass, as does the definition of take under ESA. Accordingly, the threshold for take under CESA is higher than that under ESA. For example, habitat modification is not necessarily considered take under CESA.

CFGC Section 2090 requires state agencies to comply with endangered species protection and recovery and to promote conservation of these species. CDFW administers CESA and authorizes take through CFGC Section 2081 incidental take agreements (except for species designated as fully protected) and Section 2080.1 consistency determinations. If it is determined that a proposed project would result in take of a state-listed species, an incidental take permit or consistency determination would be obtained through consultation with CDFW.

California Fully Protected Species

CFGC Sections 3511, 3513, 4700, and 5050 pertain to fully protected wildlife species (birds in Sections 3511 and 3513, mammals in Section 4700, and reptiles and amphibians in Section 5050) and strictly prohibit the take of these species. CDFW cannot issue a take permit for fully protected species, except under narrow conditions for scientific research or the protection of livestock, or if a natural community conservation plan has been adopted.

California Fish and Game Code, Sections 3503, 3503.5, and 3513

Sections 3503, 3503.5, and 3513 of the CFGC protect all native birds, birds of prey, and all nongame birds, including eggs and nests, that are not already listed as fully protected and that occur naturally within the state. Eggs and nests of all birds (except for house sparrow [*Passer domesticus*] and European starling [*Sturnus vulgaris*]) are protected under Section 3503, while Section 3503.5 protects all birds of prey, as well as their eggs and nests. Migratory nongame birds are protected under Section 3513. Except for take related to scientific research, take as described above is prohibited.

California Fish and game Code, Section 3800(a)

Section 3800(a) of the CFGC makes it unlawful to take any nongame bird except as provided in the code or in accordance with regulations of the California Fish and Game Commission. All birds occurring naturally in California that are not resident game birds, migratory game birds, or fully protected birds, are nongame birds.

California Fish and Game Code, Section 1600

Sections 1600–1603 of the CFGC state that it is unlawful for any person or agency to substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake in California that supports wildlife resources, or to use any material from the streambeds without first notifying CDFW. A Lake and Streambed Alteration Agreement must be obtained if effects are expected to occur.

The regulatory definition of a stream is a body of water that flows at least periodically or intermittently through a bed or channel having banks and that supports wildlife, fish, or other aquatic life. This definition includes watercourses having a surface or subsurface flow that supports or has supported riparian vegetation. CDFW's jurisdiction within altered or artificial waterways is based on the value of those waterways to fish and wildlife and extends to the tops of banks and often includes the outer edge of riparian vegetation canopy cover. Riparian trees that have a diameter of 6 inches or more also fall within CDFW's jurisdiction.

California Native Plant Protection Act

CESA defers to the California Native Plant Protection Act (CNPPA) to ensure that state-listed plant species are protected when state agencies are involved in projects subject to the California Environmental Quality Act (CEQA). Plants listed as rare under CNPPA are not protected under CESA, but rather under CEQA. CDFW is consulted regarding impacts on state-listed species and potential mitigation for unavoidable impacts.

Porter-Cologne Water Quality Control Act

Under the Porter-Cologne Water Quality Control Act (Porter-Cologne Act) definition, waters of the state are "any surface water or groundwater, including saline waters, within the boundaries of the state." Although all waters of the United States that are within the borders of California are also waters of the state, the reverse is not true. Therefore, California retains authority to regulate discharges of waste into any waters of the state, regardless of whether USACE has concurrent jurisdiction under CWA Section 404 and defines discharges to receiving waters more broadly than the CWA does. In 2019, The State Water Board adopted the State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State (Procedures), which revised and clarified the regulation of state wetlands and procedures for permitting impacts on wetlands. The Procedures took effect on May 28, 2020 (California State Water Resources Control Board 2019, 2020).

Waters of the state fall under the jurisdiction of the nine Regional Water Boards. Under the Porter-Cologne Act, each Regional Water Board must prepare and periodically update water quality control basin plans. The basin plan that is in place for the San Francisco Bay Regional Water Board is the Water Quality Control Plan (Basin Plan) for the San Francisco Bay. Each basin plan sets forth water quality standards for surface water and groundwater, as well as actions to control nonpoint and point sources of pollution. California Water Code Section 13260 requires any person discharging

waste, or proposing to discharge waste, in any region that could affect the waters of the state to file a report of discharge (an application for waste discharge requirements) with the applicable Regional Water Board. California Water Code Section 13050 authorizes the State Water Board and the affiliated Regional Water Board to regulate biological pollutants. Aquatic invasive plants discharged to receiving waters are an example of this kind of pollutant. Construction and restoration activities associated with the Project that may discharge wastes into the waters of the state must meet the discharge control requirements of the Porter-Cologne Act.

Local

City of Napa General Plan

The Natural Resources Element of the current General Plan includes goals and supporting policies to protect natural resources. The goals listed below are relevant to biological resources in the Planning Area (City of Napa 1998).

NR-1: To manage the natural resources, wetlands and open space areas in and around the City to preserve and enhance plant and wildlife habitats.

NR-2: To recognize and support the preservation of rare, endangered and threatened species and of other unique and fragile biological environments.

NR-3: To educate and involve the public in the stewardship of the area's natural resources.

The City of Napa Municipal Code

Section 12.44.030 Planting and Removal of Street Trees

Under Section 12.44.030 Planting and Removal of Street Trees, it shall be unlawful for any person to plant, injure, or to remove a street tree without a valid permit for such work issued by the director. Any person who desires a permit shall apply to the department on the designated form. All tree removal and tree planting shall conform to specifications established by the department.

Section 12.45 Protected Native Tree Chapter

Under Section 12.45 Protected Native Tree Chapter, specific species of trees are protected by the City if located on private property over one acre in size zoned for residential or agricultural purposes or on property zoned for commercial or industrial purposes. These trees include blue oak (*Quercus douglasii*) with a diameter at breast height (DBH) 6 inches or greater, coast redwood (*Sequoia sempervirens*) with a DBH 36 inches or greater, valley oak (*Quercus lobata*) with a DBH 12 inches or greater, coast live oak (*Quercus agrifolia*) with a DBH 12 inches or greater, black oak (*Quercus kelloggii*) with a DBH 12 inches or greater, California bay (*Umbellularia californica*) with a DBH 12 inches or greater, and black walnut (*Juglans hindsi*) with a DBH 12 inches or greater. This regulation requires protection of significant trees during construction activity; permits for activities affecting significant trees; replacement, protection, and maintenance of replacement trees; and safeguarding of protected native trees.

Section 15.52.110 Creeks and Other Watercourses

Under Section 17.52.110 Creeks and Other Watercourses, streambank stabilization and setbacks are required to be part of new development for the protection and enhancement of riparian habitat corridors.

Section 17.16.050 Special Findings Required for Agricultural Resource District Projects

Under Section 17.16.050 Special Findings Required for AR (Agricultural Resource) District Projects protection of natural resources within areas designated in the General Plan as a resource area is required.

3.3.1.2 Environmental Setting

The City of Napa is situated in the North Coast Range subregion of the California Floristic Province in southern Napa County (Baldwin et al. 2012:42–43). The topography is relatively level throughout the study area.

Land Cover Types in the Study Area

Natural communities in Napa County were mapped in 2004 using the Manual of California Vegetation classification system (Thorne et al. 2004) and updated for the County in 2016. These data are available for public use and exist on CDFW's biogeographic information and observation system (BIOS) (California Department of Fish and Wildlife 2021b). For this analysis, the 20 natural communities were grouped into six land cover types according to the California Wildlife Habitat Relationships (CWHR) system, which was used in the existing City of Napa General Plan. Table 3.3-1 provides a crosswalk of the CWHR land cover types with the natural communities mapped for Napa County, with the acreage of each natural community in the study area. Figure 3.3-1 shows the locations of the land cover types.

Table 3.3-1. Crosswalk for CWHR Land Cover Types and the Napa County's Natural Communities in the Study Area

Napa County Natural Communities		CWHR Land Cover Types	Acres
Vineyard	550	Vineyard	550
California Annual Grasslands	385	Annual Grassland	940
Upland Annual Grasslands & Forbs Formation	555		
Blue Oak	4	Oak Woodlands[a]	548
California Bay - Madrone - Coast Live Oak - (Black Oak Big Leaf Maple)	141		
Coast Live Oak	239		
Coast Live Oak - Blue Oak (Foothill Pine)	105		
Mixed Oak	13		
Valley Oak	46		
Mixed Willow	34	Valley Foothill Riparian	234
Valley Oak - (California Bay - Coast Live Oak - Walnut - Ash) Riparian Forest	154		
Valley Oak - Fremont Cottonwood - (Coast Live Oak) Riparian Forest	46		
Riverine, Lacustrine, and Tidal Mudflats	109	Riverine	355
Open Water	246		

Napa County Natural Communities		CWHR Land Cover Types	Acres
Developed	8,865	Urban	8,893
Eucalyptus	16		
Vacant	12		
(Bulrush - Cattail) Fresh Water Marsh	184	Fresh Emergent Wetland	184
Saltgrass - Pickleweed	28	Saline Emergent Wetland	28
Unknown[b]	16	Other	16
Total Acreages for all Land Cover Types			**11,748**

[a] Includes Blue Oak Woodland, Valley Oak Woodland, Coastal Oak Woodland, and Blue Oak-Foothill Pine.

[b] Includes three unidentified areas that appear to be riparian, annual grassland (potentially with wetland inclusions), and oak woodland.

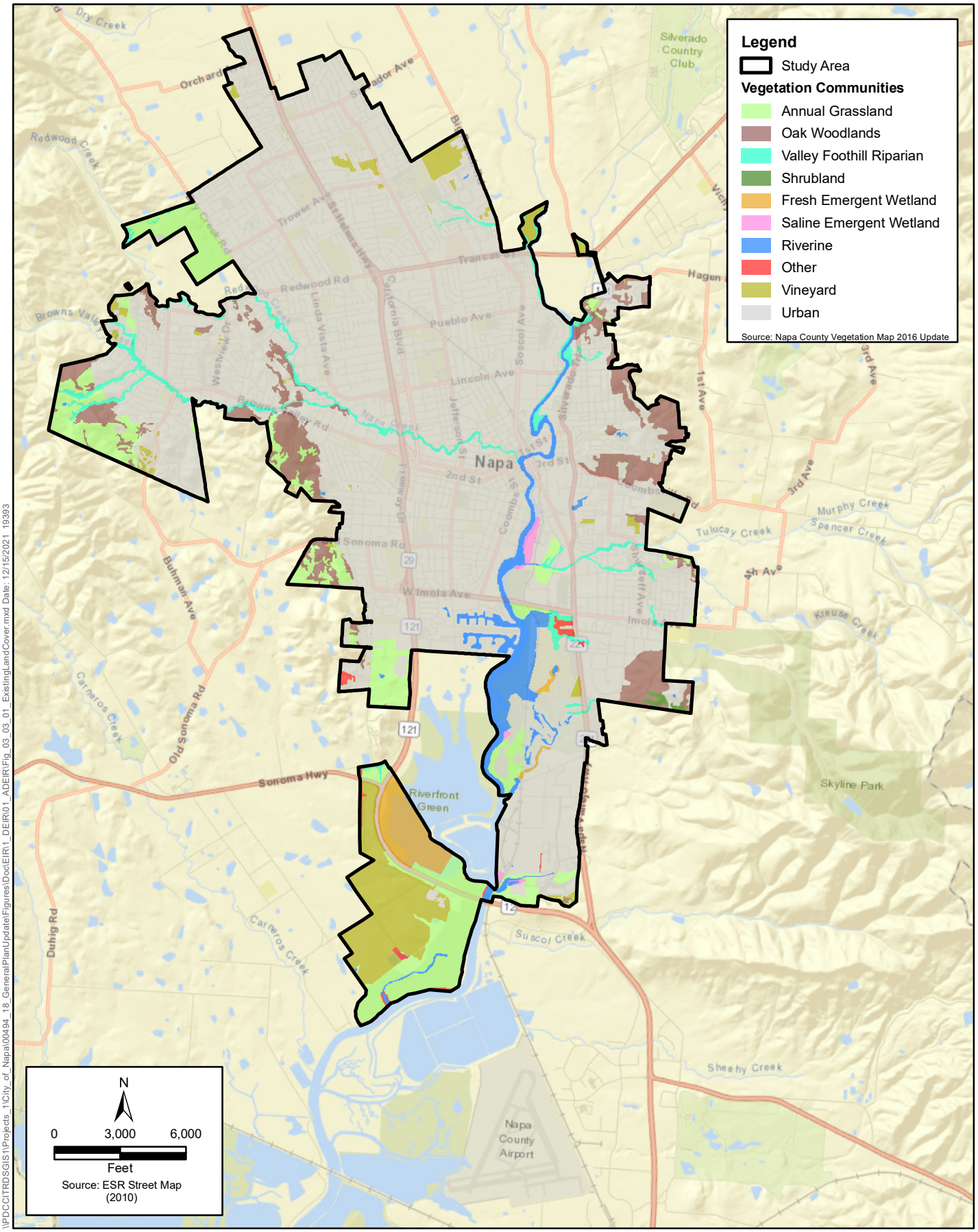
The study area supports both common and sensitive land cover types. Common land cover types are widespread vegetation communities with low plant species diversity. These types may reestablish naturally after disturbance, support primarily nonnative plant species, or be highly managed. They are not generally protected by agencies unless they provide habitat for special-status species (e.g., raptor foraging or nesting habitat, upland habitat in a wetland watershed). The common land cover types in the study area are annual grasslands and agriculture (vineyards). The urban cover type is not a natural community but includes areas of landscaping within developed and vacant lots.

Sensitive land cover types are rare vegetation communities with limited distribution. They may have high species diversity, high productivity, distinctive characteristics, or a declining status. Local, state, and federal agencies that regulate biological resources consider these types to be important, and compensation for loss of sensitive types is generally required by these agencies. Under California Public Resources Code Section 21083.4, conservation of and mitigation for impacts on oak woodlands are required. USFWS considers certain types, such as wetlands and riparian communities, important to wildlife; and USACE and EPA consider wetlands important for water quality and wildlife. Waters of the United States and waters of the state are regulated by USACE and the Regional Water Boards, respectively. CDFW's California Natural Diversity Database (CNDDB) contains a current list of rare habitat types throughout the state. The land cover types in the study area that are considered sensitive are blue oak, coast live oak, and valley oak woodlands, riparian woodlands, streams and reservoirs, and wetlands.

Plant and wildlife species most commonly associated with the study area's land cover types are described below in addition to their approximate locations.

Vineyard

The vineyard land cover type occurs primarily adjacent to the north and south fringes of the City with the densest distribution in the southern portion of the study area (Figure 3.3-1). Some areas mapped as vineyard are fallow fields. Generally annual, opportunistic, species of naturalized annual grasses with intermixed perennial and annual forbs will colonize fallow fields within one or more growing seasons.



\\PDCCITRDSGIS1\Projects_1\City_of_Napa\00494_18_GeneralPlanUpdate\Figures\DocIEIR\1_DEIR\01_ADEIR\Fig_03_03_01_ExistingLandCover.mxd Date: 12/15/2021 19393

Figure 3.3-1
Existing Land Cover in Study Area

Vineyards have been planted on deep fertile soils which once supported productive and diverse natural habitats. Larger and more diverse populations of wildlife were also supported by these native habitats. However, some species of birds and mammals have adapted to the vineyard habitats. Many have become "agricultural pests" which has resulted in intensive efforts to reduce crop losses through fencing, sound guns, or other management techniques. Wildlife, such as deer and rabbit, are known to browse on the vines; other wildlife such as squirrels and numerous birds feed on fruit (California Department of Fish and Wildlife California Interagency Wildlife Task Group 2014).

Annual Grassland

The Napa County communities in the Annual Grassland land cover type include California Annual Grasslands and Upland Annual Grasslands & Forbs Formation (Table 3.3-1). Annual grasslands occur in scattered areas throughout the study area on slopes, along roadsides, adjacent to the Napa River, and on undeveloped parcels (Figure 3.3-1).

Annual grasslands are typically dominated by naturalized annual grasses with intermixed perennial and annual forbs. Grasses commonly found in annual grasslands are wall barley (*Hordeum murinum*), ripgut brome (*Bromus diandrus*), Italian ryegrass (*Festuca perennis*), and soft chess (*Bromus hordeaceus*). Forbs commonly found in annual grasslands in the study area are yellow star-thistle (*Centaurea solstitialis*), prickly lettuce (*Lactuca serriola*), bristly ox-tongue (*Helminthotheca echioides*), sweet fennel (*Foeniculum vulgare*), Italian thistle (*Carduus pycnocephalus*), horseweed (*Conyza canadensis*), black mustard (*Brassica nigra*), fireweed (*Epilobium brachycarpum*), common sunflower (*Helianthus annuus*), pigweed (*Chenopodium* sp.), cheeseweed (*Malva parviflora*), bindweed (*Convolvulus arvensis*), and telegraph weed (*Heterotheca grandiflora*).

Annual grasslands are used by many wildlife species for foraging. Some of these species also inhabit annual grassland if special features such as cliffs, caves, ponds, or woody plants are available for breeding or resting habitat, or as escape cover. Reptiles that breed in annual grassland habitats include western fence lizard (*Sceloporus occidentalis*), common gartersnake (*Thamnophis sirtalis*), and western rattlesnake (*Crotalus tigris*). Grasslands provide foraging habitat for wide-ranging species such as red-tailed hawk (*Buteo jamaicesis*), turkey vulture (*Cathartes aura*), American kestrel (*Falco sparverius*), and northern harrier (*Circus cyaneus*). Mammals typically found in this habitat include California vole (*Microtus californicus*), western harvest mouse (*Reithrodontomys megalotis*), California ground squirrel (*Spermophilus beecheyi*), black-tailed hare (*Lepus californicus*), and coyote (*Canis latrans*) (California Department of Fish and Wildlife California Interagency Wildlife Task Group 2014). In addition, many species that nest or roost in open woodlands may forage in associated grasslands, including western bluebird (*Sialia mexicana*), western kingbird (*Tyrannus verticalis*), and some species of bats (Zeiner et al. 1990a:428, 510, 1990b).

Oak Woodland

The Napa County communities in the Oak Woodland land cover type include Blue Oak, California Bay - Madrone - Coast Live Oak - (Black Oak Big Leaf Maple), Coast Live Oak, Coast Live Oak - Blue Oak - (Foothill Pine), Mixed Oak, and Valley Oak (Table 3.3-1). Oak woodland in the study areas occurs in stands ranging in size from a few trees to several acres of densely distributed oak trees (Figure 3.3-1). The dominant overstory species in most areas is coast live oak (*Quercus agrifolia*), although other tree species are present, including blue oak (*Quercus wislizeni*), California bay (*Umbellularia californica*), big leaf maple (*Acer macrophyllum)*, and valley oak (*Quercus lobata*). Understory species typically include Himalayan blackberry (*Rubus armeniacus*), blue elderberry

(*Sambucus nigra* ssp*. caerulea*), and herbaceous annual grassland species. Some of the trees in the oak woodland are large enough to meet the definition of heritage or landmark trees as defined in the City's Protected Native Tree Ordinance (City of Napa 2015). Oak woodlands are identified in the CNDDB as a sensitive habitat type (California Department of Fish and Wildlife 2020).

Oak woodlands are important habitats because of their high value to wildlife in the form of nesting sites, cover, and food (California Department of Fish and Wildlife California Interagency Wildlife Task Group 2014). Birds associated with oak woodlands include acorn woodpecker (*Melanerpes formicivorus*), western scrub-jay (*Aphelocoma californica*), yellow-billed magpie (*Pica nuttalli*), and many warblers and flycatchers (California Partners in Flight 2002). Cavities in oak trees are important nesting sites for acorn woodpecker, oak titmouse (*Baeolophus inornatus*), Bewick's wren (*Thryomanes bewickii*), and western bluebird (California Partners in Flight 2002:24). Oak woodlands provide nesting sites and/or foraging habitat for raptors, such as red-tailed hawk, red-shouldered hawk (*Buteo lineatus*), and great horned owl (*Bubo virginianus*) (Zeiner et al. 1990a:132, 136, 326; California Partners in Flight 2002:24). Mammals associated with oak woodlands include western gray squirrel (*Sciurus griseus*), pallid bat (*Antrozous pallidus*), bobcat (*Lynx rufus*), mule deer (*Odocoileus hemionus*), and gray fox (*Urocyon cinereoargenteus*) (Zeiner et al. 1990b:70, 146, 324, 352). Acorns are an important food source for species such as California quail (*Callipepla californica*), wild turkey (*Meleagris gallopavo*), western gray squirrel, and mule deer (California Department of Fish and Wildlife California Interagency Wildlife Task Group 214).

Valley Foothill Riparian

The Napa County communities in the Valley Foothill Riparian land cover type include Mixed Willow, Valley Oak - (California Bay - Coast Live Oak - Walnut - Ash) Riparian Forest, and Valley Oak - Fremont Cottonwood - (Coast Live Oak) Riparian Forest (Table 3.3-1). Within the study area, these communities mostly occur along the Napa Creek, Valley Creek, and Napa River but are also found in the vales of surrounding hillsides (Figure 3.3-1). Riparian woodlands may be dominated by Fremont cottonwood (*Populus fremontii* ssp. *fremontii*), willow species (*Salix* sp.), valley oak, Oregon ash (*Fraxinus latifolia*), or northern California black walnut *(Juglans Hindsii).* The shrub layer includes small trees of the dominant species, box elder (*Acer negundo* var. *californicum*), tree tobacco (*Nicotiana glauca*), sandbar willow (*Salix exigua*), red willow (*S. laevigata*), poison-oak (*Toxicodendron diversilobum*), and Himalayan blackberry. Blue elderberry shrubs may also occur in riparian habitat. Herbaceous understory species can include mugwort (*Artemisia douglasiana*), rough cocklebur (*Xanthium strumarium*), cudweed (*Gnaphalium luteo-album*), and annual grasses.

Some of the riparian trees are large enough to meet the definition of heritage or landmark trees as defined in the City's Protected Native Tree Ordinance (City of Napa 2015). The CNDDB identifies riparian woodlands as a sensitive habitat type (California Department of Fish and Wildlife 2020). CDFW has adopted a no-net-loss policy for riparian habitat values, and the USFWS mitigation policy identifies California's riparian habitats in Resource Category 2, for which no net loss of existing habitat value is recommended (46 FR 7644).

When the vegetation is diverse and well developed, riparian forest provides high-value habitat for wildlife, including several special-status species. Riparian forest habitat provides food, water, and migration and dispersal corridors, as well as escape, nesting, and thermal cover for many wildlife species (California Department of Fish and Wildlife California Interagency Wildlife Task Group 2014). Invertebrates, amphibians, and aquatic reptiles live in aquatic and adjacent upland habitats. Raptors, herons, egrets, and other birds' nest in the upper canopy. A variety of songbirds use the

shrub canopy, and cavity-nesting birds, such as Nuttall's woodpecker (*Picoides nuttallii*) and oak titmouse, occupy dying trees and snags (Zeiner et al. 1990a:388, 472). Several mammals including raccoon (*Procyon lotor*), Virginia opossum (*Didelphis virginiana*), and striped skunk (*Mephitis mephitis*) are common in riparian habitats (Zeiner et al. 1990b:2, 298, 316).

Riparian vegetation is also a component of nearshore and shaded riverine aquatic (SRA) cover and directly influences the quality of fish habitat. USFWS defines SRA cover as the unique nearshore aquatic area occurring at the interface between a river and adjacent woody riparian habitat. SRA contributes to cover, food, instream habitat complexity, streambank stability, and temperature regulation. Large woody debris usually originates from riparian trees and provides habitat complexity in aquatic environments, an essential component of fish habitat. The roots of riparian vegetation at the land-water interface and on adjacent berms provide streambank stability and cover for rearing fish (Meehan and Bjorn 1991).

Riverine

The Napa County communities in the Riverine land cover type included Riverine, Lacustrine, and Tidal Mudflats and Open Water (Table 3.3-1). The Riverine land cover type includes open water channels or parts of channels in the study area, such as the Napa River, Redwood Creek, Browns Valley Creek, Milliken Creek, Napa Creek, Asylum Slough Creek, Tulocay Creek, Congress Valley Creek, and unnamed tributaries (Figure 3.3-1). Included in this cover type are also unvegetated canals and ditches that are more highly maintained than the ditches that support fresh emergent wetland habitat. The Riverine land cover type is unvegetated, but some of the open water channels are bordered by freshwater emergent wetland and riparian habitats. Riverine habitats may qualify as waters of the United States and waters of the state.

Rivers with adjacent riparian or emergent wetland vegetation provide food, water, and migration and dispersal corridors, as well as escape, nesting, and thermal cover for a variety of wildlife and fish species. The open water areas of large rivers and creeks provide resting and escape cover for many species of waterfowl and other water birds. Insectivorous birds, such as swallows, swifts, and flycatchers, catch insects over open water areas. The river shore and shallow water areas provide foraging opportunities for waterfowl, herons, and shorebirds (California Department of Fish and Wildlife California Interagency Wildlife Task Group 2014). Other wildlife species that may use the riverine habitat and/or associated riparian habitat include western pond turtle (Zeiner et al. 1988:100), river otter (*Lontra canadensis*), raccoon, and striped skunk (Zeiner et al. 1990b:298, 316, 318).

The segment of the Napa River in the study area falls within the Sacramento–San Joaquin Province (Central Valley Subprovince), one of six aquatic zoogeographic provinces in California, as defined by Moyle (2002). The Sacramento–San Joaquin Province is drained by the Sacramento and San Joaquin Rivers. Generally, four native fish assemblages can be recognized in Central Valley streams: rainbow trout assemblage, California roach assemblage, pikeminnow-hardhead-sucker assemblage, and deep-bodied fish assemblage (Moyle 2002).

Native fish species that occur in the Napa River include Sacramento sucker (*Catostomus occidentalis*), Sacramento pikeminnow (*Ptychocheilus grandis*), Sacramento splittail (*Pogonichthys macrolepidotus*), Sacramento blackfish (*Orthodon microlepidotus*) hitch (*Lavinia exilicauda*), hardhead (*Mylopharodon conocephalus*) Chinook salmon (*Oncorhynchus tshawytscha*) (fall-run), steelhead (*O. mykiss*), white sturgeon (*A. transmontanus*), Pacific lamprey (*Entosphenus tridentata*), river lamprey (*Lampetra ayresi*), delta smelt (*Hypomesus transpacificus*), longfin smelt (*Spirinchus*

thaleichthys), tule perch (*Hysterocarpus traski*), and prickly sculpin (*Cottus asper*) (Moyle 2002). Brackish water fish include bay goby (*Lepidogobius lepidus*), Pacific herring (*Clupea pallasii*), and northern anchovy (*Engraulis mordax*). Nonnative species fish species include largemouth bass (*Micropterus salmoides*), black crappie (*Pomoxis nigromaculatus*), bluegill (*Lepomis macrochirus*), American (*Alosa sapidissima*), threadfin shad (*Dorosoma petenense*), striped bass (*Morone saxatilis*), bigscale logperch (*Percina macrolepida*); golden shiner (*Notemigonus crysoleucas*); inland silverside (*Menidia beryllina*), white catfish (*Ameiurus catus*), brown bullhead (*Ameiurus nebulosus*), and common carp (*Cyprinus carpio*) (Moyle 2002; Koehler and Blank 2020).

Urban

The Napa County communities in the Urban land cover type include Eucalyptus, Vacant, and Developed (Table 3.3-1). The urban land cover type is the most prevalent in the study area. The urban land cover type consists of developed commercial, industrial, and residential parcels in the study area where vegetation, if present, is mostly landscaped, horticultural species, which include eucalyptus (Figure 3.3-1). The urban land cover type also includes roads, large, paved areas, and vacant lots.

Urban areas have marginal value for wildlife because of human disturbance and the lack of vegetation. Wildlife species that use these areas are typically adapted to human disturbance, such as western scrub-jay, northern mockingbird (*Mimus polyglottos*), house finch (*Haemorhous mexicanus*), raccoon, Virginia opossum, and striped skunk (California Department of Fish and Wildlife California Interagency Wildlife Task Group 2014).

Freshwater Emergent Wetland

The only Napa County community in the Freshwater Emergent Wetland land cover type is (Bulrush - Cattail) Fresh Water Marsh (Table 3.3-1). Freshwater emergent wetlands are found in the southern portion of the study area, adjacent to the Napa River (Figure 3.3-1). Freshwater emergent wetlands support wetland species such as tule (*Schoenoplectus acutus*), narrow-leaved cattail (*Typha angustifolia*), Himalayan blackberry, knotweed (*Persicaria hydropiperoides*), monkeyflower (*Mimulus guttatus*), English plantain (*Plantago lanceolata*), and dallisgrass (*Paspalum dilatatum*). Some wetlands in the study area qualify as waters of the United States, while others would be considered only as waters of the state. Ditches with minimal wetland vegetation are considered riverine habitat, as discussed above.

Wetlands may occur in association with terrestrial or aquatic habitats and contain varying amounts of vegetation. Wetlands provide food, cover, and water for a variety of amphibians, reptiles, birds, and mammals (California Department of Fish and Wildlife California Interagency Wildlife Task Group 2014). Wildlife species that utilize freshwater wetlands include California freshwater shrimp (*Syncaris pacifi*ca), great blue heron (*Ardea herodias*), great egret (*Ardea alba*), black crowned night heron (*Nycticorax nycticorax*) and red-winged blackbird (*Agelaius phoeniceus*) (Zeiner et al. 1990a:32, 34, 176, 638).

Saline Emergent Wetland

The only Napa County community in the Saline Emergent Wetland land cover type is Saltgrass - Pickleweed (Table 3.3-1). Saline emergent wetlands are found in the southern portion of the study area, adjacent to the Napa River (Figure 3.3-1). Saline emergent wetlands are tidal and receive regular inundation of saltwater. Saline emergent wetland is commonly dominated by pickleweed

(*Salicornia* sp.), saltgrass (*Distichlis spicata)*, or cordgrass (*Spartina* sp.). Some wetlands in the study area qualify as waters of the United States, while others would be considered only as waters of the state. Ditches with minimal wetland vegetation are considered riverine habitat, as discussed above.

Wetlands may occur in association with terrestrial or aquatic habitats and contain varying amounts of vegetation. Wetlands provide food, cover, and water for a variety of amphibians, reptiles, birds, and mammals (California Department of Fish and Wildlife California Interagency Wildlife Task Group 2014). Tidal saline emergent wetlands in the study area are associated with the growth of pickleweed which provides suitable habitat for both the California black rail (*Laterallus jamaicensis coturniculus*) and the California ridgway's rail (*Rallus obsoletus obsoletus).*

Wetlands and Nonwetland Waters

Wetlands and nonwetland waters include several of the land cover types discussed above—freshwater emergent wetland, saline emergent wetland, riverine, and some areas of valley foothill riparian. The freshwater and saline emergent wetlands and valley foothill riparian types would be considered wetlands, and the riverine types would be considered nonwetland waters. These land cover types are regulated as waters of the United States by USACE and/or as waters of the state by the Regional Water Board.

Special-Status Species

For the purposes of CEQA, the following categories are considered special-status species.

- Species listed or proposed for listing as threatened or endangered under ESA (50 CFR 17.12 [listed plants], 50 CFR 17.11 [listed animals], and various notices in the Federal Register [proposed species]).
- Species that are candidates for possible future listing as threatened or endangered under ESA (84 FR 54732 October 10, 2019).
- Species listed or proposed for listing by the State of California as threatened or endangered under CESA (California Code of Regulations [CCR], Title 14, Section 670.5).
- Species that meet the definitions of rare or endangered under State CEQA Guidelines Section 15380.
- Animals fully protected in California (California Fish and Game Code Section 3511 [birds], 4700 [mammals], and 5050 [amphibians and reptiles]).
- Animal species of special concern to CDFW (California Department of Fish and Wildlife 2021c).
- Plants listed as rare under the CNPPA (California Fish and Game Code Section 1900 et seq.).
- Plants with a California Rare Plant Rank of 1A, 1B, 2A, 2B, 3, and 4 (California Native Plant Society 2021).

Numerous animal and plant species are given special status under state and federal laws because they are rare, threatened, endangered, or otherwise identified as needing protection to ensure their survival. CDFW maintains the CNDDB, a statewide inventory of reported occurrences of special-status plant and animal species. The CNDDB includes state-listed and federally listed species, as well as nonlisted plants that are considered threatened ("California Rare Plant Rank" in Table 3.3-1). Because the General Plan update is neither site-specific nor proposes any individual development project, the following information from the CNDDB (California Department of Fish and Wildlife

2021a) and the California Native Plant Society (CNPS) Inventory (California Native Plant Society 2021) is for the Napa, Sonoma, Rutherford, Yountville, Capell Valley, Mount George, Cordelia, Cuttings Wharf, and Sears Point 7.5-minute quadrangles that include portions of the study area. Tables 3.3-2, 3.3-3, and 3.3-4 list the special-status plant, wildlife, and fish species, respectively, that have been found to occur in or near the study area, as documented in the CNDDB and CNPS in February 2021.

Special-Status Plants

Sixty-one special-status plant species were identified from database research, including the CNDDB and USFWS species lists and CNPS Inventory, as occurring in or near the study area (Table 3.3-2). While the study area does not support chaparral habitat for some of these species, suitable habitats for the other species are present. Of the 61 species identified, 28 species have a moderate or high potential to occur in the study area, including the following six state- and/or federally listed species: soft bird's beak (*Chloropyron molle* ssp. *mole*), Contra Costa goldfields (*Lasthenia conjugens*), Mason's lilaeopsis (*Lilaeopsis masonii*), Sebastopol meadowfoam (*Limnanthes vinculans*), few-flowered navarretia (*Navarretia leucocephala* ssp. *pauciflora*), and two-fork clover (*Trifolium amoenum*). The species with moderate or high potential to occur in the study area are found in a variety of natural habitats that occur in the study area, including annual grassland, fresh emergent wetland, saline emergent wetland, oak woodland, riparian, and potentially vernal pools. Table 3.3-2 lists the status, habitat requirements, and potential for occurrence in the study area for all 61 species.

Special-Status Wildlife

Thirty-seven special-status wildlife species were identified from database research, including the CNDDB and USFWS species lists, as occurring in or near the study area (Table 3.3-3). Of the 37 species identified, 20 species have a moderate or high potential to occur in the study area, including the following 10 state-listed and/or federally listed, including California fresh water shrimp (*Syncaris pacifica*), conservancy fairy shrimp (*Branchinecta conservatio*), vernal pool fairy shrimp (*Branchinecta lynchi*), California red-legged frog (*Rana draytonii*), foothill yellow-legged frog (*Rana boylii*), California black rail (*Laterallus jamaicensis coturniculus*), California least tern, California Ridgeway's rail (*Rallus obsoletus obsoletus*), Swainson's hawk (*Buteo swainsoni*), and tri-colored blackbird (*Agelaius tricolor*). The species with moderate or high potential to occur in the study area are found in a variety of natural habitats that occur in the study area, including annual grassland, fresh emergent wetland, oak woodland, riparian, and riverine. Table 3.3-3 lists the status, habitat requirements, and potential for occurrence in the study area for all 37 species.

Special-Status Fish

Eleven special-status fish species or populations are known or have potential to occur in the study area, including Central Valley fall–run Chinook salmon ESU, Central California coast steelhead DPS, green sturgeon (*Acipenser medirostris*), Delta smelt, longfin smelt, Sacramento splittail, river lamprey, Pacific lamprey, hardhead, tule perch, and hitch (Table 3.3-4).

Table 3.3-2. Special-Status Plants Identified as Occurring in or Near the Study Area

Common and Scientific Name	Legal Status[a] Federal/ State/CRPR	Range and Habitat Requirements	Identification Period	Potential for Occurrence in Study Area
Henderson's bent grass *Agrostis hendersonii*	–/–/3.2	Scattered locations in Central Valley and adjacent foothills: Butte, Calaveras, Merced, Napa, Placer, Shasta, Tehama, and Tuolumne Counties; Oregon. Moist places in valley and foothill grassland, vernal pools; 225–1000 feet.	Apr–Jun	Moderate. Suitable habitat is present in the study area in grassland and suitable wetland or vernal pool areas. There are no recorded CNDDB occurrences in the study area but there is one recorded occurrence within 5 miles of the study area.
Franciscan onion *Allium peninsulare* var. *franciscanum*	–/–/1B.2	Central Coast, San Francisco Bay region: Mendocino, Santa Clara, San Mateo, and Sonoma Counties. Clay and often serpentine soils in cismontane woodland, valley and foothill grassland; 170–1,000 feet	(Apr)May–Jun	Low. Suitable habitat is present in the study area in oak woodland and grassland areas, but there are likely no suitable clay or serpentine soils in these areas. There are no recorded CNDDB occurrences in the study area but there is one recorded occurrence within 5 miles from the study area.
Napa false indigo *Amorpha californica* var. *napensis*	–/–/1B.2	Monterey, Marin, Napa, and Sonoma Counties. Openings in broadleaved upland forest, cismontane woodland, chaparral; 390–6,560 feet.	Apr–Jul	Moderate. Suitable habitat is present in the study area in oak woodland areas. There are no recorded occurrences within the study area but there are 6 recorded occurrences within 5 miles of the study area.
Bent-flowered fiddleneck *Amsinckia lunaris*	–/–/1B.2	Inner North Coast Ranges, San Francisco Bay Area, west-central Great Valley. Coastal bluff scrub, valley and foothill grasslands, cismontane woodlands; 5–1,640 feet.	Mar–Jun	Moderate. Suitable habitat is present in the study area in grassland and oak woodland areas. There are no recorded CNDDB occurrences within 5 miles of the study area.
Baker's manzanita *Arctostaphylos bakeri* ssp. *bakeri*	–/SR/1B.1	Sonoma County, between Occidental and Camp Meeker. Often on serpentine in broadleaved upland forest or chaparral; 245–985 feet.	Feb–Apr	Low. Suitable habitat is present in the study area in oak woodland areas, but there are likely no suitable serpentine soils in these areas. There are no recorded CNDDB occurrences within 5 miles of the study area.

Common and Scientific Name	Legal Status[a] Federal/ State/CRPR	Range and Habitat Requirements	Identification Period	Potential for Occurrence in Study Area
Rincon Ridge manzanita *Arctostaphylos stanfordiana* ssp. *decumbens*	–/–/1B.1	Rincon Ridge, near Santa Rosa, Napa and Sonoma Counties. Highly restricted to red rhyolitic soils in open areas of chaparral, cismontane woodland; 245–1,215 feet.	Feb–Apr (May)	Low. Suitable habitat is present in the study area in oak woodland areas, but there are likely no suitable red rhyolitic soils in these areas. There are no recorded CNDDB occurrences within 5 miles of the study area.
Clara Hunt's milk-vetch *Astragalus claranus*	FE/ST/1B.1	Southern portion of the North Coast Ranges: endemic to Napa and Sonoma Counties. Serpentine, volcanic, rocky, or clay soils in chaparral openings, cismontane woodland, valley and foothill grassland; 245–900 feet.	Mar–May	Low. Suitable habitat is present in the study area in oak woodland and grassland areas, but there are likely no suitable serpentine, volcanic, rocky, or clay soils in these areas. There are no recorded CNDDB occurrences within 5 miles of the study area.
Alkali milk vetch *Astragalus tener* var. *tener*	–/–/1B.2	Playas, on adobe clay in valley and foothill grassland, vernal pools on alkali soils; below 197 feet.	Mar–Jun	Moderate. Suitable habitat is present in the study area in wetland and vernal pool areas, but there are no playa habitats and may not be suitable clay soils in these areas. There is 1 recorded CNDDB occurrence within the study area and 1 additional recorded occurrence within 5 miles of the study area.
Big-scale balsamroot *Balsamorhiza macrolepis*	–/–/1B.2	Scattered occurrences in the Coast Ranges and Sierra Nevada Foothills. Sometimes on serpentine soils in chaparral, cismontane woodland, valley and foothill grassland; 145–5,100 feet.	Mar–Jun	Moderate. Suitable habitat is present in the study area in oak woodland and grassland areas. There are no recorded CNDDB occurrences in the study area, but there are 4 recorded occurrences within 5 miles of the study area.
Sonoma sunshine *Blennosperma bakeri*	FE/SE/1B.1	Endemic to Sonoma County. Vernal pools, mesic valley and foothill grassland; 30–360 feet.	Mar–May	Low. Suitable habitat is present in the study area in grassland and vernal pool areas, but this species is only known from Sonoma County. There are no recorded CNDDB occurrences within 5 miles of the study area.

Common and Scientific Name	Legal Status[a] Federal/ State/CRPR	Range and Habitat Requirements	Identification Period	Potential for Occurrence in Study Area
Narrow-anthered brodiaea *Brodiaea leptandra*	–/–/1B.2	Lake, Napa, and Sonoma Counties, Broadleaved upland forest, chaparral, lower montane coniferous forest; 360–3,000 feet.	May–Jul	High. Suitable habitat is present in the study area in oak woodland areas. There is 1 recorded CNDDB occurrence within the study area and 7 recorded occurrences within 5 miles of the study area.
Mt. Diablo fairy-lantern *Calochortus pulchellus*	–/–/1B.2	Alameda, Contra Costa, and Solano Counties. Cismontane woodland; 95–2755 feet.	Apr–Jun	Low. Suitable habitat is present in the study area in oak woodland areas. There are no recorded CNDDB occurrences within 5 miles of the study area, and this species is not known from Napa County.
Small-flowered calycadenia *Calycadenia micrantha*	–/–/1B.2	Colusa, Lake, Monterey, Napa, and Trinity Counties. Rocky talus scree, roadsides, sometimes serpentine barrens in chaparral, valley and foothill grasslands, and meadows and seeps; 15–4,920 feet.	Jun–Sep	Low. Suitable habitat is present in the study area in grassland areas, but there may not be suitable substrates in these areas. There are no recorded CNDDB occurrences within 5 miles of the study area.
Lyngbye's sedge *Carex lyngbyei*	–/–/2B.2	North Coast: from Del Norte to Marin Counties; Oregon and elsewhere. Brackish or freshwater marshes and swamps; 0–35 feet.	Apr–Aug	Moderate. Suitable habitat is present in the study area in wetland areas. There are no recorded CNDDB occurrences in the study area, but there is 1 recorded occurrence within 5 miles of the study area.
Tiburon paintbrush *Castilleja affinis* var. *neglecta*	FE/ST/1B.2	San Francisco Bay Area: Marin, Napa, and Santa Clara Counties. Serpentine grasslands; 195–1,310 feet.	Apr–Jun	Low. No suitable habitat is present in the study area. There are no recorded CNDDB occurrences within 5 miles of the study area.
Mead's owl's clover *Castilleja ambigua* var. *meadii*	–/–/1B.1	Known only from the Atlas Peak area in Napa County. Gravelly, volcanic, or clay soils in meadows and seeps and vernal pools; 1,475–1,560 feet.	Apr–May	Low. Suitable habitat is present in the study area in wetland and vernal pool areas, but study area is below species elevational range. There are no recorded CNDDB occurrences in the study area, but there are 3 recorded occurrences within 5 miles of the study area.

Common and Scientific Name	Legal Status[a] Federal/ State/CRPR	Range and Habitat Requirements	Identification Period	Potential for Occurrence in Study Area
Rincon Ridge ceanothus *Ceanothus confusus*	–/–/1B.1	Inner North Coast Ranges in Lake, Mendocino, Napa, and Sonoma Counties. Volcanic or serpentine soils in closed-cone coniferous forest, chaparral, and cismontane woodland; 245–3,495 feet.	Feb–Jun	Low. Suitable habitat is present in the study area in oak woodland areas, but there may not be suitable volcanic or serpentine soils in these areas. There are no recorded CNDDB occurrences in the study area, but there is 1 recorded occurrence within 5 miles of the study area.
Calistoga ceanothus *Ceanothus divergens*	–/–/1B.2	North Coast Ranges, Lake, Napa, and Sonoma Counties. Rocky areas in chaparral on serpentine or volcanic soils; 555–3,115 feet.	Feb–Apr	Low. No suitable habitat is present in the study area. There are no recorded CNDDB occurrences within 5 miles of the study area.
Holly-leaved ceanothus *Ceanothus purpureus*	–/–/1B.2	Inner North Coast Ranges in Napa, Shasta, Solano, Sonoma, and Trinity Counties. Volcanic, rocky soils in cismontane woodland and chaparral; 390–2,100 feet.	Feb–Jun	Moderate. Suitable habitat is present in the study area in oak woodland areas, but there may not be suitable sandy, serpentinite, or volcanic soils in these areas. There are no recorded CNDDB occurrences in the study area, but there are 20 recorded occurrences within 5 miles of the study area.
Sonoma ceanothus *Ceanothus sonomensis*	–/–/1B.2	Outer North Coast Ranges, Hood Mountain Range: Napa and Sonoma Counties. Chaparral on sandy, serpentinite, or volcanic soils; 705–2,625 feet.	Feb–Apr	Low. No suitable habitat is present in the study area. There are no recorded CNDDB occurrences in the study area, but there are 2 recorded occurrences within 5 miles of the study area.
Pappose tarplant *Centromadia parryi* ssp. *parry*i	–/–/1B.2	North and Central Coast Ranges, the southern Sacramento Valley; occurrences in Butte, Colusa, Glenn, Lake, Napa, San Mateo, Solano, and Sonoma Counties. Coastal prairie, meadows and seeps, coastal salt marshes and swamps, alkaline soils in vernally mesic valley and foothill grassland; 0–1,380 feet.	May–Nov	Moderate. Suitable habitat is present in the study area within grassland and saline emergent wetland areas. There are no recorded CNDDB occurrences within the study area, but there is 1 recorded occurrence within 5 miles of the study area.

Common and Scientific Name	Legal Status[a] Federal/ State/CRPR	Range and Habitat Requirements	Identification Period	Potential for Occurrence in Study Area
Soft bird's beak *Chloropyron molle* ssp. *molle*	FE/SR/1B.2	San Francisco Bay region: Suisun Marsh, Contra Costa, Marin*, Napa, Solano, Sacramento*, and Sonoma* Counties. Tidal salt marsh; 0–10 feet.	Jun–Nov	Moderate. Suitable habitat is present in the study area within saline emergent wetland areas. There are no recorded CNDDB occurrences in the study area, but there are 3 recorded occurrences within 5 miles of the study area, including one less than 1 mile from the study area.
Sonoma spineflower *Chorizanthe valida*	–/–/1B.1	Marin and Sonoma* Counties. Sandy soils of coastal prairie; 30–1,000 feet.	Jun–Aug	Low. No suitable habitat is present in the study area. There are no recorded CNDDB occurrences within 5 miles of the study area.
Serpentine cryptantha *Cryptantha dissita*	–/–/1B.2	Inner North Coast Ranges in Colusa, Lake, Mendocino, Napa, Shasta, Siskiyou, and Sonoma Counties. Chaparral on serpentinite; 1,295–1,905 feet.	Apr–Jun	Low. No suitable habitat is present in the study area. There are no recorded CNDDB occurrences within 5 miles of the study area.
Dwarf downingia *Downingia pusilla*	–/–/2B.2	Central Valley. Vernal pools and mesic valley and foothill grasslands; 45–3,640 feet.	Jun–Jul (Sep)	Moderate. Suitable habitat is present in the study area within wetland and vernal pool areas. There is 1 recorded CNDDB occurrence (thought to be extirpated) in the study area and 8 recorded occurrences within 5 miles of the study area.
Streamside daisy *Erigeron biolettii*	–/–/3	North Coast, from Humboldt County to Marin County. Moist, rocky areas in broadleaved upland forest, cismontane woodland, North Coast coniferous forest, and ledges along rivers; 95–3,610 feet.	Jun–-Oct	Moderate. Suitable habitat is present in the study area in oak woodland areas. Suitable ledges along the Napa River are unlikely to be in the study area. There are no recorded CNDDB occurrences within 5 miles of the study area.
Greene's narrow-leaved daisy *Erigeron greenei*	–/–/1B.2	Scattered occurrences in Lake, Napa, and Sonoma Counties. Chaparral on serpentinite or volcanic substrates; 260–3,295 feet.	May–Sep	Low. No suitable habitat is present in the study area. There is 1 recorded CNDDB occurrence within the study area and 5 recorded occurrences within 5 miles of the study area.

Common and Scientific Name	Legal Status[a] Federal/ State/CRPR	Range and Habitat Requirements	Identification Period	Potential for Occurrence in Study Area
Tiburon buckwheat *Eriogonum luteolum* var. *caninum*	–/–/1B.2	Central inner north Coast Range, northern Central coast, and northern San Francisco Bay area: Alameda, Contra Costa, Marin, and Sonoma?* Counties. On sandy to gravelly serpentinite soils in chaparral, coastal prairie, oak woodland, valley and foothill grassland; 0–-2,295 feet.	May–Sep	Low. Suitable habitat is present in the study area in grassland and oak woodland areas, but there may not be suitable serpentine soils in the study area. There are no recorded CNDDB occurrences within 5 miles of the study area.
Jepson's coyote thistle *Eryngium jepsonii*	–/–/1B.2	Alameda, Amador, Calaveras, Contra Costa, Fresno, Napa, San Mateo, Solano, Stanislaus, Tuolumne, and Yolo Counties. Vernal pools and mesic valley and foothill grassland; 5–985 feet.	Apr–Aug	Moderate. Suitable habitat is present in the study area in wetland and vernal pool areas. There are no recorded CNDDB occurrences in the study area, but there are 2 recorded occurrences within 5 miles of the study area.
San Joaquin spearscale *Extriplex joaquiniana*	–/–/1B.2	West edge of Central Valley from Glenn County to Tulare County. Alkaline soils in chenopod scrub, meadows and seeps, playas, valley and foothill grassland; 0–605 feet.	Apr–Oct	High. Suitable habitat is present in the study area within alkaline grassland areas. There is 1 recorded CNDDB occurrence in the study area and 2 recorded occurrences within 5 miles of the study area.
Woolly-headed gilia *Gilia capitata* ssp. *tomentosa*	–/–/1B.1	Coastal California: Sonoma and Marin Counties. Coastal bluff scrub; 30–720 feet.	May–Jul	Low. No suitable habitat is present in the study area. There are no recorded CNDDB occurrences within 5 miles of the study area.
Diablo helianthella *Helianthella castanea*	–/–/1B.2	San Francisco Bay area: Alameda, Contra Costa, Marin*, San Francisco*, and San Mateo Counties. At chaparral/oak woodland ecotone, often in partial shade, on rocky soils, also coastal scrub, riparian woodland, broadleafed upland forest, valley and foothill grassland; 195–4,265 feet.	Mar–Jun	Low. Suitable habitat is present in the study area in grassland, oak woodland, and riparian woodland areas. There are no recorded CNDDB occurrences within 5 miles of the study area.
Congested-headed hayfield *Hemizonia congesta* ssp. *congesta*	–/–/1B.2	Mendocino, Marin, San Francisco, San Mateo, Sonoma Counties. Valley and foothill grassland, sometimes roadsides; 65–1,835 feet.	Apr–Nov	Moderate. Suitable habitat is present in the study area in grassland areas. There are no recorded CNDDB occurrences in the study area, but there is 1 recorded occurrence within 5 miles of the study area.

Common and Scientific Name	Legal Status[a] Federal/ State/CRPR	Range and Habitat Requirements	Identification Period	Potential for Occurrence in Study Area
Two-carpellate western flax *Hesperolinon bicarpellatum*	–/–/1B.2	Lake, Napa, and Sonoma Counties. Serpentine chaparral; 195–3,295 feet.	May–Jul	Low. No suitable habitat is present in the study area. There are no recorded CNDDB occurrences within 5 miles of the study area.
Brewer's western flax *Hesperolinon breweri*	–/–/1B.2	Southern north inner Coast Range, northeast San Francisco Bay region, especially Mt. Diablo: Contra Costa, Napa, and Solano Counties. Chaparral, cismontane woodland, valley and foothill grassland, usually on soils derived from serpentinite; 95–3,100 feet.	May–Jul	Low. No suitable habitat is present in the study area. There are no recorded CNDDB occurrences within 5 miles of the study area.
Sharsmith's western flax *Hesperolinon sharsmithiae*	–/–/1B.2	Lake and Napa Counties. Chaparral on serpentinite; 885–985 feet.	May–Jul	Low. No suitable habitat is present in the study area. There are no recorded CNDDB occurrences within 5 miles of the study area.
Thin-lobed horkelia *Horkelia tenuiloba*	–/–/1B.2	Scattered occurrences in Mendocino, Marin, and Sonoma Counties. Moist openings on sandy soils in chaparral, broadleaved upland forest, valley and foothill grassland; 160–1,640 feet.	May–Jul (Aug)	Low. Suitable habitat is present in the study area within oak woodland and grassland areas, but suitable sandy soil and hydrology are likely not in the study area. There are no recorded CNDDB occurrences in the study area, but there is 1 recorded occurrence within 5 miles of the study area.
Northern California black walnut *Juglans hindsii*	–/–/1B.1	Last two native stands in Napa and Contra Costa Counties; historically more widespread through southern north inner Coast Range, southern Sacramento Valley, northern San Joaquin Valley, and San Francisco Bay region. Riparian forest, riparian woodland; 0–1,445 feet.	Apr–May	Low. Suitable habitat is present in the study area in oak woodland areas, but the species is considered special status only within a native stand, which is extirpated from the Napa River. There are no recorded CNDDB occurrences in the study area, but there is 1 recorded occurrence within 5 miles of the study area.

Common and Scientific Name	Legal Status[a] Federal/ State/CRPR	Range and Habitat Requirements	Identification Period	Potential for Occurrence in Study Area
Contra Costa goldfields *Lasthenia conjugens*	FE/–/1B.1	Scattered occurrences in Coast Range valleys and southwest edge of Sacramento Valley, Alameda, Contra Costa, Mendocino*, Monterey, Marin, Napa, Santa Barbara*, Santa Clara*, Solano and Sonoma Counties. Wet areas in cismontane woodland, valley and foothill grassland, vernal pools, alkaline playas or saline vernal pools and swales; 0–1,540 feet.	Mar–Jun	High. Suitable habitat is present in the study area in wetland and vernal pool areas. There is 1 recorded CNDDB occurrence in the study area and 2 recorded occurrences within 5 miles of the study area.
Delta tule pea *Lathyrus jepsonii* var. *jepsonii*	–/–/1B.2	San Francisco Bay region, also part of Central Valley in Alameda, Contra Costa, Napa, Santa Clara*, San Joaquin, Solano, and Sonoma Counties. Coastal and estuarine marshes (freshwater and brackish); 0–15 feet.	May–Jul (Aug–Sep)	High. Suitable habitat is present in the study area in freshwater wetland areas. There are 4 recorded CNDDB occurrences in the study area and 8 recorded occurrences within 5 miles of the study area.
Legenere *Legenere limosa*	–/–/1B.1	Primarily in the lower Sacramento Valley, also from north Coast Ranges, northern San Joaquin Valley and the Santa Cruz Mountains. Deep, seasonally wet habitats such as vernal pools, ditches, marsh edges, and riverbanks; 0–2,885 feet.	Apr–Jun	Moderate. Suitable habitat is present in the study area in wetland and vernal pool areas. There is 1 recorded CNDDB occurrence within 1 mile of the study area.
Jepson's leptosiphon *Leptosiphon jepsonii*	–/–/1B.2	Lake, Napa, Sonoma, and Yolo Counties. Usually volcanic substrates in chaparral, cismontane woodland; 325–1,640 feet.	Mar–May	High. Suitable habitat is present in the study area in oak woodland areas. There is 1 recorded CNDDB occurrence in the study area and 2 recorded occurrences within 5 miles of the study area.
Woolly-headed lessingia *Lessingia hololeuca*	–/–/3	Southern north Coast Ranges, southern Sacramento Valley, northern San Francisco Bay region, Alameda, Monterey, Marin, Napa, Santa Clara, San Mateo, Solano, Sonoma, and Yolo Counties. Clay or serpentinite soils of broadleafed upland forest, coastal scrub, lower montane coniferous forest, valley and foothill grassland; 45–1,000 feet.	Jun–Oct	Low. Suitable habitat is present in the study area in oak woodland and grassland areas. There are no recorded CNDDB occurrences within 5 miles of the study area.

Common and Scientific Name	Legal Status[a] Federal/ State/CRPR	Range and Habitat Requirements	Identification Period	Potential for Occurrence in Study Area
Mason's lilaeopsis *Lilaeopsis masonii*	–/SR/1B.1	Southern Sacramento Valley, Sacramento–San Joaquin River Delta, northeast San Francisco Bay area in Alameda, Contra Costa, Marin, Napa, Sacramento, San Joaquin, Solano, and Yolo Counties. Freshwater or brackish marsh, riparian scrub, in tidal zone; 0–35 feet.	Apr–Nov	High. Suitable habitat is present in the study area in freshwater emergent wetlands and riparian woodland areas. There is 1 recorded CNDDB occurrence in the study area.
Sebastopol meadowfoam *Limnanthes vinculans*	FE/SE/1B.1	Napa and Sonoma Counties. Vernal pools, vernally mesic grasslands and wet meadows; 45–1000 feet.	Apr–May	High. Suitable habitat is present in the study area in wetland and vernal pool areas. There is 1 recorded CNDDB occurrence in the study area.
Cobb Mountain lupine *Lupinus sericatus*	–/–/1B.2	Inner North Coast Ranges: Colusa, Lake, Napa, Sonoma. In knobcone pine-oak woodland, chaparral, broadleafed upland forest, cismontane woodland, lower montane coniferous forest, on open wooded slopes in gravelly soils; 900–5,005 feet.	Mar–Jun	Low. Suitable habitat is present in the study area in oak woodland and areas, but the study area is below the species' elevational range. There are 2 recorded CNDDB occurrences within 5 miles of the study area.
Mt. Diablo cottonweed *Micropus amphibolus*	–/–/3.2	Coast Ranges from Lake County to Santa Barbara County. Rocky sites in broadleafed upland forest, mixed evergreen forest, oak woodland, chaparral, valley and foothill grasslands; 145–2,705 feet.	Mar–May	Low. Suitable habitat is present in the study area in oak woodland and grassland areas. There are no recorded CNDDB occurrences within 5 miles of the study area.
Few-flowered navarretia *Navarretia leucocephala* ssp. *pauciflora*	FE/ST/1B.1	Lake and Napa Counties. Volcanic ash, mud flow vernal pools; 1,310–2,805 feet.	May–Jun	Moderate. Suitable habitat is present in the study area in wetland and vernal pool areas, but the study area is below the species' elevational range. There is 1 recorded CNDDB occurrence in the study area.
Sonoma beardtongue *Penstemon newberryi* var. *sonomensis*	–/–/1B.3	Lake, Napa, and Sonoma Counties. Rocky areas in chaparral; 2,295–4,495 feet.	Apr–Aug	Low. No suitable habitat is present in the study area and the study area is below the species' elevational range. There is 1 recorded CNDDB occurrence in the study area.

Common and Scientific Name	Legal Status[a] Federal/ State/CRPR	Range and Habitat Requirements	Identification Period	Potential for Occurrence in Study Area
Marin knotweed *Polygonum marinense*	–/–/3.1	Coastal Alameda, Marin, Napa, Solano, and Sonoma Counties. Coastal salt marsh, brackish marsh; 0–35 feet.	(Apr) May–Aug (Oct)	Moderate. Suitable habitat is present in the study area in saline emergent wetland areas. There are no recorded CNDDB occurrences in the study area but there is 1 recorded occurrence within 1 mile of the study area and 2 recorded occurrences within 5 miles of the study area.
California beaked-rush *Rhynchospora californica*	–/–/1B.1	Scattered occurrences in northwestern California, northern and central Sierra Nevada Foothills, and northern San Francisco Bay. Bogs and fens, meadows and seeps, lower montane coniferous forest, freshwater marshes and swamps; 145–3,315 feet.	May–Jul	Low. Suitable habitat is present in the study area in freshwater emergent wetland areas. There are no recorded CNDDB occurrences within 5 miles of the study area.
Sanford's arrowhead *Sagittaria sanfordii*	–/–/1B.2	Scattered locations in Central Valley and Coast Ranges. Freshwater marshes, sloughs, canals, and other slow-moving water habitats; 0–2,135 feet.	May–Oct (Nov)	Moderate. Suitable habitat is present in the study area in freshwater emergent wetland areas. There is 1 recorded CNDDB occurrence within 5 miles of the study area.
Napa checkerbloom *Sidalcea hickmanii* ssp. *napensis*	–/–/1B.1	Napa and Sonoma Counties. Rhyolitic substrates in chaparral; 1,360–2,000 feet.	Apr–Jun	Low. No suitable habitat is present in the study area, and there is likely no suitable rhyolitic substrates in the study area. There is 1 recorded CNDDB occurrence within 5 miles of the study area.
Marin checkerbloom *Sidalcea hickmanii* ssp. *viridis*	–/–/1B.1	Lake (?), Marin, Napa, and Sonoma Counties. Openings in chaparral, on volcanic or serpentinite substrates; 160–1,410 feet.	May–Jun	Low. No suitable habitat is present in the study area and there is likely no suitable volcanic or serpentine substrates in the study area. There are no recorded CNDDB occurrences within 5 miles of the study area.

Common and Scientific Name	Legal Status[a] Federal/ State/CRPR	Range and Habitat Requirements	Identification Period	Potential for Occurrence in Study Area
Keck's checkerbloom *Sidalcea keckii*	FE/–/1B.1	Known from only three occurrences in Fresno, Merced, and Tulare Counties; plants from inner North Coast Ranges in Colusa, Napa, Solano, and Yolo Counties may be *Sidalcea diploscypha*, needs study, Serpentine clay soils in cismontane woodland, valley and foothill grassland; 245–2,135 feet.	Apr–May (Jun)	Low. Suitable habitat is present in the study area in oak woodland areas, but there are likely no suitable serpentine soils in the study area. There are no recorded CNDDB occurrences within 5 miles of the study area.
Green jewelflower *Streptanthus hesperidis*	–/–/1B.2	Glenn, Lake, Napa, and Sonoma Counties. Rocky serpentinite substrates in chaparral openings, cismontane woodland; 425–2,495 feet.	May–Jul	Low. Suitable habitat is present in the study area in oak woodland areas, but there are likely no suitable serpentine soils in the study area. There are no recorded CNDDB occurrences within 5 miles of the study area.
Suisun Marsh aster *Symphotrichum lentum*	–/–/1B.2	Sacramento - San Joaquin Delta, Suisun Marsh, Suisun Bay: Contra Costa, Napa, Sacramento, San Joaquin, and Solano Counties. Brackish and freshwater marshes and swamps; 0–10 feet.	(Apr) May–Nov	High. Suitable habitat is present in the study area in freshwater emergent wetland areas. There is 1 recorded CNDDB occurrence in the study area and 2 recorded occurrences within 1 mile of the study area.
Napa bluecurls *Trichostema ruygtii*	–/–/1B.2	Lake(?), Napa, and Solano Counties. Chaparral, cismontane woodland, lower montane coniferous forest, valley foothill grassland, vernal pools; 95–2,230 feet.	Jun–Oct	Moderate. Suitable habitat is present in the study area in oak woodland, grassland, and vernal pool areas. There are no recorded CNDDB occurrences in the study area, but there are 12 recorded occurrences within 5 miles of the study area.
Two-fork clover *Trifolium amoenum*	FE/–/1B.1	Coast Range foothills in the San Francisco Bay region, currently known from only two recent occurrences in Marin County. Low elevation grasslands, including swales and disturbed areas, sometimes on serpentinite soils; 15–1,360 feet.	Apr–Jun	High. Suitable habitat is present in the study area in grassland areas. There is 1 recorded CNDDB occurrence in the study area, 1 recorded occurrence within 1 mile of the study area and 1 recorded occurrence within 5 miles of the study area.

Common and Scientific Name	Legal Status[a] Federal/ State/CRPR	Range and Habitat Requirements	Identification Period	Potential for Occurrence in Study Area
Saline clover *Trifolium hydrophilum*	–/–/1B.2	Sacramento Valley, central western California. Salt marsh, mesic alkaline areas in valley and foothill grasslands, vernal pools, marshes and swamps; 0–985 feet.	Apr–Jun	High. Suitable habitat is present in the study area in grassland and vernal pool areas. There is 1 recorded CNDDB occurrence in the study area, 1 recorded occurrence within 1 mile of the study area and 2 recorded occurrences within 5 miles of the study area.
Oval-leaved viburnum *Viburnum ellipticum*	–/–/2B.3	Northwest California, San Francisco Bay Area, north and central Sierra Nevada Foothills: Contra Costa, El Dorado, Fresno, Glenn, Humboldt, Mendocino, Napa, Placer, Shasta, Sonoma, and Tehama Counties; also, Oregon, Washington. Chaparral, cismontane woodland, and lower montane coniferous forest; 705–4,595 feet.	May–Jun	Low. Suitable habitat is present in the study area in oak woodland areas, but the study area is below the species' elevational range. There are 4 recorded CNDDB occurrences within 5 miles of the study area.

Source: California Native Plant Society 2021; California Department of Fish and Wildlife 2021a

* = extirpated

?* = uncertainty about distribution, but extirpated if once present

? = uncertainty about distribution or identity

[a] Status explanations:

Federal

FE = listed as endangered under ESA

– = no listing

State

SE = listed as endangered under CESA

ST = listed as threatened under CESA

SR = listed as rare under the CNPPA. This category is no longer used for newly listed plants, but some plants previously listed as rare retain this designation.

– = no listing

California Rare Plant Rank

1B = rare, threatened, or endangered in California and elsewhere

2B = rare, threatened, or endangered in California but common elsewhere

3 = more information is needed about this plant

0.1 = seriously endangered in California

0.2 = fairly endangered in California

0.3 = not very threatened in California

Table 3.3-3. Special-Status Wildlife Species Identified as Occurring in or Near the Study Area

Common and Scientific Names	Status[a] Fed/State	Geographic Distribution and Habitat Requirements	Potential for Occurrence in the Study Area
Invertebrates			
California freshwater shrimp *Syncaris pacifica*	FE/SE	Endemic to Marin, Napa, and Sonoma Counties; extant populations in Lagunitas Creek in Marin County, Huichica Creek, Garnett Creek, and Napa River in Napa County, and Franz, East Austin, Sonoma, and Salmon Creeks in Sonoma County; tributary streams in the lower Russian River drainage, coastal streams flowing into the Pacific, streams draining into Tomales Bay, and those draining into Northern San Pablo Bay. Found in pool areas of low-elevation, low gradient, permanent streams; among live tree roots of undercut banks, under overhanging woody debris or vegetation.	Moderate. Suitable habitat is present in the study area within the Napa River and its tributaries. There are no recorded CNDDB occurrences in the study area but there is one recorded occurrence within 5 miles of the study area along Huichica Creek, a tributary to the Napa River (CNDDB 2021).
Conservancy Fairy Shrimp *Branchinecta conservatio*	FE/–	Disjunct occurrences in Solano, Merced, Tehama, Ventura, Butte, Placer, and Glenn Counties and Central Valley. Found in large, deep vernal pools in annual grasslands.	Moderate. Suitable habitat is present in the study area in vernal pools or other ephemeral wetlands. There are no recorded CNDDB occurrences in the study area. The closest occurrence approximately 13 miles from the study area.
Vernal pool fairy shrimp *Branchinecta lynchi*	FT/–	Central Valley; Central and South Coast Ranges from Tehama County to Santa Barbara County; isolated populations in Riverside County. Common in vernal pools and swales; also found in sandstone rock outcrop pools.	Moderate. Suitable habitat is present in the study area in vernal pools or other ephemeral wetlands. There are no recorded CNDDB occurrences in the study area, but there is 1 recorded CNDDB occurrence less than 1 mile from the study area.
Callippe silverspot butterfly *Speyeria callippe*	FE/–	San Bruno Mountain, San Mateo County, a single location in Alameda County, and Contra Costa County. Found in open hillsides where wild pansy (*Viola pedunculata*) grows; larvae feed on Johnny jump-up plants, whereas adults feed on native mints and nonnative thistles.	Low. Calflora occurrences of wild pansy (host plant) mapped just east of the study area on the Skyline Wilderness Park. There are no recorded CNDDB occurrences in the study area but there is 1 recorded occurrence within 5 miles of the study area.

Common and Scientific Names	Status[a] Fed/State	Geographic Distribution and Habitat Requirements	Potential for Occurrence in the Study Area
Monarch butterfly *Danaus plexippus* pop. 1	FC/--	Adults breed and migrate throughout California and overwinter along the California coast and in central Mexico. Open habitats including fields, meadows, weedy areas, marshes, and roadsides. Monarch butterflies roost in wind-protected tree groves (such as eucalyptus) with nectar and water sources nearby. Caterpillar host plants are native milkweeds.	Moderate. Suitable habitat is present in the study area in eucalyptus stands. There are no recorded CNDDB occurrences within 5 miles of the study area.
San Bruno Elfin Butterfly *Callophrys mossii bayensis*	FE/–	San Bruno Mountain, Montara Mountains, and northern end of Santa Cruz Mountains; San Mateo County, San Francisco Bay Area, Contra Costa County, and Marin County. Found on north-facing slopes and ridges facing Pacific Ocean from 600–1,100 feet; rocky outcrops and cliffs in coastal shrub.	None. There is no suitable habitat present in the study area and the study area is outside of the species' known range.
Western bumble bee *Bombus occidentalis*	–/–	Historically occurred throughout much of northern California but currently appears to be absent from much of this area. Nests underground. Visits a wide variety of wildflowers.	High. Suitable habitat is present in in the study area in areas where there are flowering plants. There is one recorded CNDDB occurrence in the study area and 2 recorded occurrences within 5 miles of the study area.
Valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	FT/–	Presumed historical range and current range extend from Tehama County south to Fresno County through the Central Valley and associated foothills from about the 3,000-foot contour on the east and the watershed of the Central Valley on the west. Riparian and oak savanna habitats with elderberry shrubs; elderberries are the host plant.	None. There may be suitable habitat (elderberry shrubs) present in the study area, but the study area is outside of the species' known range.

Common and Scientific Names	Status[a] Fed/State	Geographic Distribution and Habitat Requirements	Potential for Occurrence in the Study Area
Amphibians			
California giant salamander *Dicamptodon ensatus*	–/SSC	Endemic to California, found in two, possibly three isolated regions, from Mendocino County near Point Arena east into the coast rages into Lake and Glenn counties, south to Sonoma and Marin Counties, continuing south of the San Francisco Bay from San Mateo County to southern Santa Cruz County; elevation near sea level to about 3,000 feet. Does not occur east of the San Francisco Bay. Occurs in wet coastal forests in or near clear, cold permanent and semipermanent streams and seepages (California Herps 2021).	Moderate. Suitable habitat is present within the study area in stream and riverine habitats. There are no recorded CNDDB occurrences in the study area but there are 4 recorded CNDDB occurrences within 5 miles of the study area along Redwood Canyon Creek and Devil's Canyon Creek west of the study area and Sulphur Canyon Creek north of the study area (CNDDB 2021).
California red-legged frog *Rana draytonii*	FT/SSC	Found along the coast and coastal mountain ranges of California from Mendocino County to San Diego County and in the Sierra Nevada from Tehama County to Fresno County; elevation near sea level to about 4,900 feet. Permanent and semi-permanent aquatic habitats, such as slow-moving streams or creeks and cold-water ponds, with emergent and submergent vegetation (shrubby riparian). May estivate in rodent burrows or cracks during dry periods.	Moderate. Suitable habitat is present in the study area in streams and ponds. There are no recorded CNDDB occurrences in the study area but there are 11 recorded occurrences were reported within 5 miles south of the study area, primarily in American Canyon but also in Jameson Canyon and Napa Junction (CNDDB 2021).
Foothill yellow-legged frog *Rana boylii*	--/SE	Occurs in the Klamath, Cascade, north Coast, south Coast, Transverse, and Sierra Nevada Ranges up to approximately 6,000 feet. Creeks or rivers in woodland, forest, mixed chaparral, and wet meadow habitats with rock and gravel substrate and low overhanging vegetation along the edge. Usually found near riffles with rocks and sunny banks nearby.	Moderate. Suitable habitat is present in the study area in stream habitats. There are no recorded CNDDB occurrences in the study area, but there are 2 recorded CNDDB occurrences less than 1 mile from the study area at Napa Junction and Redwood Creek, and 2 additional recorded occurrences within 5 miles of the study area (CNDDB 2021).

Common and Scientific Names	Status[a] Fed/State	Geographic Distribution and Habitat Requirements	Potential for Occurrence in the Study Area
Red-bellied newt *Taricha rivularis*	–/SSC	Endemic to California. Occurs along the coast from near Bodega, Sonoma county, to near Honeydew, Humboldt county, and inland to Lower lake and Kelsey Creek, Lake County. A stream or river dweller. Found in coastal woodlands and redwood forest along the coast of northern California. Larvae retreat into vegetation and under stones during the day (California Herps 2021).	None. There may be suitable habitat present in the study area, but the study area is out of this species' known range.
Reptiles			
Western pond turtle *Emys marmorata*	–/SSC	Occurs from the Oregon border of Del Norte and Siskiyou Counties south along the coast to San Francisco Bay, inland through the Sacramento Valley, and on the western slope of Sierra Nevada. Occupies ponds, marshes, rivers, streams, and irrigation canals with muddy or rocky bottoms and with some watercress, cattails, water lilies, or other aquatic vegetation in woodlands, grasslands, and open forests. Overwintering habitat consists of mud in stream and pond bottoms or a variety of upland habitats including riparian habitat for basking.	High. Suitable habitat is present in the study area in streams and ponds. There are 3 recorded CNDDB occurrences in the study area and 12 recorded occurrences within 5 miles of the study area (CNDDB 2021).
Birds			
American peregrine falcon *Falco peregrinus anatum*	FDL/SDL/ FP	Permanent resident along the north and south Coast Ranges. May summer in the Cascade and Klamath Ranges and through the Sierra Nevada to Madera County. Winters in the Central Valley south through the Transverse and Peninsular Ranges and the plains east of the Cascade Range. Nests and roosts on protected ledges of high cliffs, usually adjacent to lakes, rivers, or marshes that support large prey populations; habitats vary from wetlands, woodlands, other forested habitats, and coastal habitats.	Moderate. Suitable foraging habitat is present in the study area, but there is no suitable nesting habitat. There is 1 recorded CNDDB occurrence in the study area.

Common and Scientific Names	Status[a] Fed/State	Geographic Distribution and Habitat Requirements	Potential for Occurrence in the Study Area
Bald eagle *Haliaeetus leucocephalus*	FDL/SE/FP	Nests in Siskiyou, Modoc, Trinity, Shasta, Lassen, Plumas, Butte, Tehama, Lake, and Mendocino Counties and in the Lake Tahoe Basin. Reintroduced into central coast. Winter range includes the rest of California, except the southeastern deserts, very high altitudes in the Sierra Nevada, east of the Sierra Nevada south of Mono County, and some rangelands and coastal wetlands. In western North America, nests and roosts in coniferous forests, woodlands, grasslands, and wetland habitats within 1 mile of a lake, reservoir, stream, or the ocean; nests are normally built-in upper canopy of large trees, such as conifers.	Low. Suitable foraging habitat is present in the study area, but there is no suitable nesting habitat. There are no recorded CNDDB occurrences in the study area. The nearest recorded CNDDB occurrence is 9 miles from the study area at Lake Hennessey.
Bank swallow *Riparia*	–/ST	Occurs along the Sacramento River from Tehama County to Sacramento County, along the Feather and lower American Rivers, in the Owens Valley, and in the plains east of the Cascade Range in Modoc, Lassen, and northern Siskiyou Counties. Small populations near the coast from San Francisco County to Monterey County. Nests in bluffs or banks, usually adjacent to water, where the soil consists of sand or sandy loam, along streams, coastal bluffs, and sand/gravel pits.	Low. Suitable foraging habitat is present in the study area, but there is no suitable nesting habitat. There are no recorded CNDDB occurrences in the study area, but there is 1 recorded CNDDB occurrence within 5 miles of the study area on a gravel bank in the Sonoma River.
Black swift *Cypseloides niger*	–/SSC	Breeds very locally in the Sierra Nevada and Cascade Range, the San Gabriel, San Bernardino, and San Jacinto mountains, and in coastal bluffs from San Mateo County south to near San Luis Obispo County. Nests in moist crevice or cave on sea cliffs above the surf, or on cliffs behind, or adjacent to/behind/beside waterfalls in deep canyons or sea caves.	Low. Suitable foraging habitat is present in the study area, but there is no suitable nesting habitat. There are no recorded CNDDB occurrences in the study area. The nearest recorded CNDDB occurrence is approximately 8 miles from the study area.

Common and Scientific Names	Status[a] Fed/State	Geographic Distribution and Habitat Requirements	Potential for Occurrence in the Study Area
California black rail *Laterallus jamaicensis coturniculus*	–/ST/FP	Permanent resident in the San Francisco Bay and eastward through the Delta into Sacramento and San Joaquin Counties; small populations in Marin, Santa Cruz, San Luis Obispo, Orange, Riverside, and Imperial Counties. Tidal salt marshes associated with heavy growth of pickleweed; also occurs in brackish marshes or freshwater marshes at low elevations.	Moderate. Suitable habitat may be present at Cuttings Wharf if suitable salt marsh habitat conditions are present. There are no recorded CNDDB occurrences in the study area, but there is 1 recorded CNDDB occurrence within 1 mile of the study area and 5 recorded occurrences within 5 miles of the study area.
California least tern *Sterna antillarum browni*	FE/SE	Nests on beaches along the San Francisco Bay and along the southern California coast from southern San Luis Obispo County south to San Diego County. Nests on sandy, upper ocean beaches, and occasionally uses sparsely vegetated mudflats; forages on adjacent surf line, estuaries, or the open ocean.	Moderate. Suitable habitat may be present at Cuttings Wharf if suitable salt marsh habitat conditions are present. There are no recorded CNDDB occurrences in the study area, but there is a documented colony in the Napa Sonoma Marsh Wildlife Area directly adjacent to the study area (CDFW 2021d; USFWS 2013).
California Ridgway's rail *Rallus obsoletus*	FE/SE/FP	Occurs in Northern California within the San Francisco and San Pablo Bays. Nesting habitat in Northern California is characterized by presence of tidal sloughs; abundant invertebrate populations; pickleweed coverage with extensive cordgrass coverage in lower zone; and tall pickleweed, Hairy Gumweed, and wrack in upper zone (Eddleman et al. 2020).	Moderate. Suitable habitat may be present at Cuttings Wharf if suitable salt marsh habitat conditions are present. There are no recorded CNDDB occurrences within the study area but there is 1 recorded occurrence within 1 mile and 8 recorded occurrences within 5 miles of the study area along the Napa River and Napa Slough.
Golden eagle *Aquila chrysaetos*	–/FP	Foothills and mountains throughout California; uncommon nonbreeding visitor to lowlands such as the Central Valley; ranges from sea level to around 11,500 feet. Rolling foothills, mountain ranges, sage-juniper flats, and desert. Nests on cliffs and escarpments or in tall trees overlooking open country. Forages in annual grassland, chaparral, and oak woodland with plentiful medium and large-sized mammals.	Low. Suitable nesting and foraging habitats are present in large trees within the study area, along the Napa River, but nesting is not expected. There is one recorded CNDDB occurrence of a golden eagle nest in a large eucalyptus tree just north of the Napa River and the Fagan Slough in the study area, but the tree has since been removed. One additional occurrence has been recorded within 5 miles of the study area.

Common and Scientific Names	Status[a] Fed/State	Geographic Distribution and Habitat Requirements	Potential for Occurrence in the Study Area
Northern harrier *Circus hudsonius*	–/SSC	Occurs throughout lowland California. Has been recorded in fall at high elevations ranging from near sea level to at least 9,000 feet in Mono County; largely within coastal lowlands from Lake Earl in Del Norte County to Bodega Head in Sonoma County, but also inland at Lake Berryessa in Napa County. Grasslands, meadows, marshes, and seasonal and agricultural wetlands/fields; prefer open habitats with adequate vegetative cover.	Moderate. Suitable nesting and foraging habitats are present in the study area in wetland/marsh and grassland areas. There are no recorded CNDDB occurrences in the study area, but there are 2 recorded occurrences within 5 miles of the study area.
Northern Spotted Owl *Strix occidentalis caurina*	FT/ST	A permanent resident throughout its range; found in the north Coast, Klamath, and western Cascade Range from Del Norte County to Marin County. Dense old-growth or mature forests dominated by conifers with topped trees or oaks available for nesting crevices.	None. No suitable habitat is present in the study area and there are no recorded CNDDB occurrences within 5 miles of the study area.
Saltmarsh common yellowthroat *Geothlypis trichas sinuosa*	–/SSC	Found only in the San Francisco Bay Area in Marin, Napa, Sonoma, Solano, San Francisco, San Mateo, Santa Clara, and Alameda Counties; range includes coastal riparian and wetland areas of western Marin County, the tidal marsh system of San Pablo Bay, the tidal marsh system of southern San Francisco Bay, and coastal riparian and wetland areas in San Mateo County. Freshwater marshes in summer and salt or brackish marshes in fall and winter; requires tall grasses, tules, and willow thickets for nesting and cover.	High. Suitable nesting and foraging habitats are present in the study area along the Napa River. There are 3 recorded CNDDB occurrences in the study area and 14 recorded occurrences within 5 miles of the study area. Two of the 3 occurrences were found near Kennedy Park and 1 was in the south portion of the study area near Cuttings Wharf.
San Pablo song sparrow *Melospiza melodia samuelis*	–/SSC	Found in San Pablo Bay and around central coastal California and the Central Valley area. Found in saline emergent wetlands; uses tidal sloughs within pickleweed marshes; requires tall bushes (usually grindelia) along sloughs for cover, nesting, and song posts; forages over mudbanks and in the pickleweed.	Moderate. Suitable nesting and foraging habitats are present in the study area near Cuttings Wharf in saline emergent wetlands and marshes. There are no recorded CNDDB occurrences in the study area, but there is 1 recorded occurrence was reported just outside of the study area on Bull Island and 6 recorded occurrences within 5 miles of the study area.

Common and Scientific Names	Status[a] Fed/State	Geographic Distribution and Habitat Requirements	Potential for Occurrence in the Study Area
Suisun song sparrow *Melospiza melodia maxillaris*	–/SSC	Restricted to the extreme western edge of the Delta, between the Cities of Vallejo and Pittsburg near Suisun Bay. Brackish and tidal marshes/channels supporting cattails, tules, various sedges, and pickleweed.	None. There may be suitable habitat present in the study area, but the study area is out of this species' known range.
Swainson's hawk *Buteo swainsoni*	–/ST	Lower Sacramento and San Joaquin Valleys, the Klamath Basin, and Butte Valley. Highest nesting densities occur near Davis and Woodland, Yolo County. Requires large, open grasslands with suitable nest trees; nests in oaks or cottonwoods in or near riparian habitats; forages in grasslands, lightly grazed pastures/crops, irrigated pastures, and grain fields.	High. Suitable nesting and foraging habitats are present in the study area near Cuttings Wharf and the Carneros Creek. There are 7 recorded CNDDB occurrences of Swainson's hawk nesting within 5 miles of the study area, 6 of which are within 1 mile of the study area.
Tricolored blackbird *Agelaius tricolor*	–/ST/SCC	Permanent resident in the Central Valley from Butte County to Kern County. Breeds at scattered coastal locations from Marin County south to San Diego County; and at scattered locations in Lake, Sonoma, and Solano Counties. Rare nester in Siskiyou, Modoc, and Lassen Counties and most extensively concentrated in and around the Sacramento-San Joaquin River Delta and coastal areas, including Monterey and Marin Counties. Nests in dense colonies in emergent marsh vegetation, such as tules and cattails, or upland sites with blackberries, nettles, thistles, and grainfields; habitat must be large enough to support 50 pair probably requires water at or near the nesting colony; colonies found in silage and grain fields near diaries in the San Joaquin Valley; winter in grasslands and agricultural fields with low-growing vegetation.	High. Suitable nesting and foraging habitats are present in the study area in wetland and marsh areas. There is one recorded CNDDB occurrence in the study area and 4 recorded occurrences within 5 miles of the study area.
Western burrowing owl *Athene cunicularia hypugea*	–/SSC	Lowlands throughout south, central, and east California, including the Central Valley, northeastern plateau, southeastern deserts, and some coastal areas. Rare along the south coast. Level, open, dry, heavily grazed or low stature grassland or desert vegetation with available burrows; also found in coastal terrace prairies and sagebrush habitats.	Moderate. Suitable burrowing and foraging habitats area present in the study area in grassland areas. There are no recorded CNDDB occurrences in the study area but there are 5 recorded occurrences within 5 miles of the study area.

Common and Scientific Names	Status[a] Fed/State	Geographic Distribution and Habitat Requirements	Potential for Occurrence in the Study Area
White-tailed kite *Elanus leucurus*	–/FP	Lowland areas west of Sierra Nevada from the head of the Sacramento Valley south, including coastal valleys and foothills to western San Diego County at the Mexico border. Low foothills or valley areas with valley or live oaks, riparian areas, and marshes near open grasslands or cropland for foraging.	High. Suitable nesting and foraging habitats are present in the study area in woodlands, grasslands, and wetlands. There is 1 recorded CNDDB occurrence of nesting in the study area in an oak tree east of Kennedy Park and 1 recorded occurrence has been recorded within 5 miles of the study area.
Western snowy plover *Charadrius alexandrinus nivosus*	FT/SSC	Nests along the entire coast of California from Del Norte to San Diego County adjacent to or near tidal waters, including along the mainland coast, peninsulas, offshore islands, and adjacent bays and estuaries. Nests at inland lakes throughout northeastern, central, and southern California, including Mono Lake and Salton Sea. Coastal beaches above the normal high tide limit in flat, open areas with sandy or saline substrates; vegetation and driftwood are usually sparse or absent. Inland, they require barren to sparsely vegetated ground at alkaline or saline lakes, reservoirs, ponds and riverine sand bars; also along sewage, salt-evaporation, and agricultural waste-water ponds.	None. Suitable habitat is not present in the study area. There are no recorded CNDDB occurrences in the study area but there are 2 recorded occurrences within 5 miles of the study area along the Napa River.
Yellow rail *Coturnicops noveboracensis*	–/SSC	Historical records of nests in Mono County east of the Sierra Nevada and formerly Marin County on the coast; winter records also on the coast from Humboldt County to Orange County, where the Central Valley merges with the San Francisco Bay estuary. Freshwater marshes, brackish marshes, coastal salt marshes with moist soil or low standing water, and grassy meadows; prefers densely vegetated marshes.	None. No suitable habitat is present in the study area. There are no recorded CNDDB occurrences in the study area, but there is 1 historical recorded occurrence within 5 miles of the study area.

Common and Scientific Names	Status[a] Fed/State	Geographic Distribution and Habitat Requirements	Potential for Occurrence in the Study Area
Mammals			
Pallid bat *Antrozous pallidus*	–/SSC	Occurs throughout California, except the high Sierra, from Shasta to Kern County and the northwest coast, primarily at lower and mid elevations (up to 6,000 feet). Occurs in a variety of habitats from desert to coniferous forest. Most closely associated with oak, mixed conifer, redwood, and giant sequoia habitats in northern California and oak woodland, grassland, and desert scrub in southern California. Relies heavily on trees for roosts but also uses caves, mines, bridges, and buildings.	High. Suitable roosting and foraging habitats are present in the study area in woodland and developed areas. There are 2 recorded CNDDB occurrences in the study area and 8 recorded occurrences within 5 miles of the study area.
Salt-marsh harvest mouse *Reithrodontomys raviventris*	FE/SE/FP	San Francisco, San Pablo, and Suisun Bays; the Delta/ San Francisco Bay area. Salt marshes with a dense plant cover of pickleweed and fat hen; adjacent to an upland site.	Moderate. Suitable habitat is present in the study area in salt marsh areas. There are 2 recorded CNDDB occurrences the study area near the Napa River and Cuttings Wharf and 6 recorded occurrences within 5 miles of the study area.
Suisun shrew *Sorex ornatus sinuosus*	–/SSC	Restricted to the north shore of San Pablo and Suisun Bays (both in Solano County), from Sonoma Creek and Tubbs Island, Sonoma County on the west, eastward to Grizzly Island, Solano County. Tidal, salt, and brackish marshes containing pickleweed, grindelia, bulrushes, cattails, *Spartina foliosa*, *Salicornia ambigua*, and *Grindelia cuneifolia*, *Scirpus californicus,* and *Typha latifolia*; requires driftwood or other objects for nesting cover; Contiguous upland habitats may provide important refuge during flooding of salt marshes	None. There may be suitable habitat present in the study area, but the study area is out of this species' known range.

Common and Scientific Names	Status[a] Fed/State	Geographic Distribution and Habitat Requirements	Potential for Occurrence in the Study Area
Western red bat *Lasiurus blossevillii*	–/SSC	Coastal areas from the San Francisco Bay area south, plus the Central Valley and surrounding foothills, with a limited number of records from southern California, extending as far east as western Riverside and central San Diego counties, upper Sacramento River near Dunsmuir, Siskiyou County. Found primarily in riparian and wooded habitats. Occurs at least seasonally in urban areas. Day roosts in trees within the foliage. Found in fruit orchards and sycamore riparian habitats in the Central Valley.	High. Suitable roosting and foraging habitats are present in the study area woodland areas and other trees. There are no recorded CNDDB occurrences in the study area. The closest CNDDB occurrence is approximately 6.3 miles from the study area.
American badger *Taxidea taxus*	–/SSC	Throughout California, except for the humid coastal forests of northwestern California in Del Norte and the northwestern Humboldt Counties. Occurs in a wide variety of open, arid habitats but are most commonly associated with grasslands, savannas, and mountain meadows near timberline; they require sufficient food (burrowing rodents), friable soils, and relatively open, uncultivated ground.	High. Suitable habitat is present in the study area in grassland and woodland areas. There are 2 recorded CNDDB occurrences in the study area.

[a] Status explanations:

Federal

FE = listed as endangered under the Federal Endangered Species Act.
FT = listed as threatened under the Federal Endangered Species Act.
PT = proposed for listing as threatened under the Federal Endangered Species Act.
FDL = delisted
– = no listing.

State

SE = listed as endangered under the California Endangered Species Act.
ST = listed as threatened under the California Endangered Species Act.
FP = fully protected under the California Fish and Game Code.
SSC = species of special concern in California.
CE = candidate for listing as endangered under the California Endangered Species Act.
SDL = delisted
– = no listing.

Table 3.3-4. Special-Status Fish Species Identified as Occurring in or Near the Study Area

Common and Scientific Name	Status[a] Federal/State	Habitat Requirements	Potential for Occurrence in Study Area
Central Valley fall-run Chinook salmon *Oncorhynchus tshawytscha*	SC/SSC	Well-oxygenated, cool, riverine habitat with water temperatures from 8.0°C to 12.5°C. Habitat types are riffles, runs, and pools (Moyle 2002).	High. Suitable adult and/or juvenile migration habitat present in the Napa River. No suitable spawning habitat present in the study area. Critical habitat has not been designated; however, the Napa River is considered EFH for Pacific salmon.
Central California coast steelhead *Oncorhynchus mykiss irideus*	FT/–	Well-oxygenated, cool, riverine habitat with water temperatures from 7.8°C to 18°C (Moyle 2002). Habitat types are riffles, runs, and pools.	High. Suitable adult and/or juvenile migration habitat present in the Napa River. No suitable spawning habitat present in study area. The Napa River, Tulucay Creek, Redwood Creek, Browns Valley Creek, Milliken Creek, and Napa Creek are designated as critical habitat in the study area (NMFS 2021).
Green sturgeon – southern DPS *Acipenser medirostris*	FT/SSC	Spawn in large river systems (Sacramento, Klamath and Trinity Rivers) with well-oxygenated water, with temperatures from 8.0 to 14°C (Moyle 2002).	Medium. Rearing habitat is available in the lower reach of the Napa River that connects to San Pablo Bay. Unlikely to be present in the study area. The Napa River is designated as critical habitat (NMFS 2021).
Delta smelt *Hypomesus transpacificus*	FT/SE	Occurs in estuary habitat in the Delta where fresh and brackish water mix in the salinity range of 2–7 parts per thousand (Moyle 2002).	Medium. Suitable habitat for adults and subadults is present in the lower part of the Napa River that connects to San Pablo Bay. May be present in the lower study area. Critical habitat is not present in the study area.
Longfin smelt *Spirinchus thaleichthys*	FC/ST	Occurs in open waters of estuaries and seasonally migrates to spawn in freshwater habitats of upper estuary; spawns over sand, rocks, and aquatic plants.	High. Suitable habitat for adults and juveniles in the study area. May spawn in the study area. Critical habitat has not been designated.
Sacramento splittail *Pogonichthys macrolepidotus*	–/SSC	Spawning takes place among submerged and flooded vegetation in sloughs and the lower reaches of rivers.	High. Suitable habitat for adults and juveniles in the study area. May spawn in the study area. Critical habitat has not been designated.
River lamprey *Lampetra ayresi*	–/SSC	Adults live in the ocean and migrate into fresh water to spawn.	High. Suitable habitat for adults and juveniles in the study area. Ammocoetes (young juveniles) may rear year-round. No suitable spawning habitat is present in the study area. Critical habitat has not been designated.

Common and Scientific Name	Status[a] Federal/State	Habitat Requirements	Potential for Occurrence in Study Area
Pacific lamprey *Entosphenus tridentatus*	–/SSC	Adults live in the ocean and migrate into fresh water to spawn.	High. Suitable habitat for adults and juveniles in the study area. Ammocoetes (young juveniles) may rear year-round. No suitable spawning habitat is present in the study area. Critical habitat has not been designated.
Hardhead *Mylopharodon conocephalus*	–/SSC	Reside in low to mid-elevation streams and prefer clear, deep pools and runs with slow velocities. Also occurs in reservoirs.	High. Suitable habitat is present in the Napa River. Critical habitat has not been designated.
Tule perch *Hysterocarpus traski*	–/SSC	Occur in lowland habitats such as estuarine sloughs and clear rivers and streams. Need cool, well-oxygenated water with cover such as aquatic vegetation, deep pools, fallen trees and undercutting. (Moyle 2002)	High. Suitable habitat is present in the Napa River. Critical habitat has not been designated.
Hitch *Lavinia exilicauda*	–/SSC	Occur in low elevation lakes, sloughs and rivers with slow moving water and also low gradient streams. Can tolerate low levels of salinity. (Moyle 2002)	High. Suitable habitat is present in the Napa River. Critical habitat has not been designated.

[a] Status explanations:

Federal

FE = endangered under the Federal Endangered Species Act.
FT = threatened under the Federal Endangered Species Act.
FC = Candidate for listing.
– = no listing.

State

SE = endangered under the California Endangered Species Act.
ST = threatened under the California Endangered Species Act.
– = no listing.

Table 3.3-5. Life Stage Timing and Distribution of Special-Status Fish Species Potentially Affected by the General Plan Update

Species/Life Stage	Distribution	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Fall-run Chinook salmon[a]													
Adult migration and spawning	San Pablo Bay to upper Napa River												
Juvenile movement and rearing	Napa River to San Pablo Bay												
Central California Coast steelhead[a]													
Adult migration	San Pablo Bay to upper Napa River and tributaries												
Juvenile movement and rearing	Upper Sacramento River and tributaries to San Francisco Bay												
Green sturgeon[b]													
Adult, subadult and juvenile rearing	San Pablo Bay to lower Napa River												
Delta smelt[c]													
Adult spawning	Napa River												
Larvae present	Napa River												
Juvenile rearing	Napa River												
Longfin smelt[d]													
Adult migration and spawning	San Pablo Bay to Napa River												
Larvae present	Napa River												
Sacramento splittail[b]													
Adult migration and spawning	Napa River												
Juvenile and adult rearing	Napa River												
River and Pacific lamprey[e]													
Adult migration and spawning	Pacific Ocean to Napa River												
Ammocoetes	Napa River and tributaries												
Hardhead[f]													
Adult spawning	Napa River tributaries												
Juvenile and adult rearing	Napa River												

Species/Life Stage	Distribution	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Tule perch[b]													
Adult spawning and birth	Napa River												
Juvenile and adult rearing	Napa River												
Hitch[f]													
Adult migration and spawning	Napa River and tributaries												
Adult and juvenile rearing	Napa River												

Sources:
[a] Koehler and Blank 2020
[b] Moyle 2002
[c] Merz et al. 2011
[d] Merz et al. 2013[4]
[e] U.S. Fish and Wildlife Service 2012
[f] California Department of Fish and Wildlife No Date a,b
Note: Gray shading indicates primary periods of species and life stage occurrence included in the assessment of project effects.

Critical Habitat

The study area does not contain designated critical habitat for any plant or terrestrial wildlife species. The study area contains critical habitat for Central California Coast steelhead and green sturgeon.

Wildlife Corridors

Riparian corridors play a critical role in helping connect remaining natural areas in the Northern California Coast. Wildlife movement corridors in California are identified and described for the California Essential Habitat Connectivity (CEHC) Project. The CEHC Project was commissioned by the California Department of Transportation and CDFW to identify a functional network of connected wildlands, which are essential for maintaining California's native biodiversity. The CEHC Project was also intended to make transportation and land-use planning more efficient and less costly, while helping reduce dangerous wildlife-vehicle collisions (Spencer et al. 2010).

The CEHC Project identified large, relatively natural blocks of habitat (Natural Landscape Blocks) across California and Essential Connectivity Areas (ECAs) that provide essential connectivity between the habitat blocks. ECAs are identified as lands likely to be important to wildlife movement between large, mostly natural areas at the statewide level. The ECAs form a functional network of wildlands that are considered important to the continued support of California's diverse habitat types. They were not developed for the needs of particular species but were based primarily on the concept of ecological integrity, which considers the degree of land conversion, residential housing impacts, road impacts, and status of forest structure (for forested areas). In addition, consideration was given to the degree of conservation protection and areas known to support high biological values, such as mapped critical habitat and areas of high species endemism (Spencer et al. 2010).

The CEHC Project identified three Natural Landscape Blocks near the study area: one to the northeast, one to the southwest, and one overlapping the south portion of the study area (Figure 3.3-2). The ECAs between these areas are east of the study area and overlapping the southern portion of the study area. Land cover within the overlapping ECA includes urban/built up, woodland, riparian, wetland, aquatic, grassland, and agricultural land uses. These areas could support the movement of a variety of aquatic and terrestrial wildlife species.

The Napa River is also mapped in the CEHC as a Potential Riparian Corridor. The Napa River and its associated riparian habitats provide an important movement corridor, as well as breeding and/or foraging habitat for many common and special-status wildlife species, such as western pond turtle, great blue heron, Swainson's hawk, striped skunk, river otter, and migratory birds. The Napa River also provides important migration habitat for several special-status fish species including Chinook salmon, steelhead, Sacramento splittail, and Pacific and river lamprey.

3.3.2 Environmental Impacts

3.3.2.1 Methods for Analysis

Evaluation of the potential impacts on biological resources is based on information from database searches, reports, and other data that describe the biological conditions and/or potential biological resources in the study area and on professional judgment. No new field surveys were conducted for the evaluation of potential impacts on biological resources. The primary sources of information used for the biological resources impact analysis are listed below.

- California Natural Diversity Database (California Department of Fish and Wildlife 2021a)
- CNPS Inventory of Rare and Endangered Plants (California Native Plant Society 2021)
- USFWS IPaC list of federally listed species (U.S. Fish and Wildlife Service 2021)
- The 2016 update to the Napa Vegetation Map of 2004 (Thorne et al. 2019)
- NOAA Fisheries Protected Resources App (National Marine Fisheries Service 2021)
- California Essential Habitat Connectivity Project (Spencer et al. 2010)

The impact analysis for biological resources focuses on the potential land use changes associated with adoption of the General Plan update and how the updated policies address the potential impacts on biological resources. The analysis did not include projections for future development under the General Plan update because there is no reasonable way to ascertain how many of the uses allowable under the General Plan update may be approved in the future, and the precise locations of such uses are not known at this time. The analysis identified general areas where biological resources could be affected by proposed land use changes by comparing the baseline conditions presented in Figure 3.3-1 with the General Plan Update Proposed Land Use Diagram (Figure 3.10-2). The analysis additionally assumes that all future developments under the General Plan update would be subject to review and regulation by state and federal agencies that protect biological resources. All discretionary projects would be subject to review under CEQA and to permitting requirements for impacts on biological resources.

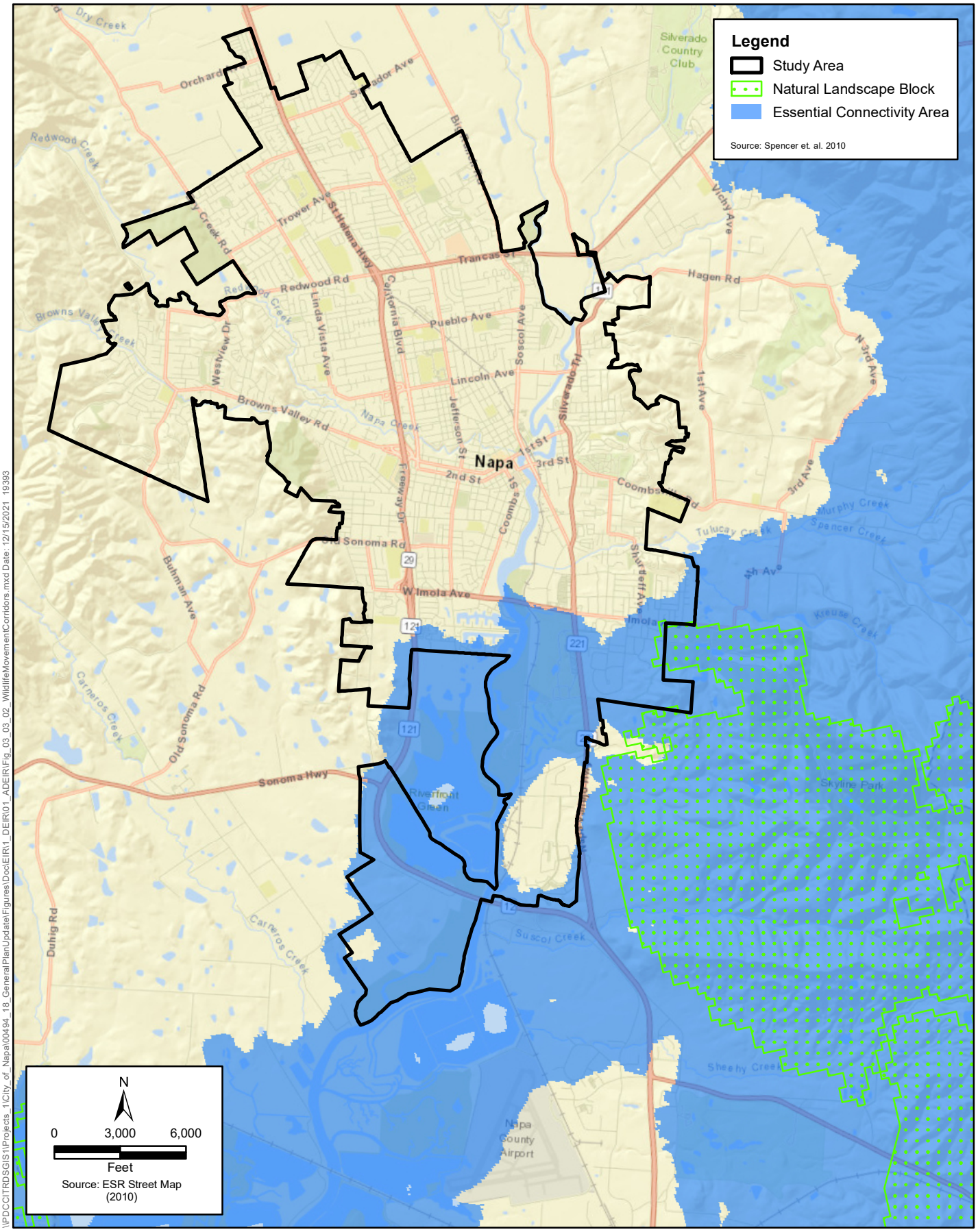


Figure 3.3-2
Wildlife Movement Corridors

Potential impacts on fish and aquatic resources were identified and evaluated based on the regulatory and professional standards described below; existing environmental conditions in the study area; relevant information on the life history, habitat requirements, and ecology of the key evaluation species; location of proposed project activities (e.g., in-water versus on land behind levees) and relative magnitude of activities related to development activities described in the proposed General Plan update; and proposed impact mechanisms linking the environmental effects of these activities with the predicted responses of the key evaluation species. The key evaluation species selected for this assessment were Chinook salmon and steelhead because of their special status, occurrence in the study area, sensitivity to anticipated Project impacts, and general utility as indicators of the response of other native fishes to potential environmental effects and mitigation measures. These two species generally capture the full range of Project impacts on other native fishes and their habitat in the study area. Where Project impacts on other fish species are not adequately captured by these two species, the specific impacts on other species are described.

Relevant General Plan Update Goals and Policies

Policy LUCD.1-1: Focus urban development to be within the voter-approved Rural Urban Limit (RUL) to provide for the protection of the surrounding open space and agriculture uses.

Policy NRC.1-1: Seek to protect and enhance the riparian habitat along waterways in the City and the Napa River.

Policy NRC.1-2: Review future waterway improvement projects (e.g., flood control, dredging, private development), as well as all development adjacent to the waterways, to protect and minimize effects on the riparian and aquatic habitats.

Policy NRC.1-3: Support restoration of degraded ecosystems to enhance the natural adaptive capacity of biological communities where feasible.

Policy NRC.1-4: Encourage native plantings along the river and creek banks to stabilize the banks, reduce sedimentation, reduce stormwater runoff volumes, and enhance aquatic habitats.

Policy NRC.1-5: Seek controlled access points in designated areas to prevent unrestricted public access to riparian habitat.

Policy NRC.1-6: Support areas of habitat and biodiversity conservation as the River Trail is completed.

Policy NRC.1-7: Identify and protect wildlife habitat corridors from being severed or significantly obstructed. Prioritize the re-establishment of disconnected habitat corridors wherever feasible, including in conjunction with stormwater management improvements.

Policy NRC.1-8: Require development projects to provide protection for significant on-site natural habitat whenever feasible, and protect significant species and groves or clusters of trees on project sites. Establish and support citywide training and support programs that provide the tools to help existing homeowners associations and residents accomplish habitat protection.

Policy NRC.1-9: Seek education opportunities for community members to learn about climate risks to habitats and biodiversity, and the need to safeguard these natural systems.

Policy NRC.2-1: Continue to consult with, and refer development proposals in sensitive areas to, State and federal wildlife agencies for review and comment.

Policy NRC.2-2: As part of development review on sites with sensitive species, require project proponents to either conserve any habitat areas, or identify any feasible means of avoiding any net loss of habitat or habitat value for endangered, threatened, and rare species. Establish programs that provide for the use of off-site mitigation when in the best interest of the public.

Policy NRC.2-3: Periodically update the City's record of known locations of rare and endangered species and sensitive habitats, as shown on Figure 3.3-1.

Policy NRC.2-4: Educate and involve the public in the stewardship of the Planning Area's natural resources, and educate property owners on the value of wildlife within the ecosystem. Seek opportunities for partnership with local organizations and the school district.

Policy NRC 3-2: Encourage, at the time of any discretionary approval, development in sensitive areas to cluster development, or to build vertically, rather than horizontally, so as to retain natural areas and habitat.

Policy NRC.4-1: Coordinate with Napa County and other agencies to preserve unique and fragile biological environments on unincorporated lands outside the Sphere of Influence (SOI), including areas such as the Napa-Sonoma Marsh.

Policy NRC.4-2: Collaborate with the Napa County Parks and Open Space District to preserve and protect open spaces within and outside of the City, including mutual support in securing resources for open space and habitat preservation.

Policy NRC.4-3: Support the Napa Land Trust and other community or nonprofit organizations seeking to purchase privately-held land designated as Agriculture or Greenbelt in the General Plan, or other land for habitat conservation, used to further conservation goals such as protecting riparian habitat, expanding/connecting open space, and preserving, protecting, or restoring wildlife corridors.

3.3.2.2 Thresholds of Significance

In accordance with Appendix G of the CEQA Guidelines, the General Plan update would be considered to have a significant effect if it would result in any of the conditions listed below.

- A substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by CDFW or USFWS.
- A substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by CDFW or USFWS.
- A substantial adverse effect on state-protected and federally protected wetlands and nonwetland waters (including, but not limited to, marshes, vernal pools, coastal wetlands, etc.) through direct removal, filling, hydrological interruption, or other means.
- Substantial interference with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impedance of the use of native wildlife nursery sites.
- Conflict with any local policies or ordinances protecting biological resources, such as the tree mitigation ordinance.
- Conflict with the provisions of an adopted HCP, natural community conservation plan, or other approved local, regional, or state HCP.
- Introduction or spread of invasive species.

3.3.2.3 Impacts and Mitigation Measures

Impact BIO-1: Potential for land use changes to result in the loss of special-status plants (less than significant)

Twenty-eight special-status plant species have a moderate or high potential to be in the study area. Special-status plants and their potential habitat could be affected by future development under updated General Plan land use designations. Future development could result in the direct removal of special-status plants and/or the loss or disturbance of habitat types that could support special-status plants, including annual grassland, saline emergent wetlands, oak woodlands, riverine, and valley foothill riparian habitats. These land cover types provide habitat for a variety of special-status plant species.

Development activities and future use of these areas associated with land use changes could result in direct effects, such as the loss or disturbance of suitable or occupied habitat, injury and mortality of special-status species, or disruption of habitats that could reduce reproductive success and overall survivorship. Indirect effects on special-status plants that could occur as a result of increased development in formerly natural areas include alteration of hydrology, soil compaction, increased dust, and degradation of water quality.

Because planned changes in land use would be minimal as compared to existing land uses, and future development under the General Plan update would occur primarily within previously disturbed areas, impacts on plants would not be substantial. In addition, the General Plan update includes policies that emphasize the conservation and protection of biological resources. The following policies in the Land Use Element under Goal LUCD-1 (Policy LUCD.1-1, maintain a compact urban form to promote a distinct community identity, and protect open space, and natural and agricultural resources surrounding the community) and Natural Resources Element under Goal NCR-1 (Policies NRC.1-1, NRC.1-2, NRC.1-3, NRC.1-4, NRC.1-5, NRC-1-6, NRC.1-8, NRC.1-9, manage natural resources, including riparian corridors, wetlands, and open space areas in and around the City to preserve and enhance plant and wildlife habitats), Goal NRC-2 (Policies NRC.2-2, NRC.2-3, NRC.2-4, recognize and support the preservation of rare, endangered, and threatened species), and Goal NRC-4 (Policies NRC.4-1, NRC.4-2 and NRC.4-3, support efforts for preserving open spaces and unique and fragile biological environments and biological environments around the City) would help minimize, avoid, and compensate for potential Project impacts on special-status plants.

Implementation of these proposed policies would help preserve existing natural habitats and reduce the direct and indirect effects on special-status plants resulting from proposed land use changes in the General Plan update. In addition, all future developments under the General Plan update would be subject to review under CEQA and to permitting requirements for impacts on special-status plants. This impact would be less than significant, and no mitigation is required.

Impact BIO-2: Potential for land use changes to result in the loss or disturbance of special-status wildlife and their habitats (less than significant)

Twenty special-status wildlife species have a moderate or high potential to be in the study area. Special-status wildlife and their potential habitat could be affected by future development under updated General Plan land use designations. Future development could result in the direct mortality of special-status wildlife and/or the loss or disturbance of habitat types that could support special-status wildlife, including vineyard, annual grassland, saline emergent wetlands, oak woodlands,

riverine, and urban, and valley foothill riparian habitats. These land cover types provide habitat for a variety of special-status wildlife species.

Development activities and future use of these areas associated with land use changes could result in direct effects, such as the loss or disturbance of suitable or occupied habitat, injury and mortality of special-status species, or disruption of normal behaviors that could reduce reproductive success and overall survivorship. Indirect effects on special-status wildlife that could occur as a result of increased human occupancy in formerly natural areas include increased mortality from vehicle collisions or predation by pets, increased trash and contaminants in waterways, and increased visual and noise disturbance from development encroaching on natural areas.

Planned changes in land use would be minimal as compared to existing land uses, and future development under the General Plan update would occur primarily within previously disturbed areas. In addition, the General Plan update includes several goals and policies that emphasize the conservation and protection of biological resources. The following policies in the Land Use Element under Goal LUCD-1 (Policy LUCD.1-1, maintain a compact urban form to promote a distinct community identity, and protect open space, and natural and agricultural resources surrounding the community) and the Natural Resources Element under Goal NCR-1 (Policies NRC.1-1, NRC.1-2, NRC.1-3, NRC.1-4, NRC.1-5, NRC-1-6, NRC.1-7, NRC.1-8, NRC.1-9, manage natural resources, including riparian corridors, wetlands, and open space areas in and around the City to preserve and enhance plant and wildlife habitats), Goal NRC-2 (Policies NRC.2-1, NRC.2-2, NRC.2-3, NRC.2-4, recognize and support the preservation of rare, endangered, and threatened species), and Goal NRC-4 (Policies NRC.4-1, NRC.4-2 and NRC.4-3, support efforts for preserving open spaces and unique and fragile biological environments and biological environments around the City) would help minimize, avoid, and compensate for potential Project impacts on special-status wildlife and their habitats.

Implementation of these proposed policies would reduce the direct and indirect effects on special-status wildlife resulting from proposed land use changes in the General Plan update. In addition, all future developments under the General Plan update would be subject to review under CEQA and to permitting requirements for impacts on special-status wildlife. With implementation of these policies and adherence to Project-level CEQA analysis, this impact would be less than significant, and no mitigation is required.

Impact BIO-3: Potential for land use changes to result in the loss or disturbance of special-status fish and their habitats (less than significant)

Eleven special-status fish species have a moderate or high potential to be in the study area (Table 3.3-3). Five of these fish species —fall-run Chinook salmon, steelhead, green sturgeon, and delta and longfin smelt—are listed as threatened or endangered under ESA or CESA.

Special-status fish and their habitat could be affected by future development under updated General Plan land use designations. Future development could result in the loss or disturbance of habitat types that could support special-status fish, such as riverine and valley foothill riparian habitats. These land cover types provide habitat for special-status fish species.

Land use changes where a current vacant area that abuts the Napa River is converted to mixed-use could affect riverine habitat. Development activities and future use of these areas associated with land use changes could result in direct effects, such as the loss or disturbance of suitable or occupied habitat, or disruption of normal behaviors that could reduce reproductive success and overall

survivorship. Indirect effects on special-status fish that could occur as a result of increased human occupancy in formerly natural areas include increased trash and contaminants in waterways and increased visual and noise disturbance from development encroaching on natural areas.

Planned changes in land use along the Napa River would be minimal in area as compared to existing land uses and land uses approved under the existing General Plan, and future development under the General Plan update would occur primarily within previously disturbed areas. In addition, the General Plan update includes several goals and policies that emphasize the conservation and protection of biological resources. The following policies in the Natural Resources Element under Goal NRC-1 (Policies NRC.1-1, NRC.1-2, NRC.1-3, NRC.1-4, NRC.1-5, manage natural resources, including riparian corridors, wetlands, and open space areas in and around the City to preserve and enhance plant and wildlife habitats), Goal NRC-2 (Policy NRC.2-2, recognize and support the preservation of rare, endangered, and threatened species), and Goal NRC-4 (Policies NRC.4-1 and NRC.4-2, NRC.4-3, support efforts for preserving open spaces and unique and fragile biological environments and biological environments around the City) would help minimize, avoid, and compensate for potential Project impacts on special-status fish and their habitats. In addition, all future developments under the General Plan update would be subject to review under CEQA and to permitting requirements for impacts on special-status fish. With implementation of these policies and adherence to Project-level CEQA analysis, this impact would be less than significant, and no mitigation is required.

Impact BIO-4: Potential for land use changes to result in the loss of oak woodland and valley foothill riparian habitat (less than significant)

Valley foothill riparian and sensitive oak woodland (blue oak, coast live oak, and valley oak) communities in the study area are primarily in parks or previously developed areas that would not be affected by General Plan update land use changes. However, some riparian and oak woodland habitat in areas planned for development could be affected under the General Plan update. Development activities and future use of these areas associated with land use changes could result in direct effects, such as the loss or disturbance of these communities. Indirect effects that could occur as a result of increased human presence in formerly natural areas include habitat disturbance from human access, encroachment into roots of trees, and increased dust from development encroaching on natural areas.

Future development under the General Plan update would occur primarily within previously disturbed areas. In addition, the General Plan update includes policies that emphasize the conservation and protection of biological resources. The following policies in the Land Use Element under Goal LUCD-1 (Policy LUCD.1-1, maintain a compact urban form to promote a distinct community identity, and protect open space, and natural and agricultural resources surrounding the community) and the Natural Resources Element under Goal NRC-1 (Policies NRC.1-1, NRC.1-2, NRC.1-3, NRC.1-4, NRC.1-5, NRC-1-6, NRC.1-8, NRC.1-9, manage natural resources, including riparian corridors, wetlands, and open space areas in and around the City to preserve and enhance plant and wildlife habitats), Goal NRC-2 (Policies NRC.2-1, recognize and support the preservation of rare, endangered, and threatened species), and Goal NRC-4 (Policies NRC.4-1 and NRC.4-2, NRC.4-3, support efforts for preserving open spaces and unique and fragile biological environments and biological environments around the City) would help minimize, avoid, and compensate for potential Project impacts on oak woodlands and valley foothill riparian communities. In addition, all future developments under the General Plan update would be subject to review under CEQA and to permitting requirements for impacts on oak woodlands and valley foothill riparian communities.

With implementation of these policies and adherence to Project-level CEQA analysis, this impact would be less than significant, and no mitigation is required.

Impact BIO-5: Potential for land use changes to result in the loss of state-protected and federally protected wetlands and nonwetland waters through direct removal, filling, hydrological interruption, or other means (less than significant)

State and federally protected wetlands and nonwetland waters (riverine, freshwater emergent wetlands, saltwater emergent wetlands) in the study area are primarily in conservation areas, parks or previously developed areas that would not be affected by General Plan update land use changes. However, some wetlands and nonwetland waters in areas planned for development could be affected under the General Plan update. Development activities and future use of these areas associated with land use changes could result in direct effects such as the loss or disturbance of wetlands and other jurisdictional waters. Indirect effects that could occur as a result of increased human presence in formerly natural areas include habitat disturbance from human access, contaminants in waterways, and increased dust from development encroaching on natural areas.

Planned changes in land use would primarily in previously disturbed areas. In addition, the General Plan update includes policies that emphasize the conservation and protection of biological resources. The following policies in the Land Use Element under Goal LUCD-1 (Policy LUCD.1-1, maintain a compact urban form to promote a distinct community identity, and protect open space, and natural and agricultural resources surrounding the community) and the Natural Resources Element under Goal NRR-1 (Policies NRC.1-1, NRC.1-2, NRC.1-3, NRC.1-4, NRC.1-5, NRC-1-6, NRC.1-8, NRC.1-9, manage natural resources, including riparian corridors, wetlands, and open space areas in and around the City to preserve and enhance plant and wildlife habitats), Goal NRC-2 (Policy NRC.2-1, recognize and support the preservation of rare, endangered, and threatened species), and Goal NRC-4 (Policies NRC.4-1 and NRC.4-2, NRC.4-3, support efforts for preserving open spaces and unique and fragile biological environments and biological environments around the City) would help minimize, avoid, and compensate for potential Project impacts on state and federally protected wetlands and non-wetland waters.

Implementation of these updated policies, as well as the required project-level review under CEQA and permitting requirements, would reduce the potential effects of the General Plan update on state and federally protected wetlands and non-wetland waters to a less-than-significant level, and no mitigation is required.

Impact BIO-6: Potential for land use changes to interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites (less than significant)

The proposed land use changes and subsequent development under the General Plan update could interfere with the movement of native wildlife species, particularly in the south portion of the study area where an ECA has been identified (Figure 3.3-2). Proposed land use designations would result in small areas of vineyard, grassland, oak woodland, and riverine areas that are within the designated ECA being converted to hospitality commercial and business park. Development activities and future use of these areas associated with land use changes could result in direct effects on wildlife movement, such as vehicle strikes or new physical barriers. Indirect effects that could occur as a result of increased human presence in formerly natural areas include habitat disturbance

from human access, new or increased lighting and noise, and increased dust from development encroaching on natural areas. Although the corridor would be reduced from these land use changes, most of the existing corridor immediately to the north and south of these areas would be maintained as open space areas, and the corridor would not be fragmented or blocked by the proposed changes.

Planned changes in land use would occur primarily within previously disturbed areas. Native wildlife nursery sites (e.g., nest or roost sites, burrows) could be removed or disturbed by development that is conducted as a result of land use changes. Removal or disturbance of nursery areas could result in injury and mortality of special-status species, as well as disruption of normal behaviors that could reduce reproductive output and overall survivorship. Proposed land use designations would result in small areas of vineyard, grassland, oak woodland, and riverine areas being converted to other uses. However, most of the large natural and open space areas, including riparian corridors and wetland areas, would not be affected.

The proposed land use changes and subsequent development would not create a physical or water quality barrier or impediment that would interfere with the movement or migration of fish because no new structures would be constructed, nor would any water quality degradation occur, that would have the capacity to interrupt or impede the movement or migration of fish in the area.

The General Plan update includes policies that emphasize the conservation and protection of biological resources. The following policies in the Land Use Element under Goal LUCD-1 (Policy LUCD.1-1, maintain a compact urban form to promote a distinct community identity, and protect open space, and natural and agricultural resources surrounding the community) and the Natural Resources Element under Goal NRC-1 (Policies NRC.1-1, NRC.1-2, NRC.1-3, NRC.1-4, NRC.1-5, NRC.1-6, NRC.1-7, NRC.1-8, NRC.1-9, manage natural resources, including riparian corridors, wetlands, and open space areas in and around the City to preserve and enhance plant and wildlife habitats), Goal NRC-2 (Policies NRC.2-1, NRC.2-2, NRC.2-3, NRC.2-4, recognize and support the preservation of rare, endangered, and threatened species), and Goal NRC-4 (Policies NRC.4-1 and NRC.4-2, NRC.4-3, support efforts for preserving open spaces and unique and fragile biological environments and biological environments around the City) would help minimize, avoid, and compensate for potential Project impacts on fish and wildlife movement and the use of native wildlife nursery sites and fish spawning habitat.

Implementation of these policies under the General Plan update would reduce the potential effects on fish and wildlife movement and the use of native wildlife nursery sites. In addition, all future developments under the General Plan update would be subject to review under CEQA for impacts on wildlife corridors. With implementation of these policies and adherence to Project-level CEQA analysis, this impact would be less than significant, and no mitigation is required.

Impact BIO-7: Potential for updates to the General Plan biological resource policies to conflict with existing local policies or ordinances protecting biological resources, such as the City of Napa Tree Preservation Standards (no impact)

Municipal Code Chapter 12.45 Trees on Private Property requires preservation of significant trees and permitting for impacts on, or removal of, these trees. Municipal Code 16.36.110 Resource Areas requires avoidance and mitigation for impacts on sensitive biological resources, including plants, wildlife, and habitats. Municipal Code 17.16.050 Special findings required for AR district projects requires protection of natural resources within areas designated in the General Plan as a resource area. Municipal Code 17.52.110 Creeks and Other Watercourses requires streambanks stabilization

and setbacks to be part of new development for the protection and enhancement of riparian habitat corridors.

The proposed policies in the General Plan update would not conflict with any existing City policies or ordinances protecting biological resources; rather they would expand the existing policies to better address sensitive biological resources. Policies in the Land Use Element under Goal LUCD-1 (Policy LUCD.1-1, maintain a compact urban form to promote a distinct community identity, and protect open space, and natural and agricultural resources surrounding the community) and the Natural Resources Element under Goal NRC-1 (Policies NRC.1-1, NRC.1-2, NRC.1-3, NRC.1-4, NRC.1-5, NRC.1-6, NRC.1-7, NRC.1-8, NRC.1-9, manage natural resources, including riparian corridors, wetlands, and open space areas in and around the City to preserve and enhance plant and wildlife habitats), Goal NRC-2 (Policies NRC.2-1, NRC.2-2, NRC.2-3, NRC.2-4, recognize and support the preservation of rare, endangered, and threatened species), and Goal NRC-4 (Policies NRC.4-1 and NRC.4-2, NRC.4-3, support efforts for preserving open spaces and unique and fragile biological environments and biological environments around the City) would expand existing policies that protect trees, sensitive biological resources, creeks, and riparian corridors. In addition, new development would still need to be constructed in compliance with existing codes. Therefore, there would be no impact, and no mitigation is required.

Impact BIO-8: Potential for land use changes to conflict with the provisions of an adopted habitat conservation plan, natural community conservation plan, or other approved local, regional, or state habitat conservation plan (no impact)

No HCPs or natural community conservation plans have been adopted in the study area or in Napa County; therefore, there would be no impacts, and no mitigation is required.

Impact BIO-9: Potential for land use changes and subsequent development to introduce or spread invasive plant species (less than significant with mitigation)

The proposed land use changes and subsequent development under the General Plan update could result in the introduction of new invasive species or the spread of invasive species to areas outside of the study area, particularly in the south portion of the study area where proposed land use changes are adjacent to open space areas. Planned changes in land use would occur primarily within previously disturbed areas. However, proposed land use designations would result in small areas of vineyard, grassland, oak woodland, and riverine areas being converted to other uses. Invasive plants or their seeds may be dispersed by construction equipment if appropriate preventive measures are not implemented.

As described in the impacts above, the General Plan update includes policies that emphasize the conservation and protection of biological resources. However, no policies specifically address the avoidance and minimization of the spread of invasive species. The potential for the spread of invasive species into sensitive natural communities in or adjacent to development under the General Plan would be a significant impact. Implementation of Mitigation Measure BIO-9 would add a policy to the General Plan update to avoid the introduction and spread of invasive plants, and thereby reduce this impact to a less than-significant level.

Mitigation Measure BIO-9: Add a policy to the General Plan to avoid the introduction and spread of invasive plants

The City, its contractor, or private applicants for new development in the City will be responsible for avoiding the introduction of new invasive plants and the spread of invasive plants into open space areas, sensitive natural communities, and wetlands in the City. The following measures will be implemented during construction of projects within the City.

- Educate construction supervisors and managers on weed identification and the importance of controlling and preventing the spread of invasive weeds.
- Dispose of invasive species material removed during project construction offsite at an appropriate disposal facility to avoid the spread of invasive plants into natural areas.
- Minimize surface disturbance to the greatest extent feasible to complete the work.
- Use weed-free imported erosion-control materials (or rice straw in upland areas).
- Use locally grown native plant stock and native or naturalized (noninvasive) grass seed during revegetation.

3.3.3 References Cited

Baldwin, B.G., D.H. Goldman, D.J. Keil, R. Patterson, T.J. Rosatti, and D.H. Wilken (eds). 2012. *The Jepson Manual: Vascular Plants of California*. (2nd ed., revised). Berkeley, CA: University of California Press.

Beamesderfer, R., M. Simpson, G. Kopp. 2006. Use of life history information in a population model for Sacramento green sturgeon. September. Environ Biol. Fish. DOI 10.1007/s10641-006-9145-x.

California Department of Fish and Wildlife. NDa. Sacramento Splittail. *Pogonichthys macrolepidotus* (Ayres). FileHandler.ashx (ca.gov). Accessed: March 1, 2021.

California Department of Fish and Wildlife. NDb. Hardhead *Mylopharodon conocephalus* (Baird and Girard). FileHandler.ashx (ca.gov). Accessed: March 1, 2021.

California Department of Fish and Wildlife. 2021a. *California Natural Diversity Database*. RareFind 5, Version 5.1.1, February 15, 2021, update. Records search of the Napa, Sonoma, Rutherford, Yountville, Capell Valley, Mount George, Cordelia, Cuttings Wharf, and Sears Point. USGS 7.5-minute quadrangles. Sacramento, CA.

———. 2021b. *California Department of Fish and Wildlife BIOS.* Version v5.99.22. Available: BIOS viewer 5.99.22 (ca.gov). Accessed: March 31, 2021.

———. 2021c. *Special Animals List.* October 2021. Available: Special Animals List (ca.gov).

———. 2021d. Napa-Sonoma Marshes Wildlife Area Bird List. Available: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=93808&inline. Accessed: June 7, 2021.

———. 2020. *California Natural Community List.* September 9, 2020. Biogeographic Data Branch. Sacramento, CA. Available: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=153398&inline Accessed: February 22, 2021.

California Department of Fish and Wildlife California Interagency Wildlife Task Group. 2014. CWHR version 9.0 personal computer program. Sacramento, CA.

California Native Plant Society, Rare Plant Program. 2021. Inventory of Rare and Endangered Plants of California (online edition, v8-03 0.39). Available: http://www.rareplants.cnps.org. Accessed: February 15, 2021.

California Partners in Flight. 2002. *The Oak Woodland Bird Conservation Plan: A Strategy for Protecting and Managing Oak Woodland Habitats and Associated Birds in California.* Version 2.0. S. Zack, lead author. Stinson Beach, CA: Point Reyes Bird Observatory. Available: http://prbo.org/calpif/plans.html.

City of Napa. 2015. *Protected Native Tree Information.* Parks and Recreation Services Department. Napa, California. Chapter 12.45. Page 1.

Eddleman, W. R. and C. J. Conway (2020). Ridgway's Rail (*Rallus obsoletus*), version 1.0. In Birds of the World (P. G. Rodewald, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.ridrai1.01

Koehler, J. and P. Blank. 2020. Napa River steelhead and salmon monitoring program. 2019-2020 report. Napa Resource Conservation District. September.

Meehan, W. R., and T. C. Bjornn. 1991. Salmonid distributions and life histories. Pages 47-82 in W. R. Meehan, editor. Influences of forest and rangeland management on salmonids fishes and their habitats. American Fisheries Society Special Publication 19. Bethesda, MD.

Merz, J., S. Hamilton, P.S. Bergman, and B. Cavallo. 2011. Spatial perspective for delta smelt: a summary of contemporary survey data. *California Fish and Game* 97(4):164–189. Spatial perspective for delta smelt: a summary of contemporary survey data (baydeltalive.com). Accessed: March 1, 2021.

Merz, J., P.S. Berman, J.F. Melgo, and S. Hamilton. 2013. Longfin smelt: spatial dynamics and ontogeny in the San Francisco Estuary, California. *California Fish and Game* 99(3):122–148. FileHandler.ashx (ca.gov). Accessed: March 1, 2021.

Moyle, P. 2002. *Inland Fishes of California*. Berkeley CA: University of California Press.

National Marine Fisheries Service. 2021. NOAA Fisheries Protected Resources App. Critical habitat for Central California Coast steelhead and the southern DPS of green sturgeon in the Napa River. Available: Protected Resources App (noaa.gov). Accessed: October 5, 2021.

Spencer, W.D., P. Beier, K. Penrod, K. Winters, C. Paulman, H. Rustigian-Romsos, J. Strittholt, M. Parisi, and A. Pettler. 2010. *California Essential Habitat Connectivity Project: A Strategy for Conserving a Connected California*. Prepared for California Department of Transportation, California Department of Fish and Game, and Federal Highway Administration.

Thorne J.H., R.M. Boynton, A. Merritt, S.K. Rice, E. Kalalipour, J. Patrick. 2004. Napa County Vegetation Map.

———. 2019. The 2016 update to the Napa Vegetation Map of 2004. University of California, Davis. Available: BIOS viewer 5.99.22 (ca.gov).

United States Fish and Wildlife Service. 2012. Pacific Lamprey (*Entosphenus tridentatus*). Assessment and template for conservation measures in California. Sacramento, CA. Available: PLCI_CA_Assessment_Final.pdf (fws.gov). Accessed: March 1, 2021.

———. 2013. Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California. Sacramento, California. xviii + 605 pp. Available: https://www.fws.gov/sfbaydelta/EndangeredSpecies/RecoveryPlanning/Tidal_Marsh/Documents/tidal_marsh_recovery_plan_v1.pdf. Accessed: July 19, 2021.

———. 2021. *IPaC Information Planning and Consultation.* Napa, California. Accessed February 15, 2021 https://ecos.fws.gov/ipac/

Zeiner, D. C., W.F. Laudenslayer, Jr., and K.E. Mayer (eds.). 1988. *California's Wildlife*. *Volume I: Amphibians and Reptiles*. California Statewide Wildlife Habitat Relationships System. Sacramento, CA: California Department of Fish and Game.

———. 1990a. *California's Wildlife. Volume II: Birds*. California Statewide Wildlife Habitat Relationships System. Sacramento, CA: California Department of Fish and Game.

———. 1990b. *California's Wildlife. Volume III: Mammals*. California Statewide Wildlife Habitat Relationships System. Sacramento, CA: California Department of Fish and Game.

3.4 Cultural Resources

3.4.1 Existing Conditions

3.4.1.1 Regulatory Setting

This section describes the federal, state, and local regulations related to cultural resources that would apply to the General Plan update. A cultural resource may be designated as significant by national, state, or local authorities. For a resource to qualify for listing in the National Register of Historic Places (NRHP) or the California Register of Historical Resources (CRHR), it must meet one or more established criteria.

Federal

National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA) requires that, before beginning any undertaking, a federal agency must take into account the effects of the undertaking on historic properties and offer the Advisory Council on Historic Preservation and other interested parties an opportunity to comment on these actions. The NHPA applies to federal actions and is most commonly invoked at the local level when a development project is subject to federal permits. It is also invoked when local projects, such as road projects, receive federal funds. Specific regulations regarding compliance with Section 106 state that, although the tasks necessary to comply with Section 106 may be delegated to others, the federal agency is ultimately responsible for ensuring that the Section 106 process is completed.

The Section 106 review process involves a five-step procedure.

1. Initiate the Section 106 process (assess the potential for the undertaking to affect historic properties, identify consulting parties, and plan to involve interested parties).
2. Identify historic properties in the area of potential effect (APE).
3. Assess adverse effects.
4. Resolve adverse effects.
5. Implement the project according to the memorandum of agreement or implement the project without a memorandum of agreement if one is unnecessary.

Section 106 requires federal agencies or those they fund or permit to consider the effects of their actions on properties that are determined eligible for listing or are listed in the NRHP. To determine whether an undertaking could affect NRHP-eligible properties, cultural resources (archaeological, historical, architectural, and traditional cultural properties) must be inventoried and evaluated for the NRHP.

To be listed in the NRHP, a property must be at least 50 years old (or be of exceptional historic significance if less than 50 years old) and meet one or more of the NRHP criteria. To qualify for listing, a historic property must represent a significant theme or pattern in history, architecture, archaeology, engineering, or culture at the local, state, or national level. It must meet one or more of

the four criteria listed below and have sufficient integrity to convey its historic significance. The criteria for evaluating the eligibility of a historic property for listing in the NRHP are defined as follows (36 Code of Federal Regulations [CFR] 60.4).

- Criterion A—Association with events that have made a significant contribution to the broad patterns of our history.
- Criterion B—Association with the lives of persons significant to our past.
- Criterion C—Resources that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.
- Criterion D—Resources that have yielded, or may be likely to yield, information important to history or prehistory.

In addition to meeting the significance criteria, a significant historic property must possess integrity to be considered eligible for listing in the NRHP. *Integrity* refers to a property's ability to convey its historic significance. Integrity is a quality that applies to historical resources in seven specific ways: location, design, setting, materials, workmanship, feeling, and association. To be considered a significant historic property, a resource must possess two, and usually more, of these kinds of integrity, depending on the context and the reasons why the property is significant. The National Park Service's *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation* (National Park Service 1995) discusses the types of integrity.

- **Location**—The place where the historic property was constructed or the place where the historic event took place.
- **Design**—The combination of elements that create the form, plan, space, structure, and style of a property.
- **Setting**—The physical environment of a historic property.
- **Materials**—The physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a historic property.
- **Workmanship**—The physical evidence of the crafts of a particular culture or people during any given period in history or prehistory.
- **Feeling**—A property's expression of the aesthetic or historic sense of a particular period of time.
- **Association**—The direct link between an important historic event or person and a historic property.

The NRHP criteria also limit the consideration of moved properties because significance is embodied in locations and settings. Under the NRHP, moving a building destroys the integrity of location and setting. A moved property can be eligible for listing if it is significant primarily for architectural value or if it is the surviving property most importantly associated with a historic person or event (National Park Service 1995).

Section 106 regulations define an *adverse effect* as an effect that alters, directly or indirectly, the qualities that make a resource eligible for listing in the NRHP (36 CFR 800.5(a)(1)). Consideration must be given to the property's location, design, setting, materials, workmanship, feeling, and

association, to the extent that these qualities contribute to the integrity and significance of the resource. Adverse effects may be direct and reasonably foreseeable, or they may be more remote in time or distance (36 CFR 8010.5(a)(1)). Examples of adverse effects are listed below.

- Physical destruction of or damage to all or part of the property.
- Alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation, and provision of handicapped access, that is not consistent with the *Secretary's Standards for the Treatment of Historic Properties* (Weeks and Grimmer 1995) and applicable guidelines.
- Removal of the property from its historic location.
- Change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance.
- Introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features.
- Neglect of a property that causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to a Native American tribe or Native Hawaiian organization.
- Transfer, lease, or sale of property out of federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance.

State

California Environmental Quality Act

CEQA uses the term *historical resources* to describe buildings, sites, structures, objects, or districts that may have historical, prehistorical, architectural, archaeological, cultural, or scientific importance. CEQA states that "[a] project that may cause a substantial adverse change in the significance of an historical resource is a project that may have a significant effect on the environment" (Public Resources Code [PRC] Section 21084.1).

If implementation of a project could result in significant effects on historical resources, then alternative plans or mitigation measures that reduce the effects to a less-than-significant level must be incorporated into the project (14 California Code of Regulations [CCR] 15064.5, 15126.4). The first step in the analysis of a project's potential impacts on historical resources is to determine whether any significant historical resources are present. The CEQA Guidelines define three ways that a property will qualify as a historical resource for the purposes of CEQA review.

- The resource is listed in or determined eligible for listing in the California Register of Historical Resources (CRHR).
- The resource is included in a local register of historical resources as defined in PRC 5020.1(k) or is identified as significant in a historical resource survey meeting the requirements of PRC 5024.1(g), unless the preponderance of evidence demonstrates that it is not historically or culturally significant.
- The lead agency determines the resource to be significant, as supported by substantial evidence in light of the whole record (14 CCR 15064.5(a)).

Each of these is related to the eligibility criteria for inclusion in the CRHR (PRC 5020.1(k), 5024.1, 5024.1(g)). A historical resource may be eligible for inclusion in the CRHR if it meets any of the following conditions (14 CCR 4850).

- It is associated with events or patterns of events that have made a significant contribution to the broad patterns of local or regional history, or the cultural heritage of California or the United States.
- It is associated with the lives of persons important to local, California, or national history.
- It embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of a master, or possesses high artistic values.
- It has yielded, or has the potential to yield, information important to the prehistory or history of the local area, California, or the nation.

Properties that are listed in or eligible for listing in the NRHP are considered eligible for listing in the CRHR and thus are also significant historical resources for the purpose of CEQA (PRC 5024.1(d)(1)).

Under CEQA, a *substantial adverse change* in the significance of a resource means the physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of the historical resource would be materially impaired. Actions that would materially impair the significance of a historic resource are any actions that would demolish or adversely alter the physical characteristics that convey the property's historical significance and qualify it for inclusion in the CRHR, the NRHP, or in a local register or survey that meets the requirements of PRC 5020.1(k) and 5024.1(g).

Policies Concerning Native American Heritage

PRC 5097.9 states that no public agency or private party on public property "shall…interfere with the free expression or exercise of Native American religion…." The code further states that "nor shall any such agency or party cause severe or irreparable damage to any Native American sanctified cemetery, place of worship, religious or ceremonial site, or sacred shrine located on public property, except on a clear and convincing showing that the public interest and necessity so require." County and City lands are exempt from this provision, except for parklands larger than 100 acres.

Policies Concerning Human Remains

Disturbance of human remains without the authority of law is a felony (Health and Safety Code 7052). If the remains are of Native American origin, they are under the jurisdiction of the Native American Heritage Commission (NAHC) (Health and Safety Code 7050.5c; PRC 5097.98).

If human remains are discovered or recognized in any location other than a dedicated cemetery, there can be no further excavation or disturbance of the site, or any nearby area reasonably suspected to overlie adjacent human remains until the following have taken place:

- The County Coroner has been informed and has determined that no investigation of the cause of death is required.
- The Coroner makes a determination that the remains are Native American or has reason to believe they are Native American, in which case the Coroner must contact NAHC.

- NAHC determines the most likely descendant, and one of the following is carried out:
    - The most likely descendants of the deceased Native American(s) have made a recommendation to the landowner or the person responsible for the excavation work, for means of treating or disposing of, with appropriate dignity, the human remains, and any associated grave goods as provided in PRC 5097.98; or
    - The NAHC was unable to identify a most likely descendant; or
    - The most likely descendent failed to make a recommendation within 24 hours after being notified by the NAHC (Health and Safety Code 7050.5c; PRC 5097.98).

If the NAHC is unable to identify a descendant, or the descendants identified fail to make a recommendation, or the landowner or his or her authorized representative rejects the recommendation of the descendants and the mediation provided for in subdivision (k) of Section 5097.94, if invoked fails to provide measures acceptable to the landowner, the landowner or his or her authorized representative shall reenter the human remains and items associated with Native American human remains with appropriate dignity on the property in a location not subject to further and future subsurface disturbance. The landowner shall use protection measures outlined in PRC 5097.98.

Senate Bill 18 (Chapter 905, Statutes of 2004)—Local and Tribal Intergovernmental Consultation

Senate Bill (SB) 18 is a process separate from CEQA that requires cities and counties that include traditional tribal cultural places on both public and private lands to consult with federally and non-federally recognized Native American tribes prior to approving amendments to their general plans. A cultural place is a landscape feature, site, or cultural resource that has some relationship to particular tribal religious heritage or is a historic or archaeological site of significance or potential significance.

SB 18 places the responsibility of initiating consultation on the relevant City/county by notifying tribal representatives of the proposed general plan amendment and giving the tribes at least 90 days to accept the offer of consultation. The purpose of SB 18 is to provide time for tribal input early in the planning process so that the general plan amendment can incorporate features that would protect tribal cultural places. Consultation is a "government to government" interaction between tribal representatives and representatives of the county. The NAHC maintains a list of Native American individual/groups, organized by county, for SB 18 tribal consultation.

Assembly Bill 52—Native American Consultation Under CEQA

Please see Section 3.16, *Tribal Cultural Resources.*

Local

City of Napa General Plan

The goals and policies listed below are relevant to cultural resources in the City and are excerpted from the *Historic Resources* chapter in the *City of Napa's 2020 General Plan Policy Document* (City of Napa 1998). Since the 2020 General Plan was adopted, a few policies have come to completion or are no longer applicable to the current state of preservation in Napa and are indicated below.

Reflecting the community's growing concern about preserving its historic buildings following redevelopment in the 1970s, the City of Napa included its first *Historic Preservation Element* into its 1982 General Plan. Chapter 6, *Historic Resources* of the *Envision Napa 2020: City of Napa General Plan* (1998) was the second iteration of the element. It contains five sets of goals, policies, and implementation programs to promote the preservation of Napa's historic, archaeological, and cultural resources. In the years since this document was adopted in 1998, some policies are no longer applicable to the current state of preservation in Napa, or recommended actions have since come to completion. Those policies are listed below. The effort for the General Plan update currently underway would include recommendations for changes or additions to the current goals and policies.

Goal HR-1: To preserve and maintain sites, buildings, and landscapes that serve as significant, visible reminders of the City's social, architectural, and agricultural history.

Policies

HR-1.1: The City shall identify historical buildings, sites, features and districts that are reminders of past eras, events and people; significant examples of architectural styles; irreplaceable assets; or, examples of how past generations lived.

HR-1.2: The City shall continue to identify historic objects and features that are a part of the City's cultural heritage. These elements include signs of all types, street light standards, stone bridges and walls, windrows, sculptures and remnants of historic infrastructure, such as historic storm drains, stone curbs, cobblestones and manhole covers.

HR-1.3: The City shall continue to update and amend the City's historic resources inventory with intensive surveys.

HR-1.4: The City shall review and strengthen its present legal framework and administrative procedures governing projects affecting historical resources.

HR-1.5: The City shall adopt land use regulations that recognize, maintain, and promote historic patterns of housing densities and urban form.

HR-1.6: The City shall use the State Historical Building Code to preserve historic resources consistent with protection of life safety (***no longer applicable***).

HR-1.7: The City shall preserve historic resources by nominating historic buildings and districts to the National Register of Historic Places and California Register of Historic Places.

HR-1.8: The City shall document, review, and designate local landmarks and conservation districts identified in the Citywide survey.

HR-1.9: The City shall solicit property owners' support and adopt the Napa Abajo / Fuller Park National Register District as a local historic district, and other, future districts as they are identified through the ongoing survey process (***no longer applicable***).

HR-1.10: The City shall advocate specific projects, legislation and economic strategies which will realize preservation goals and policies.

HR-1.11: The City shall work with construction trade groups to support apprenticeship programs that teach restoration techniques such as lead paint remediation, historic woodworking and finishing.

HR-1.12: The City shall pursue funding and grant monies which could be used to further the goals and implement the historic preservation policies of this General Plan.

HR-1.13: The City shall develop incentives to encourage owners to retrofit unreinforced masonry buildings.

HR-1.14: The City shall create a list of volunteers willing to research historic resources.

HR-1.15: The City shall identify and reinforce historic linkages between the natural and built environment.

HR-1.16: The City shall work with other agencies to ensure that any future flood control project does not sever the historic relationship between the river and the adjacent historic neighborhoods and commercial areas.

HR-1.17: When planning for transportation routes, the City shall seek routes and improvements that recognize and protect historic neighborhoods.

HR-1.18: The City shall identify its historic gateways and support the preservation of their historic bridges, stone walls, street trees and viewsheds.

HR-1.19: The City shall identify historic landscape features and landmark trees as a first step toward their preservation.

HR-1.20: The City shall encourage landscape plans that enhance historic areas.

Goal HR-2: To encourage owners of historic resources to preserve or upgrade historic properties by improving their economic viability.

Policies

HR-2.1: The City shall investigate incentives for single family residential restoration such as tax relief for designated landmarks or districts, and inform historic homeowners of available incentives (***no longer applicable***).

HR-2.2: The City shall investigate and publicize the use of various federal, state, local and private funding sources and economic mechanisms available to support historic resource preservation.

HR-2.3: The City shall support the creation of a revolving loan fund for historic rehabilitation to be financed through public and private contributions with efforts to encourage banks to provide loans for rehabilitating historic properties financed with public and private contributions, for the acquisition or rehabilitation of historic properties.

HR-2.4: The City shall encourage the formation of nonprofit corporations organized for the purpose of purchasing and rehabilitating at-risk historic properties. The City shall support the efforts of Napa County Landmarks, Inc., in this effort.

HR-2.5: The City shall encourage the continuation and appropriate expansion of federal and state programs that provide tax and other incentives for the rehabilitation of historically- or architecturally-significant structures.

HR-2.6: The City shall work with the County Assessor to create a property tax relief program for qualified historic structures (Mills Act) (***no longer applicable***).

Goal HR-3: To promote community awareness and appreciation of Napa's history and architecture.

Policies

HR-3.1: The City shall educate the community and historic property owners of the importance and benefits of, and opportunities for participating in, the preservation of resources.

HR-3.2: The City shall support establishment of a Restoration Center by Napa County Landmarks, Inc., which would serve as a repository for information on historic building methods, construction techniques and materials and which could provide technical advice and services for restoration.

HR-3.3: The City shall support the preparation by Napa County Landmarks, Inc., or other private organizations and the Napa County Historical Society of a list of sources for historic research materials such as Sanborn Maps, old City maps, historic subdivision maps, and old photographs that would assist project proponents in identifying the historic conditions and context for their project.

HR-3.4: The City shall support the efforts of private, nonprofit organizations to educate school children as to the value of local history and architecture, using historic inventory information.

Goal HR-4: To achieve a vital downtown that reflects its historic urban form and setting, offering a mix of old and new buildings.

Policies

HR-4.1: The City shall promote the preservation of the historic urban form of the downtown. Historic heights, street faces and building massing shall be supported by new development.

HR-4.2: The City shall evaluate historic unreinforced masonry (URM) buildings and wood framed structures in accordance with the provisions of the State Historical Building Code and provide for mitigation of URM hazards.

HR-4.3: The City shall take advantage of the historic setting of downtown, and encourage lively, interactive uses throughout the day and into the evening.

HR-4.4: The City shall support the downtown Facade Improvement Program to improve building fronts based upon historic commercial building design guidelines. Restoration could include the removal of facades which have been applied in the past to “update” structures.

HR-4.5: The City shall maintain and restore City owned properties identified as landmarks, within an historic district, or listed on the National Register of Historic Places.

HR-4.6: The City shall work with the local tourism industry to support and foster historic resources as a destination, demonstrating that cooperation with the preservation community will improve the quality of the visitors' experience.

Goal HR-5: To maintain historic neighborhoods that provide a diverse mix of housing types and services to meet the needs of families and build a sense of community.

Policies

HR-5.1: The City shall preserve the character, livability, and civic pride of Napa's historic neighborhoods through neighborhood conservation efforts.

HR-5.2: The City shall prepare programs to guide future investment and development for designated or eligible historic districts.

HR-5.3: The City shall target code enforcement to at-risk neighborhoods, or parts thereof. The City should also target Community Development Block Grant (CDBG) housing rehabilitation loan funds to these areas.

HR-5.4: The City shall encourage heritage tourism by encouraging bed and breakfast inns, walking tours, home tours, and similar uses in historic neighborhoods.

HR-5.5: The City shall explore methods to discourage through-traffic on streets in historic neighborhoods in order to maintain their livability and walkability.

Goal HR-6: To preserve important archaeological resources.

Policies

HR-6.1: The City shall enforce current federal and state and procedures for identifying, preserving and protecting prehistoric sites.

HR-6.2: The City shall require investigation during the planning process for all proposed developments in archaeologically sensitive areas in order to determine whether prehistoric resources may be affected by the project and, if so, require that appropriate mitigation measures be incorporated into the project design.

HR-6.3: Recognizing that Native American burials or archaeological artifacts may be encountered at unexpected locations, the City shall continue to enforce state mandates with its current mitigation requirement, applied to all development permits and tentative subdivision

maps, that upon discovery of remains during construction, all activity will cease until qualified professional archaeological examination and reburial in an appropriate manner is accomplished.

HR-6.4: The City shall investigate ISTEA funding sources to identify and protect portions of the Silverado Trail and other Native American trails that developed over time into the roadways we now use.

3.4.1.2 Environmental Setting

The environmental context summary below was provided in the *Napa 2040 General Plan Existing Conditions* report (Dyett & Bhatia 2019). Please refer to the City-Wide Historic Context Statement (Page and Turnbull 2010) for an expanded discussion of each historic period, theme, and property type relative to broad patterns of City development.

Prior to European settlement, the Napa Valley region was inhabited by Native Americans of the Wappo group. The Wappo occupation of the area dates back 10,000 years, to about 8000 BC, making Napa Valley one of the longest inhabited regions in California. Its long occupation was due to abundant natural resources that the Wappo relied on for subsistence. The Wappo were primarily a hunter-gatherer society and lived in permanent villages typically located near the Napa River or other water courses; sometimes smaller camps could be found near natural springs, along prominent hunting trails, or near major oak groves, which were the sources of acorns that provided nourishment for the tribe.

By the early 1800s, however, the Native Americans were no longer the sole inhabitants of Napa Valley. In 1821, Mexico gained independence from Spain, and two years later, an expedition led by Ensign Jose Sanchez and accompanied by Jesuit Father Altimura ventured into Napa Valley. Their purpose was to prepare the region for Mexican settlement and to deter Russian and American parties from claiming the land. The Mexicans brought Christianity to the Sonoma-Napa region. Mission San Francisco de Solano, the northernmost mission and last to be constructed (1823) was located in present-day Sonoma. The missions were self-sufficient communities, and each included a church, residences, and support facilities. By the 1830s, with secularization, most missions had been repurposed or dismantled for building materials that went to constructing new buildings. Outside of Mission San Francisco de Solano, society during the Mexican period was dominated by the landowning Vallejo family. General Mariano Vallejo was in control of vast tracts of land in the Napa Valley, which he subsequently awarded to his loyal soldiers and friends. Cattle ranching was the primary industry on these ranchos. One building that remains from this period is the Cayetano Juarez adobe at Soscol Avenue and Silverado Trail.

By 1846, the Mexican government had begun to protest the arrival of many undocumented foreigners, and rumors circulated that non-Mexican immigrants would be driven out of California and Napa Valley. Worried that they would lose their land due to confusing titles, a band of area residents—including John C. Fremont and future Napa City founders John Grigsby and Nathan Coombs—organized as the Bear Flag Party to lead a revolt against Mexican rule in Alta California. In early June 1846, the Bear Flaggers initiated the overthrow of the Mexican government by capturing the town of Sonoma, arresting General Mariano Vallejo, and raising the Bear Flag as a symbol of an independent California. The revolt established the California Republic, which remained independent for only 25 days; it was annexed by the United States as official news of the Mexican-American War (1846-1848) reached California. The following year, in 1847, Napa City was founded by Grigsby and Coombs on a small site at the confluence of the Napa River and Napa Creek. In 1850, California was

admitted to the Union as a free state. In Napa, a new street parallel to First Street was named in honor of Henry Clay, the Kentucky senator whose Omnibus Bill admitted California to the Union.

The discovery of gold in the foothills of the Sierra Nevada in 1848 brought miners and entrepreneurs to California from all over the world, and Napa Valley prospered as a result. The town's population soon expanded as the region's mild climate attracted miners and merchants to Napa for the winter. Early Napa City residents were typically single, working-class men, many of whom lived in hotels or boarding houses. A number of wood-frame commercial buildings were constructed Downtown, but many were temporary due to the ad-hoc nature of Napa's growth in the wake of the Gold Rush. Agricultural development was scattered throughout the county, with pioneers such as George Yount and others establishing farms on the outskirts of the City. Major development trends that would shape Napa in later years—such as the importance of the Napa River for transportation and commerce, the development of roads and infrastructure, and the establishment of agriculture as a major economic force—had their beginnings during this era. However, little physical evidence of the early American period remains in Napa, as no buildings which date to the mid-1800s appear to be extant in the City today.

Napa grew steadily throughout the Victorian era as people continued to settle and more businesses were established in the town. Transportation, infrastructure, and social services were greatly improved, and by 1880, Napa had a bustling downtown and a population of approximately 4,000. Napa was officially incorporated on March 23, 1872, as the "Town of Napa City," and was reincorporated on February 24, 1874, as the "City of Napa." Around this time, the wine industry grew as the dominant agricultural endeavor, with an increased demand for local wines facilitated partly by the completion of the Napa Valley Railroad in 1868. New vineyards were established throughout the valley, and winery operations ranged from small family businesses to large winery complexes. By the late 1880s, there were more than 20,000 acres of vineyards producing nearly 5 million gallons of wine per year. The vestiges of small agricultural properties, including barns, tankhouses, and other outbuildings can still be found throughout the City and represent rural farmsteads that were gradually enveloped by urban growth.

By the turn of the twentieth century, Napa had grown into a self-sufficient town with successful industries, businesses, and residents. Still tied to its agricultural roots, Napa had a population of 5,500 in 1905. Over the next two decades, the arrival of interurban electric railroads linked Napa to Vallejo, San Francisco, and the rest of the Bay Area, boosting its economy and encouraging residential growth through World War I. In the 1920s and 1930s, Napa was a blue-collar community; most men worked union jobs at the local clothing and other factories or at the nearby Mare Island Naval Shipyard. This era saw steady construction of single-family homes and the establishment of more factories, but Prohibition and the Great Depression greatly curbed economic development in Napa.

When the United States entered World War II in 1941, the entire Bay Area quickly became an arsenal for the production of wartime supplies as well as the departure point for the Pacific Theater. For instance, Contra Costa County alone produced 3.5 percent of all war products manufactured in the entire nation, and the City of Richmond hosted 55 major war industries, including Kaiser's four gigantic shipyards that employed 100,000 workers. Nearly half a million people from all over the country flocked to the Bay Area for employment, and local communities experienced housing shortages and major demographic shifts. Napa's main contribution to the war effort came in supplying housing for defense workers, rather than in the actual production of goods. In 1930, Napa had a population of only 6,437; by 1950, that figure had jumped to over 13,000. Because of the large

influx of people, infrastructure improvements and rapid suburban development occurred in Napa during the war and continued well into the postwar era. Up until that time, the City had grown in an organic piecemeal fashion, but with such a boom in population and physical growth, the first zoning ordinance was instituted in 1945. Since then, zoning regulations have controlled how and where the City expands.

The City continued to grow beyond the postwar era, reaching a population of 37,000 by 1970. However, the decline of manufacturing, redevelopment, and the rebirth of the wine industry were the major forces that impacted modern Napa. The City of Napa is still the valley's population center but is a very different place than it was in the nineteenth and early twentieth centuries. Since its initial growth in the Gold Rush and Victorian eras, Napa has been transformed from a blue-collar town into a service-based, majority-crop community. With an estimated population of 80,416 in 2016 and an area of 18.15 square miles, the City's economy today remains keyed to wine and tourism.

3.4.2 Environmental Impacts

3.4.2.1 Methods for Analysis

A records search was completed by staff at the Northwest Information Center (NWIC) of the California Historic Resources Information System (CHRIS) on April 7, 2021 (NWIC File No. 20-1668). The records search sought the number and types of archaeological resources recorded within the Planning Area. This included both archaeological sites and built environment resources. The record search indicated that 51 archaeological resources have been recorded in the Planning Area. The archaeological sites included 26 prehistoric sites consisting of mounds, burials, bedrock mortars, lithic scatters, and other evidence of habitation, 26 historic-era sites consisting of refuse deposits, railroads, bridges, remains of structures, and elements of ranching and railroad districts. The record search also identified 162 built environment properties listed in the *Napa County Built Environment Resources Directory* consisting primarily of residential structures, bridges, farms, wharfs, levees, ponds, dams, and ranches.

Relevant General Plan Update Goals and Policies

Applicable goals and policies from the *Historic and Cultural Resources Element* are as follows.

Historic Preservation and Awareness

Goal HCR-1: Preserve and enhance Napa's historic resources. Encourage rehabilitation and adaptive reuse, as well as sensitive, context-compatible infill design.

Policy HCR 1-1: Utilize sustainable or "green" building practices in the preservation and maintenance of historic resources, provided that the sustainable building practices adhere to the Secretary of the Interior's Standards for the Treatment of Historic Properties and local design guidelines.

Policy HCR 1-2: Apply the California State Historical Building Code to rehabilitation projects to ensure that rehabilitation does not compromise the integrity of historic resources.

Policy HCR 1-3: Encourage seismic strengthening to protect the City's valuable historic properties from future earthquakes, wildfire, and other events caused by climate change. This includes the development of incentives to encourage property owners to retrofit their buildings.

Policy HCR 1-4: Maintain a photographic record of successful restoration projects to inform future project applicants of architectural styles, historic construction methods, probable materials, and appropriate reconstruction techniques.

Policy HCR 1-5: Promote the use, update, and preparation of new design guideline for new additions, rehabilitation of existing structures, and infill design to ensure compatibility with historic resources.

Policy HCR 1-6: Establish design guidelines to adapt industrial historic properties where these are designated for new uses.

Policy HCR 1-7: Encourage and assist property owners in bringing damaged or blighted historic properties into use and/or new use.

Policy HCR 1-8: Update parking requirements to encourage adaptive reuse of historic properties into viable contemporary uses.

Goal HCR-2: Continue implementation of the City's preservation program in accordance with Certified Local Government (CLG) requirements, including identifying sites, buildings, and landscapes that serve as significant, visible reminders of the City's social, architectural, and agricultural history. This should include the recognition of historic resources that have been underrepresented, such as those associated with ethnic heritage, cultural landscapes, and the recent past.

Policy HCR 2-1: Leverage resources from State, federal, and private programs, as well as local preservation groups to assist in the identification, designation, and preservation of historic and cultural resources.

Policy HCR 2-2: Update the City of Napa Historic Context Statement as part of the CLG Program, including updating themes related to ethnic heritage, cultural landscapes, the recent past, and intangible cultural heritage. The Recommendations section, which prioritizes future historic resource survey efforts, may also be updated.

Policy HCR 2-3: Update the City's Historic Resource Inventory (HRI) at least every five to ten years to include properties that may have reached 45 years of age and have been found historically significant. This should include the following survey efforts:

- Update the five previously surveyed areas to capture buildings that have since become 45 years of age. This includes historic buildings, structures, sites, objects, and districts that are reminders of past eras, events, and people; significant examples of architectural styles; irreplaceable assets; and examples of how past generations lived. Though all five surveys should be updated, priority may be given in the following order, based on percentage of properties built after 1965: Alta Heights (14.5 percent) Downtown (13 percent), Spencer's Addition (10percent), Soscol Gateway (8.5 percent), and lastly West Napa (7 percent).
- Survey additional areas to provide a comprehensive look at historic resources citywide. The City-Wide Historic Context Statement (2009) identified and prioritized 33 areas within Napa that were built between 1850 and 1963 (the 45-year threshold at the time the document was prepared) that have the potential for historic properties. As five areas were surveyed, the remaining 28 subareas should be added to the City's survey work program. Properties 45 years or older at the time of survey should be recorded in these areas.
- If the updated City-Wide Historic Context Statement provides recommendations for survey of additional areas beyond the 33 previously identified areas that may contain properties built between 1964 and the 45-year threshold at the time the document is updated, those subareas should also be added to the survey work program.

Policy HCR 2-4: Add individual properties that are determined to be significant and eligible at the local, State, or national levels through Historic Resource Evaluations to the HRI.

Goal HCR-3: Encourage the designation and recognition of properties and districts as local landmarks and on the California Register of Historical Resources and National Register of Historic Places.

Policy HCR 3-1: Enlist a qualified architectural historian to conduct a survey update of recognized potential landmark districts, including identification of boundaries and contributing and non-contributing properties, and preparation of nominations for the designations. Following the process outlined in the Historic Preservation Ordinance, the nominations should be filed with the Community Development Department and considered by the Cultural Heritage Commission and the City Council.

Policy HCR 3-2: Efforts to designate individual properties and historic districts to the California Register or National Register may be initiated by City staff, the Cultural Heritage Commission, and/or citizens who desire to recognize the historic qualities of properties in the City of Napa. The process for preparing and reviewing nominations should follow instructions provided by the California Office of Historic Preservation.

Policy HCR 3-3: Continue implementation of the City's Historic District Signage program to recognize and promote Napa's unique neighborhoods and designated Landmark Districts.

Policy HCR 3-4: Continue implementation of the City's bronze medallions, awarded by Heritage Napa, to be attached to City Landmarks.

Goal HCR-4: Promote community awareness and appreciation of Napa's history and architecture through educational programs.

Policy HCR 4-1: Host community workshops and lectures that discuss the history of Napa's development, criteria for historic designation, the review process for alterations to historic properties, and methods for preserving or restoring historic features, sites, and landscapes.

Policy HCR 4-2: Encourage heritage tourism through walking tours (guided or self-guided), home tours, history-related events, and similar experiences in historic neighborhoods during National Preservation Month (May) and throughout the year.

Policy HCR 4-3: Support the efforts of private, nonprofit organizations to educate school children about the value of local history and architecture, using HRI information.

Economic Viability

Goal HCR-5: Promote economic viability of historic and cultural resources through historic preservation and programs to encourage owners of historic resources to preserve or rehabilitate historic properties by providing incentives where feasible.

Policy HCR 5-1: Encourage application for Mills Act contracts for designated historic resources on the City's HRI.

Policy HCR 5-2: Promote financial incentives such as façade grants, easements, a revolving loan fund, and low-interest loans, and target these to priority issues or projects.

Goal HCR-6: Encourage retention of historic structures in their original use or conversion back to their original use where feasible and support sensitive, adaptive reuse.

Policy HCR 6-1: Allow flexible use as part of an adaptive use strategy, provided that the architectural integrity of the building is preserved and conforms with the Secretary of the Interior's Standards for Rehabilitation. Particular standards for authorized types of uses should be identified in the zoning code.

Goal HCR-7: Balance the preservation of historic resources with the desire of property owners of historic structures to sensitively adopt energy efficient strategies.

Policy HCR 7-1: Encourage energy efficient strategies provided that projects meet the Secretary of the Interior's Guidelines and Standards.

Goal HCR-8: Promote the economic benefits that historic preservation provides to local economies.

Policy HCR 8-1: Promote marketing efforts to identify Napa as a destination for heritage tourism, which could lead to additional revenue generation or incentive.

Historic Downtown

Goal HCR-9: Achieve a vital Downtown that reflects its historic urban form and setting, offering a mix of old and new buildings.

Policy HCR 9-1: Promote the preservation of the historic urban form of the Downtown when rehabilitating historic buildings or designing infill construction. Use techniques such as integrating sensitive massing transitions between new construction and historic buildings, compatibility with historic materials, and characteristic rhythms, solid-to-void ratios, and landscape elements.

Policy HCR 9-2: Maintain and restore or rehabilitate City-owned properties identified as landmarks, within a historic district, or listed on, or eligible for, the California Register of Historical Resources or the National Register of Historic Places.

Policy HCR 9-3: Encourage the maintenance and restoration of privately owned Downtown properties listed in the City of Napa's HRI, identified as City landmarks, located within a historic district, or listed on the California Register of Historical Resources or the National Register of Historic Places.

Goal HCR-10: Work with the local tourism industry, businesses, and property owners to support and foster Downtown historic resources as a destination, demonstrating that historic resources contribute to the uniqueness of the visitor experience.

Policy HCR 10-1: Continue efforts to provide educational resources to the public regarding Napa's historic and cultural resources to support heritage tourism.

Policy HCR 10-2: Encourage Downtown businesses located in historic buildings to add information to their websites and social media accounts about the history and architecture of the building.

Goal HCR-11: Protect the setting of historic resources when providing parking in Napa's historic Downtown.

Policy HCR 11-1: If additional parking is required due to density increases or building use changes, establish regulations that will allow flexible parking requirements to protect threatened historic resources.

Policy HCR 11-2: Provide additional parking in locations and at a scale that will not negatively impact the setting of historic resources.

Historic Neighborhoods

Goal HCR-12: Maintain historic neighborhoods and encourage retention of the character of existing historic buildings, parks and open spaces, and urban design elements that define the built environment of the City's older neighborhoods.

Policy HCR 12-1: Identify and protect historic gateways and support the preservation of historic bridges, stone walls, street trees, open space and viewsheds that contribute to the character of historic neighborhoods.

Policy HCR 12-2: Encourage traffic calming measures in historic neighborhoods to maintain their charm, particularly on cut-through streets used by GPS routing and delivery vehicles.

Goal HCR-13: Retain historic character when Accessory Dwelling Units (ADUs) are built, by taking siting, massing, and design into consideration along with the historic context of the neighborhood and the property's historic architecture.

Policy HCR 13-1: Encourage the establishment and use of objective design standards for ADUs on historic properties and within historic districts.

Archaeological Resources and Intangible Cultural Heritage

Goal HCR-14: Protect and preserve important archaeological resources.

Policies

Policy HCR 14-1: HCR 14-1 Consider federal and State procedures and requirements relating to the preservation and protection of archeological resources and sites, such as the National Historic Preservation Act's Section 106 process and the National Environmental Policy Act, when evaluating applications for development projects.

Policy HCR 14-2: For development and redevelopment proposals in archaeologically or tribal culturally sensitive areas of Napa, require an assessment of the potential presence of archaeological and tribal cultural resources, including a site survey and a records search of the California Historical Resources Information System at the Northwest Information Center. As warranted by the results of the assessment, require additional studies to identify and address project-specific impacts on archaeological and tribal cultural resources.

Goal HCR-15: Recognize the Tribal Nations who first lived in the Napa area and preserve their identity, culture, and artifacts.

Policy HCR 15-1: Work with local Tribal Nations on development projects to avoid known cultural sites and resources to the extent feasible.

Policy HCR 15-2: Establish City policies and procedures that require development projects to comply with state and Federal law that upon discovery of Native American remains or archaeological artifacts during construction, all activity will cease until qualified professional archaeological examination and reburial in an appropriate manner is accomplished.

Policy HCR 15-3: Collaborate with local Tribal Nations on treatment protocols for handling human remains and cultural items affiliated with affected Tribal Nations.

Policy HCR 15-4: Collaborate with local Tribal Nations on cultural events and development of educational signage to promote recognition of their contributions to Napa.

Goal HCR 16: Recognize the endemic traditions of various communities in Napa, including Latinx, Asian American, and African American communities.

Policy HCR 16-1: Promote the retention and appreciation of Napa's intangible cultural heritage. Representations of intangible cultural heritage may include oral traditions, performing arts, social practices and festive events, legacy businesses, knowledge and practices concerning nature and the universe, and traditional craftsmanship.

3.4.2.2 Thresholds of Significance

In accordance with Appendix G of the CEQA Guidelines, the General Plan update would be considered to have a significant effect if it would result in any of the following conditions.

- Cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5.
- Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5.
- Disturb any human remains, including those interred outside of formal cemeteries.

According to CEQA Guidelines Section 15126.4(b), public agencies should, whenever feasible, seek to avoid damaging effects on any historical resource of an archaeological nature. The following

factors listed under Section 15126.4(b)(3) must be considered for a project involving such an archaeological site.

(A) Preservation in place (avoidance) is the preferred manner of mitigating impacts to archaeological sites. Preservation in place maintains the relationship between artifacts and the archaeological context. Preservation may also avoid conflict with religious or cultural values of groups associated with the site.

(B) Preservation in place may be accomplished by, but is not limited to, the following:

- Planning construction to avoid archaeological sites;
- Incorporation of sites within parks, green space, or other open space;
- Covering the archaeological sites with a layer of chemically stable soil before building tennis courts, parking lots, or similar facilities on the site.
- Deeding the site into a permanent conservation easement.

(C) When data recovery through excavation is the only feasible mitigation, a data recovery plan, which makes provisions for adequately recovering the scientifically consequential information from and about the historical resource, shall be prepared and adopted prior to any excavation being undertaken. Such studies shall be deposited with the California Historical Resources Regional Information Center. Archaeological sites known to contain human remains shall be treated in accordance with the provisions of Section 7050.5 Health and Safety Code.

(D) Data recovery shall not be required for a historical resource if the lead agency determines that testing or studies already completed have adequately recovered the scientifically consequential information from and about the archaeological or historical resource, provided that the determination is documented and that the studies are deposited with the California Historical Resources Information Center.

3.4.2.3 Impacts and Mitigation Measures

Impact CUL-1: Potential to cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5 (less than significant).

The General Plan update includes revisions and additions to the goals and policies pertaining to cultural resources. Although the concentration of future development in already urbanized areas and circulation improvements may indirectly increase the number of projects entailing the demolition, alteration, or relocation of CEQA historical resources, the General Plan update would not substantially alter City policies regarding the significance of impacts on historical resources. Furthermore, the General Plan update provides additional goals and policies intended to encourage rehabilitation, sensitive use adaptations, and flexible reuse to minimize adverse changes to historical resources.

Similarly, the General Plan update would not alter the significance of impacts on historical resources compared to the existing General Plan. General Plan updates do not modify the procedures or policies regarding how historical resources are identified or evaluated for historical significance, nor do they change how impacts on historical resources are assessed or mitigated under the general plan.

In general, prior to commencement of any action, development, or land use changes on lands subject to federal jurisdiction, or for projects involving federal funding, a cultural resource survey and an environmental analysis must be prepared. These serve in concert with the General Plan update policies to preserve and maintain sites, buildings, and landscapes that act as significant, visible

reminders of the City's social, architectural, and agricultural history. As listed above, the General Plan update includes multiple policies that attempt to mitigate impacts on historical built resources through protection, rehabilitation, and adaptive reuse. The General Plan update also includes policies and goals that would provide better documentation and review of historic resources in order to better protect known and as of yet unknown historic resources. Specifically, policies HCR 1-1, HCR 1-2, and HCR 1-3, encourage the preservation and reuse of historic resources including using sustainable "green" building and rehabilitation practices and protection of historic resources, where possible. Policies HCR 2-1, HCR 2-2, HCR 2-3, and HCR 2-4 protect historic resources by ensuring surveys and records of existing and as-of-yet unknown resources are performed following state, federal, and private guidelines by qualified persons and are updated regularly. Historical resources are also protected under the regulations of the NHPA when projects involve federal agencies.

Any projects resulting from the promotion of increased urban density, or the improvement of transportation networks would continue to require project-level review. Therefore, the impact of implementation of the General Plan update on historical resources would be less than significant with implementation of existing regulations and the proposed goals and policies.

Impact CUL-2: Potential to cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5 (less than significant)

Archaeological resources are known to be present in the plan area as identified through the NWIC record search results. Consequently, it is possible that future development, redevelopment, and construction activities proposed under the General Plan update may result in direct or indirect impacts on both prehistoric and historic archaeological resources. If archaeological resources are present in the areas where development is planned, they could be damaged by earth-disturbing construction activities, such as excavation for foundations, placement of fill, trenching for utility systems, and grading for roads and staging areas. In particular, construction activities may disturb such resources, thereby exposing them to potential vandalism or causing them to be displaced from the original context and integrity. Additionally, transportation improvements could restrict access to previously accessible locations that are important to Native Americans. This could result in a significant impact on archaeological resources. Specific analysis would be required under CEQA when individual projects are proposed. In general, however, causing a substantial adverse change in the significance of an archaeological resource that has the potential to yield information important to the prehistory or history of the local area, California, or the nation in general, would be considered significant. With implementation of the policies under Goal HCR-14 (protect and preserve important archaeological resources), of the General Plan update, the impact would be reduced to a less-than-significant level.

Impact CUL-3: Disturbance of any human remains, including those interred outside of formal cemeteries (less than significant)

The Planning Area is located in an area inhabited by Native Americans during pre-European times. Accordingly, Native American burials may be found in the future on sites where no record of such burials exists. Buried human remains that were not identified during previous research and field studies could be inadvertently unearthed during ground-disturbing activities, possibly resulting in damage to the human remains. Accordingly, human remains could be damaged or destroyed by future development related to buildout under the General Plan update. In the absence of regulations, this impact would be significant.

The treatment of Native American human remains is regulated by Public Resources Code Section 5097.98, as amended by Assembly Bill 2641, which addresses the disposition of Native American burials, protects remains, and appoints the NAHC to resolve disputes. In addition, California Health and Safety Code Section 7050.5 includes specific provisions for the protection of human remains in the event of discovery, and Section 7052 makes the willful mutilation, disinterment, or removal of human remains a felony. The Health and Safety Code is applicable to any project where ground disturbance would occur.

Policy HCR 15-2 establishes City policies and procedures that require development projects to comply with state and federal law that upon discovery of Native American remains or archaeological artifacts during construction, all activity will cease until qualified professional archaeological examination and reburial in an appropriate manner is accomplished. Policy HCR 15-3 in the General Plan update would further reduce the potential impact on archaeological and tribal cultural resources, including human remains, by requiring collaboration with local Tribal Nations on treatment protocols for handling human remains and cultural items affiliated with affected Tribal Nations.

The impact of implementation of the General Plan update on human remains would therefore be less than significant with implementation of existing State regulations and proposed General Plan policies HCR 15-2 and HCR 15-3.

3.4.3 References Cited

City of Napa. 1998. *City of Napa General Plan*. Adopted: December 1, 1998. Napa, CA.

Dyett & Bhatia. 2019. *Napa 2040 General Plan Existing Conditions Report.* Adopted: March 2019. Napa, CA.

National Park Service. 1995. *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation.* Available: https://www.nps.gov/subjects/nationalregister/upload/NRB-15_web508.pdf. Accessed: July 19, 2021.

Page and Turnbull. 2010. *West Napa Historic Context Statement and Survey Report. Napa California.* Prepared for City of Napa, Community Development Department & California Office of Historic Preservation. September 13.

Weeks and Grimmer. 1995. The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring & Reconstructing Historic Buildings. Available: https://www.nps.gov/tps/standards/treatment-guidelines-2017.pdf. Accessed: September 29, 2021.

3.5 Energy

This section describes the regulatory and environmental setting for potential environmental impacts relating to energy use in the Planning Area, analyzes effects on energy use that would result from implementation of the General Plan, and provides mitigation measures, if applicable, to reduce the effects of any significant impacts. There were no comments related to energy usage received during the Notice of Preparation scoping period.

3.5.1 Existing Conditions

3.5.1.1 Regulatory Setting

This section summarizes key federal, state, and regional and local regulations, laws, and policies relevant to energy usage in the Planning Area.

Federal

Energy Policy and Conservation Act

The Energy Policy and Conservation Act of 1975 sought to ensure that all vehicles sold in the United States would meet certain fuel economy goals. Through this act, Congress established the first fuel economy standards for on-road motor vehicles in the United States. Pursuant to the act, the National Highway Traffic and Safety Administration, which is part of the U.S. Department of Transportation (USDOT), is responsible for establishing additional vehicle standards and for revising existing standards. Since 1990, the fuel economy standard for new passenger cars has been 27.5 miles per gallon. Since 1996, the fuel economy standard for new light trucks (gross vehicle weight of 8,500 pounds or less) has been 20.7 miles per gallon. Heavy-duty vehicles (i.e., vehicles and trucks over 8,500 pounds gross vehicle weight) are not currently subject to fuel economy standards. Compliance with federal fuel economy standards is determined based on each manufacturer's average fuel economy for the portion of its vehicles produced for sale in the United States. The Corporate Average Fuel Economy (CAFE) program, administered by the U.S. Environmental Protection Agency (EPA), was created to determine vehicle manufacturers' compliance with the fuel economy standards. EPA calculates a CAFE value for each manufacturer based on City and highway fuel economy test results and vehicle sales. Based on the information generated under the CAFE program, USDOT is authorized to assess penalties for noncompliance.

Energy Policy Act of 1992

The Energy Policy Act of 1992 (EPAct) was passed to reduce the country's dependence on foreign petroleum and improve air quality. EPAct includes several parts intended to build an inventory of alternative fuel vehicles (AFVs) in large, centrally fueled fleets in metropolitan areas. EPAct requires certain federal, state, and local government and private fleets to purchase a percentage of light duty AFVs capable of running on alternative fuels each year. In addition, financial incentives are included in EPAct. Federal tax deductions are allowed for businesses and individuals to cover the incremental cost of AFVs. States are also required by the act to consider a variety of incentive programs to help promote AFVs.

Energy Policy Act of 2005

The Energy Policy Act of 2005 was signed into law on August 8, 2005. Generally, the act provides for renewed and expanded tax credits for electricity generated by qualified energy sources, such as landfill gas; provides bond financing, tax incentives, grants, and loan guarantees for a clean renewable energy and rural community electrification; and establishes a federal purchase requirement for renewable energy.

State

Warren-Alquist Act

The 1975 Warren-Alquist Act established the California Energy Resources Conservation and Development Commission, now known as the California Energy Commission (CEC). The act established state policy to reduce wasteful, uneconomical, and unnecessary uses of energy by employing a range of measures. The California Public Utilities Commission (CPUC) regulates privately owned utilities in the energy, rail, telecommunications, and water sectors.

Assembly Bill 2076: Reducing Dependence on Petroleum

Pursuant to Assembly Bill (AB) 2076 (Chapter 936, Statutes of 2000), CEC and the California Air Resources Board (CARB) prepared and adopted a joint agency report in 2003, *Reducing California's Petroleum Dependence*. Included in this report are recommendations to increase the use of alternative fuels to 20 percent of on-road transportation fuel use by 2020 and to 30 percent by 2030, significantly increase the efficiency of motor vehicles, and reduce per capita vehicle miles traveled (VMT) (California Energy Commission and California Air Resources Board 2003). Further, in response to the CEC's 2003 and 2005 *Integrated Energy Policy Reports*, Governor Joseph Graham "Gray" Davis directed CEC to take the lead in developing a long-term plan to increase alternative fuel use. A performance-based goal of AB 2076 was to reduce petroleum demand to 15 percent below 2003 demand by 2020.

Integrated Energy Policy Report

Senate Bill (SB) 1389 (Chapter 568, Statutes of 2002) required CEC to: "[C]onduct assessments and forecasts of all aspects of energy industry supply, production, transportation, delivery and distribution, demand, and prices. The Energy Commission shall use these assessments and forecasts to develop energy policies that conserve resources, protect the environment, ensure energy reliability, enhance the state's economy, and protect public health and safety" (Public Resources Code Section 25301(a)). This work culminated in the *Integrated Energy Policy Report* (IEPR).

CEC adopts an IEPR every 2 years and an update every other year. The 2019 IEPR is the most recent IEPR, which was adopted February 20, 2020. The 2019 IEPR provides a summary of priority energy issues currently facing the state, outlining strategies and recommendations to further the State's goal of ensuring reliable, affordable, and environmentally responsible energy sources. Energy topics covered in the report include progress toward statewide renewable energy targets and issues facing future renewable development; efforts to increase energy efficiency in existing and new buildings; progress by utilities in achieving energy efficiency targets and potential; improving coordination among the state's energy agencies; streamlining power plant licensing processes; results of preliminary forecasts of electricity, natural gas, and transportation fuel supply and demand; future

energy infrastructure needs; the need for research and development efforts to support statewide energy policies; and issues facing California's nuclear power plants.

Senate Bill 1078: California Renewables Portfolio Standard Program

SB 1078 (Chapter 516, Statutes of 2002) establishes a renewable portfolio standard (RPS) for electricity supply. The RPS required that retail sellers of electricity, including investor-owned utilities and community choice aggregators, provide 20 percent of their supply from renewable sources by 2017. In addition, electricity providers subject to the RPS must increase their renewable share by at least 1 percent each year. The outcome of this legislation will impact regional transportation powered by electricity. As of 2016, the State has reported that a minimum of 25 percent of electricity has been sourced from certified renewable sources (California Public Utilities Commission 2017).

Senate Bill X1-2: California Renewable Energy Resources Act

SB X1-2 of 2011 required all California utilities to generate 33 percent of their electricity from renewables by 2020. SB X1-2 set a three-stage compliance period requiring all California utilities, including independently owned utilities, energy service providers, and community choice aggregators, to generate 20 percent of their electricity from renewables by December 31, 2013; 25 percent by December 31, 2016; and 33 percent by December 31, 2020. SB X1-2 also required the renewable electricity standard to be met increasingly with renewable energy that is supplied to the California grid from sources within, or directly proximate to, California. SB X1-2 mandates that renewables from these sources make up at least 50 percent of the total renewable energy for the 2011 through 2013 compliance period, at least 65 percent for the 2014 through 2016 compliance period, and at least 75 percent for 2016 and beyond.

Senate Bill 350: Clean Energy and Pollution Reduction Act of 2015

The Clean Energy and Pollution Reduction Act of 2015 (SB 350) requires the amount of electricity generated and sold to retail customers per year from eligible renewable energy resources to be increased to 50 percent by December 31, 2030. This act also requires doubling of the energy efficiency savings in electricity and natural gas for retail customers through energy efficiency and conservation by December 31, 2030.

Energy Action Plan

The first *Energy Action Plan* (EAP) emerged in 2003 from a crisis atmosphere in California's energy markets. California's three major energy policy agencies (CEC, CPUC, and the Consumer Power and Conservation Financing Authority [established under deregulation and now defunct]) came together to develop one high-level, coherent approach to meeting California's electricity and natural gas needs. It was the first time that energy policy agencies formally collaborated to define a common vision and set of strategies to address California's future energy needs and emphasize the importance of the impacts of energy policy on the California environment.

In the October 2005 *Energy Action Plan II: Implementation Roadmap for Energy Policies*, CEC and CPUC updated their energy policy vision by adding some important dimensions to the policy areas included in the original EAP, such as the emerging importance of climate change, transportation-related energy issues and research and development activities. The CEC adopted an update to the

EAP II in February 2008 that supplements the earlier EAPs and examines California's ongoing actions in the context of global climate change.

Assembly Bill 1007: State Alternative Fuels Plan

AB 1007 (Chapter 371, Statues of 2005) required CEC to prepare a state plan to increase the use of alternative fuels in California. CEC prepared the *State Alternative Fuels Plan* (SAF Plan) in partnership with CARB and in consultation with other state, federal, and local agencies. The SAF Plan presents strategies and actions California must take to increase the use of alternative, non-petroleum fuels in a manner that minimizes the costs to California and maximizes the economic benefits of in-state production. The SAF Plan assessed various alternative fuels and developed fuel portfolios to meet California's goals to reduce petroleum consumption, increase alternative fuel use, reduce greenhouse gas (GHG) emissions, and increase in-state production of biofuels without causing a significant degradation of public health and environmental quality.

Executive Order S-06-06

Executive Order (EO) S-06-06, signed on April 25, 2006, established targets for the use and production of biofuels and biopower, and directed state agencies to work together to advance biomass programs in California while providing environmental protection and mitigation. The EO established the following target to increase the production and use of bioenergy, including ethanol and biodiesel fuels made from renewable resources: produce a minimum of 20 percent of its biofuels within California by 2010, 40 percent by 2020, and 75 percent by 2050. The EO also calls for California to meet a target for use of biomass electricity. The *2011 Bioenergy Action Plan* identified those barriers and recommended actions to address them so that the state can meet its clean energy, waste reduction, and climate protection goals. The *2012 Bioenergy Action Plan* updated the 2011 plan and provides a more detailed action plan to achieve the following goals.

- Increase environmentally and economically sustainable energy production from organic waste.
- Encourage development of diverse bioenergy technologies that increase local electricity generation, combined heat and power facilities, renewable natural gas, and renewable liquid fuels for transportation and fuel cell applications.
- Create jobs and stimulate economic development, especially in rural regions of the state.
- Reduce fire danger, improve air and water quality, and reduce waste. (O'Neill 2012)

As of 2018, 2.35 percent of the total electricity system power in California was derived from biomass (California Energy Commission 2018).

California Building Standards Code

The California Building Standards Code, Title 24 of the California Code of Regulations, contains the regulations that govern the construction of buildings in California. Within the Building Standards Code, two parts pertain to the incorporation of both energy efficient and green building elements into land use development. Part 6 is California's Energy Efficiency Standards for Residential and Nonresidential Buildings and Part 11 is the California Green Building Standards, also known as CALGreen. Title 24 was established by CEC in 1978 in response to a legislative mandate to create uniform building codes to reduce California's energy consumption and provide energy efficiency standards for residential and non-residential buildings. The most recent Title 24 standards were updated in 2019 and became effective January 1, 2020. The building efficiency standards are

enforced through the local plan check and building permit process. Local government agencies may adopt and enforce additional energy standards for new buildings as reasonably necessary because of local climatologic, geologic, or topographic conditions, provided that these standards exceed those provided in Title 24.

Assembly Bill 32, Climate Change Scoping Plan and Update

In December 2008, CARB adopted its first version of its *Climate Change Scoping Plan*, which contained the main strategies California will implement to achieve the mandate of AB 32 (2006) to reduce statewide GHG emissions to 1990 levels by 2020. In May 2014, CARB released and subsequently adopted the *First Update to the Climate Change Scoping Plan* to identify the next steps in reaching the goals of AB 32 (2006) and evaluate the progress made between 2000 and 2012 (California Air Resources Board 2014). After releasing multiple versions of proposed updates in 2017, CARB adopted *California's 2017 Climate Change Scoping Plan* (2017 Scoping Plan) in December of that same year (California Air Resources Board 2017). The 2017 Scoping Plan indicates that California is on track to achieve the 2020 statewide GHG target mandated by AB 32 of 2006 (California Air Resources Board 2017:9). It also lays out the framework for achieving the mandate of SB 32 of 2016 to reduce statewide GHG emissions to at least 40 percent below 1990 levels by the end of 2030 (California Air Resources Board 2017). The 2017 Scoping Plan identifies the GHG reductions needed by each emissions sector (e.g., transportation, building energy, agriculture).

The measures identified in the 2017 Scoping Plan have the co-benefits of reducing California's dependency of fossil fuels and making land use development and transportation systems more energy efficient. More details about the Statewide GHG reduction goals and 2017 Scoping Plan measures are provided in the regulatory setting of Section 3.7, *Greenhouse Gas Emissions*.

Senate Bill 375

SB 375, signed by Governor Arnold Schwarzenegger in September 2008, aligns regional transportation planning efforts, regional GHG emission reduction targets, and land use and housing allocation. SB 375 requires metropolitan planning organizations (MPOs) to adopt a sustainable communities strategy (SCS) or alternative planning strategy, showing prescribed land use allocation in each MPO's regional transportation plan. CARB, in consultation with the MPOs, is to provide each affected region with reduction targets for GHGs emitted by passenger cars and light trucks in their respective regions for 2020 and 2035. Implementation of SB 375 has the co-benefit of reducing California's dependency on fossil fuels and making land use development and transportation systems more energy efficient.

SB 375 requires the Association of Bay Area Governments and Metropolitan Transportation Commission (ABAG and MTC, respectively) to identify strategies that will reduce per capita GHG emissions from passenger vehicles by approximately 19 percent by 2035 over base year 2005. ABAG and MTC jointly adopted their SCS as part of *Plan Bay Area 2040*.

Executive Order B-30-15

On April 20, 2015, Governor Edmund G. Brown Jr. signed EO B-30-15 to establish a California GHG reduction target of 40 percent below 1990 levels by 2030. The EO aligns California's GHG reduction targets with those of leading international governments such as the 28-nation European Union, which adopted the same target in October 2014. California is on track to meet or exceed the target of reducing GHG emissions to 1990 levels by 2020, as established in the California Global Warming

Solutions Act of 2006 (AB 32). California's new emission reduction target of 40 percent below 1990 levels by 2030 will make it possible to reach the goal of reducing emissions 80 percent below 1990 levels by 2050. This is in line with the scientifically established levels needed in the United States to limit global warming below 2 degrees Celsius, the warming threshold at which major climate disruptions are projected, such as super droughts and rising sea levels.

Executive Order B-48-18: Zero Emission Vehicles

In January 2018, Governor Brown signed EO B-48-18 requiring all State entities to work with the private sector to put at least 5-million zero-emission vehicles on the road by 2030, as well as install 200 hydrogen fueling stations and 250,000 zero-emissions chargers (10,000 of which to be direct current fast chargers) by 2025. This EO also requires all State entities to continue to partner with local and regional governments to streamline the installation of zero-emission vehicle infrastructure. The Governor's Office of Business and Economic Development is required to publish a Plug-in Charging Station Development Guidebook and update the 2015 *Hydrogen Station Permitting Guidebook* to aid in these efforts. All State entities are required to participate in updating the 2018 *Zero-Emissions Vehicle Action Plan* to help expand private investment in zero-emissions vehicle infrastructure with focus in low-income and disadvantaged communities (Governor's Interagency Working Group on Zero-Emission Vehicles 2018). Additionally, all State entities are to support and recommend policies and actions to expand infrastructure in homes, through the Low Carbon Fuel Standard, and recommend how these actions can strengthen the economy, create jobs, and ensure affordability and accessibility for all drivers.

California and 22 other states filed suit in November 2019 to challenge the Trump administration's decision to revoke California's authority to set stiff vehicle tailpipe emissions rules and require an increasing number of zero-emission vehicles. The lawsuit, filed in the U.S. Court of Appeals for the District of Columbia, seeks to overturn EPA's decision in September 2019 to revoke portions of a waiver it granted in 2013. As of the writing of this report, the lawsuit is still in litigation.

Senate Bill 32 and Assembly Bill 197 of 2016

In August 2016, Governor Brown signed SB 32 and AB 197, which serve to extend California's GHG reduction programs beyond 2020. SB 32 amended the Health and Safety Code to include Section 38566, which contains language to authorize CARB to achieve a statewide GHG emission reduction of at least 40 percent below 1990 levels by no later than December 31, 2030. SB 32 codified the targets established by EO B-30-15 for 2030, which set the next interim step in the State's continuing efforts to pursue the long-term target expressed in EOs S-3-05 and B-30-15 of 80 percent below 1990 emissions levels by 2050. Achievement of these goals has the co-benefit of reducing California's dependency on fossil fuels and making land use development and transportation systems more energy efficient.

Advanced Clean Cars Program

In January 2012, CARB approved the Advanced Clean Cars program, which combines the control of GHG emissions and criteria air pollutants, as well as requirements for greater numbers of zero-emission vehicles, into a single package of standards for vehicle model years 2017 through 2025. The new rules strengthen the GHG standard for 2017 models and beyond. This will be achieved through existing technologies, the use of stronger and lighter materials, and more efficient drivetrains and engines. The program's zero-emission vehicle regulation requires battery, fuel cell, and/or plug-in hybrid electric vehicles to account for up to 15 percent of California's new vehicle

sales by 2025. The program also includes a clean fuels outlet regulation designed to support the commercialization of zero-emission hydrogen fuel cell vehicles planned by vehicle manufacturers by 2015 by requiring increased numbers of hydrogen fueling stations throughout the state. The number of stations will grow as vehicle manufacturers sell more fuel cell vehicles. By 2025, when the rules will be fully implemented, the statewide fleet of new cars and light trucks will emit 34 percent fewer global warming gases and 75 percent fewer smog-forming emissions than the statewide fleet in 2016 (California Air Resources Board 2021).

Local

City of Napa General Plan

The following goals and policies excerpted from the *Parks and Recreation*, *Housing, Natural Resources,* and *Land Use Elements* of the current General Plan pertain to energy.

> **Policy PR-2.11:** The City shall continue to use and consider new cost-effective means of operating and maintaining parks and recreation facilities such as shared financing with other public entities, use of energy efficient technology and water conservation, and by preparing a maintenance impact analysis for new facilities.
>
> **Policy H3.9: Strengthen Sustainable Building**. Through its Green Building program and site and building design guidelines, the City will require new residential development and rehabilitation projects to incorporate sustainable building design and siting, construction and operation. Sustainable green building means development, design, construction and operation that reduces energy consumption, particularly reduction in the use of fossil fuels and potable water; incorporates alternate and renewable energy sources and recycled water; provides more natural light; reduces storm runoff; uses renewable, local, salvage and nontoxic building materials; reduces use of non-recyclable materials and promotes recycling; and improves indoor air quality.
>
> **Policy NR-5.2:** The City shall encourage land use patterns and management practices that conserve air and energy resources, such as mixed-use development and provisions for local-serving commercial uses adjacent to neighborhoods.
>
> **Policy NR-5.3:** The City shall promote energy conservation/energy efficiency improvement programs, which reduce energy demand from power-generating facilities which contribute to background levels of regional air emissions.

GOAL LU-11: Enhance and improve sustainable practices in Napa to minimize long term effects of development on the local and global environment.

> **Policy LU-11.1:** The City shall create Green Building Initiatives to encourage or require new development and rehabilitation projects to incorporate sustainable practices, green building techniques, energy conservation and recycling measures, alternate and renewable energy producing systems.
>
> **Policy LU-11.2:** The City shall incorporate green building practices into City facilities, and integrate energy efficiency and conservation into City functions.
>
> **Policy LU-11.3:** The City shall continue to promote development patterns that provide for resource conservation.

3.5.1.2 Environmental Setting

Sustainability Plan

The City of Napa adopted its first Sustainability Plan in July 2012. The Sustainability Plan includes 95 initiatives to promote sustainability within the Napa community and also within the City's internal government operations. The Sustainability Plan is arranged into focus areas that are the key components of community and City government operations.

Within each focus area, the Sustainability Plan identities several initiatives, many of which will reduce GHG emissions within the City. The initiatives identify actions to be taken by the City, such as promoting existing energy conservation programs, encouraging a connected system of bike, and walking paths, and adding a food scraps curbside composting program. The initiatives in the plan were developed by City staff, subject matter experts, and the community at-large through public meetings, interviews, and surveys. Collectively, the sustainability initiatives within the Sustainability Plan will reduce the City's GHG emissions from its community and City government operations, consistent with the State's GHG reduction goals.

Energy Use and Global Warming

Scientists and climatologists have produced evidence that the burning of fossil fuels by vehicles, power plants, industrial facilities, residences, and commercial facilities has led to an increase in the earth's temperature. For an analysis of GHG emissions and impacts on climate change, please see Section 3.7, *Greenhouse Gas Emissions*.

Electricity and Gas Service

The City purchases electricity and gas from the Pacific Gas and Electric Company (PG&E). PG&E has limited renewable energy opportunities. Only 15.9 percent of its total electric power distribution are renewable resources. Due to this circumstance, Napa's current energy conservation efforts focus mainly on energy reduction methods.

3.5.2 Environmental Impacts

This section describes the environmental impacts associated with energy use that would result from implementation of the General Plan update. It describes the methods used to determine the effects of the General Plan update and lists the thresholds used to conclude whether an impact would be significant. Measures to mitigate (i.e., avoid, minimize, rectify, reduce, eliminate, or compensate for) significant impacts are provided, if applicable.

3.5.2.1 Methods for Analysis

Energy consumption resulting from future development under the General Plan update would include energy directly consumed for space heating and cooling, electricity- and gas-powered equipment (including industrial equipment), and interior and exterior lighting of buildings (residential and commercial) in the Planning Area. Indirect energy consumption resulting from future development under the proposed plan would include fuels consumed for the generation of electricity at power plants and the energy used for the treatment of water and the transportation of water to and from the Planning Area. Transportation-related energy consumption includes the fuels and electricity used to power automobiles, trucks, busses, railways, ridesharing. It also includes

heavy duty mobile machinery, such as farm equipment and forklifts. Energy would also be consumed by equipment and vehicles used during construction and maintenance of roadways, buildings, and landscaping. As a general plan, a programmatic approach is used for evaluating potential impacts that relies primarily on a qualitative analysis supported by figures showing levels of fuel consumption.

Relevant General Plan Update Goals and Policies

Applicable General Plan update goals and policies from the *Climate Change and Sustainability Element* are as follows.

Climate Change and Greenhouse Gases Reduction

GOAL CCS-1: Further the City's sustainability initiatives to reduce the community's GHG emissions, and foster green development patterns – including buildings, sites, and landscapes.

Policy CCS 1-1: Seek to achieve net zero climate pollutants from public and private operations within the City by 2030 and carbon neutrality by 2040, which is five years sooner than what is established under Executive Order B-55-18.

Policy CCS 1-2: The City should lead by example in managing its local government operations to reduce GHG emissions and promote sustainable environmental practices. Components of this strategy include:

- Develop plans for the reduction of fossil fuel consumption through all aspects of local government operations, including construction, purchasing, and ongoing operation.
- Require new or substantially renovated municipal facilities to incorporate cost-effective strategies for reducing greenhouse gas emissions, conserving energy and water, and utilizing sustainable construction practices.
- Reduce solid waste from City operations.

CCS 1-3: Partner with local, regional, and County agencies and utility companies to achieve greenhouse gas reduction targets. Efforts for this include:

- Support local efforts to market programs and conduct community outreach through schools, non-profit groups, community organizations, and the business community to increase participation in GHG reduction efforts.
- Partner with the Napa Valley Unified School District, private schools, community-based non-profit organizations, and others to undertake public outreach and education efforts that broaden community involvement in reducing GHG emissions.
- Foster and build public-private partnerships that help achieve greater energy efficiency and reduce greenhouse gas emissions.

Policy CCS 1-4: Expand local awareness of actions that residents and businesses can take to reduce climate impacts. Actively seek grants, and continue to provide community outreach and robust education through partnership opportunities with City residents. Develop an open data Community Climate Dashboard to engage residents in progress and accomplishments toward goals.

Policy CCS 1-5: Work collaboratively with regional agencies and other partners to develop a Climate Action Plan to address the GHG reduction goals of Executive Order B-55-18, Senate Bill 32, and Executive Order S-03-05.

The Climate Action Plan could serve as a Qualified GHG Reduction Strategy to ensure that the City is in compliance with State targets for GHG emissions.

Land Use and Mobility

GOAL CCS-2: Promote Napa as a network of interconnected neighborhoods with compact, walkable development patterns that are integrated with a sustainable mobility system that emphasizes walking, biking, or taking transit.

Policy CCS 2-1: Support programs to reduce auto-dependency and GHG emissions from personal vehicles. Efforts for this include:

- Establish regulations to limit uses of drive-through windows, including limitations on drive-through restaurants.
- Initiate programs that encourage car-free tourism through incentives, outreach, awareness, and by creating a bicycle and pedestrian-friendly environment.
- Establish programs to reduce vehicle miles traveled (VMT), such as transportation demand management.
- Support the expansion of Park and Ride areas and other support facilities to encourage use of public transportation, including Napa Valley Transportation Authority's (NVTA) on-demand service, and car and van pooling. Expand programs that encourage the installation of electric vehicle charging infrastructure.
- Support programs to install bike racks in new developments, commercial areas, and within Downtown Napa and the Oxbow district.

Policy CCS 2-2: Promote increased transit service and ridership in Napa and connections with County transit services, including by implementing transportation plans in accordance with the NVTA Countywide Transportation Plan.

Policy CCS 2-3: Study options to transition the City's vehicle fleet, starting with small and mid-size vehicles, to vehicles that are 100 percent electric or powered by clean, renewable energy.

Policy CCS 2-4: Support programs that help businesses and organizations switch from fossil fuel-powered fleet vehicles to vehicles powered by clean, renewable energy sources.

Policy CCS 2-5: Establish programs for the public street system to reduce VMT and promote more sustainable modes of transportation. Consider VMT and alternative modes of transportation in the design of street extensions, connections, and right-of-way controls at intersections, and when monitoring and adjusting traffic signals.

Policy CCS 2-6: Encourage alternatives to City employees' use of single-occupancy vehicles by providing bicycle racks, preferential parking permits for carpools and vanpools, commuter information, and other incentives.

Sustainable Built and Natural Environments

Energy Generation and Security

GOAL CCS-6: Considering power shutdowns that affect the Napa community, promote sustainable energy generation practices and further develop energy security that is resilient to wildfire and related climate disasters.

Policy CCS 6-2: Promote renewable energy generation and storage to decrease reliance on outside sources, and minimize impacts from public safety power shutdowns.

Policy CCS 6-3: Incentivize solar panel deployment beyond the State's mandates. Establish guidance regarding the placement of solar panels to minimize impacts to aesthetic resources.

Policy CCS 6-4: Promote renewable energy generation on City-owned sites and the deployment of micro-grids for energy independence and lifeline operations in the event of power shutdowns.

Policy CCS 6-5: Evaluate technologies to reduce reliance on fossil fuel-powered backup generators and study program to transition to more climate friendly options -including battery storage, solar-powered generators, and small-scale wind turbines - in appropriate areas.

Policy CCS 6-6: Adopt renewable energy production standards for the City based on quantifiable measures that increase per capita renewable generation levels.

GOAL CCS-7: Implement programs and work with jurisdictional partners to increase sustainable energy production and energy security.

Policy CCS 7-1: Pursue State, regional, and federal funding programs designed to reduce energy demand through conservation and efficiency.

Policy CCS 7-2: Conduct audits, and regularly monitor the effectiveness of City and County energy efficiency implementation measures and adapt them to meet targets.

Policy CCS 7-3: In support of countywide energy generation efforts, increase local renewable energy generation.

Policy CCS 7-4: Promote alternative modes of electricity generation—such as wind, solar, biomass, geothermal, and hydroelectric—and invest in electric storage infrastructure at the City-wide level.

Policy CCS 7-5: Promote alternative modes of electricity generation on City-owned lands.

Policy CCS 7-6: Partner with the County of Napa to implement an AB 811 program that makes funding available to residential and commercial property owners seeking to improve their properties to conserve energy and water, and/or install solar systems to generate solar energy.

Policy CCS 7-7: Increase installation of electric vehicle charging stations with funding from State and federal sources.

Policy CCS 7-8: Convert street lighting, water pumping, water treatment, and other energy-intensive operations to more efficient technologies.

Policy CCS 7-9: Work with the Pacific Gas & Electric Company and the California Public Utilities Commission on undergrounding utilities, with goals to reduce fire risk, modernize the cable network, minimize network downtime, and reduce the range of electromagnetic fields.

Policy CCS 7-10: Incentivize the use of on-site renewable energy generation for new and existing buildings.

Green Building

GOAL CCS-8: Support Napa's vision of a sustainable community by promoting efforts to reduce energy demand and resource conservation through improved building design.

Policy CCS 8-1: Support use of the CALGreen Building Standards Code (CALGreen) to reduce energy demand and promote resource conservation through improved building design. Encourage existing buildings to adapt to CALGreen sustainability practices.

Policy CCS 8-2: Seek to incorporate net zero energy or net-positive design in City-owned new and renovated buildings.

Policy CCS 8-3: Encourage roofing design and surface treatments (e.g., "cool roofs") that reduce the heat island effect of new development, and support reduced energy use, reduced air pollution, and a healthy urban forest. Connect businesses and residents with cool roof rebate programs for new and retrofitted roofs through City outreach efforts.

3.5.2.2 Thresholds of Significance

In accordance with Appendix G of the CEQA Guidelines, the General Plan update would be considered to have a significant effect if it would result in any of the following conditions.

- Result in wasteful, inefficient, or unnecessary consumption of energy resources during project construction or operations.
- Conflict with or obstruct a state or local plan for renewable energy or energy efficiency.

3.5.2.3 Impacts and Mitigation Measures

Impact ENE-1: Result in wasteful, inefficient, or unnecessary consumption of energy resources during project construction or operation (less than significant)

Construction associated with future developments under the proposed project would consume gasoline and diesel fuel through operation of heavy-duty, off-road construction equipment and on-road vehicles. The amount of fuel consumed by these activities would vary substantially depending on the level of activity, length of the construction period, specific construction operations, types of equipment, and number of personnel. Because the General Plan update does not propose any specific development projects, the precise level and intensity of construction activities that would occur in the Planning Area through 2040 is not known at this time.

For the purposes of this analysis, it is assumed that the types of land uses envisioned under the General Plan update, which includes residential, commercial, industrial, and recreational uses, would involve construction activities typical of most land use developments within the Planning Area and in the San Francisco Bay Area Air Basin. Because construction emissions from both mobile and stationary sources are considered to be relatively short-term emissions that would cease once construction of a project is complete, they would represent a relatively short demand on local and regional fuel supplies that would be easily accommodated. Additionally, Executive Order N-79-20 (EO N-79-20) establishes a goal to transition to 100 percent zero-emission off-road vehicles and equipment by 2035 where feasible. EO N-79-20 directs CARB to develop regulations that will help achieve these goals. The City would require developers to adhere to EO N-79-20 for future development. Therefore, construction activities associated with the General Plan update would not result in a wasteful, inefficient, and unnecessary usage of direct or indirect energy.

Future development under the General Plan update would generate vehicle trips once operational, which would consume gasoline and diesel. Future development would also result in the consumption of electricity and natural gas for power, heating, and cooking. While the number of residential units and commercial and industrial square footage would increase between 2018 and 2040, total energy use is anticipated to decrease, primarily due to Napa's delivery of energy through MCE, which has much higher goals for renewable energy than PG&E, and the increase in fuel efficiency for vehicles that would result as more vehicles are designed to meet stricter Pavley standards come into use.

In addition, the General Plan update includes goals and policies, identified above, in the Climate Change and Sustainability Element aimed at reducing energy consumption and consequently would help decrease GHG emissions. While many of the policies within the General Plan update do not set specific and quantifiable goals, they do address general concepts such as increasing energy efficiency and renewable energy, encouraging bicycle and pedestrian transit, decreasing car use by

tourists, and more. When implemented, these actions would further decrease energy consumption from natural gas, electricity, and gasoline and diesel fuels.

By decreasing demand for energy- and fuel-related energy resources both overall and on a per service population basis, operation of future land uses associated with the General Plan update would not result in a wasteful, inefficient, and unnecessary usage of direct or indirect energy. Therefore, this impact is considered less than significant.

Impact ENE-2: Conflict with or obstruct a state or local plan for renewable energy or energy efficiency (less than significant)

All future development under the General Plan update would be required to comply with the latest CBC requirements, including CBC Energy Efficiency Standards, as well as all federal, state, and local rules and regulations pertaining to energy consumption and conservation. The General Plan update includes policies that emphasize energy reduction strategies and does not contain policies that would conflict with existing energy conservation regulations.

Through implementation of General Plan update policies, the General Plan update would support the CARB passenger vehicle GHG emissions reduction targets through measures that would reduce VMT in the Planning Area. Additionally, CARB's low carbon fuels standard, which aims to reduce the full fuel-cycle, carbon intensity of the transportation fuel pool used in California, would further assist in meeting established energy reduction goals and GHG emission reduction targets. Therefore, impacts would be less than significant.

3.5.3 References Cited

California Air Resources Board. 2014. *First Update to the Climate Change Scoping Plan*. Available: https://www.arb.ca.gov/cc/scopingplan/2013_update/first_update_climate_change_scoping_plan.pdf. Accessed: February 10, 2021.

California Air Resources Board. 2017. *California's 2017 Climate Change Scoping Plan: The Strategy for Achieving California's 2030 Greenhouse Gas Target*. Adopted by the California Air Resources Board on December 14, 2017. Available: https://www.arb.ca.gov/cc/scopingplan/scopingplan.htm. Accessed: February 10, 2021.

California Air Resources Board. 2021. Advanced Clean Cars Program. Available: https://ww2.arb.ca.gov/our-work/programs/advanced-clean-cars-program. Accessed: October 7, 2021.

California Energy Commission and California Air Resources Board. 2003. *Reducing California's Petroleum Dependence*. August. Available: https://www.arb.ca.gov/fuels/carefinery/ab2076final.pdf. Accessed: February 10, 2021.

California Energy Commission. 2018. *Total System Electric Generation*. Available: http://www.energy.ca.gov/almanac/electriCity_data/total_system_power.html. Accessed: February 10, 2021.

California Public Utilities Commission. 2017. *2017 Annual Report: Renewables Portfolio Standard*. November 2017. Available: http://www.cpuc.ca.gov/uploadedFiles/CPUC_Website/Content/Utilities_and_Industries/Energy/Reports_and_White_Papers/Nov%202017%20-%20RPS%20Annual%20Report.pdf. Accessed: February 10, 2021.

Governor's Interagency Working Group on Zero-Emission Vehicles. 2018. *2018 ZEV Action Plan Priorities Update*. September 2018. Available: https://static.business.ca.gov/wp-content/uploads/2019/12/2018-ZEV-Action-Plan-Priorities-Update.pdf. Accessed: February 10, 2021.

O'Neill, G. 2012. *2012 Bioenergy Action Plan*. California Energy Commission, Efficiency and Renewables Division. Publication number: CEC-300-2012-XXX-XXX.

3.6 Geology and Soils

Issues identified in response to the Notice of Preparation (NOP) (Appendix A) were considered in preparing this analysis. The NOP comments pertaining to geology and soils include a recommendation by the California Geological Survey to review specific geology and soils sources in development of the affected environment and impact analysis. These issues are addressed in this section.

3.6.1 Existing Conditions

3.6.1.1 Regulatory Setting

Federal

Earthquake Hazard Reduction Act of 1977

Federal laws codified in United States Code Title 42, Chapter 86, were enacted to reduce risks to life and property from earthquakes in the United States through the establishment and maintenance of an effective earthquake hazards reduction program. Implementation of the requirements are regulated, monitored, and enforced at the state and local levels.

Clean Water Act Section 402 (National Pollutant Discharge Elimination System Program)

Because the U.S. Environmental Protection Agency (EPA) has delegated enforcement of Section 402 of the Clean Water Act (CWA) to the states, this section is addressed under *State*.

Paleontological Resources Act of 2009

The Paleontological Resources Act of 2009 (Public Law No. 111-11, Subtitle D) includes provisions for the protection and preservation of paleontological resources. The law also prohibits the collection of paleontological resources from federal land without a permit, except in the case of noncommercial collecting that complies with other regulations for that federal land.

Historic Sites Act of 1935

The Historic Sites Act of 1935 establishes a national registry of natural landmarks and protects "outstanding examples of major geological features." Topographic and geologic features are also protected under CEQA.

State

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act of 1972 (Alquist-Priolo Act) (California Public Resources Code [PRC] § 2621 et seq.) is intended to reduce the risk to life and property from surface fault rupture during earthquakes. The Alquist-Priolo Act prohibits the location and construction of most types of structures intended for human occupancy over active fault traces and strictly

regulates construction in corridors along active faults.[1] The California state geologist has established regulatory zones along active faults,[2] called *earthquake fault zones*, and published maps that identify areas where surface traces of active faults are present (California Geological Survey 2020).

Seismic Hazards Mapping Act

Like the Alquist-Priolo Act, the Seismic Hazards Mapping Act of 1990 (PRC §§ 2690–2699.6) is intended to reduce damage resulting from earthquakes. While the Alquist-Priolo Act addresses surface fault rupture, the Seismic Hazards Mapping Act addresses other earthquake-related hazards, including strong ground shaking, liquefaction, and seismically induced landslides. Its provisions are similar in concept to those of the Alquist-Priolo Act—the State is charged with identifying and mapping areas at risk of strong ground shaking, liquefaction, landslides, and other corollary hazards—and cities and counties are required to regulate development within mapped seismic hazard zones.

Under the Seismic Hazards Mapping Act, permit review is the primary mechanism for local regulation of development. Specifically, cities and counties are prohibited from issuing development permits for sites within seismic hazard zones until appropriate site-specific geologic and/or geotechnical investigations have been carried out and measures to reduce potential damage have been incorporated into the development plans. Geotechnical investigations conducted within Seismic Hazard Zones must incorporate standards specified by California Geological Survey Special Publication 117a, *Guidelines for Evaluating and Mitigating Seismic Hazards* (California Geological Survey 2008).

Clean Water Act Section 402 General Permit for Construction and other Land Disturbance Activities (General Order 2010-0014-DWQ)

The CWA is discussed in detail in Section 3.9, *Hydrology and Water Quality*. However, because Section 402 is directly relevant to grading activities, additional information is provided here.

Section 402 of the CWA mandates that certain types of construction activity comply with the requirements of EPA's National Pollutant Discharge Elimination System (NPDES) program. EPA has delegated to the State Water Resources Control Board (State Water Board) the authority over the NPDES program in California, where it is implemented by the state's nine Regional Water Quality Control Boards (Regional Water Boards).

Dischargers whose projects disturb 1 or more acres of soil, or whose projects disturb less than 1 acre but are part of a larger common plan of development that in total disturbs 1 or more acres, are required to obtain coverage under General Order 2010-0014-DWQ. Construction activities subject to this permit include clearing, grading, and disturbances to the ground such as stockpiling or excavation, but do not include regular maintenance activities performed to restore the original line, grade, or capacity of the facility. General construction permit applicants are required to prepare a notice of intent and a stormwater pollution prevention plan (SWPPP) and to implement and maintain best management practices (BMPs) to avoid adverse effects on receiving water quality as a result of construction activities, including earthwork.

---

1 With reference to the Alquist-Priolo Act, a structure for human occupancy is defined as one "used or intended for supporting or sheltering any use or occupancy that is expected to have a human occupancy rate of more than 2,000 person-hours per year" (14 California Code of Regulations, Division 2, § 3601(e)).

2 An active fault, for the purposes of the Alquist-Priolo Act, is one that has ruptured in the past 11,000 years.

Coverage under the general construction permit is obtained by submitting permit registration documents to the State Water Board that include a risk level assessment and a site-specific SWPPP identifying an effective combination of erosion control, sediment control, and non-stormwater BMPs. The general construction permit requires that the SWPPP define a program of regular inspections of the BMPs and, in some cases, sampling of water quality parameters.

In the City of Napa, project applicants would need to obtain coverage under the NPDES general construction activity stormwater permit and obtain a state NPDES stormwater permit from the San Francisco Regional Water Quality Control Board.

Clean Water Act Section 402 Municipal Separate Storm Sewer System Program

EPA defines a municipal separate storm sewer system (MS4) as any conveyance or system of conveyances (roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, human-made channels, and storm drains) owned or operated by a state, city, town, country, or other public body having jurisdiction over stormwater, that is designed or used for collecting or conveying stormwater. As part of the NPDES program, EPA initiated a program requiring that entities having MS4s apply to their local Regional Water Board for stormwater discharge permits. The program proceeded through two phases. Under Phase I, the program-initiated permit requirements for designated municipalities with populations of 100,000 or more to obtain NPDES permit coverage for their stormwater discharges. Phase II expanded the program to municipalities with populations less than 100,000 as well as small MS4s outside the urbanized areas that are designated by the permitting authority to obtain NPDES permit coverage for their stormwater discharges.

Generally, Phase I MS4s are covered by individual permits, and Phase II MS4s are covered by a general permit. Each regulated MS4 is required to develop and implement a stormwater management plan to reduce the contamination of stormwater runoff and prohibit illicit discharges.

The City of Napa is named as a small MS4 permittee in the Phase II stormwater permit. To meet requirements of Section E.12 of the Phase II MS4 permit, the City provides a post-construction standard plan to guide proponents and municipal plan reviewers through the requirements of the MS4 permit.

International Building Code

The design and construction of engineered facilities in California must comply with the requirements of the International Building Code (IBC) adopted by the State of California (see *California Building Code* under *Regulatory Setting—State*).

California Building Code

The state's minimum standards for structural design and construction are given in the California Building Code (CBC) (24 California Code of Regulations). The CBC is based on the IBC, which is used widely throughout the United States (generally adopted on a state-by-state or district-by-district basis) and has been modified for California conditions with numerous more detailed or more stringent regulations. The CBC requires that classification of the soil at each building site will be determined when required by the building official and that the classification will be based on observation and any necessary test of the materials disclosed by borings or excavations. The CBC provides standards for various aspects of construction, including (i.e., not limited to) excavation, grading, and earthwork construction; fills and embankments; expansive soils; foundation investigations; and liquefaction potential and soil strength loss. In accordance with California law,

projects carried out under the General Plan update would be required to comply with all relevant provisions of the CBC.

The CBC requires extensive geotechnical analysis and engineering for grading, foundations, retaining walls, and other structures, and includes criteria for seismic design.

Local

City of Napa General Plan

The following goals in the *Health and Safety* Element of the current General Plan Policy Document pertain to geology and soils (City of Napa 1998). Note that the existing City of Napa General Plan does not contain any goals related to paleontological resources.

Health and Safety

Goal HS-1: HS-1 To minimize the risk to life and property from seismic activity.

Policy HS-1.1 The City shall require that all new buildings be designed and constructed to resist stresses produced by earthquakes. To this end, the City shall require all new buildings to conform to the structural requirements of the most recently adopted edition of the Uniform Building Code.

Policy HS-1.2 The City shall discourage the siting of facilities necessary for emergency services, major utility lines and facilities, manufacturing plants using or storing hazardous materials, high occupancy structures (such as multi-family residences and large public assembly facilities), or facilities housing dependent populations (such as schools and convalescent centers) within areas subject to very strong, violent, or very violent ground shaking, as indicated in the ABAG Groundshaking Intensity Maps (Figure 8-1A and B), unless no alternative is available and adequate mitigation measures can be incorporated into the project.

Policy HS-1.3 The City shall require soils and geologic studies for proposed development with large client populations (such as schools and convalescent centers) within areas subject to very strong, violent, or very violent ground shaking, as indicated in the ABAG Shaking Intensity Map. Such studies should determine the actual extent of the seismic hazards, optimum location for structures, the advisability of special structural requirements, and the feasibility and desirability of a proposed facility in a specified location. Mitigation measures shall be incorporated as conditions of any project approval.

Policy HS-1.4 The City shall require special construction features in the design of structures where site investigations confirm potential seismic hazards.

Policy HS-1.5 The City shall require that facilities necessary for emergency services be capable of withstanding a maximum credible earthquake from any of the seven active faults in the region and remaining operational to provide emergency response.

Policy HS-1.6 The City shall encourage the study and rehabilitation of high occupancy structures (such as multi-family residences and large public assembly facilities) susceptible to collapse or failure in an earthquake.

Goal HS-1: HS-2 To minimize the hazards to people and property caused by soil erosion and landslides.

Policy HS-2.1 The City shall seek to minimize grading and impermeable surfaces in high-erosion areas. If grading or impermeable surfaces are necessary, they shall be properly engineered and drained to reduce runoff and erosion.

Policy HS-2.2 The City shall consider natural landform contours and geologic conditions in the development of roadways and individual project design.

Policy HS-2.3 The City shall continue to regulate development on hillsides to reduce the hazards posed by soil erosion and landslides.

Policy HS-2.4 The City shall require that an erosion control plan be prepared and approved for development on slopes of 15 percent or greater. The plan should include limitations on vegetation removal, revegetation, and installation of other erosion and sedimentation control measures.

Policy HS-2.5 The City shall continue to apply its Hillside Development Guidelines to properties in sensitive hillside locations.

City of Napa Municipal Code

Chapter 8.36.120 of the City's Municipal Code describes construction requirements that relate to stormwater control. Specifically, any project 1 acre or greater or is part of a larger common plan of development or sale of 1 or more acres must have an approved grading permit and comply with the Construction General Permit. In addition, such development requires completion of an erosion and sediment control plan. These requirements include a requirement to document BMPs to be followed to preserve water quality and minimize erosion.

Chapter 15.04.010 of the City's Municipal Code adopts the 2019 edition of the California Building Standards Code with additional amendments.

Chapter 16.20.010 of the City's Municipal Code states that unless the City Engineer determines that due to the City's knowledge of the soils condition of a project, a soils and/or geotechnical report may be required by the Chief Building Official upon application for a building permit.

Chapter 16.36.200 of the City's Municipal Code states that a geotechnical report shall include the nature and extent of any seismic or geologic hazard, the effect of the seismic or geologic conditions on the proposed development, and an assessment of the risk such hazards pose on the occupants of the proposed project. The report must include an assessment of existing slope stability as well as measures needed to mitigate seismic or geologic hazards and to reduce identified hazards, recommendations for grading procedures and design criteria for erosion control, and recommendations for site design to minimize seismic or geologic hazards and erosion.

3.6.1.2 Environmental Setting

The study area for geology, seismicity, soils, and paleontological resources is the Planning Area.

Regional Geology

The Planning Area is in southern Napa Valley. The Napa Valley is in the California Coast Ranges Geomorphic Province, a geologically young and seismically active region (California Geological Survey 2002). Northwest–southeast trending ranges of low mountains and intervening valleys dominate this region. Napa Valley, formed by regional folding and faulting, is bounded to the north and west by the Mayacamas Mountains and to the east by the Howell Mountains.

Planning Area Topography

Slopes on the valley floor are generally less than 5 percent, while those in the uplands range from 5 to 30 percent. Upland portions of the Planning Area have elevations exceeding 600 feet, while the valley floor is approximately 20 feet above sea level.

Planning Area Geology

The majority of the Planning Area is immediately underlain by Holocene alluvium and alluvial fan deposits (Wagner and Gutierrez 2017; Clahan et al. 2004). In addition to surficial Holocene deposits, the City also has Pleistocene, Pliocene, and Miocene deposits mainly along the outer peripheries of the City. These are comprised of the Sonoma Volcanics (Late Miocene to Pliocene; Mafic lava flows and tuffs, rhyolite to dacite ash flow tuff, lava flows, intrusions, breccia, also includes tuffaceous sediment), and the Great Valley Sequence (early Cretaceous and late Jurassic; Sandstone, pebble conglomerate, siltstone, and shale).

Planning Area Soils

Portions of the Planning Area that are less developed are mantled by surface soils that reflect the characteristics of the underlying materials on which the soils developed. The surface soils in the Planning Area have been mapped by the Natural Resources Conservation Service (NRCS) and consist of several soil types. Soils in the Planning Area are predominantly of the Bale-Cole-Yolo, Haire-Coombs, and Reyes-Clear Lake soil associations, with small quantities of other soil associations (Natural Resources Conservation Service 2018) (see Figure 3.6-1).

Seismicity

The entire San Francisco Bay Area is located within the San Andreas Fault System (SAFS), a complex of active faults forming the boundary between the North American and Pacific lithospheric plates. Movement of the plates relative to one another results in the accumulation of strain along the faults, which is released during earthquakes. Numerous moderate to strong historic earthquakes have been generated in northern California by the SAFS. This level of active seismicity results in a relatively high seismic risk in the San Francisco Bay Area. The Working Group for California Earthquake Probabilities (WGCEP) at the U.S. Geologic Survey (USGS) predicted a 72 percent chance of a magnitude 6.7 or greater earthquake occurring in the San Francisco Bay Area in 30 years (Working Group for California Earthquake Probabilities 2015).

The SAFS includes numerous faults found by the California Geological Survey in the Bay Area under the Alquist-Priolo Earthquake Fault Zoning Act (A-PEFZA) to be “active” (i.e., to have evidence of fault rupture in the past 11,000 years) (California Geological Survey, 2018a; 2018b). Active regional faults include the San Andreas, Hayward, Calaveras, Greenville, Healdsburg-Rodgers Creek, and Concord-Green Valley (which extends into Napa County) faults. The Coast Range-Sierran Block Boundary (CRSBB) is also currently recognized as a potential seismic source capable of generating moderate earthquakes that could affect the Planning Area (Wong et al. 1988).

In addition to the regional faults, active faults within Napa County—the Cordelia and West Napa faults—also pose a risk to Napa residents and property (California Geological Survey 2018b, 2018c; DeLong et al. 2016). The West Napa fault zone crosses the western portion of the Planning Area (see Figure 3.6-2). On August 24, 2014, an earthquake of Moment Magnitude 6.0 (MW6.0) occurred on the West Napa fault zone. The earthquake caused injuries and property damage in the City. The damage included significant damage to some commercial buildings, including historic structures, damage to wood-frame houses, buckling and cracking in road surfaces, and broken water mains.

Due to its proximity to regional and local fault systems, the Planning Area is subject to various seismic and geologic hazards, including surface rupture along the West Napa fault zone, ground shaking, liquefaction, and landslides. Each of these hazards is discussed in the following subsections.

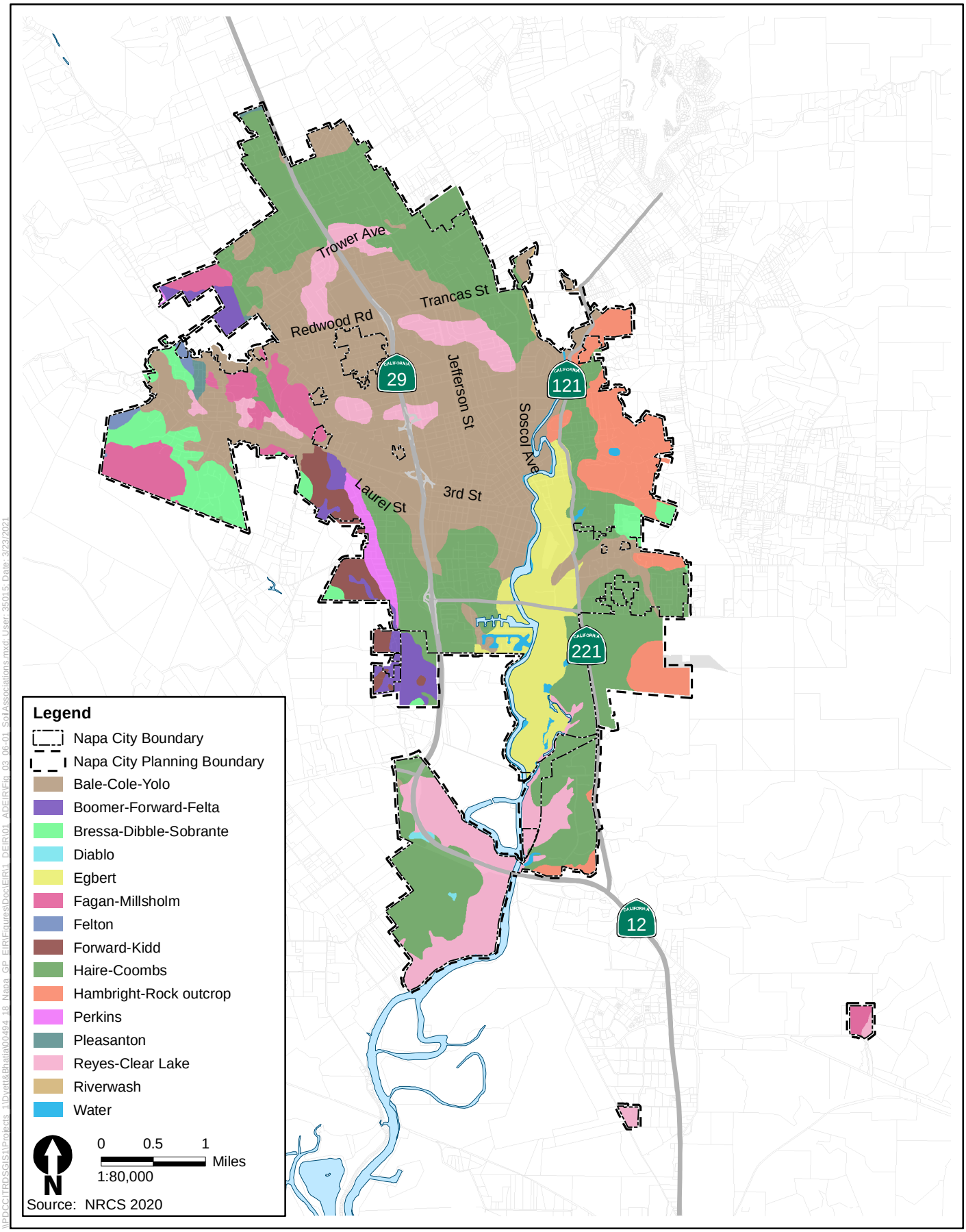
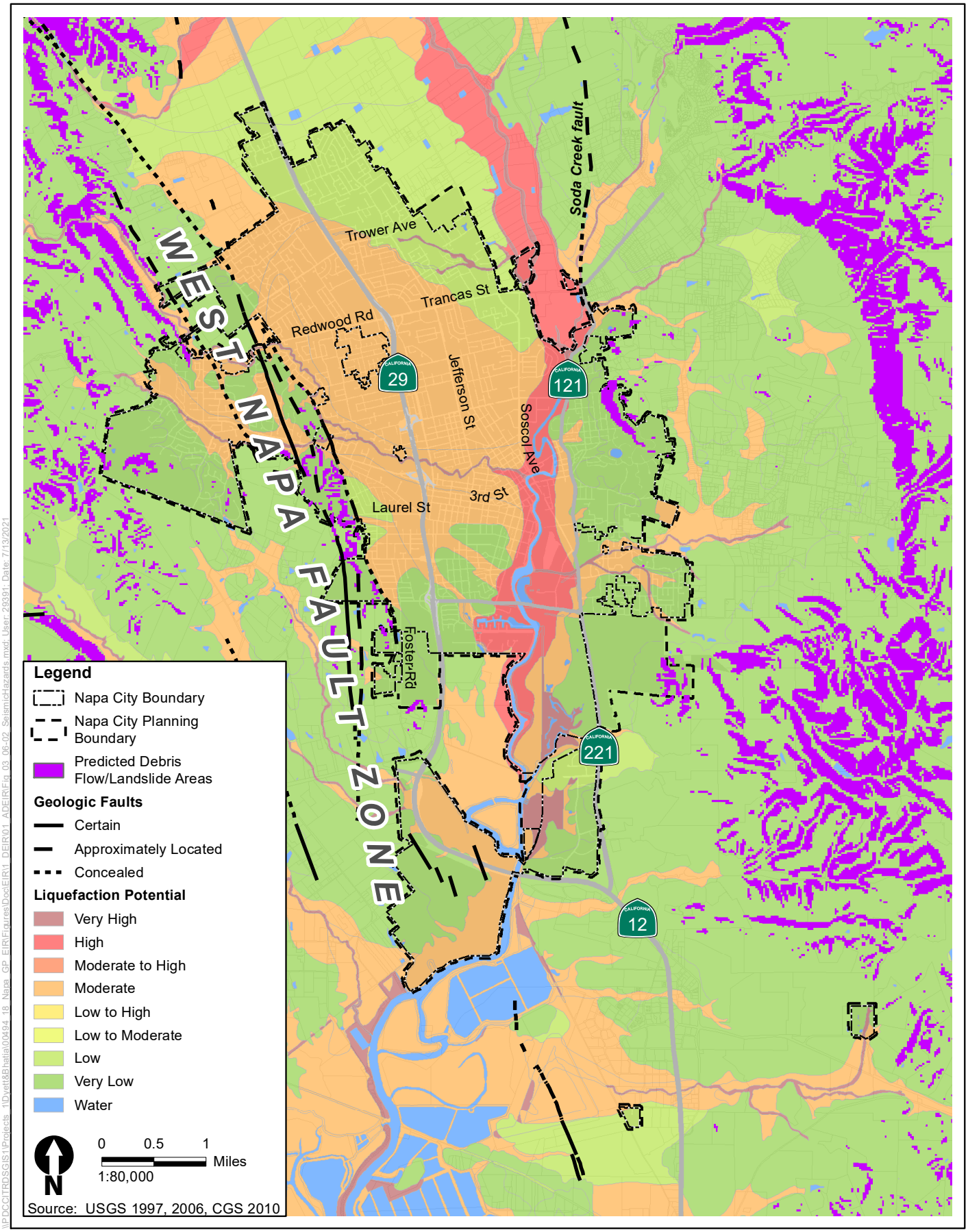


Figure 3.6-1
Soil Associations in the Planning Area



\\PDCCTRDSGIS1\Projects_1\Dyett&Bhatia\00404_18_Napa_GP_EIR\Figures\Doc\EIR1_DEIR\01_ADEIR\Fig_03_06-02_SeismicHazards.mxd User: 29391 Date: 7/13/2021

Figure 3.6-2
Seismic Hazards in the Planning Area

Primary Seismic Hazards

The State of California considers two aspects of earthquake events as primary seismic hazards: surface fault rupture (i.e., visual disruption of the Earth's surface because of fault activity) and seismic ground shaking.

Surface Fault Rupture

Surface rupture occurs when the ground surface is broken due to fault movement during an earthquake. The location of surface rupture generally can be assumed to be along an active or potentially active fault trace. The West Napa fault zone crosses the western portion of the Planning Area. After the 2014 South Napa Earthquake, geologists mapped approximately 8 miles of surface rupture across the West Napa fault zone, in an area slightly more than a mile wide, and aerial survey indicated that the length of rupture could be up to twice as long as surveyed on the ground. In addition, ongoing fault movement along the surface rupture (afterslip) continued for several months, causing damage to structures and foundations. The 2014 South Napa Earthquake also exposed fault strands in residential areas that had not been previously mapped and other strands thought not to be hazardous (U.S. Geological Survey 2015).

Strong Ground Shaking

Unlike surface rupture, ground shaking is not confined to the trace of a fault but, rather, propagates into the surrounding areas during an earthquake. Ground shaking is a general term referring to all aspects of motion of the earth's surface resulting from an earthquake and is normally the major cause of property damage in seismic events. The extent of ground shaking is controlled by the magnitude and intensity of the earthquake, distance from the rupture, and local geologic conditions. Intensity is a subjective measure of the perceptible effects of seismic energy at a given point and varies with distance from the epicenter and local geologic conditions. The Modified Mercalli Intensity Scale (MMI) is a commonly used scale for measurement of the subjective effects of earthquake intensity. It reports the intensity of shaking on a scale from not felt, "not felt except by a few under especially favorable circumstances" (I), to extreme, "damage total" (XII). The moment magnitude scale, abbreviated MW, is the scale typically used to report the objective size of an earthquake. It measures the total moment release of the earthquake, where moment is a product of the distance a fault moved, and the force required to move it.

Napa could experience very strong to severe ground shaking during a seimic event (Association of Bay Area Governments 2021; Branum et al. 2016). During the 2014 South Napa Earthquake, ground shaking was very strong along the West Napa Fault and in the Napa Valley, with damage occurring in Yountville, Vallejo, and American Canyon. Many historic masonry buildings and older residences in Napa were damaged because of ground shaking (U.S. Geological Survey 2015).

Secondary Seismic Hazards

Secondary seismic hazards refer to seismically induced landsliding, liquefaction, and related types of ground failure. As discussed in *Regulatory Setting*, the State maps areas that are subject to secondary seismic hazards pursuant to the Seismic Hazards Mapping Act of 1990.

Landslide and Other Slope Stability Hazards

Landslides occur when the stability of a slope changes from a stable to an unstable condition. The stability of a slope is affected by the following primary factors: inclination, material type, moisture

content, orientation of layering, and vegetative cover. In general, steeper slopes are less stable than more gently inclined ones.

Most of the Planning Area's unstable slopes are located on the west side of the valley, associated with weaker, less consolidated sedimentary rock (Wills et al. 2000). Regional (from Division of Mines and Geology) landslide mapping of the Planning Area indicates only one area of active landslide deposits, west of Foster Road (see Figure 3.6-2). The hills surrounding the Browns Valley area to the west are particularly susceptible to landslide. The other areas in Napa are primarily mapped as flat land not susceptible to landsliding. East of the Planning Area, because of the volcanic base rock, nearly vertical slopes are stable (Wills et al. 2000; Clahan et al. 2004).

Liquefaction and Related Ground Failures

Liquefaction is a phenomenon in which the strength and stiffness of unconsolidated sediments are reduced by earthquake shaking or other rapid loading. The susceptibility of an area to liquefaction is determined largely by the depth to groundwater and the properties (e.g., texture and density) of the soil and sediment within and above the groundwater. The sediments most susceptible to liquefaction are saturated, unconsolidated sand and silt soils with low plasticity within 50 feet of the ground surface (California Geological Survey 2008).

Other types of ground failure related to liquefaction include lateral spreading and differential settlement. Lateral spreading is a failure of soil/sediment within a nearly horizontal zone, which causes the soil to move toward a free face (such as a streambank or canal) or down a gentle slope. Lateral spreading can occur on slopes as gentle as one-half degree. Even a relatively thin seam of liquefiable sediment can create planes of weakness that could cause continuous lateral spread over large areas (California Geological Survey 2008:36). Examples of locations susceptible to lateral spread include river channels and artificial fill placed on slopes.

Differential settlement, the uneven settling of soil, is the most common fill displacement hazard (California Geological Survey 2008:49). Examples of fill in the Planning Area include road fills and foundation fills.

Liquefaction is the temporary transformation of loose, saturated, granular sediments from a solid state to a liquefied state because of seismic ground shaking. In the process, the soil undergoes a temporary loss of strength, which commonly causes ground displacement or ground failure to occur. Since saturated soils are a necessary condition for liquefaction, soil layers in areas where the groundwater table is near the surface have higher liquefaction potential than those in which the water table is located at greater depths.

The 2014 South Napa Earthquake occurred at the end of California's dry season, and during a multi-year-long severe drought, which induced low water table and dry ground inhibiting liquefaction from occurring (U.S. Geological Survey 2015). However, regional liquefaction hazard mapping (from USGS) (Witter et al. 2006) indicates that the Planning Area includes areas ranging from low to moderate to very high liquefaction susceptibility, with areas along the channel of the Napa River mapped as having a high susceptibility to liquefaction, and areas along Napa Creek and Tulucay Creek mapped as having a moderate to high susceptibility (see Figure 3.6-2). In addition, the area south of the City that was historic marshland consists of Holocene Alluvium and Bay Mud, which may be susceptible to liquefaction. Much of the area west of the Napa River is mapped as having a low to moderate susceptibility.

Lateral Spreading

Lateral spreading is a phenomenon in which a surficial soil displaces along a shear zone that formed within an underlying liquefied layer. The surficial blocks are transported downslope or in the direction of a free face, such as a bay or creek, by earthquake and gravitational forces. Lateral spreading is generally the most pervasive and damaging type of liquefaction-induced ground failure generated by earthquakes. In general, for lateral spreading to occur, soils must consist of saturated, cohesionless sandy sediments in an area where there is a high groundwater table and an open face such as a cliff or streambank. While most of the county, and the Planning Area, is not susceptible to lateral spreading, the potential for lateral spreading existing in alluvial areas adjacent to open stream changes where a bank or terrace face exist, particuarly along portions of the Napa River (County of Napa 2007).

Land Subsidence

Subsidence is the sinking of a large area of ground surface in which the material is displaced vertically downward, with little or no horizontal movement. Subsidence occurs in three ways: because of groundwater overdraft or oil and gas withdrawal, compaction, and oxidation of peat soils, and hydrocompaction (U.S. Geological Survey 2000:1–2). Land subsidence as a result of groundwater overdraft is discussed below. Land subsidence as a result of compaction/oxidation of peat soils and hydrocompaction are not significant concerns in the Planning Area and are not discussed.

Groundwater overdraft occurs when groundwater extraction results in compression of a clay bed within an aquifer to such an extent that it no longer expands to its original thickness after groundwater recharge. Clay beds often compress when wells pump groundwater and expand after pumping stops. Clay beds contain individual clay particles and small pores that fill with groundwater in saturated conditions. Groundwater maintains the pore space, expands the clay particles, and helps the bed maintain its thickness. A clay bed will yield a certain volume of groundwater (i.e., safe yield) without losing its storage capacity. If safe yield is not exceeded, the clay bed will compress and expand as the soil pores alternately fill with water and drain. This can lead to elastic land subsidence at the ground surface where elevation decreases when water is extracted then increases when water is recharged. If the safe yield of a clay bed is exceeded, however, its pores collapse, and the surrounding clay particles settle in their place. When the clay particles settle, the clay bed is effectively thinned, resulting in permanent land subsidence at the ground surface.

Survey data included in the recent Basin Analysis Report described stability in recent land surface elevation measurements indicating that subsidence has not occurred in the Planning Area (California Department of Water Resources 2019). The Planning Area is not shown by USGS as experiencing current or historic subsidence due to groundwater pumping, peat loss, or oil extraction (U.S. Geological Survey 2021).

Expansive Soils

Expansive soils are characterized by their ability to undergo significant volume changes (i.e., shrink and swell) due to variation in moisture content. Expansive soils are typically very fine grained and have a high to very high percentage of clay. They can damage structures and buried utilities and increase maintenance requirements. Generally, projects in areas with expansive soils may require special building foundations or grade preparation, such as the removal of problematic soils and their

replacement with engineered soils. However, the relative strength or weakness of alluvial soils also depends on the combination of clay and sand.

As shown in Figure 3.6-3, most of the Planning Area is underlain with soils with a moderate to high shrink-swell potential with some areas very high (Natural Resources Conservation Service 2018). Soils considered to have a very high shrink-swell potential occur mostly in the northern portion of the Planning Area along Trower Avenue, east and west of CA-29, and extending on the west side to Redwood Road; below Trancas Street west of CA-29; and surrounding the CA-29/West Lincoln Avenue interchange. The area underlain with soils exhibiting the lowest shrink-swell potential occurs in the eastern portion of the Planning Area, east of CA-121 and CA-221.

Weak Soils

Weak soils can compress or collapse under the weight of buildings and fill, causing settlement relative to the thickness of the weak soil. Usually, the thickness of weak soil varies, and differential settlement will occur. Some weak soils, specifically unconsolidated settlements, can amplify shaking during an earthquake, and when saturated can be susceptible to liquefaction.

Weak soils have been found within close proximity to the Planning Area, in the southern region where there is a high presence of compressible Bay Mud (County of Napa 2007). Therefore, the highest risk of impacts resulting from weak soils are expected to be in the southern parts of Napa, though other areas may be affected as well.

Erodible Soils

Soil erosion is a natural process by which soil particles are removed by wind, water, or gravity. Different soils will have different susceptibility to erosion depending on particle size, gradation, organic structure, and permeability. Additionally, topography (including length and steepness of slope) and presence of vegetative cover influence a soil's susceptibility to erosion. Soils containing a high percentage of silt or very fine clay are generally the most erodible.

As shown in Figure 3.6-4, the majority of the Planning Area is underlain by soils with a slight susceptibility to erosion by water (Natural Resources Conservation Service 2018). Areas with a moderate to severe susceptibility to erosion by water are mostly located along the western and eastern perimeter of the City.

As shown in Figure 3.6-5, the majority of the Planning Area is underlain by soils with a low susceptibility to erosion by wind (Natural Resources Conservation Service 2018). Areas with a moderate to severe susceptibility to erosion by water are mostly located along the Napa River and in the northern portion of the Planning Area along Trower Avenue, east and west of CA-29, and extending on the west side to Redwood Road; below Trancas Street west of CA-29; and surrounding the CA-29/West Lincoln Avenue interchange.

Suitability for Alternative Wastewater Disposal Systems

Soils vary in their suitability for use for septic tanks and alternative wastewater disposal systems. Soils need to have the ability to absorb effluent. Therefore, soils that are sandy or loamy and that have low clay content are suited for septic tanks and alternative wastewater disposal systems. The majority of the Planning Area is underlain by soils that are somewhat to very limited for septic tanks and alternative wastewater disposal systems (Natural Resources Conservation Service 2021).

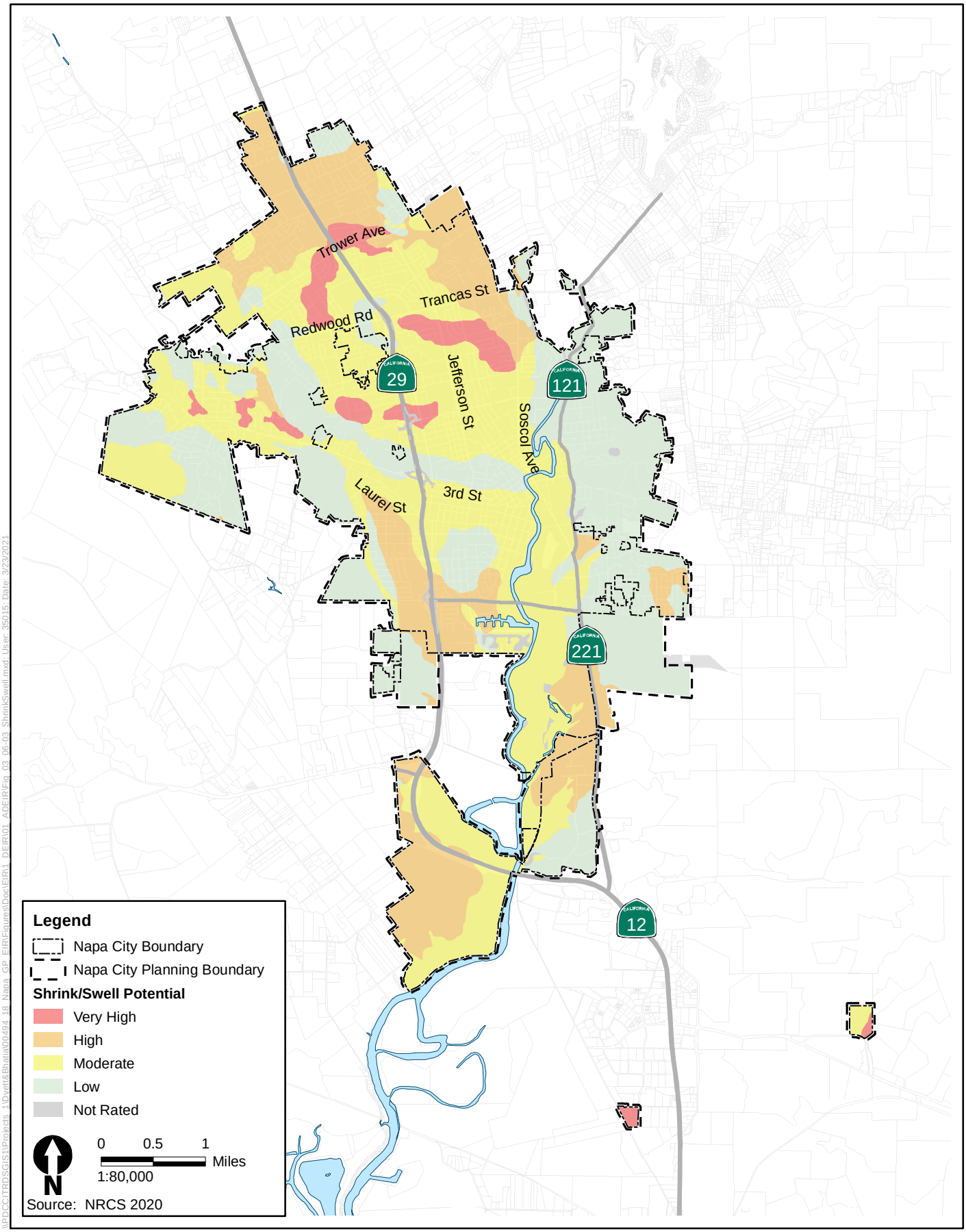


Figure 3.6-3
Shrink/Swell Potential in the Planning Area

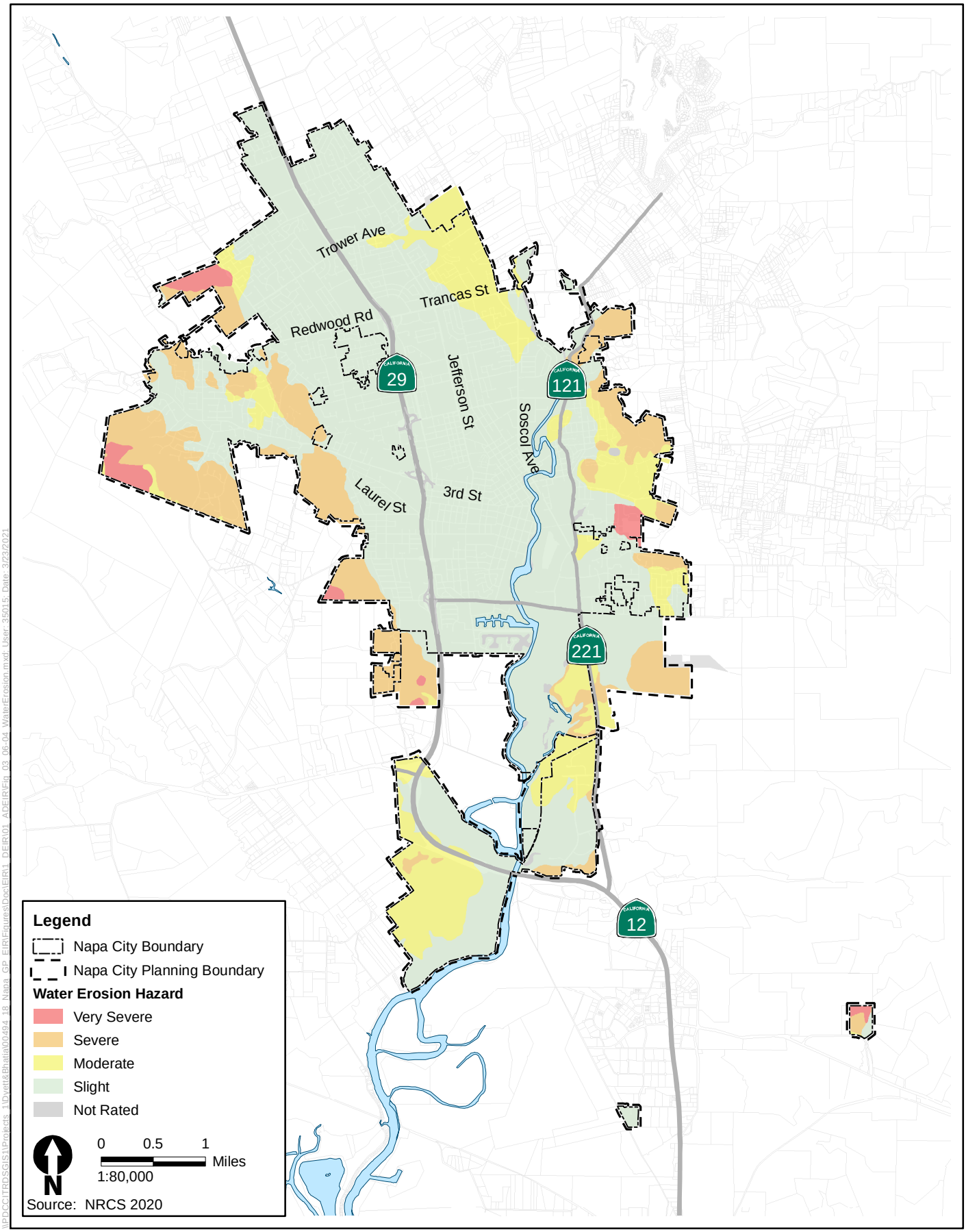


Figure 3.6-4
Water Erosion Hazard in the Planning Area

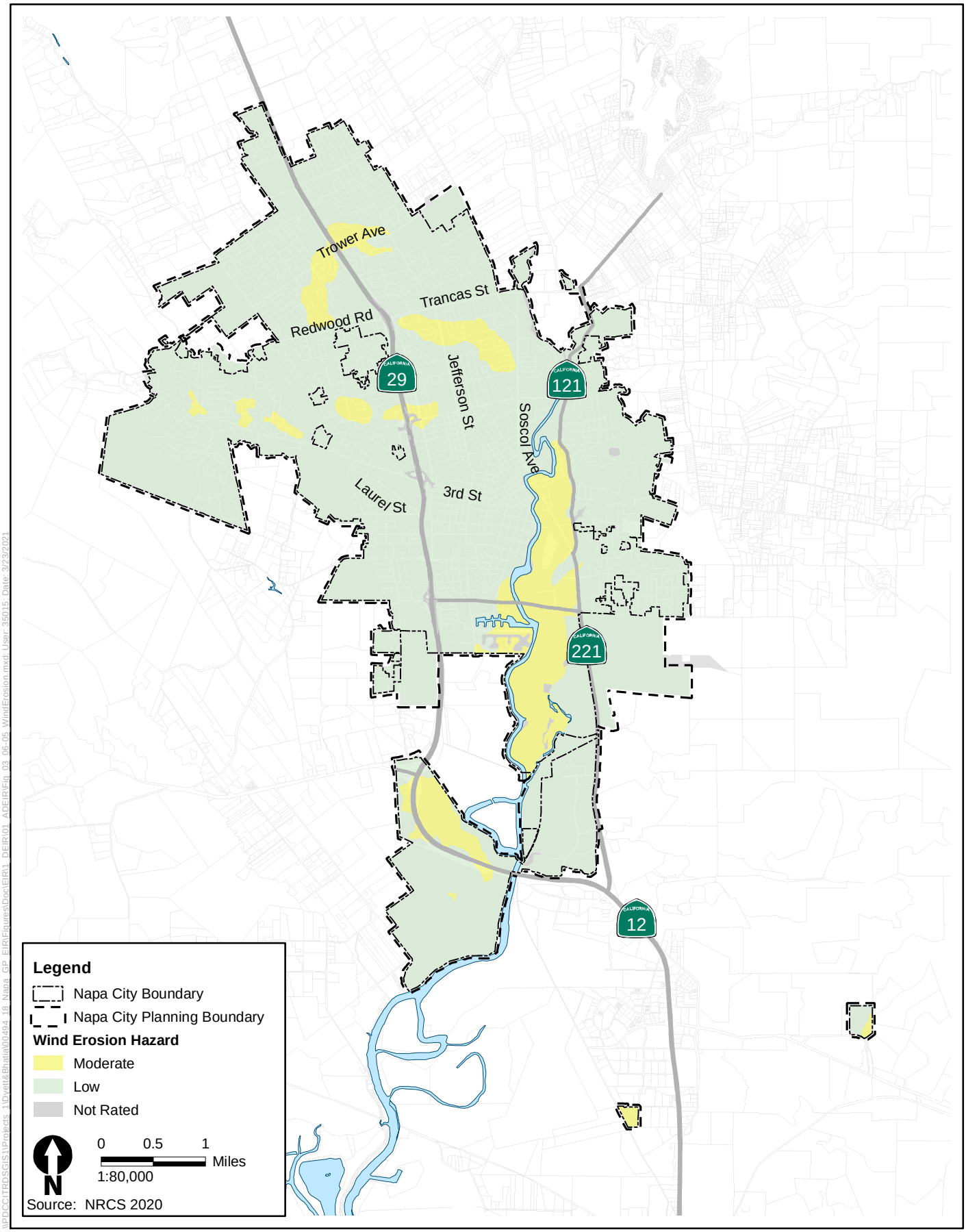


Figure 3.6-5
Wind Erosion Hazard in the Planning Area

Paleontological Resources

Paleontological sensitivity is a qualitative assessment based on the paleontological potential of the stratigraphic units present, the local geology and geomorphology, and other factors relevant to fossil preservation and potential yield. According to the Society of Vertebrate Paleontology (SVP) (2010), standard guidelines for sensitivity are (1) the potential for a geological unit to yield abundant or significant vertebrate fossils or to yield a few significant fossils, large or small, vertebrate, invertebrate, or paleobotanical remains; and (2) the importance of recovered evidence for new and significant taxonomic, phylogenetic, paleoecological, or stratigraphic data (Table 3.6-1).

Unlike archaeological sites, which are narrowly defined, paleontological sites are defined by the entire extent (both areal and stratigraphic) of a unit or formation. In other words, once a unit is identified as containing vertebrate or other rare fossils, the entire unit is a paleontological site (Society of Vertebrate Paleontology 2010:2). For this reason, the paleontological sensitivity of geologic units is described and analyzed broadly.

Table 3.6-1. Paleontological Sensitivity Ratings

Potential	Definition
High	Rock units from which vertebrate or significant invertebrate, plant, or trace fossils have been recovered are considered to have a high potential for containing additional significant paleontological resources. Paleontological potential consists of both (a) the potential for yielding abundant or significant vertebrate fossils or for yielding a few significant fossils, large or small, vertebrate, invertebrate, plant, or trace fossils and (b) the importance of recovered evidence for new and significant taxonomic, phylogenetic, paleoecologic, taphonomic, biochronologic, or stratigraphic data.
Undetermined	Rock units for which little information is available concerning their paleontological content, geologic age, and depositional environment are considered to have undetermined potential. Further study is necessary to determine if these rock units have high or low potential to contain significant paleontological resources.
Low	Reports in the paleontological literature or field surveys by a qualified professional paleontologist may allow determination that some rock units have low potential for yielding significant fossils. Such rock units will be poorly represented by fossil specimens in institutional collections, or based on general scientific consensus, will only preserve fossils in rare circumstances and the presence of fossils is the exception not the rule.
None	Some rock units, such as high-grade metamorphic rocks (e.g., gneisses and schists) and plutonic igneous rocks (e.g., granites and diorites), have no potential to contain significant paleontological resources. Rock units with no potential require neither protection nor mitigation measures relative to paleontological resources.

Source: Society of Vertebrate Paleontology 2010.

The majority of the Planning Area is immediately underlain by Holocene alluvium and alluvial fan deposits (Wagner and Gutierrez 2017; Clahan et al. 2004), which are likely too young to contain fossils. According to the SVP, paleontological resources are considered to be older than approximately 5,000 years (i.e., older than middle Holocene) (Society of Vertebrate Paleontology 2010:11). The depth of Holocene deposits in Napa is not known or the depth at which the middle Holocene occurs but, given the young age of these deposits and the degree to which they have been disturbed by cultivation and construction, fossils are not likely to occur in the upper 3 feet of Holocene sediments. Moreover, there are no records of paleontological resources found in Holocene deposits in Napa County (University of California, Berkeley Museum of Paleontology 2021a).

In addition to surficial Holocene deposits, Napa also has Pleistocene, Pliocene, and Miocene deposits mainly along the outer peripheries of Napa (Wagner and Gutierrez 2017; Clahan et al. 2004). These are comprised of the Sonoma Volcanics (Late Miocene to Pliocene; Mafic lava flows and tuffs, rhyolite to dacite ash flow tuff, lava flows, intrusions, breccia, also includes tuffaceous sediment), and the Great Valley Sequence (early Cretaceous and late Jurassic; Sandstone, pebble conglomerate, siltstone, and shale). The University of California Museum of Paleontology database has no records of any fossil finds in either of these geologic units (University of California Museum of Paleontology 2021b, 2021c). However, a further review of the University of California Museum of Paleontology database revealed that mammal fossils have been recovered in Napa County from Ritchie Creek; both finds are of horse (*Equus* sp.) and not located in Napa (University of California Museum of Paleontology 2021a). The Great Valley Sequence, which consists of an accumulation of marine and nonmarine clastic rocks of Jurassic to early Paleocene age and contains several formations (Bartow and Nilsen 1990), has produced fossils, such as hexactinellid sponge (*Hormathospongia dictyota*), which is a new genus and species of sponge as well as invertebrates, and marine reptiles, ginkgoes, cycads, and conifers (see Bartow and Nilsen 1990; Paleoportal 2021; Rigby et al. 2016). The Great Valley Sequence appears in small areas on the western edges of Napa.

While significant fossils may not have been recovered in Napa from the Sonoma Volcanics and the Great Valley Sequence, these geologic units are considered sensitive as they have demonstrated recovery of significant fossils in their entire extent. Accordingly, the following formations and sequences that occur in Napa have potential for sensitive paleontological resources.

- Sonoma Volcanics
- Great Valley Sequence

3.6.2 Environmental Impacts

3.6.2.1 Methods for Analysis

Evaluation of the geology, seismicity, and soils impacts in this section is based on information from published maps, reports, and other documents that describe the geologic, seismic, and soil conditions of the Planning Area, and on professional judgment. The analysis assumes that all development in the Planning Area would conform to the latest CBC standards, City of Napa Municipal Code ordinances, and NPDES requirements. The California Supreme Court held in a 2015 decision (California Building Industry Association v. Bay Area Air Quality Management District (2015) 62 Cal.4th 369, Case No. S213478) that effects of the existing environment on a project's future users or residents does not constitute an impact under CEQA unless a proposed project risks exacerbating those environmental hazards or conditions that already exist. When a proposed project would exacerbate the environmental hazards or conditions, the potential impacts of such hazards must be evaluated. Accordingly, this impact analysis considers whether the proposed project would exacerbate hazards.

The primary source of information used in developing the paleontological resources analysis is geologic mapping of the Napa 7.5' quadrangle (Clahan et al. 2004) and the paleontological database at the University of California, Berkeley. Effects on paleontological resources were analyzed qualitatively, based on professional judgment and the SVP guidelines below.

SVP's *Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources* provides standard guidelines that are widely followed (Society of Vertebrate Paleontology

2010). These guidelines reflect the accepted standard of care for paleontological resources. The SVP guidelines identify two key phases in the process for protecting paleontological resources from project impacts.

- Assess the likelihood that the area contains significant nonrenewable paleontological resources that could be directly or indirectly affected, damaged, or destroyed as a result of the project.
- Formulate and implement measures to mitigate potential adverse impacts.

An important strength of SVP's approach to assessing potential impacts on paleontological resources is that the SVP guidelines provide some standardization in evaluating paleontological sensitivity. Table 3.6-2 summarizes SVP's recommended treatments to avoid adverse effects in each paleontological sensitivity category.

No new fieldwork, research, or engineering-level design was conducted for the preparation of this EIR.

Table 3.6-2. Society of Vertebrate Paleontology's Recommended Treatment for Paleontological Resources

Sensitivity Category	Mitigation Treatment
High or Undetermined	An intensive field survey and surface salvage prior to earthmoving, if applicable. Monitoring by a qualified paleontological resource monitor of excavations. Salvage of unearthed fossil remains and/or traces (e.g., tracks, trails, burrows). Screen washing to recover small specimens, if applicable. Preliminary survey and surface salvage before construction begins. Preparation of salvaged fossils to a point of being ready for curation (i.e., removal of enclosing matrix, stabilization and repair of specimens, and construction of reinforced support cradles where appropriate). Identification, cataloging, curation, and provision for repository storage of prepared fossil specimens. A final report of the finds and their significance.
Low or no	Rock units with low or no potential typically will not require mitigation measures to protect fossils.

Source: Society of Vertebrate Paleontology 2010.

Relevant General Plan Update Goals and Policies

Applicable General Plan update goals and policies from the *Safety and Noise* as well as the *Historic and Cultural Resources Element* are as follows.

GOAL SN-1: Minimize the risk to life and property caused by seismic activity, soil erosion, and landslides.

Policy SN 1-1: Investigate and mitigate geologic and seismic hazards, or establish regulations to provide for appropriate setbacks from such hazards, in order to preserve life and protect property, especially in areas that are prone to earthquakes and landslides, such as along the West Napa fault zone.

Policy SN 1-2: Work with State agencies and property developers to identify the location of faults where these are not known.

Policy SN 1-3: Identify appropriate legislative action by City Council to establish soil and geotechnical studies for significant new development in undeveloped areas within or proximate

to fault zones, such as the southwestern area in City's Rural Urban Limit (RUL) along Foster Road, developments that have a sensitive population (like schools or nursing homes), and buildings over three stories tall.

Such studies should determine the actual extent of the seismic hazards, optimum location for structures, the advisability of special structural requirements, and the feasibility and desirability of a proposed facility in a specified location. Mitigation measures can be incorporated as conditions of any project approval.

Policy SN 1-4: Maintain and update the Napa Hillside Development Guidelines as needed, and use this as the guide for regulating development in the hillsides.

Policy SN 6-4: Effectively coordinate disaster response and preparation strategies with County, regional, State, and federal agencies in the event of major seismic activity, flood, or wildland fire.

Policy HCR 1-3: Encourage seismic strengthening to protect the City's valuable historic properties from future earthquakes, wildfire, and other events caused by climate change. This includes the development of incentives to encourage property owners to retrofit their buildings.

3.6.2.2 Thresholds of Significance

In accordance with Appendix G of the CEQA Guidelines, the General Plan update would be considered to have a significant effect if it would result in any of the following conditions.

- Exposure of people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving any of the following.
    - Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault. (Refer to Division of Mines and Geology Special Publication 42).
    - Strong seismic ground shaking.
    - Seismic-related ground failure, including liquefaction.
    - Landslides.
- Substantial soil erosion or the loss of topsoil.
- Location on a geologic unit or soil that is unstable or that would become unstable as a result of the project and potentially result in an onsite or offsite landslide or subsidence.
- Location on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property.
- Soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems in areas where sewers are not available for the disposal of wastewater.
- Direct or indirect destruction of a unique paleontological resource or site or unique geologic feature.

3.6.2.3 Impacts and Mitigation Measures

Impact GEO-1: Exposure of people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving fault rupture; strong seismic ground

shaking; seismic-related ground failure, including liquefaction; or landslides (less than significant)

If future structures as a result of General Plan update implementation are located on or near an active fault, rupture of that fault could cause damage or destruction of the structure, resulting in injury, loss of life, or property damage. If a proposed project would exacerbate risk of surface fault rupture, seismic ground shaking, seismic-related ground failure, or seismic-related landslide, this would be a significant impact. The West Napa fault zone crosses the western portion of the Planning Area. However, development conducted under the General Plan update would not increase seismic stresses by either introducing a substantial load to seismic faults or by introducing a lubricant, such as water in a reservoir, thereby exacerbating risk of surface fault rupture, strong seismic ground shaking, seismic-related ground failure, or seismic-related landslide. In addition, Policy SN 1-1 of the General Plan update would require setbacks from seismic hazards, especially in areas that are prone to earthquakes and landslides. Policy SN 1-3 of Goal SN-1 of the General Plan update would require that a geotechnical report be prepared, and its mitigation measures be incorporated into the design. These policies would be implemented through the regulation and development review process, which requires that all construction comply with the CBC. The impact would be less than significant, and no mitigation is required.

Impact GEO-2: Potential to result in substantial soil erosion or the loss of topsoil (less than significant)

Ground-disturbing earthwork associated with projects constructed under the General Plan update may increase erosion rates, potentially causing accelerated erosion. Construction activities would cause ground disturbance and vegetation removal at construction sites, exposing soil to rain and wind and potentially causing accelerated erosion, thereby resulting in significant impacts. However, Chapter 8.36.120 of the City's Municipal Code requires compliance with the City's grading ordinance and NPDES permit, ensuring preparation of a SWPPP and issuance of a grading permit for all construction projects, as required by the Central Valley Regional Water Board and the City's municipal code. These policies are implemented through the regulation and development review process, which requires that all construction comply with the CBC.

Compliance with the federal and local erosion-related regulations applicable to projects carried out under the General Plan update (i.e., the SWPPP that is developed for the site and the requirements of the City's municipal code) would ensure that construction activities as a result of the General Plan update would not result in significant erosion impacts. This impact would be less than significant, and no mitigation is required.

Impact GEO-3: Location on a geologic unit or soil that is unstable or that would become unstable as a result of the project and potentially result in an onsite or offsite landslide or subsidence (less than significant)

In addition to seismic-related ground failure described in Impact GEO-1, construction in areas with the potential to exacerbate risk of nonseismic-related landsliding caused by heavy precipitation or improper grading or cuts could also expose people or structures to potential substantial adverse effects. However, the Planning Area is fairly level; moreover, Policy S-3.2 of the General Plan update would require that a geotechnical report be prepared, and its mitigation measures be incorporated into the design. This policy is implemented through the regulation and development review process,

requiring that all construction comply with the CBC, which addresses engineered fills and cuts. This impact would be less than significant, and no mitigation is required.

As discussed above under *Land Subsidence*, subsidence has not occurred in the Planning Area. Future development under the General Plan update would not include groundwater extraction or substantial dewatering that would result in subsidence. Subsidence as a result of peat loss or oil extraction is not an issue in Napa; therefore, the impact would be less than significant, and no mitigation is required.

Impact GEO-4: Location on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property (less than significant)

Expansive soils occur in the Planning Area, and structures built on expansive soils would be subject to the expansion and contraction of these soils, which could cause structural damage if the subsoil, drainage, and foundation are not properly engineered. However, soil sampling and treatment procedures for expansive soils, as well as other soil-related issues, are addressed by the CBC. Compliance with the CBC would create conditions suitable for construction. This impact would be less than significant, and no mitigation is required.

Impact GEO-5: Presence of soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems in areas where sewers are not available for the disposal of wastewater (no impact)

Improperly located or designed septic systems could cause water quality issues, and as discussed under *Suitability for Alternative Wastewater Disposal Systems*, most soils in the Planning Area are not suitable for use of septic tanks or alternative wastewater disposal systems. The septic system's design depends on the permeability and other aspects of the soil in which it will be constructed. The Napa Sanitation District (NapaSan) provides customers within its service boundary with wastewater disposal. NapaSan owns and operates the sanitary sewer collection system and wastewater treatment plant that serves the City. Future development under the General Plan update would be served by NapaSan and would not involve installation of septic systems or other alternative wastewater disposal systems. There would be no impact, and no mitigation is required.

Impact GEO-6: Direct or indirect destruction of a unique paleontological resource or site or unique geologic feature (less than significant with mitigation)

Although the surficial Holocene deposits in the Planning Area have a low sensitivity for paleontological resources, Sonoma Volcanics and Great Valley Sequence present in the margins of Napa are highly sensitive for paleontological resources. If fossils are present where development is planned, they could be damaged by earth-disturbing activities during construction, such as excavation for foundations, placement of fills, trenching for utility systems, and grading for roads and staging areas. The more extensive and deeper the earth-disturbing activity, the greater the potential for damage to paleontological resources. The impact would be significant.

Implementation of Mitigation Measure GEO-6 would reduce the potential impact on paleontological resources by requiring worker awareness training for any projects that would disturb previously undisturbed geologic units with high paleontological sensitivity, a stop-work order within 25 feet of the paleontological resources find, and development of a Paleontological Mitigation and Monitoring Plan (PMMP) if the Qualified Paleontologist determines that the find is important to the scientific

record. With implementation of Mitigation Measure GEO-6, the impact would be less than significant.

Mitigation Measure GEO-6: Provide Worker Awareness Training, Stop Work in Case of Unanticipated Discovery of Paleontological Resources During Construction, and As Appropriate, Prepare a Paleontological Monitoring and Mitigation Plan (PMMP)

For any proposed development in the City that would disturb previously undisturbed surficial or subsurface geologic units with high paleontological sensitivity, the following procedures must be undertaken. High sensitivity geologic units in the City are Sonoma Volcanics and Great Valley Sequence.

Prior to commencing ground disturbance of previously undisturbed native sediments in areas where geologic units at the surface or subsurface have high paleontological sensitivity, the project applicant shall engage a Qualified Paleontologist, as defined by SVP 2010, to provide worker awareness training to ensure that all project construction workers are trained on recognition of paleontological resources. In addition, the project applicant shall inform the contractor and construction personnel of the immediate stop work procedures to be followed

In case of discovery of a paleontological resource during construction, ground-disturbing activities shall temporarily be halted within 25 feet of the find until the discovery is examined by a Qualified Paleontologist. Work within the sensitive area shall resume only when deemed appropriate by the Qualified Paleontologist. The Qualified Paleontologist shall determine whether the discovery is scientifically significant, how to involve other responsible or resource agencies and stakeholders, and what methods to follow for resource recovery.

If the Qualified Paleontologist determines that the resource is not scientifically important, the conclusion shall be documented in a letter to the City of Napa to demonstrate compliance with applicable statutory requirements.

If the Qualified Paleontologist determines that the paleontological resource is of scientific importance and there are no feasible measures to avoid disturbing this paleontological resource, the Qualified Paleontologist shall prepare a PMMP. The PMMP shall include measures to fully document and recover the resource of scientific importance. The Qualified Paleontologist shall submit the PMMP to the City for review and approval within 10 business days of the discovery. Upon approval by the City, ground-disturbing activities in the project area shall resume and be monitored as determined by the Qualified Paleontologist for the duration of such activities. The PMMP shall include measures for a preconstruction survey, a training program for construction personnel, paleontological monitoring, fossil salvage, curation, and final reporting, as applicable.

3.6.3 References Cited

Association of Bay Area Governments. 2021. Shaking Hazard Map. Available: https://mtc.maps.arcgis.com/apps/webappviewer/index.html?id=4a6f3f1259df42eab29b35dfcd086fc8. Accessed: March 23, 2021.

Bartow, Alan J., and Nilsen, Tor H. 1990. Review of the Great Valley Sequence, Eastern Diablo Range and Northern San Joaquin Valley, Central California. U.S. Geological Survey Open File Report 90-226.

Branum, D., R. Chen, M. Petersen, and C. Wills. 2016. Earthquake Shaking Potential for California. (Map Sheet 48, Revised 2016.) Available: https://www.conservation.ca.gov/cgs/Documents/Publications/Map-Sheets/MS_048.pdf. Accessed: July 13, 2021.

California Department of Water Resources. 2019. Sustainable Groundwater Management Program Alternative Assessment Staff Report. Available here: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Alternatives/Files/10year/NapaValley/02_Napa_Valley_StatementofFindings_Exhibits__a_y19.pdf?la=en&hash=E9059E03540E8E48176035B3EA2C1B60E5EC4D2D: Accessed: March 22, 2021.

California Geological Survey. 2002. California Geomorphic Provinces. (Note 36.) Available: https://www.conservation.ca.gov/cgs/Documents/Publications/CGS-Notes/CGS-Note-36.pdf. Accessed: July 8, 2021.

California Geological Survey. 2008. *Guidelines for Evaluating and Mitigating Seismic Hazards in California*. CDMG Special Publication 117a: Sacramento, CA. Available: http://www.conservation.ca.gov/cgs/shzp/webdocs/Documents/sp117.pdf. Accessed: March 17, 2021.

California Geological Survey. 2018a. Earthquake Fault Zones: A Guide for Government Agencies, Property Owners/Developers, and Geoscience Practitioners for Assessing Fault Rupture Hazards in California. (Special Publication 42.)

California Geological Survey. 2018b. Earthquake Zones of Required Investigation, Napa Quadrangle. January 11, 2018.)

California Geological Survey. 2018c. West Napa Fault in the Napa and Cuttings Wharf 7.5-minute Quadrangles, Napa and Solano County, California. (CGS Fault Evaluation Report FER-256.)

California Geological Survey. 2020. *The Alquist-Priolo Earthquake Fault Zoning Act*. Available: https://www.conservation.ca.gov/cgs/alquist-priolo. Accessed: March 17, 2021.

Clahan, K. B., D. L. Wagner, G. J. Saucedo, C. E. Randolph-Loar, and J. M. Sowers. 2004. Geologic Map of the Napa 7.5' Quadrangle, Napa County, California.

City of Napa. 1998. *Envision Napa 2020: City of Napa General Plan Policy Document*. Available: https://www.cityofnapa.org/DocumentCenter/View/452/Chapter-8---Health-and-Safety-PDF. Accessed: July 12, 2021.

County of Napa. 2007. *Napa County General Plan Update County of Napa: Draft Environmental Impact Report: Section 4.10 Geology and Soils*. Available here: https://www.countyofnapa.org/DocumentCenter/View/7936/410-Geology-General-Plan-DEIR-PDF. Accessed: March 24, 2021.

DeLong, S. B., A. Donnellan, D. J. Pondi, R. S. Rubin, J. J. Lilienkaemper, C. S. Prentice, T. E. Dawson, G. Seitz, D. P. Schwartz, K. W. Hudnut, C. Rosa, A. Pickering, and J. W. Parker. 2016. Tearing the terroir: Details and implications of surface rupture and deformation from the 24 August 2014 M6.0 South Napa earthquake, California. *Earth and Space Science* 3:416–430.

Natural Resources Conservation Service. 2018. Web Soil Survey—Soil properties reports (soil report, K factor whole soil, corrosion of steel and concrete, linear extensibility). Available: https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx. Accessed: September 6, 2018.

Natural Resources Conservation Service. 2021. Web Soil Survey—Septic Tank Absorption Fields. Available: https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx. Accessed: July 6, 2021.

Paleoportal, 2021. Paleontology of North America: California. Available: http://paleoportal.org/kiosk/sample_site/state_10.html. Accessed March 30, 2021.

Rigby, J. Keith, Patrick Embree, and Michael Murphey. 2016. An unusual Upper Cretaceous (Santonian) hexactinellid sponge from the Great Valley sequence, western Sacramento Valley, Northern California. Available: https://www.cambridge.org/core/journals/journal-of-paleontology/article/abs/an-unusual-upper-cretaceous-santonian-hexactinellid-sponge-from-the-great-valley-sequence-western-sacramento-valley-northern-california/2938BE8D7B867BA912CAED13F1DADFDC. Accessed March 31, 2021.

Society of Vertebrate Paleontology. 2010. *Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources.* Available: https://vertpaleo.org/wp-content/uploads/2021/01/SVP_Impact_Mitigation_Guidelines.pdf. Accessed: March 26, 2021.

U.S. Geological Survey. 2000. *Ground Water Resources for the Future, Land Subsidence in the United States*. USGS Fact Sheet-165-00. Reston, VA. Available: http://water.usgs.gov/ogw/pubs/fs00165/. Accessed: July 8, 2021.

U.S. Geological Survey. 2015. South Napa Earthquake – One Year Later. Available here: https://www.usgs.gov/news/south-napa-earthquake-%E2%80%93-one-year-later. Accessed: March 23, 2021.

U.S. Geological Survey and California Geological Survey. 2018. Quaternary Fault and Fold Database of the United States: California. Available here: https://usgs.maps.arcgis.com/apps/webappviewer/index.html?id=5a6038b3a1684561a9b0aadf88412fcf. Accessed October 6, 2021.

U.S. Geological Survey. 2021. Areas of Land Subsidence in California. Available here: https://ca.water.usgs.gov/land_subsidence/california-subsidence-areas.html. Accessed: March 22, 2021.

University of California, Berkeley Museum of Paleontology. 2021a. UCMP specimen search for Napa County. Available: https://ucmpdb.berkeley.edu/loc.html. Accessed: March 26, 2021.

University of California, Berkeley Museum of Paleontology. 2021b. UCMP specimen search for the Sonoma Volcanics. Available: https://ucmpdb.berkeley.edu/advanced.html . Accessed: March 26, 2021.

University of California, Berkeley Museum of Paleontology. 2021c. UCMP specimen search for the Great Valley Sequence. Available: https://ucmpdb.berkeley.edu/advanced.html. Accessed: March 26, 2021.

Wagner, D. L. and C. I. Gutierrez. 2017. Preliminary Geologic Map of the Napa and Bodega Bay 30'x60' Quadrangles, California. Available: https://www.conservation.ca.gov/cgs/maps-data/rgm/preliminary. Accessed: July 13, 2021.

Wills, C. J. and H. H. Majmundar. 2000. Landslide Inventory of Southwest Napa County, California. Department of Conservation, Division of Mines and Geology. (Open-File Report 99-06.)

Witter, R. C., K. L. Knudsen, J. M. Sowers, C. M. Wentworth, R. D. Koehler, C. E. Randolph. 2006. Maps of Quaternary Deposits and Liquefaction Susceptibility in the Central San Francisco Bay Region, California: Liquefaction Susceptibility. (Open-File Report 06-1037.) Available: https://pubs.usgs.gov/of/2006/1037/. Accessed: July 13, 2021.

Wong, I. G., R. W. Ely, A. C. Kollman. 1988. Contemporary seismicity and tectonics of the northern and central coast ranges-Sierran Block Boundary Zone, California. Journal of Geophysical Research Solid Earth 93(B7): 7813-7833.

Working Group for California Earthquake Probabilities. 2015. UCERF3: A New Earthquake Forecast for California's Complex Fault System. (Fact Sheet 2015-3009.) March.

3.7 Greenhouse Gas Emissions

This section discusses greenhouse gas (GHG) emissions and climate change. Criteria pollutants and air quality impacts are discussed in Section 3.2, *Air Quality*. No comments were received in response to the Notice of Preparation (NOP) pertaining to topics covered in this section.

3.7.1 Existing Conditions

3.7.1.1 Regulatory Setting

Federal

U.S. Environmental Protection Agency (EPA)

On April 2, 2007, in *Massachusetts v. EPA*, 549 U.S. 497 (2007), the Supreme Court found that GHGs are air pollutants covered by the Clean Air Act. The Court held that the Administrator must determine whether emissions of GHGs from new motor vehicles cause or contribute to air pollution, which may reasonably be anticipated to endanger public health or welfare, or whether the science is too uncertain to make a reasoned decision.

On December 7, 2009, EPA Administrator Lisa Jackson signed a final action, under Section 202(a) of the Clean Air Act, finding that six key well-mixed GHGs constitute a threat to public health and welfare and that the combined emissions from motor vehicles cause and contribute to the climate change problem.

This action was a prerequisite for implementing GHG emissions standards. Current efforts include issuing GHG emission standards for new motor vehicles, developing and implementing renewable fuel standard program regulations, proposing carbon pollution standards for new power plants, setting GHG emissions thresholds to define when permits are required for new and existing industrial facilities under the Clean Air Act, and establishing a GHG reporting program.

Renewable Fuel Standard Program

Finalized on February 3, 2010, this rule makes changes to the Renewable Fuel Standard (RFS) program, as required by the Energy Independence and Security Act of 2007. The original RFS program was designed to implement the provisions of the Energy Policy Act of 2005 (EPAct, described later). The revised statutory requirements establish new specific volume standards for cellulosic biofuel, biomass-based diesel, advanced biofuel, and total renewable fuel that must be used in transportation fuel each year. The revised statutory requirements also include new definitions and criteria for both renewable fuels and the feedstocks used to produce them, including new GHG emission thresholds for renewable fuels.

Greenhouse Gas Findings (2009)

In the U.S. Supreme Court case *Massachusetts v. EPA* (2007), 12 states, three cities, and 13 environmental groups filed suit that the EPA should be required to regulate carbon dioxide and other GHGs as pollutants under the federal Clean Air Act. In April 2007, the U.S. Supreme Court found that the EPA has a statutory authority to formulate standards and regulations to address

GHGs. On December 7, 2009, the EPA Administrator finalized two findings to be effective January 14, 2010. The findings are related to GHGs under section 202(a) of the Clean Air Act. These findings do not themselves impose any requirements on industry or other entities.

- Endangerment Finding: The Administrator finds that the current and projected concentrations of the six key well-mixed GHGs—carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6)—in the atmosphere threaten the public health and welfare of current and future generations.
- Cause or Contribute Finding: The Administrator finds that the combined emissions of these well-mixed GHGs from new motor vehicles and new motor vehicle engines contribute to the greenhouse gas pollution which threatens public health and welfare.

Executive Order 13154 Federal Leadership in Environmental, Energy, and Economic Performance

On October 5, 2009, President Obama issued Executive Order (EO) 13154, which instructs federal agencies to set or achieve various emissions reduction and energy and environmental benchmarks by 2015, 2020, and 2030. The order requires agencies to set GHG emissions reduction targets for 2020 within 90 days and requires the Office of Management and Budget (OMB) to set a federal government target for 2020 within 120 days. The order also sets required reductions in vehicle fleet petroleum use, requires increases in water and energy efficiency and in recycling and waste diversion rates, and mandates adoption of certain contract and procurement practices designed to promote energy and water efficiency and environmentally-preferable products.

Consolidated Appropriations Act of 2021

Included in an omnibus energy package that appropriated funding for research, development, and deployment for clean energy technologies and clean energy tax incentives, this legislation committed the U.S. to phasing down the production and consumption of HFCs— a type of pollutant normally found in refrigerants or air coolants, and which are thousands of times more effective at trapping heat in the atmosphere than CO_2—85 percent by 2036.

Safer Affordable Fuel-Efficient Vehicles Rule and Corporate Average Fuel Economy Preemption

On September 27, 2019, the United States Department of Transportation (DOT) National Highway Traffic Safety Administration (NHTSA) and EPA published the Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule Part One: One National Program (SAFE I Rule), a joint agency action relating to the state regulation of GHG emissions from motor vehicles and state mandates for zero emission vehicles (ZEVs). The SAFE I Rule expressly declared that certain types of state regulation were preempted on the basis of conflicting fuel economy standards, and as part of the SAFE I action, EPA also withdrew portions of a waiver extended to the California Air Resources Board (CARB) under Section 209 of the Clean Air Act to regulate new motor vehicle emissions through GHG standards and a ZEV mandate. California, 22 other states, the District of Columbia, and two cities filed suit against this rulemaking on September 20, 2019 (California et al. v. U.S. Department of Transportation et al., 1:19-cv-02826, U.S. District Court for the District of Columbia).

On January 20, 2021, President Biden signed EO 13990, which directed DOT, NHTSA, and EPA to immediately review and consider suspending, revising, or rescinding their respective portions of the SAFE I Rule. In response, EPA proposed a reconsideration of its withdrawal of California's waiver under the Clean Air Act on April 28, 2021, and on May 12, 2021, NHTSA published a Notice of Proposed Rulemaking entitled the Corporate Average Fuel Economy (CAFE) Preemption. The

proposed CAFE Preemption was finalized on December 21, 2021. The final rule concludes that the SAFE I Rule overstepped the agency's legal authority and established overly broad prohibitions that did not account for a variety of important state and local interests. The final rule ensures that the SAFE I Rule will no longer form an improper barrier to states exploring solutions to address their local communities' environmental and public health challenges. (National Highway Traffic Safety Administration 2021)

State

California has adopted statewide legislation addressing various aspects of climate change and GHG emissions mitigation. Much of this legislation establishes a broad framework for the state's long-term GHG reduction and climate change adaptation program. In the absence of federal regulations, control of GHGs is generally regulated at the state level and is typically approached by setting emission reduction targets for existing sources of GHGs, setting policies to promote renewable energy and increase energy efficiency, and developing statewide action plans. Summaries of key policies, regulations, and legislation at the state level that are relevant to the Project are described below.

Executive Order S-03-05 (2005)

California EO S-3-05 sets forth a series of target dates by which statewide emissions of GHGs need to be progressively reduced, as follows: by 2010, reduce GHG emissions to 2000 levels (approximately 457 million metric tons of carbon dioxide equivalent [MT CO_2e]); by 2020, reduce emissions to 1990 levels (approximately 427 million MT CO_2e); and by 2050, reduce emissions to 80 percent below 1990 levels (approximately 85 million MT CO_2e). EOs are binding only on state agencies. Accordingly, California EO S-3-05 guide State agencies' efforts to control and regulate GHG emissions but have no direct binding effect on local government or private actions. The Secretary of the California Environmental Protection Agency (CalEPA) is required to report to the Governor and State legislature biannually on the impacts of global warming on California, mitigation and adaptation plans, and progress made toward reducing GHG emissions to meet the targets established in this EO.

Assembly Bill 1493—Pavley Rules (2002, Amendments 2009, 2012 rulemaking)

Known as "Pavley I," Assembly Bill (AB) 1493 (California Health and Safety Code Section 42823) standards are the nation's first GHG standards for automobiles. AB 1493 requires CARB to adopt vehicle standards that will lower GHG emissions from new light duty autos to the maximum extent feasible beginning in 2009. Additional strengthening of the Pavley standards (previously referred to as "Pavley II," now referred to as the "Advanced Clean Cars" measure) has been proposed for vehicle model years 2017–2025. Together, the two standards are expected to increase average fuel economy to roughly 54.5 miles per gallon by 2025. In June 2009, EPA granted California's waiver request enabling the state to enforce its GHG emissions standards for new motor vehicles beginning with the current model year. As discussed under the SAFE I Rule and CAFE Preemption, CARB continues to maintain regulative authority over GHG emissions.

Senate Bills 1078/107 and Senate Bill X1-2 (2011)—Renewables Portfolio Standard

Senate Bills (SBs) 1078 and 107 comprise California's Renewables Portfolio Standard (RPS), which obligates investor-owned utilities (IOUs), energy service providers (ESPs), and Community Choice Aggregations (CCAs) to procure an additional one percent of retail sales per year from eligible

renewable sources until 20 percent is reached, no later than 2010. The California Public Utilities Commission (CPUC) and California Energy Commission (CEC) are jointly responsible for implementing the program. SB X1-2 (2011), called the California Renewable Energy Resources Act, obligates California electricity providers to obtain at least 33 percent of their energy from renewable resources by 2020. The RPS has been extended by SB 350, discussed further below, to 50 percent for 2030.

Assembly Bill 32—California Global Warming Solutions Act (2006) and California Climate Change Scoping Plan (2008/2014)

In 2006, the California legislature passed AB 32 (California Health and Safety Code Division 25.5, Sections 38500 et seq.), also known as the California Global Warming Solutions Act. AB 32 requires CARB to implement emission limits, regulations, and other feasible and cost-effective measures such that statewide GHG emissions are reduced to 1990 levels by 2020.

Pursuant to AB 32, CARB adopted the Climate Change Scoping Plan (Scoping Plan) in December 2008, which outlines measures for meeting the 2020 GHG emissions reduction limits. The Scoping Plan must be updated every five years to evaluate AB 32 policies and ensure that California is on track to achieve the 2020 GHG emissions reduction goal. In 2014, CARB released the First Update to the Climate Change Scoping Plan (First Update), which builds upon the initial plan with new strategies and recommendations. The First Update identifies opportunities to leverage existing and new funds and drive GHG emissions reductions through strategic planning and targeted low-carbon investments. This update defines CARB's short- and mid-term climate change priorities and sets the groundwork for reaching the long-term goals set forth in California EO S-3-05. The First Update highlights California's progress toward meeting the near-term 2020 GHG emissions reduction goals in the initial scoping plan. It also evaluates actions to align the State's longer-term GHG emissions reduction strategies with other State policy priorities for water, waste, natural resources, clean energy, transportation, and land use. An update to the Scoping Plan for 2022 is currently underway and will reflect State targets for 2030 and carbon neutrality by 2045.

Executive Order S-01-07—Low Carbon Fuel Standard (2007)

California EO S-01-07 mandates (1) that a statewide goal be established to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020, and (2) that a low-carbon fuel standard (LCFS) for transportation fuels be established in California. The executive order initiates a research and regulatory process at CARB, which is responsible for implementing the LCFS.

State of California Energy Action Plans (2005, Amendments 2008)

The CEC is responsible for preparing the State Energy Action Plan, which identifies emerging trends related to energy supply, demand, conservation, public health and safety, and the maintenance of a healthy economy. At the beginning of 2008, CEC and CPUC determined that an update to the 2005 California Energy Action Plan would be more appropriate than a new plan, given the passage of AB 32 and the critical role it will play in energy policy in coming years. The 2008 Update shifts focus to climate change. The nine major action areas, as described in previous Energy Action Plans include: energy efficiency; demand response; renewable energy; electricity adequacy, reliability, and infrastructure; electricity market structure; natural gas supply, demand, and infrastructure; transportation fuels supply, demand, and infrastructure; research, development, and demonstration; and climate change. The report emphasizes the importance of improving fuel standards in order to

reduce energy use and GHGs and notes the importance of also incorporating smart growth and land use policies.

Senate Bill 375—Sustainable Communities Strategy (2008)

SB 375 (California Government Code Sections 14522.1, 14522.2, 65080, 65080, 65080.01, 65400, 65583, 65584.01, 65584.02, 65584.04, 65587, 65588, and Public Resources Code Sections 2161.3, 21155, 21159.28) provides for a new planning process that coordinates land use planning, regional transportation plans (RTPs), and funding priorities to help California meet the GHG reduction goals established in AB 32. SB 375 requires metropolitan planning organizations (MPOs) to develop RTPs and incorporate a sustainable communities strategy (SCS). The goal of the SCS is to reduce regional vehicle miles traveled (VMT) through land use planning and consequent transportation patterns. CARB released the regional targets in September 2010.

The Metropolitan Transportation Commission (MTC) is the MPO for the San Francisco Bay Area (Bay Area) region, which includes Napa. MTC and the Association of Bay Area Governments (ABAG), the regional planning agency and council of governments for the Bay Area, jointly developed and adopted the SB-375-compliant RTP/SCS Plan Bay Area in 2013. Plan Bay Area has since been updated for the horizon year 2040 (adopted in 2016) and for 2050 (adopted in October 2021). SB 375 also includes provisions for streamlined CEQA review for certain types of mixed-use and transit priority projects that meet specific criteria established by SB 375. According to State CEQA Guidelines Section 15183.5, quantified plans, such as the Plan Bay Area Environmental Impact Report (EIR), "may be used in the cumulative impacts analysis of later projects." More specifically, "[l]ater project-specific environmental documents may tier from and/or incorporate by reference" the "programmatic review" conducted for the GHG reduction plan. Section 15183.5 also states:

> An environmental document that relies on a greenhouse gas reduction plan for a cumulative impacts analysis must identify those requirements specified in the plan that apply to the project, and, if those requirements are not otherwise binding and enforceable, incorporate those requirements as mitigation measures applicable to the project.

Environmental documents prepared for projects that are consistent with the Plan Bay Area EIR are not required to reference, describe, or discuss the following in their GHG impact analysis.

1. Growth-inducing impacts.
2. A reduced-density alternative to address impacts on transportation or climate change of increased car and truck VMT induced by the project.
3. Any project-specific or cumulative impacts from cars and light-duty truck trips generated by the project on global warming or the regional transportation network.

The Project does not qualify for streamlining under SB 375 because it does not meet the eligibility requirements for mixed-use residential, transit priority, or sustainable communities projects. However, future mixed-use or transit-priority projects under the Project that are consistent with Plan Bay Area may qualify for CEQA streamlining and tier from the Plan Bay Area EIR for their project-level GHG emissions analysis.

CARB Innovative Clean Transit Regulation

The Innovative Clean Transit (ICT) regulation (California Code of Regulations Title 13 sections 2023.5-2023.11) was adopted by CARB on December 14, 2018 to replace the Fleet Rule for Transit Agencies and is a part of CARB's heavy-duty ZEV programs. The regulation requires all public transit

agencies, regardless of size, to gradually transition to a 100-percent zero-emission bus fleet and requires reporting information on progress toward achieving this goal to CARB starting March 31, 2021. CARB's ICT regulation complements SB 375, described above, and SB 350, which provides opportunity for transportation electrification through collaboration between CPUC, CARB, and CEC. ICT regulation aims to: reduce NO_X and GHG emissions, especially in transit-dependent and disadvantaged communities; increase penetration of the first wave of zero-emission heavy-duty technologies into applications well-suited to their use; save energy and reduce dependency on petroleum and other fossil fuels; expand ZEV industry to provide high quality green jobs; and provide other societal benefits by encouraging improved mobility and connectivity with zero-emission transportation modes and reduced growth in light-duty VMT.

Integrated Energy Policy Reports (2009 report)

SB 1389 (Chapter 568, Statutes of 2002) requires that the CEC prepare a biennial integrated energy policy report that contains an assessment of major energy trends and issues facing the state's electricity, natural gas, and transportation fuel sectors and provides policy recommendations to conserve resources; protect the environment; ensure reliable, secure, and diverse energy supplies; enhance the state's economy; and protect public health and safety (Public Resources Code Section 25301[a]). The 2009 Integrated Energy Policy Report is the most current report to fulfill the requirement of SB 1389. According to the 2009 report:

> As California pursues its goal to address climate change by reducing greenhouse gas emissions, the driving force for the state's energy policies continues to be maintaining a reliable, efficient, and affordable energy system that minimizes the environmental impacts of energy production and use. Although the economic downturn has reduced energy demand in the short-term, demand is expected to grow over time as the economy recovers. It is essential that the state's energy sectors be flexible enough to respond to future fluctuations in the economy and that the state continue to develop and adopt the "green" technologies that are critical for long-term reliability and economic growth.

California Energy Efficiency Standards for Residential and Nonresidential Buildings—Green Building Code, Title 24 (2019)

The Green Building Standards Code (CALGreen) applies to the planning, design, operation, construction, use, and occupancy of newly constructed buildings and requires the installation of energy- and water-efficient indoor infrastructure for all new projects beginning after January 1, 2011. The 2019 CALGreen Code took effect January 1, 2020 and also requires newly constructed buildings to develop a waste management plan and divert at least 65 percent of the construction materials generated during project construction.

Administrative regulations for CALGreen Part 11 and the California Building Energy Efficiency Standards also apply to newly constructed buildings and additions and alterations to existing buildings. The 2019 energy standards are generally more stringent than previous standards as the final step toward meeting the State's zero net energy (ZNE) goal for newly constructed residential buildings by 2020. Later standards are expected to require ZNE for newly constructed commercial buildings. Part 11 also established voluntary standards that became mandatory in the 2010 edition of the code, including planning and design for sustainable site development, energy efficiency, water conservation, material conservation, and internal air contaminants. The standards offer builders better windows, insulation, lighting, ventilation systems, and other features that reduce energy consumption in homes and businesses.

The next triennial edition of Title 24 is forthcoming and will constitute the 2022 Building Energy Efficiency Standards that will improve upon the 2019 standards for new construction of, and additions and alterations to, residential and nonresidential buildings. The CEC adopted the 2022 standards on August 11, 2021. If approved by the California Building Standards Commission, the 2022 standards will go into effect on January 1, 2023.

State CEQA Guidelines (2021)

The State CEQA Guidelines require lead agencies to describe, calculate, or estimate the amount of GHG emissions that would result from a project. Moreover, the State CEQA Guidelines emphasize the necessity to determine the potential climate change effects of a project and propose mitigation as necessary. The State CEQA Guidelines confirm the lead agency's discretion to determine the appropriate significance threshold but require the preparation of an EIR if "there is substantial evidence that the possible effects of a particular project are still cumulatively considerable notwithstanding compliance with adopted regulations or requirements" (Section 15064.4).

State CEQA Guidelines Section 15126.4 includes considerations for lead agencies related to feasible mitigation measures to reduce GHG emissions. Such measures may include, among others, measures in an existing plan or mitigation program for the reduction of emissions that are required as part of the lead agency's decision; implementation of project features, project design, or other measures that are incorporated into the project to substantially reduce energy consumption or GHG emissions; and offsite measures, including offsets that are not otherwise required.

The California Supreme Court has held that the Scoping Plan's statewide goal of reducing GHG emissions by 29 percent from business as usual to meet AB 32's target can be used as a threshold of significance for GHG emissions (*Center for Biological Diversity v. Department of Fish and Wildlife* (2015) 62 Cal.4th 204, henceforth referred to as Newhall Ranch). However, if applied to a local project, the EIR must provide supporting evidence that the project emissions relate to the Scoping Plan. The Court stated, in overturning Newhall Ranch's application of the Scoping Plan goal to an individual project:

> At bottom, the [Newhall Ranch] EIR's deficiency stems from taking a quantitative comparison method developed by the Scoping Plan as a measure of the greenhouse gas emissions reduction effort required by the state as a whole, and attempting to use that method, without consideration of any changes or adjustments, for a purpose very different from its original design: To measure the efficiency and conservation measures incorporated in a specific land use development proposed for a specific location.

Senate Bill 743 (2013)

SB 743 initiated an update to the CEQA Guidelines in 2013 to change how lead agencies evaluate transportation impacts under CEQA and understand actual transportation-related environmental impacts of any given project. These changes were made to encourage alternative options to driving and thereby help achieve the State's climate commitments, preserve the environment, improve health and safety, and boost the economy by prioritizing co-located jobs, services, and housing. Starting on July 1, 2020, agencies analyzing transportation impacts of new projects must use vehicle miles traveled (VMT) as the metric in place of Level of Service (LOS) standards, which traditionally evaluated automobile delay at intersections and congestion on nearby highway segments. VMT measures how much actual auto travel (additional miles driven) a proposed project would create on California roads. SB 743 focuses on reducing VMT through various strategies to achieve its main environmental, health, and fiscal objectives.

Assembly Bill 341 (2011)

In 2011, AB 341 set the goal of 75 percent recycling, composting, or source reduction of solid waste by 2020 calling for the California Department of Resources Recycling and Recovery (CalRecycle) to take a statewide approach to decreasing California's reliance on landfills. This goal was an update to the continuing mandate of 50 percent waste diversion set by AB 939.

Short-Lived Pollutant Reduction Strategy

In 2014, SB 605 directed CARB, in coordination with other State agencies and local air districts, to develop a comprehensive Short-Lived Climate Pollutant (SLCP) Reduction Strategy. In 2016, SB 1383 directed CARB to approve and implement the SLCP Reduction Strategy to achieve the following reductions in SLCPs:

- 40 percent reduction in CH_4 relative to 2013 levels by 2030,
- 40 percent reduction in HFC gases relative to 2013 levels by 2030, and
- 50 percent reduction in anthropogenic black carbon relative to 2013 levels by 2030.

SB 1383 also establishes the following targets for reducing organic waste in landfills as well as CH_4 emissions from dairy and livestock operations, as follows:

- 50 percent reduction in organic waste disposal relative to 2014 levels by 2020,
- 75 percent reduction in organic waste disposal relative to 2014 levels by 2025, and
- 40 percent reduction in CH_4 emissions from livestock and dairy manure management operations relative to the livestock and dairy sectors' 2013 levels by 2030.

CARB and CalRecycle have developed regulations to achieve the organic waste reduction goals under SB 1383. CalRecycle adopted new and amended regulations to CCR Title 14 and Title 27 in November 2020. Among other things, the regulations set forth minimum standards for organic waste collection, hauling, and composting. The final regulations will take effect on or after January 1, 2022.

CARB adopted the SLCP Reduction Strategy in March 2017 as a framework for achieving the CH_4, HFC, and anthropogenic black carbon reduction targets set by SB 1383. The SLCP Reduction Strategy includes 10 measures to reduce SLCPs, which fit within a wide range of ongoing planning efforts throughout the state, including CARB's and CalRecycle's proposed rulemaking on organic waste diversion (discussed above).

Senate Bill 350—De Leon (Clean Energy and Pollution Reduction Act of 2015) (2015)

SB 350 was approved by the California legislature in September 2015 and signed by Governor Brown in October 2015. Its key provisions are to require the following by 2030: (1) a renewables portfolio standard of 50 percent and (2) a doubling of energy efficiency (electrical and natural gas) by 2030, including improvements to the efficiency of existing buildings. These mandates will be implemented by future actions of CPU) and CEC.

Senate Bill 32 and Assembly Bill 197 (2016)

In conjunction with EO B-30-15, SB 32 extends AB 32 and requires CARB to ensure that statewide GHG emissions are reduced to at least 40 percent below 1990 levels by 2030. The companion bill, AB

197, creates requirements to form a Joint Legislative Committee on Climate Change Policies, requires CARB to prioritize direct emission reductions and consider social costs when adopting regulations to reduce GHG emissions beyond the 2020 statewide limit, requires CARB to prepare reports on sources of GHGs and other pollutants, establishes six-year terms for voting members of CARB, and adds two legislators as non-voting members of CARB.

Pursuant to SB 32, CARB updated the prior AB 32 Scoping Plan to address implementation of GHG reduction strategies to meet the 2030 reduction target. The final plan was approved in December 2017. The 2017 plan continues the discussion from the original scoping plan and 2014 update of identifying scientifically-backed policies within six of the state's economic sectors to reduce GHGs. The updated Scoping Plan includes various elements, including doubling energy efficiency savings, increasing the low carbon fuel standard from 10 to 18 percent, adding 4.2 million zero-emission vehicles on the road, implementing the Sustainable Freight Strategy, implementing a post-2020 Cap-and-Trade Program, creating walkable communities with expanded mass transit and other alternatives to traveling by car, and developing an Integrated Natural and Working Lands Action Plan to protect land-based carbon sinks.

The 2017 Scoping Plan also provides guidance for local communities to meet AB 32 and EO S-3-05 targets. Per CARB, local actions—such as general plans and climate action plans—are essential tools for the State to meet its GHG emission reduction goals. According to the Scoping Plan, local agencies should target total emissions of no more than 6.0 MT CO_2e per capita per year by 2030 and no more than 2.0 MT CO_2e per capita by 2050 to be consistent with the 2017 Scoping Plan and the State's long-term goals. A 2040 target of 4.0 MT CO_2e can be interpolated using a linear trajectory in emissions reduction between 2030 and 2050.

The 2022 update to the Scoping Plan is currently underway and will assess progress toward achieving the 2030 target and carbon neutrality by 2045. To achieve carbon neutrality, anticipated changes include moving the State away from fossil fuel combustion and transitioning toward a clean energy economy. The updated plan will also focus efforts in environmental justice communities, directed by input from the Environmental Justice Advisory Committee.

100 Percent Clean Energy Act (SB 100, 2018)

The 100 Percent Clean Energy Act of 2018 (SB 100) sets a state policy that eligible renewable energy and zero-carbon resources supply 100 percent of all retail sales of electricity in California by 2045. SB 100 accelerates California's RPS established under SB 350. In recognition that California retail sellers are well on their way to achieving the target in advance of the existing deadlines, SB 100 requires providers to supply 50 percent of their electricity from eligible renewable energy resources by 2026 and 60 percent by 2030.

Governor's Executive Order B-55-18 (2018)

EO B-55-18, issued in 2018, established a statewide goal to achieve carbon neutrality as soon as possible, and no later than 2045, and to achieve and maintain net negative emissions thereafter. EO B-55-18 is established in addition to the existing statewide targets of reducing GHG emissions. To achieve this target, remaining emissions must be offset by equivalent net removals of CO_2 from the atmosphere, including through sequestration in forests, soils, and other natural landscapes.

Executive Order N-79-20 (2020)

EO N-79-20, issued in September 2020, established a statewide goal that 100 percent of in-state sales of new passenger cars and trucks will be zero-emission by 2035, that 100 percent of medium- and heavy-duty vehicles in the State be zero-emission by 2045 for all operations where feasible, and that 100 percent of all drayage trucks will be zero-emission by 2035 where feasible. EO N-79-20 also establishes a goal to transition to 100 percent zero-emission off-road vehicles and equipment by 2035 where feasible. EO N-79-20 directs CARB to develop regulations that will help achieve these goals.

Regional and Local

Plan Bay Area 2050

On July 26, 2017, Plan Bay Area 2040 was adopted by ABAG and MTC. As a limited and focused update, Plan Bay Area 2040 builds upon the growth pattern and strategies developed in the original 2013 Plan Bay Area but with updated planning assumptions that incorporate key economic, demographic, and financial trends since 2013. Most recently, Plan Bay Area 2050 update was adopted on October 21, 2021. Building upon the previous iterations of Plan Bay Area, Plan Bay Area 2050 focuses on coordinating housing and job growth while achieving the goals of making a more resilient and equitable future for the Bay Area. Plan Bay Area 2050 also includes an updated long-range Regional Growth Forecast. Plan Bay Area incorporates 35 strategies to tackle the region's transportation, housing, economic and environmental challenges.

Bay Area Air Quality Management District

The Bay Area Air Quality Management District (BAAQMD) has local jurisdiction over air quality in the San Francisco Bay Area Air Basin (SFBAAB), including projects in the City of Napa. BAAQMD has adopted advisory emission thresholds to assist CEQA lead agencies in determining the level of significance of a project's GHG emissions, including long range plans (e.g., general plans, specific plans), which are outlined in its *California Environmental Quality Act: Air Quality Guidelines* (CEQA Guidelines), adopted in 2010 and last updated in 2017. The CEQA Guidelines also outline methods for quantifying GHG emissions, as well as potential mitigation measures. The CEQA Guidelines establishes a threshold of significance for operational-related GHG impacts of plans of either a GHG efficiency-based metric of 6.6 MT per service population per year of CO_2e, or compliance with a qualified GHG Reduction Strategy. The GHG efficiency threshold may only be applied to general plans, and GHG Reduction Strategies using this threshold with horizon years beyond 2020 should consider horizon-year goals consistent with climate stabilization predictions identified in the Governor's Executive Order S-03-05.

BAAQMD is currently updating its existing CEQA Guidelines (2017) and thresholds of significance to reflect new State GHG targets and evolving case law. The updated thresholds of significance for GHG emissions are scheduled to be considered for adoption in early 2022. The proposed thresholds for land use projects are: (1) projects must (at a minimum) prohibit natural gas in residential and non-residential buildings, achieve compliance with electric vehicle requirements in the most recently adopted version of CALGreen Tier 2, and achieve SB 743 target of 15 percent reduction in VMT per capita below regional average; *or* (2) be consistent with a local GHG Reduction Strategy that meets the criteria under State CEQA Guidelines Section 15183.5(b). At a plan level, the proposed thresholds are: (1) meet State's goals to achieve 40 percent emissions below 1990 levels by 2030, and carbon neutrality by 2045; *or* (2) be consistent with a local GHG Reduction Strategy that meets

the criteria under State CEQA Guidelines Section 15183.5(b). BAAQMD will include guidance on how local climate action plans can comply with Section 15183.5(b). (Bay Area Air Quality Management District 2021)

City of Napa Sustainability Plan (2012)

At the local level, the City of Napa adopted its first Sustainability Plan in July 2012 to meet GHG emissions reduction targets for 2020 set by AB 32. The Sustainability Plan includes 95 initiatives to promote sustainability within the Napa community and also within the City's internal government operations. The Sustainability Plan is arranged into focus areas that are the key components of community and City government operations. City government focus areas in the Sustainability Plan include energy, transportation, recycling and waste, water, and planning and land use. Community focus areas in the Sustainability Plan include energy, mobility and transportation, recycling and waste, natural and built environment, community connectedness, local business and economy, and local food.

Within each focus area, the Sustainability Plan identities a number of initiatives, many of which will reduce GHG emissions within the city. The initiatives identify actions to be taken by the City, such as promoting existing energy conservation programs, encouraging a connected system of bike and walking paths, and adding a food scraps curbside composting program. The initiatives in the plan were developed by City staff, subject matter experts, and the community at large through public meetings, interviews, and surveys. Collectively, the sustainability initiatives within the Sustainability Plan will reduce the city's GHG emissions from its community and City government operations, consistent with the State's GHG reduction goals.

Disposal Reduction Policy (2012)

In 2012, the City formally adopted a *Disposal Reduction Policy* that mirrored AB 341 at a local level and set a local goal of 75 percent (or more) of recycling and composting by the year 2020.

3.7.1.2 Environmental Setting

The specific chemical properties of GHGs enable them to become well mixed within the atmosphere and transported over long distances. Consequently, unlike other resource areas that are primarily concerned with localized project impacts (e.g., within 1,000 feet of the project site), the global nature of climate change requires a broader analytic approach. The following subsections provide background information on global climate change and principal GHGs associated with implementation of the Project. Potential impacts of climate change on the study area are also identified.

Greenhouse Effect and Climate Change

The phenomenon known as the *greenhouse effect* keeps the atmosphere near Earth's surface warm enough for the successful habitation of humans and other life forms. The greenhouse effect is created by sunlight that passes through the atmosphere. Some of the sunlight striking Earth is absorbed and converted to heat, which warms the surface. The surface emits a portion of this heat as infrared radiation, some of which is re-emitted toward the surface by GHGs. Human activities that generate GHGs increase the amount of infrared radiation absorbed by the atmosphere, thus enhancing the greenhouse effect and amplifying the warming of Earth (Center for Climate and Energy Solutions 2016).

Increases in fossil fuel combustion and deforestation have exponentially increased concentrations of GHGs in the atmosphere since the Industrial Revolution. Rising atmospheric concentrations of GHGs in excess of natural levels result in increasing global surface temperatures—a phenomenon commonly referred to as *global warming*. Higher global surface temperatures, in turn, result in changes to Earth's climate system, including increased ocean temperature and acidity, reduced sea ice, variable precipitation, and increased frequency and intensity of extreme weather events (Intergovernmental Panel on Climate Change 2021). Large-scale changes to Earth's system are collectively referred to as *climate change.*

The Intergovernmental Panel on Climate Change (IPCC) was established by the World Meteorological Organization and United Nations Environment Programme to assess scientific, technical, and socioeconomic information relevant to the understanding of climate change, its potential impacts, and options for adaptation and mitigation. The latest IPCC report (2021) assesses five climate futures depending on the level of GHG emissions, ranging from carbon neutrality by 2050 to very high levels of GHG emissions. In all five scenarios, global surface temperature will continue to increase until at least the mid-century under all emissions scenarios considered. Global warming of 1.5 degrees Celsius (°C) and 2°C will be exceeded during the 21st century unless deep reductions in CO_2 and other GHG emissions occur in the coming decades. Large increases in global temperatures could have substantial adverse effects on the natural and human environments worldwide and in California. Changes in several climatic impact-drivers would be more widespread at 2°C compared to 1.5°C global warming and even more widespread and/or pronounced for higher warming levels (IPCC 2021).

Greenhouse Gases

As noted above, the principle anthropogenic (human-made) GHGs contributing to global warming are CO_2, CH_4, N_2O, and fluorinated compounds, including SF_6, HFCs, and PFCs. Water vapor, the most abundant GHG, is not included in this list because its natural concentrations and fluctuations far outweigh its anthropogenic sources. Principal characteristics surrounding the principle anthropogenic GHGs are discussed below.

- **CO_2** enters the atmosphere through the burning of fossil fuels (oil, natural gas, and coal), solid waste, trees and wood products; respiration; and as a result of other chemical reactions (e.g., manufacture of cement). CO_2 is also removed from the atmosphere (or *sequestered*) when it is absorbed by plants as part of the biological carbon cycle.
- **CH_4** is emitted during the production and transport of coal, natural gas, and oil. Methane emissions also result from livestock and other agricultural practices and by the decay of organic waste in municipal solid waste landfills.
- **N_2O** is emitted during agricultural and industrial activities, as well as during combustion of fossil fuels and solid waste.
- **SF_6**, an anthropogenic chemical, is used as an electrical insulating fluid for power distribution equipment, in the magnesium industry, in semiconductor manufacturing, and as a tracer chemical for the study of oceanic and atmospheric processes.
- **HFCs** are anthropogenic chemicals used in commercial, industrial, and consumer products and have high global warming potential (GWP). HFCs are generally used as substitutes for ozone-depleting substances in automobile air conditioners and refrigerants.

- **PFCs** are typically emitted as byproducts of industrial and manufacturing processes. They were originally introduced as alternatives to ozone-depleting substances.
- Methods have been set forth to describe emissions of GHGs in terms of a single gas to simplify reporting and analysis. The most commonly accepted method to compare GHG emissions is the GWP methodology defined in the IPCC reference documents. The IPCC defines the GWP of various GHG emissions on a normalized scale that recasts all GHG emissions in terms of CO_2e, which compares the gas in question to that of the same mass of CO_2 (CO_2 has a global warming potential of 1 by definition).

Table 3.7-1 lists the GWP of relevant GHGs, their lifetimes, and abundances in the atmosphere.

Table 3.7-1. Atmospheric Lifetimes and Global Warming Potentials of Key Greenhouse Gases

Greenhouse Gases	GWP (100 years)	Lifetime (years)	2020 Atmospheric Abundance
CO_2	1	50–200	412.4 ppm
CH_4	25	9–15	1,879.1 ppb
N_2O	298	121	333.0 ppb
HFC-23	14,800	222	18 ppt*
HFC-134a	1,430	13.4	110 ppt
HFC-152a	124	1.5	3.9 ppt*
SF_6	22,800	3,200	10.27 ppt

Sources: NOAA Global Monitoring Laboratory. 2021.

*Most current data is from 2014, found in Myhre et al. 2013; Blasing 2016; Intergovernmental Panel on Climate Change 2007.

CH_4 = methane.
CO_2 = carbon dioxide.
N_2O = nitrous oxide.
ppb = parts per billion.
ppm = parts per million.

Greenhouse Gas Emissions Inventories

A GHG inventory is a quantification of all GHG emissions and sinks (a process, activity, or mechanism that removes GHGs from the atmosphere) within a selected physical or economic boundary. GHG inventories have been prepared at the state level (by CARB), at the regional level (by BAAQMD), and at the local level for the City of Napa's community and municipal (i.e., City government) operations. As discussed above, the City has prepared a Sustainability Plan and, in that Plan has indicated a desire to update the 2005 inventory with a more recent inventory year. At this time, the 2005 inventory is the City's most recent assessment of GHG emissions.

Table 3.7-2 outlines the most recent global, national, and statewide GHG inventories.

Table 3.7-2. Global, National, and State GHG Emissions Inventories

Emissions Inventory	CO_2e (metric tons)
2016 CARB State GHG Emissions Inventory	429,400,000
2011 BAAQMD GHG Emissions Inventory	86,600,000
2005 City of Napa Community GHG Emissions	455,062
2005 City of Napa Municipal GHG Emissions	6,778

Sources: California Air Resources Board 2018, California Greenhouse Gas Emission Inventory for 2000-2016; Bay Area Quality Management District, Bay Area Emissions Inventory Summary Report: Greenhouse Gases, 2015; City of Napa Sustainability Plan, 2012.

In the City of Napa and the Planning Area, GHGs are emitted by vehicles traveling on roadways, energy usage in buildings, demolition and construction activities, and other sources. GHG emissions are also emitted outside of the Planning Area from sources that are a direct result of people living and working within Napa. For example, emissions at power plants, landfills, and wastewater treatment plants generate emissions outside of Napa, but the ultimate driver of these emissions (electricity demand, solid waste, and wastewater) originate in Napa. Overall, the City's GHG emissions inventory in 2005 was 455,062 MT CO_2e for community operations and 6,778 MT CO_2e for municipal operations. The City's 2005 community GHG emissions, by sector, are shown in Table 3.7-3.

Table 3.7-3. City of Napa 2005 Community Greenhouse Gas Emissions Inventory (metric tons CO_2e)

Emissions Sector	2005 Emissions (metric tons)	Percent of 2005 Emissions
Residential Buildings	106,003	23%
Commercial & Industrial Buildings	71,120	16%
Transportation	221,901	49%
Lawn & Garden Equipment	2,109	<1%
Construction & Industrial/Commercial Equipment	24,277	5%
Agriculture/Farming	286	<1%
Solid Waste	29,366	6%
Total	**455,062**	**100%**
Population	74,499	
Emissions per Capita	6.1	

Sources: Napa County Transportation & Planning Agency, Napa Countywide Community Climate Action Framework, Community Review Draft, 2009; California Department of Finance, 2012-2020.

As affirmed by the Newhall Ranch decision, California communities can adopt the State's AB 32 target as their own local target, which allows local goals to synchronize with State goals. In recognition that many communities may not have access to, or simply may not have, data from 1990, the State has issued further guidance for local community thresholds. The recommendation for a community-wide goal expands upon the reduction of 15 percent from "current" (2005-2008) levels by 2020 as recommended in the 2008 Scoping Plan (California Air Resources Board 2017).

In March 2009, BAAQMD funding allowed the County, in collaboration with Napa County cities and other relevant partners, to conduct a countywide GHG emissions inventory. The inventory was performed following the CARB-recommended "community protocol" in cooperation with

International Council for Local Environmental Initiatives (ICLEI, now Local Governments for Sustainability) and used 2005 as the baseline year to derive 1990 levels. The results of this study estimated that 1990 levels for the City of Napa were 386,083 MT CO_2e (Napa County Transportation and Planning Agency 2009). A 40-percent reduction from 1990 levels would therefore require the City to reduce annual emissions to 232,082 MT CO_2e by 2030. This corresponds to a net reduction of 312,489 MT CO_2e in annual emissions between 2020 and 2030. Based on linear interpolation, the City would need to further reduce annual emissions by 154,721 MT CO_2e (to 77,361 MT CO_2e overall) by 2040 to be on target for achieving carbon neutrality by 2045.

Potential Effects of Climate Change in California and in the Project Area

Even with the efforts of municipalities throughout the state, a certain amount of climate change is inevitable because of existing and unavoidable future GHG emissions. According to the California Climate Action Team (CCAT), accelerating global climate change has the potential to cause a number of adverse impacts in California, including but not limited to: a shrinking Sierra snowpack that would threaten the state's water supply; public health threats caused by higher temperatures and more smog; damage to agriculture and forests due to reduced water storage capacity, rising temperatures, increasing salt water intrusion, flooding, and pest infestations; critical habitat modification and destruction; eroding coastlines; increased wildfire risk; and increased electricity demand. (CCAT 2006) These impacts have and will continue to have considerable costs associated with them. The following paragraphs describe in more detail some of the most relevant impacts to the environment that could result from continued global warming.

Increased Temperatures and Extreme Heat Events

Climate change is expected to lead to an increase in ambient (i.e., outdoor) average air temperature, with greater increases expected in summer than in winter months. Larger temperature increases are anticipated in inland communities as compared to the California coast. Climate models predict a 4 degrees Fahrenheit (ºF) temperature increase in the next 20 to 40 years, with an increase in the number of long dry spells.

The potential health impacts from sustained and significantly higher than average temperatures include heat stroke, heat exhaustion, and the exacerbation of existing medical conditions such as cardiovascular and respiratory diseases, diabetes, nervous system disorders, emphysema, and epilepsy. Over the past 15 years, heat waves have claimed more lives in the state than all other declared disaster events combined. According to the IPCC's Sixth Assessment Report (2021), heat-related morbidity and mortality is projected to increase in the future as the number of heat waves increases.

Increased temperatures also pose a risk to human health when coupled with high concentrations of ground-level ozone and other air pollutants, which may lead to increased rates of asthma and other pulmonary diseases. The incidence of bad air days in California's urban areas has increased, mostly in the summer. On long, hot, stagnant days, ground level ozone can build up to levels that violate federal and state health-based standards. Recent studies indicate that hot days correlate with poor air quality days, and air pollution is contributing to more annual deaths and cases of respiratory

illness and asthma. (Jacobson 2008) For more discussion of air quality impacts, see Section 3.2, Air Quality. Other impacts related to increased temperatures and heat waves include:

- **Increased urban heat island effect:** urban heat islands are especially dangerous because they are both hotter during the day and do not cool down at night, increasing the risk of heat-related illness;
- **Reduced freezing events:** too few freezes could lead to increased incidence of disease as vectors and pathogens do not die off. In addition, certain agricultural crops depend on freezing as part of the life cycle, so fewer such events would impact California's food production and indirectly the food supply in Napa;
- **Increased energy demand:** it is expected that energy, particularly electricity, demand will increase in order to meet increasing demands for air conditioning and refrigeration.

Changes in Precipitation and Extreme Events

Climate change is anticipated to cause 20 to 30 percent increase in precipitation in the spring and fall in California. More frequent and heavier precipitation events cause flooding and mudslides, which would incur considerable costs in damages to property, infrastructure and even human life. Such events also are associated with drinking water contamination outbreaks; contamination of shellfish and other food-borne illnesses; and overloading of wastewater and storm water systems.

With warmer average temperatures, more winter precipitation will fall in the form of rain instead of snow, shortening the winter snowfall season and accelerating the rate at which the snowpack melts in the spring. Not only does such snow melt increase the threat for spring flooding, it will decrease the Sierras' capacity as a natural water tower, resulting in decreased water availability for agricultural irrigation, hydro-electric generation and the general needs of a growing population. The decrease in snowpack is particularly relevant in California, as the Sierra snowpack provides approximately 80 percent of California's annual water supply. A decreased snowpack would result in increased drought conditions; water supply and quality impacts; and food production impacts.

Drought conditions also result in increased frequency, intensity, and duration of wildfires. In these conditions, fires burn hotter and spread faster. According to the California Department of Forestry and Fire Protection (CAL FIRE), between January 1, 2017 and December 31, 2017 there were 7,117 fires in California, burning a total of 505,956 acres; this is significantly larger than the 4,835 fires in the five year average in the same time interval (47 percent increase). (CAL FIRE 2021) In addition to fatalities and property damage, smoke from wildfires impairs air quality and can cause acute and chronic health impacts.

Impacts on Plants and Vegetation

Native plants and animals are also at risk as temperatures rise. Scientists are reporting more species moving to higher elevations or more northerly latitudes in response. Increased temperatures also provide a foothold for invasive species of weeds, insects, and other threats to native species. The increased flow and salinity of water resources could also seriously affect the food web and mating conditions for fish that are of both of economic and recreational interest to residents. In addition, the natural cycle of plant's flowering and pollination, as well as the temperature conditions necessary for a thriving locally adapted agriculture could be affected, with perennial crops such as grapes taking years to recover. In California, the impacts of climate change on agriculture are

estimated by the Farm Bureau to be $30 billion, mostly due to changes in chill hours required per year for cash crops.

Diseases

Warming temperatures, fewer freezing spells, and increased precipitation are likely to change the distribution and quantity of common disease vectors, such as mosquitos, ticks, and rodents.

Sea Level Rise

Sea level rise as a consequence of global warming has received considerable attention in the scientific community and the media. Higher global temperatures will lead to the melting of polar ice caps, which in turn will cause global sea levels to rise. The analysis of sea level rise impacts is provided in Section 3.5, *Hydrology, Flooding, and Water Quality.*

3.7.2 Environmental Impacts

3.7.2.1 Methods for Analysis

GHG emissions associated with the Project would result from operation of future land uses that would be developed in the Planning Area and from traffic volumes generated by these new developments. These emissions would occur incrementally over the course of the Project's buildout period. Construction activities would also generate GHG emissions within the Planning Area and on roadways resulting from construction-related traffic.

For this analysis, impacts of the Project on GHG emissions from construction were assessed qualitatively, consistent with BAAQMD Guidelines, while impacts from operations were assessed quantitatively using standard and accepted software tools, techniques, and emission factors. The primary assumptions and key methods used to quantify emissions and estimate potential impacts are described below. Model inputs and calculation files are provided in Appendix B, *Air Quality Data*.

This analysis provides a program-level overview of construction and operational emissions that could occur with buildout of the Project. Subsequent project-level environmental review, including quantification of construction GHG emissions, would be conducted during the processing of individual applications for future projects associated with the Project.

Construction GHG Emissions

Land uses that could be developed under the Project would generate construction-related GHG emissions from mobile and stationary construction equipment exhaust and employee and haul truck vehicle exhaust. Construction activities may also require additional electricity consumption or result in tree removal, which would correspond with a loss of pollutant and GHG sequestration potential as well as other long-term ecological benefits. With an anticipated buildout year of 2040, development of the various land uses associated with the Project would occur over an extended period and would depend on factors such as local economic conditions, market demand, and other financing considerations. However, the specific size, location, and construction techniques and scheduling that would be utilized for each individual development project occurring within the Planning Area from implementation of the Project is not currently known. Without specific project-level details (e.g., size and scale of the project to be constructed, construction schedule, equipment fleet, construction worker crew estimates, and demolition and grading quantities), it is not possible to develop a

refined construction inventory, and the determination of construction emission impacts associated with GHGs for each individual development project, or a combination of these projects, would require the City to speculate regarding such potential future project-level environmental impacts. Thus, in the absence of the necessary construction information required to provide an informative and meaningful analysis, the evaluation of potential construction-related impacts resulting from implementation of the Project is conducted qualitatively in this Draft EIR and assessed against applicable BAAQMD criteria.

Operational GHG Emissions

Operation of the land uses introduced by the Project would generate long-term emissions of CO_2, CH_4, and N_2O. Five types of GHG sources are expected during operation of the land uses associated with the Project:

- **Area** sources include landscaping activities.
- **Energy** sources include electricity consumption and natural gas combustion for lighting and heating requirements.
- **Mobile** sources are vehicle trips that are generated by the service population associated with the Project.
- **Waste** sources refer to CH_4 and N_2O from the decomposition of waste generated from the new land use developments in the Planning Area.
- **Water** sources includes electricity consumption for the supply, treatment, and distribution of water for the new land uses.

Long-term (i.e., operational) GHG emissions were quantified for the Project using the most recent version of California Emissions Estimator Model (CalEEMod), version 2020.4.0. Modeling for GHG emissions was performed using the same methodology and inputs as described in Chapter 3.2, *Air Quality.* Where air quality analysis focuses on criteria air pollutants and toxic air contaminants, the following analysis focuses on GHG emissions, including from sources not discussed for air quality: energy, waste, and water.

Like area sources, energy, waste, and water emissions were modeled according to the amount (i.e., commercial/industrial square footage or number of dwelling units) and type of land uses proposed. Energy sources account for emissions associated with the combustion of natural gas for building heating and hot water, apart from natural gas and wood hearths, which are prohibited in the SFBAAB per BAAQMD Regulation 6, Rule 3. Waste and water directly relate to the scale of the land use inputs.

Stationary sources such as emergency generators and boilers that would be developed for each individual development project, or a combination of these projects, would be subject to the permitting requirements by the BAAQMD. These are not included in modeled emissions because details of future projects and their stationary sources cannot be known at this time.

Emissions were quantified for existing (2021, with exception of 2015 traffic data – see discussion for methodology in Chapter 3.2, *Air Quality*) conditions based on current land uses and traffic data. Project buildout conditions (2040) were quantified for two scenarios, both based on anticipated land uses and modeled traffic data: One models the Project's operational emissions due to only land use and transportation changes incorporated in the traffic data, while the second includes

implementation of quantifiable proposed policies. For example, modeled mitigations include policies that would achieve water use conservation and solid waste landfill diversion. The effectiveness of these mitigative policies were determined based on the quantitative goals within the proposed policy, existing policies and regulatory context, and past trends[1]. Modeled emissions for 2040 Project buildout (both scenarios) also account for State GHG reduction actions that will be undertaken during the planning horizon (described below). Land use assumptions, traffic data inputs, and CalEEMod output files are included in Appendix B, *Air Quality Data*.

- **Renewable Portfolio Standard.** California's RPS, discussed under the State Regulations section above, is one of the most ambitious renewable energy standards in the country. The RPS requires that investor-owned utilities—like Pacific Gas and Electric (PG&E), the energy provider for the Planning Area[2]—50 percent of their electricity from renewable sources by 2030 and carbon neutrality by 2045. A portion of Napa's electricity emissions would be reduced by the RPS.
- **Title 24 Building Efficiency Improvements.** Title 24, discussed under Section 3.7.1.1, *Regulatory Setting,* is California's Building Energy Code. The most recent Title 24 code became effective in 2019, and an update that will take effect in 2023 is forthcoming. A portion of Napa's area emissions would be reduced by compliance with Title 24.

3.7.2.2 Relevant General Plan Update Goals and Policies

Land Use and Community Design Element

Policy LUCD 8-2: Support rehabilitation of vacant and derelict homes to bring them back into productive use as residences.

Goal LUCD-12: Promote diverse industrial opportunities in suitable locations to provide employment for Napa residents and promote economic growth in the City.

Transportation Element

Goal TE-2: Keep Napa moving with livable streets that provide a balanced, cost-effective, multi-modal transportation system (vehicles, pedestrians, bikes, transit), accommodating the mobility needs of all ages and abilities.

Goal TE-4: Work with NVTA to continue to develop and maintain an efficient and convenient transit system providing alternatives to the use of the personal automobile to residents, workers, and visitors within the City, with connections within the City, to elsewhere in the County, and beyond.

Goal TE-6: Support policies and programs to reduce automobile mode share, reduce automobile dependency, and encourage alternative forms of transportation.

[1] Water use reduction was assumed at 10 percent, in accordance with the downward trend between 2000-2010, per the City's 2015 Urban Water Management Plan. Although the decrease through 2015 would result in a greater reduction (almost 22 percent), the lesser value was used in consideration of anomalous drought conditions between 2000-2015 and increasing service population over the Project's planning period.

[2] Analysis assumed all energy would be provided by PG&E, given that only one energy provider can be input into CalEEMod. However, future energy providers could include Marin Clean Energy (MCE), a non-profit, public agency born from AB 117, which allowed Community Choice Aggregation (CCA) programs in California. MCE is California's first CCA program and offers renewable power (electricity) service across Contra Costa, Marin, Napa, and Solano counties.

Goal TE-7: Maintain parking standards that balance parking demand with urban design goals and do not negatively impact pedestrians, bicyclists, and transit users in development areas throughout the City.

Policy TE 10-1: Promote personal use of electric vehicles by providing or promoting adequate publicly-accessible charging stations and designated parking at City facilities, multi-family housing, and commercial developments.

Historic and Cultural Resources Element

Policy HCR 1-3: Encourage seismic strengthening to protect the City's valuable historic properties from future earthquakes, wildfire, and other events caused by climate change. This includes the development of incentives to encourage property owners to retrofit their buildings.

Climate Change and Sustainability Element

Goal CCS-1: Further the City's sustainability initiatives to reduce the community's GHG emissions, and foster green development patterns – including buildings, sites, and landscapes.

Policy CCS 1-1: Seek to achieve net zero climate pollutants from public and private operations within the City by 2030 and carbon neutrality by 2040, which is five years sooner than what is established under Executive Order B-55-18.

Policy CCS 1-2: The City should lead by example in managing its local government operations to reduce GHG emissions and promote sustainable environmental practices. Components of this strategy include:

- Develop plans for the reduction of fossil fuel consumption through all aspects of local government operations, including construction, purchasing, and ongoing operations.
- Require new or substantially renovated municipal facilities to incorporate cost-effective strategies for reducing greenhouse gas emissions, conserving energy and water, and utilizing sustainable construction practices.
- Reduce solid waste from City operations.

Policy CCS 1-3: Partner with local, regional, and County agencies and utility companies to achieve GHG reduction targets. Efforts for this include:

- Support local efforts to market programs, and conduct community outreach through schools, non-profit groups, community organizations, and the business community to increase participation in GHG reduction efforts.
- Partner with the Napa Valley Unified School District, private schools, community-based non-profit organizations, and others to undertake public outreach and education efforts that broaden community involvement in reducing GHG emissions.
- Foster and build public/private partnerships that help achieve greater energy efficiency and reduce GHG emissions.

Policy CCS 1-4: Expand local awareness of actions that residents and businesses can take to reduce climate impacts. Actively seek grants, and continue to provide community outreach and robust education through partnership opportunities with City residents. Develop an open data Community Climate Dashboard to engage residents in progress and accomplishments toward goals.

Policy CCS 1-5: Work collaboratively with regional agencies and other partners to develop a Climate Action Plan to address the GHG reduction goals of Executive Order B-55-18, Senate Bill 32, and Executive Order S-03-05.

The Climate Action Plan could serve as a Qualified GHG Reduction Strategy to ensure that Napa is in compliance with State targets for GHG emissions.

Goal CCS-2: Promote Napa as a network of interconnected neighborhoods with compact, walkable development patterns that are integrated with a sustainable mobility system that emphasizes walking, biking, or taking transit.

Policy CCS 2-1: Support programs to reduce auto-dependency and GHG emissions from personal vehicles. Efforts for this include:

- Establish regulations to limit uses of drive-through windows, including limitations on drive-through restaurants.
- Initiate programs that encourage car-free tourism through incentives, outreach, awareness, and by creating a bicycle and pedestrian-friendly environment.
- Establish programs to reduce vehicle miles traveled (VMT), such as transportation demand management.
- Support the expansion of Park and Ride areas and other support facilities to encourage use of public transportation, including Napa Valley Transportation Authority's (NVTA) on-demand service, and car and van pooling. Expand programs that encourage the installation of electric vehicle charging infrastructure.
- Support programs to install bike racks in new developments, commercial areas, and within Downtown Napa and the Oxbow district.

Policy CCS 2-3: Study options to transition the City's vehicle fleet, starting with small and mid-size vehicles, to vehicles that are 100 percent electric or powered by clean, renewable energy.

Policy CCS 2-4: Support programs that help businesses and organizations switch from fossil fuel-powered fleet vehicles to vehicles powered by clean, renewable energy sources.

Policy CCS 2-6: Encourage alternatives to City employees' use of single-occupancy vehicles by providing bicycle racks, preferential parking permits for carpools and vanpools, commuter information, and other incentives.

Goal CCS-5: Ensure that Napa residents are prepared for climate change-induced drought conditions by reducing water consumption and promoting resilient water supplies.

Goal CCS-6: Considering power shutdowns that affect the Napa community, promote sustainable energy generation practices and further develop energy security that is resilient to wildfire and related climate disasters.

Policy CCS 6-4: Promote renewable energy generation on City-owned sites and the deployment of micro-grids for energy independence and lifeline operations in the event of power shutdowns.

Policy CCS 7-1: Pursue State, regional, and federal funding programs designed to reduce energy demand through conservation and efficiency.

Policy CCS 7-5: Promote alternative modes of electricity generation on City-owned lands.

CCS 7-6: Partner with the County of Napa to implement an AB 811 program that makes funding **Policy** available to residential and commercial property owners seeking to improve their properties to conserve energy and water, and/or install solar systems to generate solar energy.

Policy CCS 7-8: Convert street lighting, water pumping, water treatment, and other energy-intensive operations to more efficient technologies.

Policy CCS 7-10: Incentivize the use of on-site renewable energy generation for new and existing buildings.

Policy CCS 8-1: Support use of the California Green Building Standards Code (CALGreen) to reduce energy demand and promote resource conservation through improved building design. Encourage existing buildings to adapt to CALGreen sustainability practices.

Policy CCS 8-3: Encourage roofing design and surface treatments (e.g., "cool roofs") that reduce the heat island effect of new development, and support reduced energy use, reduced air pollution, and a healthy urban forest. Connect businesses and residents with cool roof rebate programs for new and retrofitted roofs through City outreach efforts.

Community Services, Parks, and Recreation

Goal CSPR-8: Improve programs to reduce waste accumulation in landfills.

Policy CSPR 8-7: Strive to reach the statewide goal of ensuring that 75 percent of solid waste generated is either reduced at source, recycled, or composted from the year 2020 forward, per AB 341, SB 1383, and the City's own Disposal Reduction Policy (R2012-100).

Natural Resources and Conservation

Policy NRC 5-4: Require all construction equipment to be maintained and tuned to meet appropriate EPA and CARB emission requirements, including use of Tier 4 engines in off-road equipment and cleaner heavy-duty trucks to reduce NO_X and PM exhaust emission levels.

Safety and Noise

Goal SN-3: Reduce risk to life and property due to flooding, including inundation resulting from the failure of water supply reservoir dams.

Public Health and Equity

Policy PHE 1-1: Continue to craft proactive policies in collaboration with community members and Napa public agencies that address the design of the built environment; effective programs and services; strong partnerships with health providers and agencies; and community education and engagement. Incorporate health and equity criteria into all capital projects, such as those in the City of Napa's Capital Improvement Program, to advance health equity through project development and prioritization (e.g., improving safe and active transportation).

For example, the City of Oakland considers equity as a weighted prioritization factor when evaluating capital improvement project priorities.

Goal PHE-6: Continue to support stable and integrated communities through housing opportunities that provide safe, high quality, and affordable housing for all segments of the community in locations near amenities, public transportation, parks, and recreation opportunities.

Policy PHE 6-3: Develop and monitor indicators such as change in share of low-income households, average rent and sales price, supply of affordable units, and evictions and foreclosures within the City. Use this data to identify at-risk neighborhoods, and develop programs and resources to assist, including renter protections such as just cause eviction ordinances, within the limitations of City Charter Section 172.

Policy PHE 6-6: Continue to coordinate with representatives of public agencies, affordable and for-profit housing developers, housing advocacy groups, and other community organizations, and participate in forums for ongoing dialogue on local housing issues and strategies to address them.

Policy PHE 6-7: Continue to engage the community in developing new, and refining existing, affordable housing and anti-displacement strategies.

Goal PHE-9: Foster equity in City planning efforts and decision making by actively engaging communities that historically have had less familiarity or experience with participation in the development and implementation of City policies.

Policy PHE 9-3: Seek to engage the broadest possible spectrum of the community in public policy discussions, including residents, businesses, non-profit organizations, other public agencies, and particularly underrepresented groups by:

- Utilizing a full range of community engagement and meeting facilitation techniques to achieve an open exchange of ideas and positive outcomes for public meetings.
- Providing adequate time and opportunities for early engagement when community members may have the greatest ability to impact outcomes.
- Proactively interacting with community members to nurture the effectiveness of their participation, and actively encouraging participation by a broad range of community members.

Policy PHE 9-7: Invest in high-speed internet in underserved low-income communities to expand digital access and engagement opportunity.

Economic Development

Policy ED 1-1: Encourage and strengthen industry clusters, emerging sectors, and strategies to incentivize, attract, and retain industries, as well as foster entrepreneurial activities that represent the future of the City, including healthcare and wellness, manufacturing/maker space, business incubation, and satellite work environments.

Policy ED 1-3: Preserve the City's limited industrial and other employment-generating uses in key geographic areas to foster growth of targeted economic clusters and uses identified herein, including spaces for innovation, collaborative workspaces, business incubators/accelerators, and maker spaces.

Policy ED 1-8: Provide incentives to new businesses that meet certain criteria, such as create high-quality jobs (at least 75% of median income); generate a net positive impact on the City's General Fund; rehabilitate, improve, and locate within older or vacant buildings; fall within one of the City's targeted industries; and/or facilitate housing opportunities for their employees.

Policy ED 2-5: Continue and expand local-hire initiatives, training, apprenticeships, and partnerships with employers, WANB, NVC, and others to develop a job pipeline in targeted and growth industry sectors in Napa.

Policy ED 2-6: Support efforts to develop an equitable procurement policy for the City to prioritize certified underrepresented business enterprises, including businesses owned by people of color, women, LGBTQ+ community members, veterans, and individuals with disabilities, and locally-owned businesses.

Goal ED-5: Reinforce local production, including small-batch, artisanal production—a growing trend in manufacturing—by capitalizing on the City's existing strength as a global destination and brand.

3.7.2.3 Thresholds of Significance

Climate change is a global problem and GHGs are global pollutants, unlike criteria air pollutants (such as ozone precursors), which are primarily pollutants of regional and local concern. Given their long atmospheric lifetimes (Table 3.7-1), GHGs emitted by countless sources worldwide accumulate in the atmosphere. No single emitter of GHGs is large enough to trigger global climate change on its own. Rather, climate change is the result of the individual contributions of countless past, present, and future sources. Therefore, GHG impacts are inherently cumulative.

In accordance with Appendix G of the State CEQA Guidelines, the Project would be considered to have a significant effect if it would result in any of the conditions listed below.

- Generation of GHG emissions, either directly or indirectly, that may have a significant impact on the environment.
- Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs.

Generation of GHG Emissions

CARB recommends statewide targets of no more than 6.0 MT CO_2e per capita by 2030 and no more than 2.0 MT CO_2e by 2050. These statewide per capita targets account for all emissions sectors in the State, statewide population forecasts, and the statewide reductions necessary to achieve the 2030 statewide target under SB 32 and the long-term goal of 80 percent below 1990 levels by 2050. CARB recommends, but does not statutorily require, that local governments evaluate and adopt robust and quantitative locally-appropriate goals that align with the statewide per capita targets and the State's sustainable development objectives, as affirmed by the Newhall Ranch decision (see Section 3.7.1.1, *Regulatory Setting*). Emissions inventories and reduction goals should be expressed in mass emissions, per capita emissions, and service population emissions. (California Air Resources Board 2017)

The statewide per capita goals were developed by applying the percent reductions necessary to reach the 2030 and 2050 climate goals (40 percent and 80 percent, respectively) to the State's 1990 emissions limit established under AB 32. Following this methodology, the table below shows the maximum mass emissions (i.e., emissions targets) that the City would need to have to achieve State reduction targets. The table also shows the resultant per capita targets for the City, which would be well below the maximum levels established by the State.

As seen in Table 3.7-4, targets for 2040 were calculated based on a linear trajectory between 2030 and 2050, resulting in a target maximum GHG emissions of 154,433 MT CO_2e. In addition to proving a net reduction in mass emissions compared to existing conditions, mass emissions generated by the Project at or below this amount would constitute a less-than-significant impact on the environment.

Table 3.7-4. City of Napa GHG Emissions Targets Pursuant to AB 32

	1990 Levels	Targets		
		2030	2040	2050
Mass Emissions	386,083	231,650	154,433	77,217
Percent reduction from 1990		40%	60% [a]	80%
Population [b]	61,865	85,934	87,961	87,630
Resultant Per Capita Emissions	6.2	2.7	1.8	0.9
State Max. Per Capita Emissions		6.0	4.0 [a]	2.0
Service Population [c]	86,885	204,344	217,620	229,607
Resultant Per Service Population Emissions [d]	4.4	1.1	0.7	0.3

Sources: Napa County Transportation and Planning Agency 2009; California Department of Finance 2007, 2020; California Economic Development Department 2021.

General note: Emissions in terms of metric tons of carbon dioxide equivalent (MT CO_2e).

[a] 2040 targets assumed to be the midpoint between 2030 and 2050 (i.e., linearly interpolated).

[b] Projected population from California Department of Finance for Napa County, calculated for the City using current proportion (60 percent) as a conservative estimate.

[c] Service population based on long-term (10-year) job growth (9.5 percent) projected by California Employment Development Department based on 2018 baseline. 2030 uses projection for 2028, and growth rate extrapolated to 2048, used as a proxy for 2050. 1990 calculated as 60 percent share of county employment in 1990.
[d] The State has not established per service population targets.

It is noted that these statewide benchmarks are out-of-date, given that the statewide goal has moved to carbon neutrality by 2045 pursuant to EO B-55-18, which would correspond to both a per capita and per service population emissions of 0.0 MT CO_2e by 2045. Updates to BAAQMD CEQA Guidelines, not yet adopted, include proposed thresholds for GHG that would align with these updated targets, and the CARB 2022 Scoping Plan, also under development, would align targets to match statewide goals. While a maximum emissions threshold of 154,433 MT CO_2e is used to analyze Impact GHG-1, Impact GHG-2 considers whether the Project would further State goals to achieve this more stringent target, in addition to the criteria discussed below.

Conflict with Applicable Plans, Policies, or Regulations

As described in Section 3.7.1.1., *Regulatory Setting*, applicable plans, policies, and regulations adopted for the purpose of reducing GHG emissions include AB 32, SB 32, EO S-3-05, EO B-55-18, CARB's 2017 Scoping Plan, and SB 375/Plan Bay Area 2050. State plans, policies, and regulations are tied to the quantitative targets discussed above, and exceeding these determined thresholds would constitute a significant impact. In contrast, consistency with SB 375 and Plan Bay Area 2050 is assessed qualitatively, and conflict with any applicable strategies of the RTP/SCS would constitute a significant impact. The Project must meet both these criteria to have a less-than-significant impact.

3.7.2.4 Impacts and Mitigation Measures

Impact GHG-1: Generation of GHG emissions, either directly or indirectly, that may have a significant impact on the environment (Significant and Unavoidable)

Construction

Construction associated with the Project would result in the temporary generation of CO_2, CH_4, and N_2O. Emissions sources include exhaust from mobile and stationary construction equipment and employee and haul truck vehicles, as well as construction-related electricity consumption and tree removal. Construction-related emissions would vary substantially depending on the level of activity, length of the construction period, specific construction operations, types of equipment and number of personnel.

The Project does not propose any specific development projects, but construction of land use developments allowable under the Project would occur intermittently over the course of the 20-year buildout period. As the timing and intensity of future development projects is not known at this time, the precise effects of construction activities associated with buildout of the Project cannot be quantified at this time. Project-specific details of future development within the Planning Area is currently unknown because development would be driven by market conditions, site constraints, land availability, and property owner interest. It is assumed that implementation of the Project ultimately could result in a net new development of up to 7,800 residential units; 817,000 square feet of office uses; 1,799,000 square feet of industrial uses; and 631,000 square feet of retail uses. It is anticipated that in any given year, multiple land use development projects would be constructed within the Planning Area.

Future development would be required to comply with policies proposed as part of the Project that would reduce GHG emissions from construction, including NRC 5-4, which would require contractors to use best management practices (BMPs) to reduce emissions associated with construction activities and CCS 1-2, which calls for City to develop plans to reduce fossil fuel consumption in construction and requires that construction for municipal projects use sustainable construction practices. Additionally, Policy CCS 8-1 calls for green building practices, construction debris and waste diversion, and demonstrate high performance building standards.

Current BAAQMD CEQA guidance does not define thresholds of significance for construction-related GHG emissions, but rather, recommends that agencies follow BMPs to reduce the impact of short-term construction-related emissions. Given that Project policies would require future development to comply with BMPs and that other policies would further reduce construction-related GHG emissions, the Project's impact due to short-term construction emissions would be less than significant.

Operation

Operation of land uses supported by the Project would generate direct and indirect GHG emissions. Sources of direct emissions include mobile vehicle trips, natural gas combustion, and landscaping activities. Indirect emissions would be generated by electricity generation and consumption, waste and wastewater generation, solid waste, and water use. Operational emissions for existing baseline and 2040 buildout conditions (with and without quantifiable policies) are summarized in Table 3.7-5. The modeled emissions for unmitigated Project conditions are a conservative estimate of the Project's impact on GHGs because they do not account for Project policies such as solid waste reduction, water and energy conservation, and promotion of sustainable modes of transportation (goals CCS-2, CCS-5, and CCS-6). Therefore, a conservative estimate of operational emissions generated by the Project would result in a net decrease in annual emissions by 29,848 MT CO_2e compared to existing conditions. As seen in Table 3.7-5, these reductions primarily come from mobile sources and, to a lesser extent, water consumption; however, there is a slight increase in emissions from area and energy sources. These changes reflect the increasing population and greater intensity development enabled by the Project, as well as diversification of land uses due to new mixed-use designations, which would reduce VMT.

Table 3.7-5 shows that implementation of proposed policies, including those that would achieve reductions in parking (Goal LUCD-4 and policies LUCD 3-6, LUCD 4-1, LUCD 11-3, LUCD 12-5, and LUCD 17-2), commute trips (goals CCS-1 and CCS-2), water use (Goal CCS-5), and waste generation (Policy CSPR 8-7) would result in a net reduction in annual emissions by 62,026 MT CO_2e compared to existing conditions – more than double what the unmitigated Project would achieve. It is noted that some policies cannot be quantified by CalEEMod due to lack of information or dependence on individual behavior – for example: Policy CCS 7-8, which converts street lighting, water pumping, water treatment, and other energy-intensive operations to more efficient technologies; Policy CCS 7-10, which incentivizes the use of on-site renewable energy generation for new and existing buildings; and TE 10-1, which promotes personal use of electric vehicles by providing or promoting adequate publicly-accessible charging stations and designated parking at City facilities, multi-family housing, and commercial developments. The effects of such policies would reasonably have additional mitigating potential that would further reduce GHG emissions, though it is unlikely that these reductions would be on the scale needed to offset mass emissions.

Table 3.7-5. Estimated Project Operational GHG Emissions

		Emissions (metric tons per year)			
Condition	Source	CO_2	CO_2e	N_2O	CO_2e
Existing	Area	3,110	0	0	3,174
	Energy	91,004	7	2	91,702
	Mobile	194,844	13	11	198,434
	Waste	9,496	561	0	23,526
	Water	4,329	150	4	9,143
	Total	**302,783**	**731**	**16**	**325,978**
Project - Unmitigated	Area	3,205	0	0	3,271
	Energy	100,960	9	2	101,812
	Mobile	156,529	8	8	158,958
	Waste	9,496	561	0	23,526
	Water	3,750	150	4	8,564
	Total	**273,939**	**728**	**13**	**296,131**
	Net Reductions				**-29,848**
Project - with Policies [a]	Area	3,205	0	0	3,271
	Energy	100,960	9	2	101,812
	Mobile	143,029	7	7	145,281
	Waste	2,374	140	0	5,881
	Water	3,375	135	3	7,708
	Total	**252,943**	**292**	**12**	**263,952**
	Net Reductions				**-62,026**

[a] Includes only policies that can be quantified in CalEEMod.

Based on these modeled emissions, changes in land use and transportation activity under the Project (unmitigated scenario) would result in a per capita emissions of 3.0 MT CO_2e and a per service population emissions of 1.8 MT CO_2e. Per capita, the Project outperforms the region and is in line with the linearly interpolated State target of 4.0 MT CO_2e in 2040, as shown in Table 3.7-6 below. The Project also achieves a lower per service population emissions ratio than the region overall. With respect to overall mass emissions, however, the Project would achieve less reductions than the regional plan (23 percent versus 38 percent in 2040 for the Project and the region, respectively) and would not be on target with the 2017 Scoping Plan (60 percent in 2040). Moreover, the Project would not meet the City-specific target (Table 3.7-4) of 154,433 MT CO_2e needed to achieve long-term State goals. Although quantified emissions for the Project with proposed policies is closer to this target—with 263,952 MT CO_2e and a 32 percent reduction from 1990 levels—the Project's emissions continue to exceed the threshold for analysis of this impact.

Table 3.7-6. City of Napa, Regional, and State GHG Emissions Efficiency Metrics

	Project Projections [a]	Plan Bay Area 2050 Projections [b,c]	State Targets (2017 Scoping Plan) [c]
2030			
Per capita (MT CO_2e)	-	5.0	6.0
Per service population (MT CO_2e)	-	3.4	-
Percent reduction since 1990	-	36%	40%
2040			
Per capita (MT CO_2e)	3.0	4.4	4.0
Per service population (MT CO_2e)	1.8	2.9	-
Percent reduction since 1990	23%	38%	60%
2050			
Per capita (MT CO_2e)	-	4.0	2.0
Per service population (MT CO_2e)	-	2.6	-
Percent reduction since 1990	-	39%	80%

Sources: Bay Area Air Quality Management District 2015; California Department of Finance 2007, 2020; Metropolitan Transportation Commission/Association of Bay Area Governments 2021b, 2021c.

[a] Unmitigated Project scenario used for most direct comparison with regional projections. Estimated emissions for the Project with quantifiable policies would result in 2.7 MT CO_2e per capita, 1.6 MT CO_2e per service population, and a 32 percent reduction from 1990 levels.

[b] Plan Bay Area 2050 projections are from the Program EIR and are calculated using estimated emissions generated by operation of the regional plan divided by the forecast population. This EIR used 1990 levels for the Bay Area region from the BAAQMD inventory (base year 2011), which reported 67.1 million MT CO_2e.

[c] 2040 is linearly interpolated between the given values for 2030 and 2050.

Because the City of Napa does not have a Qualified GHG Reduction Strategy (i.e., a climate action plan), the Project is analyzed quantitatively to evaluate potential significant impact on the environment due to GHG emissions. As discussed above, quantified estimates of the Project's operational emissions would result in a significant impact. Unquantified construction emissions would further contribute to the overall total, though qualitatively less-than-significant when considered alone. As such, the City has preemptively determined that it is necessary to adopt a climate action plan as a Qualified GHG Reduction Strategy in order to ensure that the City and the Project, if adopted, would further the State's and region's GHG reduction goals. Proposed Policy CCS 1-5 would require the City to work with BAAQMD and other relevant agencies and partners to adopt a climate action plan as a Qualified GHG Reduction Strategy to address the GHG reduction goals of EO B-55-18, SB 32, and EO S-03-05. Implementation of this policy would lower the Project's impacts below both BAAQMD's current and proposed plan-level significance thresholds for GHG. However, because implementation of this policy (i.e., adoption of a Qualified GHG Reduction Strategy) cannot be guaranteed, this impact is significant and unavoidable.

Impact GHG-2: Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs (Significant and Unavoidable)

SB 375 and Plan Bay Area 2050

Plan Bay Area 2050 provides a long-range framework to minimize transportation impacts on the environment, improve regional air quality, protect natural resources, and reduce GHG emissions. The plan supports smart growth principles, promotes infill development, and proactively links land use, air quality, and transportation needs in the region. Plan Bay Area implements SB 375, which

requires MTC/ABAG to adopt an SCS that outlines policies to reduce GHG emissions from automobiles and light trucks per service population. The SCS policies include a mix of 35 strategies that encourage compact growth patterns, mixed-use design, alternative transportation, transit, mobility and access, network expansion, and transportation investment. Table 3.7-7 demonstrates the Project's consistency with the strategies of Plan Bay Area 2050 that are applicable to the Planning Area.

Table 3.7-7. Project Implementation of Plan Bay Area 2050 Strategies

No.	Plan Bay Area 2050 Strategy	Supporting Proposed General Plan Policies
Housing Strategies		
H1	Further strengthen renter protections beyond state law.	Strategies H1, H2, H4, and H5 relate to provision and protection of housing affordable to lower-income populations, which is supported by Goal PHE-6 and policies PHE 6-3, PHE 6-6, and PHE 6-7 that call for affordable housing, particularly near public amenities and other services or resources. The Land Use and Community Development Element creates new land use designations focused along key corridors and Downtown (part of the Priority Development Area in Napa) that allow higher densities and intensities and encourage mixed-use development, both of which will result in greater housing opportunities, including mixed-income housing, in walkable neighborhoods near community-serving retail and transit, as outlined in strategies H3, H6, and H8 of Plan Bay Area. Goal PHE-9 and policies PHE 9-3 and ED 2-6 support Strategy H7 by proactively engaging and prioritizing local businesses and underrepresented groups to further equity.
H2	Preserve existing affordable housing.	
H3	Allow a greater mix of housing densities and types in Growth Geographies (Priority Development Areas, select Transit-Rich Areas, and select High-Resource Areas).	
H4	Build adequate affordable housing to ensure homes for all.	
H5	Integrate affordable housing into all major housing projects.	
H6	Transform aging malls and office parks into neighborhoods.	
H7	Provide targeted mortgage, rental, and small business assistance to Equity Priority Communities (low-income communities and communities of color).	
H8	Accelerate reuse of public and community-owned land for mixed-income housing and essential services.	
Economic Strategies		
EC1	Implement a statewide universal basic income.	Proposed Policy ED 1-8 supports Strategy EC1 by incentivizing businesses to create high-quality jobs (at least 75 percent of median income). Policies ED 1-1 and ED 2-5 call for job training and incubator programs (Strategy EC2). Policy PHE 9-7expands digital access in underserved low-income communities (EC 3). Strategies EC4 and EC5 are addressed by land use designations, as discussed above, which increase maximum allowable densities/intensities and introduce mixed uses in areas that are currently only single-use, particularly along focus areas and other key locations to improve connectivity and reduce VMT. Goals LUCD-12 and ED-5 and Policy ED 1-3 seek to preserve industrial lands and encourage development of these areas as maker spaces that support local economy and culture (Strategy EC6).
EC2	Expand job training and incubator programs.	
EC3	Invest in high-speed internet in underserved low-income communities.	
EC4	Allow greater commercial densities in Growth Geographies.	
EC5	Provide incentives to employers to shift jobs to housing-rich areas well served by transit.	
EC6	Retain and invest in key industrial lands.	

No.	Plan Bay Area 2050 Strategy	Supporting Proposed General Plan Policies
Transportation Strategies		
T1	Restore, operate, and maintain the existing system.	Strategies T3, T6, T7, and T8 relate to street network improvements, which are a priority of the Transportation Element in the Project. Traffic-calming and development of Complete Streets support safe and efficient multi-modal environments that are the focus of Goal TE-2, which also supports a Vision Zero policy and integration of the local Napa Vine bus service and Napa Valley Transportation Authority's regional transit network (Goal TE-4). These proposed policies support strategies T1, T9, T10, and T12. Policy PHE 1-1 calls for community collaboration in design of the built environment, including transportation, and consideration of equity in capital projects through project development and prioritization.
T2	Support community-led transportation enhancements in Equity Priority Communities.	
T3	Enable a seamless mobility experience.	
T6	Improve interchanges and address highway bottlenecks.	
T7	Advance other regional programs and local priorities.	
T8	Build a Complete Streets network.	
T9	Advance regional Vision Zero policy through street design and reduced speeds.	
T10	Enhance local transit frequency, capacity, and reliability.	
T12	Build and integrated regional express lands and express bus network.	
Environmental Strategies		
EN1	Adapt to sea level rise.	Goal SN-3 addresses flooding that may occur due to sea level rise (EN1). LUCD 8-2, CCS 8-3, and HCR 1-3 provide support and incentives for property owners to retrofit or rehabilitate their buildings (EN2). Policy CCS 7-6 would fund energy conservation strategies for residential and commercial property owners, and Policies CCS 6-4, CCS 7-1, and CCS 7-5 would further carbon neutrality goals in public buildings (EN3). Policies CCS 2-3 and CCS 2-4 expand clean vehicle initiatives (EN 8); CCS 2-1 and CCS 2-6 expand strategies, alternatives, and incentives for employees to reduce commute trips (EN7); and Goals TE-6 and TE-7 address transportation demand management (EN9). There are no Priority Conservation Areas within the Planning Area, and development under the Project would be within the Rural-Urban Limit line (RUL) and incorporated portions of the City – specifically in focus areas and other locations identified for targeted growth, consistent with objectives of the Land Use and Community Design element (EN4). The Natural Resources Conservation and Community Services, Parks, and Recreation elements balance recreational needs and protection of natural lands in and around the Planning Area (EN5, EN6).
EN2	Provide means-based financial support to retrofit existing residential buildings.	
EN3	Fund energy upgrades to enable carbon neutrality in all existing commercial and public buildings.	
EN4	Maintain urban growth boundaries.	
EN5	Protect and manage high-value conservation lands (including but not limited to Priority Conservation Areas and wildland-urban interface areas).	
EN6	Modernize and expand parks, trails, and recreation facilities.	
EN7	Expand commute trip reduction programs at major employers.	
EN8	Expand clean vehicle initiatives.	
EN9	Expand transportation demand management initiatives.	

Sources: Metropolitan Transportation Commission/Association of Bay Area Governments 2021a.

AB 32, SB 32, EO-S-3-05, and EO B-55-18

AB 32 and SB 32 outline the State's GHG emissions reduction targets for 2020 and 2030, respectively. While not legislatively adopted, EO S-03-05 establishes the State's long-term goal to reduce GHG emissions 80 percent from 1990 levels by 2050. EO B-55-18 sets a more ambitious State goal of net zero GHG emissions (carbon neutrality) by 2045.[3]

In 2008 and 2014, CARB adopted the Scoping Plan and First Update, respectively, as a framework for achieving AB 32. The Scoping Plan and First Update outline a series of technologically feasible and cost-effective measures to reduce statewide GHG emissions. CARB adopted the Climate Change Scoping Plan in November 2017 as a framework to achieve the 2030 GHG reduction goal described in SB 32. There is currently no adopted State plan for addressing GHG reductions beyond 2030, but the 2022 Scoping Plan update is underway and will assess progress towards achieving the SB 32 2030 target as well as lay out a path to achieve carbon neutrality by 2045.

Based on CARB's 2017 Scoping Plan, many of the reductions needed to meet the 2030 target will come from State regulations, including Cap-and-Trade, the requirement for increased renewable energy sources in California's energy supply, updates to Title 24 (including the forthcoming 2022 Energy Code, which will take effect in 2023 if adopted), and increased emission reduction requirements for mobile sources. The 2017 Scoping Plan indicates that reductions would need to come in the form of changes pertaining to vehicle emissions and mileage standards, changes pertaining to sources of electricity and increased energy efficiency at existing facilities, and State and local plans, policies, or regulations that will lower GHG emissions relative to business-as-usual conditions. The 2017 Scoping Plan carries forward GHG reduction measures from the First Update, as well as new potential measures to help achieve the State's 2030 target across all sectors of the California economy, including transportation, energy, and industry.

As discussed in Impact GHG-1 and Table 3.7-7, policies included in the Project would support State reduction strategies through VMT reductions enabled by sustainable development strategies, including mixed-use and infill development, as well as transportation improvements to the street network and sustainable modes of transportation (i.e., bicycle, pedestrian, and transit connectivity). Additionally, energy reduction policies, including conservation strategies such as community outreach programs, renewable energy generation, and building electrification (goals CCS-6, CCS-7, and CCS-8) will complement forthcoming building standards around all-electric design. Management of known emissions sources and implementation of sustainable design standards and practices will also contribute to GHG emissions reductions that will implement State and regional regulations.

However, as shown in Table 3.7-5, emissions from area and energy sources would increase under the Project, despite reductions in mobile, waste, and water sectors. As discussed under Impact GHG-1, overall operational emissions quantified for the Project would exceed the amount needed to meet AB 32 targets for 2030 and 2050. Moreover, the Project would need to achieve an even more stringent mass emissions target of 77,217 MT CO_2e by 2040 in order to be on track to achieve carbon neutrality by 2045 per EO B-55-18.[4] Construction-related emissions from future

[3] Existing technologies do not currently have the ability to achieve net zero emissions. While new technologies may be developed, this Draft EIR considers only considers existing and reasonably foreseeable settings. It is therefore noted that implementation of all existing best practices and technologies may still not be enough to attain carbon neutrality by 2045, nor would it be feasible.

[4] Calculated based on the linear trajectory between 231,650 MT CO_2e in 2030 and zero MT CO_2e in 2045.

development allowed by the Project would further add to the total. Although the Project includes a suite of policies intended to minimize GHG emissions, including a policy that requires adoption of a Qualified GHG Reduction Strategy, it is uncertain whether these policies will, in effect, lower the City's GHG emissions to a less-than-significant level. Therefore, while the Project strives to be consistent with policies and plans that encourage energy conservation, energy efficiency, and sustainability, growth enabled by the Project would ultimately result in a fundamental conflict with State plans, policies, and regulations regarding GHGs.

Conclusion

The Project includes numerous policies that support all applicable Plan Bay Area strategies, and proposed policies would achieve net reductions in GHG emissions and otherwise implement a Qualified GHG Reduction Strategy to meet targets established by EOs S-3-05 and B-55-18. However, due to the scale of emissions reductions needed to comply with these targets and given that adoption of a Qualified GHG Reduction Strategy cannot be guaranteed, as also discussed in Impact GHG-1, this impact would be significant and unavoidable.

3.7.3 References Cited

Bay Area Air Quality Management District. 2015. Bay Area Emissions Inventory Summary Report: Greenhouse Gases Base Year 2011, January. https://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/Emission%20Inventory/BY2011_GHGSummary.ashx?la=en&la=en . Accessed October 2021.

———. 2017. California Environmental Quality Act: Air Quality Guidelines. May. https://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en. Accessed October 2021.

———. 2021. Air District Update to CEQA Thresholds of Significance for Greenhouse Gases Public Workshop. December 9. https://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa-thresholds-workshop-120921/120921-public-workshop-ghg-thresholds-final-pdf.pdf?la=en&rev=9c056fdabfd243dfbe1b86c09ef7bd2f. Accessed: December 2021.

Blasing, T. J. 2016. *Recent Greenhouse Gas Concentrations*. DOI: 10.3334/CDIAC/atg.032. Updated April.

California Air Resources Board. 2017. California's 2017 Climate Change Scoping Plan, November. https://ww2.arb.ca.gov/sites/default/files/classic/cc/scopingplan/scoping_plan_2017.pdf. Accessed October 2021.

———. 2019. CARB 2017 Scoping Plan-Identified VMT Reductions and Relationship to State Climate Goals. January. https://ww2.arb.ca.gov/sites/default/files/2019-01/2017_sp_vmt_reductions_jan19.pdf. Accessed November 2021.

———. 2021. 2000–2019 GHG Emissions Trends Report. https://ww2.arb.ca.gov/ghg-inventory-data. Accessed October 2021.

California Department of Finance, E-8 Historical Population and Housing Estimates for Cities, Counties, and the State, 2000-2010, November 2012. https://www.dof.ca.gov/forecasting/demographics/estimates/E-8/2000-10/. Accessed October 2021.

———. E-5 Population and Housing Estimates for Cities, Counties, and the State, 2011-2021 with 2010 Census Benchmark, May 2020. https://www.dof.ca.gov/forecasting/demographics/estimates/e-5/. Accessed April 2021.

California Department of Forestry and Fire Protection. Stats and Events, November 2021. https://www.fire.ca.gov/stats-events/. Accessed November 2021.

Center for Climate and Energy Solutions. 2016. *The Basics*. Available: http://www.c2es.org/facts-figures/basics/greenhouse-effect. Accessed: May 12, 2016.

City of Napa. 2012. Sustainability Plan. July 24. http://www.cityofnapa.org/DocumentCenter/View/925/Sustainability-Plan-Initiatives-PDF?bidId=. Accessed June 2021.

Intergovernmental Panel on Climate Change. 2007. Introduction. In B. Metz, O. R. Davidson, P. R. Bosch, R. Dave, L. A. Meyer, (eds.), *Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 2007*. Cambridge, U.K. and New York, NY, USA: Cambridge University Press. Available: http://www.ipcc.ch/pdf/assessment-report/ar4/wg3/ar4-wg3-chapter1.pdf. Accessed: August 11, 2009.

———. 2013. *Draft: Climate Change 2013: The Physical Science Basis*. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. S. Joussaume, J. Penner, and F. Tangang (eds.). New York, NY: Cambridge University Press.

———. 2014. *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland. Available: http://www.ipcc.ch/report/ar5/syr/. Accessed: December 16, 2015.

———, 2021: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press. In Press.

Jacobson, M. Z. On the causal link between carbon dioxide and air pollution mortality, *Geophys. Res. Lett.*, 35, L03809, February 2008. doi:10.1029/2007GL031101. Accessed November 2021.

Metropolitan Transportation Commission and Association of Bay Area Governments. Plan Bay Area 2050, 2021a. https://www.planbayarea.org/sites/default/files/documents/Plan_Bay_Area_2050_October_2021.pdf. October. Accessed October 2021.

———. 2021b. Plan Bay Area 2050 Draft Program Environmental Impact Report (State Clearinghouse #2020090519). June. https://www.planbayarea.org/sites/default/files/documents/2021-06/PBA_2050_DEIR.pdf. Accessed December 2021.

———. 2021c. Plan Bay Area 2050 Final Program Environmental Impact Report (State Clearinghouse #2020090519). October. https://www.planbayarea.org/sites/default/files/documents/PBA_2050_Final_EIR.pdf. Accessed December 2021.

Myhre, G., D. Shindell, F.-M. Bréon, W. Collins, J. Fuglestvedt, J. Huang, D. Koch, J.-F. Lamarque, D. Lee, B. Mendoza, T. Nakajima, A. Robock, G. Stephens, T. Takemura, and H. Zhang. 2013. Anthropogenic and Natural Radiative Forcing. Pages 659–740 in: *Climate Change 2013: The Physical Science Basis*. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T. F., D. Qin, G.-K. Plattner, M. Tignor, S. K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex, and P. M. Midgley (eds.)]. Cambridge, United Kingdom and New York, NY, USA: Cambridge University Press.

Napa County Transportation and Planning Agency. 2009. Napa Countywide Community Climate Action Plan Community Review Draft. December. https://www.napawatersheds.org/managed_files/Document/4269/Draft_napa_climate.pdf. Accessed: December 2021.

National Highway Traffic Safety Administration. 2021. NHTSA Repeals SAFE I Rule, Corporate Average Fuel Economy. United States Department of Transportation. December 21. https://www.nhtsa.gov/laws-regulations/corporate-average-fuel-economy. Accessed: December 2021.

National Oceanic and Atmosphere Administration Global Monitoring Laboratory. 2021. Carbon Cycle Greenhouse Gases, Global. October. https://gml.noaa.gov/ccgg/trends/global.html . Accessed November 2021.

3.8 Hazards and Hazardous Materials

Hazardous materials are substances that are dangerous to the public's health and safety, particularly if they are improperly used, stored, transported, or disposed. Hazardous materials include substances known to be toxic, flammable, explosive, corrosive, infectious, carcinogenic, or radioactive. The primary concerns pertaining to hazardous materials in Napa are their use, transportation, storage, and handling (i.e., potential accidents or spills). Additionally, hazardous materials (e.g., gasoline, diesel fuel, hazardous waste) are conveyed along highways and railways in the region.

3.8.1 Existing Conditions

3.8.1.1 Regulatory Setting

Federal

The primary federal laws regulating hazardous wastes/materials are the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) and the Resource Conservation and Recovery Act of 1976 (RCRA). The U.S. Environmental Protection Agency (EPA) is the principal federal regulatory agency responsible for the safe use and handling of hazardous materials. The key federal regulations pertaining to hazardous wastes relevant to the project are described below.

Comprehensive Environmental Response, Compensation, and Liability Act

The purpose of CERCLA, often referred to as *Superfund*, is to clean up contaminated sites so that public health and welfare are not compromised. CERCLA maintains a national trust for hazardous waste-related industries to be able to fund and coordinate large cleanup activities for hazardous waste spills and accidents and to clean up older abandoned waste sites. Amended in 1986, the act establishes two primary actions: (1) to coordinate short-term removal of hazardous materials; and (2) to coordinate and manage the long-term removal of hazardous materials identified on EPA's National Priorities List (NPL). The NPL is a record of known or threatened releases of hazardous substances, pollutants, or contaminants. A national database and management system, known as the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS), is used by EPA to track activities at hazardous waste sites considered for cleanup under CERCLA. CERCLA also maintains provisions and guidelines dealing with closed and abandoned waste sites and tracks amounts of liquid and solid media treated at sites on the NPL or sites that are under consideration for the NPL.

Resource Conservation and Recovery Act of 1976

RCRA (42 United States Code [U.S.C.] 6901–6987) provides for *cradle to grave* regulation of hazardous wastes and includes the Hazardous and Solid Waste Amendments of 1984 (HSWA). RCRA and HSWA protect human health and the environment, and impose regulations on hazardous waste generators, transporters, and operators of treatment, storage, and disposal facilities. HSWA also requires EPA to establish a comprehensive regulatory program for underground storage tanks. The corresponding regulations in 40 Code of Federal Regulations (CFR) 260–299 provide the general

framework for managing hazardous waste, including requirements for entities that generate, store, transport, treat, and dispose of hazardous waste.

Toxic Release Inventory

The Emergency Planning and Community Right-to-Know Act of 1986 and the Pollution Prevention Act of 1990 established the Toxic Release Inventory, a publicly available database that has information on toxic chemical releases and other waste management activities. The inventory is updated annually and lists chemical releases by industry groups and federal facilities managed by EPA.

Chemical Accident Prevention Provisions

Under the authority of Section 112(r) of the Clean Air Act, the Chemical Accident Prevention Provisions require facilities that produce, handle, process, distribute, or store certain chemicals to develop a Risk Management Program, prepare a Risk Management Plan (RMP), and submit the RMP to EPA.

Occupational Safety and Health Standards

Occupational safety standards exist in federal and state laws to minimize worker safety risks from both physical and chemical hazards in the workplace. The Occupational Safety and Health Administration (OSHA) is responsible for assuring worker safety in the workplace. OSHA asbestos regulations are contained in 29 CFR. Lead-based paint regulations are described in the Lead-Based Paint Elimination Final Rule (24 CFR 35), governed by the U.S. Department of Housing and Urban Development.

Hazardous Materials Transportation Act

The U.S. Department of Transportation (USDOT), the Federal Highway Administration (FHWA), and the Federal Railroad Administration are the three entities that regulate the transport of hazardous materials at the federal level. The Hazardous Materials Transportation Act (49 CFR 171 [C]) governs the transportation of hazardous materials. These regulations are promulgated by USDOT and enforced by EPA.

State

California hazardous materials and wastes regulations are equal to or more stringent than federal regulations. EPA has granted the state primary oversight responsibility to administer and enforce hazardous waste management programs. State regulations require planning and management to ensure that hazardous materials are handled, stored, and disposed of properly to reduce risks to human health and the environment. State laws pertaining to hazardous materials and wastes are discussed below.

California Accidental Release Prevention Program

As specified in 19 California Code of Regulations (CCR) 2, Chapter 4.5, Articles 1 through 11, all businesses that handle specific quantities of hazardous materials are required to prepare a California Accidental Release Prevention (CalARP) Program RMP. The CalARP RMP is the state equivalent of the federal RMP. CalARP RMPs include the preparation of an offsite consequence analysis of worst-case release of the stored chemicals and the preparation of emergency response

plans, including coordination with local emergency response agencies. CalARP RMPs are required to be updated at least every 5 years and when there are significant changes to the stored chemicals.

Hazardous Materials Release Response Plans and Inventory Act

The Hazardous Materials Release Response Plans and Inventory Act (also referred to as the Business Plan Act) requires a business using hazardous materials to prepare a business plan describing the facility, inventory, emergency response plans, and training programs. The owner or operator of any business that has specified amounts of liquid and solid hazardous materials, compressed gases, extremely hazardous substances, or underground storage tanks onsite, or that generates or treats hazardous waste, is required to develop and submit a business plan to the local Certified Unified Program Agency (CUPA), which, for the General Plan update, is the Napa County Division of Environmental Health.

California Health and Safety Codes

The California Environmental Protection Agency (Cal-EPA) has been granted primary responsibility by EPA for administering and enforcing hazardous materials management plans in California. Cal-EPA, more generally than EPA, defines a hazardous material as a material that, because of its quantity, concentration, or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety or to the environment if released. State regulations include detailed planning and management requirements to ensure that hazardous materials are properly handled, stored, and disposed of to reduce human health risks. In particular, the state has acted to regulate the transfer and disposal of hazardous waste. Hazardous waste haulers are required to comply with regulations that establish numerous standards, including criteria for handling, documenting, and labeling the shipment of hazardous waste.

Cortese List

Cal-EPA maintains the Hazardous Wastes and Substances Site (Cortese) List, a planning document used by state and local agencies and developers to comply with CEQA requirements in providing information about the locations of hazardous materials release sites. Per Government Code Section 65962.5, the Cortese List must be updated at least once annually. The California Department of Toxic Substances Control (DTSC), State Water Resources Control Board, and California Department of Resources Recycling and Recovery contribute to the hazardous material release site listings.

Hazardous Waste Control Act

The state equivalent of RCRA is the Hazardous Waste Control Act (HWCA). HWCA created the State Hazardous Waste Management Program, which is similar to but more stringent than the RCRA program. HWCA establishes requirements for the proper management of hazardous substances and wastes with regard to criteria for identification and classification of hazardous wastes; generation and transportation of hazardous wastes; design and permitting of facilities that recycle, treat, store, and dispose of hazardous wastes; treatment standards; operation of facilities; staff training; closure of facilities; and liability requirements.

Emergency Services Act

Under the California Emergency Services Act, the state developed an emergency response plan to coordinate emergency services provided by all governmental agencies. The plan is administered by the California Office of Emergency Services (OES). OES coordinates the responses of other agencies,

including EPA, the Federal Emergency Management Agency (FEMA), the California Highway Patrol, regional water quality control boards, air quality management districts, and county disaster response offices. Local emergency response teams, including fire, police, and sheriff's departments, provide most of the services to protect public health.

The Napa Fire Department serves as emergency management coordinator for the City of Napa and is the lead agency fulfilling the City's requirements under the Emergency Services Act (Government Code Section 8550 et. seq.). The fire department works with all City departments and other mutual aid partners that have emergency management responsibilities, including the Napa County OES. The office responds to disasters in Napa.

Public School Siting Requirements

The California Department of Education has developed a *School Site Selection and Approval Guide* to help school districts (1) select school sites that provide both a safe and a supportive environment for the instructional program and the learning process; and (2) gain state approval for the selected sites. Safety is the first consideration in the selection of school sites. Safety factors considered include the following: (1) proximity to airports; (2) proximity to high-voltage power transmission lines; (3) presence of toxic and hazardous substances; (4) hazardous air emissions and facilities within a quarter mile; (5) other health hazards; (6) proximity to railroads; (7) proximity to high-pressure natural gas lines, gasoline lines, pressurized sewer lines, or high-pressure water pipelines; (8) proximity to propane tanks; (9) noise; (10) proximity to major roadways; (11) results of geological studies and soils analyses; (12) condition of traffic and school bus safety; (13) safe routes to school; and (14) safety issues for joint-use projects.

The presence of potentially toxic or hazardous substances on or in the vicinity of a prospective school site is a concern relating to the safety of students, staff, and the public. The school district must submit materials documenting compliance with the toxic and hazardous substances requirements before submitting the balance of the site approval package documents required by the California Department of Education.

Worker Safety

The California Division of Occupational Safety and Health (Cal/OSHA) is the state agency responsible for assuring worker safety in the workplace. Cal/OSHA assumes primary responsibility for developing and enforcing standards for safe workplaces and work practices within the state. At sites become known as contaminated, a site safety plan must be prepared to protect workers. The site safety plan establishes policies and procedures to protect workers and the public from exposure to potential hazards at the contaminated site.

California Public Resources Code—State Responsibility Area

The California Public Resources Code requires the designation of State Responsibility Areas (SRAs), which are identified based on cover, beneficial water uses, probable erosion damage, and fire risks and hazards. The financial responsibility of preventing and suppressing fires in an SRA is primarily the responsibility of the state. Fire protection in areas outside of SRAs are the responsibilities of local or federal jurisdictions and are referred to as local responsibility areas and federal responsibility areas, respectively.

California Public Resources Code Sections 4201–4204

This section of the Public Resources Code was amended in 1982 to require the California Department of Forestry and Fire Protection (CAL FIRE) to classify Fire Hazard Severity Zones within SRAs. Lands within SRAs are classified in accordance with the severity of fire hazard present to identify measures to be used to retard the rate of spreading and reduce the potential intensity of uncontrolled fires that threaten to destroy resources, life, or property (California Department of Forestry and Fire Protection 2020).

Very High Fire Hazard Severity Zones

Government Code Section 51178 requires CAL FIRE to identify very high fire hazard severity zones in the state. Government Code Section 51179 requires a local agency to designate, by ordinance, very high fire hazard severity zones in its jurisdiction.

Local

Certified Uniform Program Agency

Cal-EPA can delegate responsibility for many of its programs to a local government through certification as a CUPA. A CUPA is responsible for implementing a unified hazardous materials and hazardous waste management program. This program was established under the amendments to the California Health and Safety Code (HSC) made by Senate Bill 1082 in 1994. HSC 25505 requires handlers of hazardous materials to submit business plans to the CUPA if hazardous materials inventories meet or exceed established thresholds. A CUPA can be a county, city, or joint powers authority that demonstrates its ability to administer the program.

Napa County Division of Environmental Health

The Division of Environmental Health has been designated by Cal-EPA as the CUPA for Napa County. As the CUPA, the division is responsible for performing all assessments of environmental contamination and/or human exposure and providing oversight of cleanup activity and coordination with the lead state agency having cleanup jurisdiction. In addition, the division oversees permitting and inspection of water wells and sewage disposal and petroleum waste injection wells; implements programs for hazardous materials emergency response and hazardous waste generators; and regulates the construction, operation, repair and removal of both aboveground storage tanks (ASTs) and underground storage tanks (USTs).

City of Napa Emergency Operations Plan

The City maintains an Emergency Operation Plan (EOP) that provides a framework for performing emergency functions before, during, and after an emergency event, natural disaster, or technological incident, and it supports the National Incident Management System (NIMS) and the Standardized Emergency Management System (SEMS). This plan is updated every five years.

City of Napa Local Hazard Mitigation Plan

The City of Napa Local Hazard Mitigation Plan (LHMP), managed by the City's Fire Department, acts as the City's primary implementing tool to identify hazards, estimate the probability of future occurrences, increase education and awareness, establish priorities, and set goals to mitigate

potential risks to reduce or eliminate long-term natural or human-made hazard risks to human life and property for the City and its residents. As of 2021, the LHMP is undergoing an update.

Napa General Plan

The following goals and policies excerpted from the Health and Safety and Natural Resources Elements of the current General Plan pertain to hazards and hazardous materials.

Health and Safety

Goal HS-6: To protect development from hazards and associated impacts due to aircraft and prevent incompatible land uses in the vicinity of the airport.

Policy HS-6.1: The City shall coordinate with the ALUC the review of development proposals on lands within the RUL to determine consistency with the Napa County Airport Land Use Compatibility Plan.

Policy HS-6.2: The City shall limit building heights for airspace protection in accordance with Federal Aviation Regulations Part 77.

Policy HS-6.3: The City shall restrict land uses within ALUCP Zones C, D and E (see Figure 8-10) that would create increased hazard risks (e.g., low mobility, highly sensitive to noise) in accordance with the use, density and design criteria provided in the ALUCP.

Policy HS-6.4: The City shall give consideration to the proximity of flight patterns, frequency of overflight, terrain conditions and type of aircraft in determining the acceptable locations for residential uses in Zone E.

Policy HS-6.5: The City shall require airport aircraft approach surfaces in ALUCP Zone C to be shown on all new development plans in Zone C and in Zone D within 100 feet of Zone C.

Policy HS-6.6: The City should cluster development, to the extent feasible, to preserve open land for safety purposes in Zones C and D of the ALUCP (see Figure 8-10).

Policy HS-6.7: The City shall require the dedication of overflight easements and/or deed notices when subdivisions or new construction are proposed on property within the jurisdiction of the ALUC.

Policy HS-6.8: The City shall refer helipad proposals anywhere within the City's Planning Area to the ALUCP for a consistency determination.

Goal HS-7: To reduce the risks to health and safety from hazardous wastes.

Policy HS-7.1: The City shall continue to monitor, modify if necessary and implement goals of the Household Hazardous Wastes Element.

Policy HS-7.2: The City shall support the Countywide Integrated Solid Waste Management Plan.

Policy HS-7.3: The City shall support the County's role as the Certified Unified Program Agency for all County jurisdictions.

Policy HS-7.3: The City shall seek to further develop and support policies such as green chemistry and Extended Producer Responsibility (EPR) that will reduce the overall generation of hazardous wastes and/or provide more sustainable funding and collection opportunities for the local residents and businesses.

Goal HS-8: A community that is informed and educated about natural hazards and safety procedures, and which participates in County emergency response efforts.

Policy HS-8.1: The City shall promote public awareness and understanding of natural hazards.

Policy HS-8.2: The City shall support the addition of a mandatory hazards education program to the state-required SEMS curricula.

Policy HS-8.4: The City shall require all sensitive facilities (facilities housing large numbers of people who have restricted mobility, i.e., hospitals, nursing homes, day care facilities, assisted care facilities, jails, etc.) to maintain and regularly update emergency response plans identifying safety procedures and evacuation routes.

Policy HS-8.5: The City shall identify evacuation routes and procedures for all sensitive facilities and implement programs to practice evacuation and safety maneuvers.

Policy HS-8.7: The City shall coordinate with County efforts to ensure efficient and integrated emergency response efforts.

Policy HS-8.10. The City shall review City resources and efforts to maintain a state of readiness in the event of an emergency.

Policy HS-8.12. The City shall coordinate the revision of the City of Napa Emergency Management Plan to address local needs and to satisfy all state and federal emergency management system requirements.

Policy HS-8.13. The City shall enlist the support of all City departments as well as the CAL EMA, CAL FIRE and the Federal Emergency Management Agency (FEMA) for assistance in the preparation of a plan consistent with Standardized Emergency Management/National Incident Management System (SEMS/NIMS) procedures.

Policy HS-8.15. The City shall maintain and equip an Emergency Operation Center (EOC) for immediate availability in the event of a disaster.

Policy HS-8.16. The City shall develop mechanisms in advance of a major emergency to cope with the subsequent rebuilding and recovery phases.

Natural Resources

Policy NR-1.9: The City shall continue the existing program for hazardous waste collection events to allow the public to safely dispose of pollution-causing products.

3.8.1.2 Environmental Setting

Certain chemical compounds located on, or below, the ground surface have the potential to contaminate the soil and groundwater. Furthermore, excavation and grading work has the possibility to expose the general public to contaminated materials either through physical contact or hazardous vapors. Mismanagement or mishandling of contaminated groundwater and soil can propagate the spread of contamination through surface water runoff or airborne dust, consequently increasing the public's exposure to these hazards.

In cooperation with the Regional Water Quality Control Board (RWQCB) and DTSC, the Napa County Environmental Health Division and the City of Napa coordinate the identification and cleanup of sites that have been classified as hazardous waste sites or leaking underground storage tanks (LUSTs) in the Planning Area. Containment and cleanup activities are provided by the Napa Interagency Hazardous Incident Team and Napa Fire Department.

Underground Storage Tanks and Leaking Underground Storage Tanks

The State Water Resource Control Board maintains GeoTracker, a data management system that can be accessed by State Boards, regional boards, and local agencies to acquire information regarding the location of USTs, LUSTs, land disposal sites, as well as other areas that may require groundwater cleanup. One UST was identified in Napa at the Raja Development Corporation located at 849 Jackson Street. The site of the UST is a commercial warehouse with a paved parking lot that was found to have petroleum contamination in the soil. There are 15 permitted USTs in the City of Napa.

GeoTracker lists 184 locations in the Planning Area that contained LUSTs. One site is open and eligible for closure, three sites are open and are being assessed, one site is currently being remediated, and 178 sites are completed and considered closed. All LUSTs in the Planning Area that are currently open and eligible for closure or are currently being assessed are shown in the *Existing Conditions Report* (City of Napa 2019: Figure 5-5, Table 5-4).

Cleanup Program Sites in the Planning Area

DTSC oversees the cleanup of over 90,000 properties throughout California that are believed to be contaminated or are contaminated to some degree with toxic substances. GeoTracker lists 21 locations in the Planning Area that have been identified by DTSC as Cleanup Program sites. There are four active sites, two closed sites, two inactive sites, two certified operational and management sites, and 11 sites that are under the control of another agency, such as RWQCB or EPA. The cleanup sites and locations are listed in the *Existing Conditions Report* (City of Napa 2019: Table 5-5).

Solid Waste Information System

The Solid Waste Information System (SWIS) is a database for solid waste facilities, operations, and disposal sites throughout California. The database provides the location, owner, operator, facility type, regulatory and operational status, local enforcement agency, and inspection and enforcement records for each facility listed in the system. The type of facilities found in the database range from landfills to waste tire sites. There are six facilities that have been identified as closed or active SWIS facilities in the Planning Area and are listed in the *Existing Conditions Report* (City of Napa 2019: Table 5-6).

Cortese List

Government Code Section 65962.5 requires the California Environmental Protection Agency to maintain an annually updated list of Hazardous Waste and Substances Sites, or Cortese List. The Cortese list provides information regarding the location of hazardous materials release sites. The list is compiled using information from the California DTSC, as well as state agencies, local agencies, and developers that are required to report hazardous materials releases. Within the Planning Area, no hazardous material release sites have been identified on the most recent Cortese List.

Fire Hazards

Government Code Section 51175-89 advises CAL FIRE, to identify areas, or zones, of very high fire hazard severity potential under the Fire and Resources Assessment Program (FRAP). These zones are mapped and identified on the basis of expected burn probabilities, potential fuels over a 30–50-year time period, and their correlated expected fire behavior, to better predict the possible vegetation fire exposure to buildings and developments. Under the FRAP, CAL FIRE has designated the Planning Area as NON-VHFHSZ. This indicates that the Planning Area is a non-very high fire hazard severity zone, and that the probability of a wildfire affecting the incorporated City is very low.

The western and southeastern borders of the Planning Area are adjacent to moderate fire hazard severity zones, while the remaining northern, eastern, and southern portions of the Planning Area are undesignated. All moderate, high, and very high fire hazard severity zones are under the financial responsibility of the state for fire protection and prevention in SRAs. Only very high fire

hazard severity zones are under the responsibility of the local jurisdiction for fire protection and prevention.

Notwithstanding the Planning Area's designation as a NON-VHFHSZ, in October 2017, several major wildfires occurred in the Napa County region (City of Napa 2019: Figure 5-6). Three major wildfires occurred in proximity to the Planning Area: the Nuns Fire, the Patrick Fire, and the Atlas Peak Road Fire. The Nuns Fire was suspected of originating less than 0.5 mile north of Highway 12, northwest of the Planning Area. The fire burned 56,216 acres and resulted in three fatalities. The Patrick Fire burned along the west side of the City of Napa on Patrick Road. The fire burned 10,000 acres and destroyed several homes before merging with the Nuns Fire. The two merged fires cumulatively affected nine wineries within the area, resulting in the destruction of buildings and infrastructure. The Atlas Fire originated on Atlas Peak Road, east of the Planning Area. The fire burned 51,624 acres and resulted in six fatalities. The fire also affected 10 wineries; one winery, VinRoc, was completed destroyed.[1]

Although the Planning Area is not designated as being located in a fire hazard zone by CAL FIRE, the City of Napa considers wildfire to be a serious risk to life and property. The City considers the densely developed perimeters of the Planning Area to the east and west as particularly susceptible to damage from wildfires.

Airport Hazards

The Napa County Airport is approximately 5 miles south of the City of Napa, outside the perimeter of the Planning Area. The airport has three runways with an average of 148 aircraft operations per day (AirNav 2021).

The Napa County Airport Land Use Commission (ALUC) created the Airport Land Use Compatibility Plan (ALUCP) in 1991 to explicitly define safety policies to protect public health, safety, and welfare by limiting the general public's exposure to risks associated with potential aircraft accidents within the area surrounding the Napa County Airport (Shutt Moen Associates 2019). The ALUCP establishes five compatibility zones around the airport, which delineate land use standards and land development restrictions based on the zone's proximity to the airport. These zones are Zone A: Runway Protection Zone, Zone B: Approach/Departure Zone, Zone C: Extended Approach/Departure Zone, Zone D: Common Traffic Pattern, and Zone E: Other Airport Environs. Each of these zones imposes different development conditions and prohibits certain land uses based on the individual zone's proximity to the airport. The closer the zone is to the airport, the stricter the development conditions are due to the greater the risk of accident and increased noise impacts.

Airport Zones A, B, and C are subject to height restrictions up to 35 feet above ground for any building, structure, or tree, and must comply with the rules outlined in the Federal Aviation Administration Part 77. However, a permit may be obtained to conduct work on any existing use, structure, or tree larger than 35 feet above ground. No building permit will be approved that would create or exacerbate a flight hazard. An avigation easement may be required for other types of development that are larger than 35 feet above ground.

The southern portions of the Planning Area are in Zones D and E. Much of this land is open space or in agriculture/vineyard use; industrial uses and a lodging use are also present. In Zone D, aircraft can range from 300 to 1,000 feet above the ground, and residential uses, as well as uses hazardous

[1] San Francisco Chronicle, Interactive Map: Wine Country Fires, 2018.

to flights, are prohibited in this zone. In Zone E, the zone farthest from the airport, there is a low risk of accidents, and noise impacts are much less and classified as overflight annoyance. The only prohibited uses in this zone are noise-sensitive outdoor uses. Overflight easements or deed notices may be required for other development uses in this zone.

3.8.2 Environmental Impacts

3.8.2.1 Methods for Analysis

The analysis of hazards and hazardous materials is based on a review of the *2040 Napa General Plan* (City of Napa 2000), review of the *Existing Conditions Report* (City of Napa 2019), and database research prepared in compliance with federal, state, and local ordinances and regulations and professional standards pertaining to hazards and hazardous materials. The environmental baseline for the analysis consists of the hazards and hazardous materials that are known to occur in the Planning Area and identified in the General Plan and other sources cited in Section 3.8.1, *Existing Conditions*, *Environmental Setting*.

Relevant General Plan Update Goals and Policies

Applicable General Plan update goals and policies from the Safety and Noise Element and Public Health and Equity Element are as follows.

Hazards and Hazardous Materials

GOAL SN-2: Protect Napa residents from health and safety impacts related to the use, storage, manufacture, and transport of hazardous materials.

Policy SN 2-1: Promote cleanup of hazardous sites and safe disposal of hazardous materials.

Policy SN 2-2: Carefully evaluate new uses that rely extensively on the use of hazardous materials to weigh their public health risks against their benefit.

Policy SN 2-3: Continue to monitor and educate property owners with Underground Storage Tanks (USTs) to prevent leakage. Assist property owners with site cleanup if the site is to be redeveloped.

Fire

GOAL SN-5: Work to prevent urban fires and exposure to wildfires, as well as protect life and property from fire dangers.

Policy SN 5-1: Implement best practices to address wildfire prevention on open space land within and around the City.

Policy SN 5-2: Facilitate communication and education to the community about fire safety, wildland fire protection measures, and evacuation/emergency response to wildland fires.

Policy SN 5-3: Continue to educate property owners and the public about local fire hazard prevention programs, vegetation management strategies, and other disaster preparation activities in areas threatened by wildfire.

Policy SN 5-4: Ensure that future development plans provide adequate evacuation routes, vegetation management policies, and fire-reduction design measures, as appropriate.

Policy SN 5-5: Regularly assess adequacy of emergency response and evacuation routes and identify any need for road extensions to serve neighborhoods that do not have sufficient evacuation routes or access for emergency services.

Policy SN 5-6: Support extending Linda Vista Avenue to Browns Valley Road to serve areas north of Napa Fire Station 5 to improve the provision of emergency fire service.

Other Public Safety and Hazards

GOAL SN-6: Help prepare for and mitigate various hazards that affect the Napa community.

Policy SN 6-2: Consider long-term compatibility between proposed new land uses surrounding the Napa County Airport.

Policy SN 6-3: Inform and educate community members about natural hazards and safety procedures.

- Centralize and familiarize the community with the City's and County's emergency information sources and ensure that these are accessible to those who have limited English speaking ability, as well as those with limited internet access.
- Work with the Napa Valley Community Emergency Response Team to improve public emergency preparedness.

Policy SN 6-4: Effectively coordinate disaster response and preparation strategies with County, regional, State, and federal agencies in the event of major seismic activity, flood, or wildland fire.

Policy SN 6-5: Coordinate with other local public agencies to facilitate resilient telecommunication networks and infrastructure during disasters.

Policy SN 6-6: Facilitate expansion of the telecommunications system to ensure widespread community access during a disaster.

Public Health and Equity Element

Health and Sustainable Natural Environment

Policy PHE 3-1: Protect sensitive receptors such as schools, childcare centers, senior living facilities, and residences from the impacts of stationary and nonstationary sources of pollution by ensuring adequate buffers or mitigation measures.

3.8.2.2 Thresholds of Significance

In accordance with Appendix G of the CEQA Guidelines, the General Plan update would be considered to have a significant effect if it would result in any of the following conditions.

- Creation of a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.
- Creation of a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.
- Release of hazardous emissions or handling of hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school.
- Location on a site that is on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and the creation of a significant hazard to the public or the environment.
- Location within an airport land use plan area or, where such a plan has not been adopted, location within 2 miles of a public airport or public use airport, resulting in a safety hazard or excessive noise for people residing or working in the Planning Area.

- Impairment of or physical interference with implementation of an adopted emergency response plan or emergency evacuation plan.
- Exposure of people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires.

3.8.2.3 Impacts and Mitigation Measures

Impact HAZ-1: Creation of a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials (less than significant)

Current land uses, as well as future land use changes and development under the General Plan update, involve, or could involve the transport, use, storage, generation, and disposal of hazardous materials, including lead and asbestos from building materials, chemicals from commercial uses, or fertilizers and pesticides from agricultural uses. Many businesses in the Planning Area currently use hazardous materials and generate hazardous wastes, which require regulatory oversight to protect human health and the environment. This includes open, eligible, or currently assessed LUSTs in the Planning Area (City of Napa 2019: Figure 5-5, Table 5-4), as well as pesticides used for agriculture. These uses are regulated by the Napa County Planning Building and Environmental Services under state and federal laws and regulations, including DTSC, which regulates the generation, transport, and disposal of hazardous waste, and the State Water Resources Control Board, which enforces the Clean Water Act and protects the quality of ground and surface waters. Routine transport of hazardous materials on State Routes 29 and 121 are regulated and monitored by USDOT, Caltrans, and the California Highway Patrol. Any hazardous material transport on the Napa Valley Wine Train rail tracks would be regulated and monitored by USDOT.

Agricultural transport and use of pesticides, which takes place on most agricultural use-designated land within and adjacent to the Planning Area, is regulated by CCR Title 3, which mitigates risks of hazard through routine use. Additionally, General Plan Policy SN 2-1 promotes the cleanup of hazardous sites and safe disposal of hazardous materials in the City, and Policy SN 2-2 would require the City to evaluate new uses that rely extensively on the use of hazardous materials to weigh their public health risks against their benefit. Implementation of policies would reduce impacts to less-than-significant levels.

Households in the Planning Area could also typically use small quantities of potentially hazardous materials for garden care and building maintenance, including but not limited to, garden chemicals, paints, solvents, and car care products. Similar materials are also maintained for public buildings and uses, such as the City Corporation Yard and City Hall. CCR Title 27 regulates waste disposal, including hazardous materials, to reduce exposure to potential hazards. General Plan Policies SN 2-3 and SN-6.3 address the education of Napa households regarding LUSTs and natural hazards and safety procedures.

Although the use and storage of hazardous materials releases cannot feasibly be eliminated, the requirements of existing regulatory programs combined with implementation of General Plan update policies referenced above would reduce potential impacts of routine transport, use, or disposal of hazardous materials and reasonably foreseeable upset or accident conditions to a less-than-significant level.

Impact HAZ-2: Creation of a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment (less than significant)

Implementation of the General Plan update would lead to additional development in the Planning Area, which would be subject to existing regulations described above and subsequent environmental review under CEQA. Construction equipment that is typically used for development projects has the potential to release oils, greases, solvents, and other finishing materials through accidental spills. Given the nature of hazardous materials that would be used, stored, or disposed of (e.g., materials for construction equipment, contaminated soil), there is a possibility for upset and accident conditions involving the release of hazardous materials into the environment. Accidental releases of small quantities of these substances could contaminate soils and degrade the quality of surface water and groundwater, resulting in a public safety hazard. However, the handling and disposal of these materials would be governed according to regulations enforced by the Napa Fire Department, CUPA, Cal/OSHA, and DTSC. In addition, regulations under the federal Clean Water Act require contractors to avoid allowing the release of materials into surface waters as part of their SWPPP and National Pollutant Discharge Elimination System (NPDES) permit requirements (Section 3.9, *Hydrology and Water Quality*). Therefore, it is not anticipated that the use of hazardous materials during construction would result in a reasonably foreseeable upset or accident condition that would cause a significant hazard to the public or environment.

In addition to the regulatory requirements noted above, reasonably foreseeable spills under operational conditions would be handled according to the specifications of the Napa County Area Plan. This plan identifies hazardous materials that pose a threat to the community, includes procedures for emergency response, provides for notification and coordination of emergency response personnel, provides for public safety including notification and evacuation, establishes training, and identifies emergency response supplies and equipment. Because compliance with the existing regulatory scheme would be required for all future development to avoid or minimize impacts related to the release of hazardous materials into the environment, this impact would be less than significant, and no mitigation is required.

Impact HAZ-3: Release of hazardous emissions or handling of hazardous or acutely hazardous materials, substances, or waste within 0.25 quarter mile of an existing or proposed school (less than significant)

Implementation of the General Plan update would lead to urban development and the intensification of land uses that could result in the release of hazardous emissions or entail the handling of hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school. There are existing and proposed land uses designated for schools throughout the Planning Area. The General Plan does not explicitly incorporate policies to limit the use of hazardous materials near school sites or limit the development of proposed schools near existing contamination; however, Policy PHE 2-1 in the Public Health and Equity Element of the General Plan update calls for the protection of sensitive receptors such as schools from impacts of stationary and non-stationary sources of pollution. The City also routinely consults with the school district prior to discretionary approval of new businesses and industry that use hazardous materials near existing school sites as part of the project review process. Additionally, school siting regulations implemented by the Department of Education prohibit locating proposed schools near existing contamination. Therefore, this impact would be less than significant, and no mitigation is required.

Impact HAZ-4: Location on a site that is on a list of hazardous materials sites and the resultant creation of a significant hazard to the public or the environment (less than significant)

As described above, no hazardous material release sites have been identified on the most recent Cortese List in the Planning Area. There are six open LUST sites, 21 cleanup sites, and six SWIS sites in the Planning Area. The Planning Area is not located on a Superfund or other NPL site; therefore, it would not result in a significant hazard to the public or the environment through exposure to such sites.

All future projects would be required to be consistent with the General Plan update and would be subject to environmental review under CEQA. The General Plan update would not change existing provisions regarding hazardous material sites. Existing regulations would ensure that sites containing hazardous materials be cleaned up to existing standards for the proposed land use prior to development. The impact is less-than-significant, and no mitigation is required.

Impact HAZ-5: Location in an airport land use plan area or within 2 miles of a public airport or public use airport, resulting in a safety hazard or excessive noise for people residing or working in the Planning Area (less than significant)

The closest public airport is the Napa County Airport located approximately 5 miles south of the City of Napa, outside the perimeter of the Planning Area. The airport has three runways with an average of 148 aircraft operations per day (AirNav 2021). The very southern portions of the Planning Area are in Zones D and E of the ALUCP. Much of this land is open space or in agriculture/vineyard use; industrial uses and a lodging use are also present. In Zone D, aircraft can range from 300 to 1,000 feet above the ground, and residential uses, as well as uses hazardous to flights, are prohibited in this zone. Finally, in Zone E, the zone farthest from the airport, there is a low risk of accident, and noise impacts are much less and classified as overflight annoyance. The only prohibited uses in this zone are noise-sensitive outdoor uses. Overflight easements or deed notices may be required for other development uses in this zone.

An aircraft crash occurring within the City would be a potentially disastrous hazard. Napa County Airport poses the greatest risk for aircraft hazards to the City. The *Napa County Multi-Jurisdictional Hazard Mitigation Plan* (Napa County 2020) contains goals and strategies to help plan for disaster events, such as an aircraft crash. Although arriving and departing planes from the Napa County Airport do pass over the City, these flight paths are generally over rural and agricultural areas. In addition, the Napa Fire Department has mutual aid agreements with other fire protection agencies, which could assist the City in the event of an accident. Thus, implementation of the General Plan update would not change any of the land uses within the ALUP or otherwise alter safety conditions for people within the Planning Area. The impact is less than significant, and no mitigation is required.

Impact HAZ-6: Impairment of or physical interference with implementation of an adopted emergency response plan or emergency evacuation plan (less than significant)

Development under the General Plan update, including new land uses and increased densities, has the potential to create obstacles to the implementation of emergency response or evacuation plans adopted for the City of Napa. Relevant emergency response or evacuation plans in the Planning Area include the Napa County Emergency Operations Plan and the Napa County Operational Area Hazard Management Plan. Several General Plan policies and implementing actions address the reduction of

risk due to hazards, which, in turn, reduces the impact of new development on emergency response plans. Policy SN 5-1 advises implementing best practices to aggressively address wildfire prevention on open space land. Policy SN 5-2 facilitates communication and education to the community on fire safety, wildland fire protection measures, and evacuation/emergency response to wildland fires. Policy SN 5-4 ensures that future development plans provide adequate evacuation routes. Policy SN 5-5 would require that the City regularly assess adequacy of emergency response and evacuation routes and identify need for road extensions to serve neighborhoods that do not have sufficient evacuation routes or access for emergency services. Adherence to existing regulations and the policies in the General Plan update would reduce this impact to less than significant and no mitigation is required.

Impact HAZ-7: Exposure of people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires (less than significant)

The provision of fire protection services is addressed in the discussion of the City's firefighting personnel and facilities, including wildland, structural, and basic hazardous materials response, in Section 3.13, *Public Services*. Several factors contribute to susceptibility to wildfire danger in Napa County: most notably climate, winds, vegetation, and water supply. Under the FRAP, CAL FIRE has designated the Planning Area as NON-VHFHSZ. This indicates that the Planning Area is a non-very high fire hazard severity zone, and that the probability of a wildfire affecting the incorporated City is very low. The western and southeastern borders of the Planning Area are adjacent to moderate fire hazard severity zones, while the remaining northern, eastern, and southern portions of the Planning Area are undesignated.

Implementation of the General Plan update could create a significant impact if future development were located in areas that exacerbated the potential wildfire risk. As described in Section 3.8.1, *Existing Conditions*, *Environmental Setting*, there are no areas within the Planning Area that have been classified by the state as having very high fire risk. However, there are areas outside of the Planning Area to the east and west that have experienced devastating fires in the recent past (i.e., the Nun's and Patrick and Atlas Peak Road fires). Chapter 15.04.010 of the City of Napa Municipal Code adopts the California Fire Code as amended, which regulates fire safety for existing and new construction. The California Strategic Fire Plan also reduces the fire risk of new development by focusing on fire suppression and prevention efforts, including hazard and risk assessment, land use planning, cooperation between fire protection jurisdictions, fire-resistant development, and post-fire recovery efforts.

Additionally, several policies in the General Plan update address potential fire hazards. Policy SN 5-1 advises implementing best practices to address wildfire prevention on open space land within and around the City. Policy SN 5-2 facilitates communication and education to the community on fire safety, wildland fire protection measures, and evacuation/emergency response to wildland fires. Policy SN 5-3 would continue to educate property owners and the public about local fire hazard prevention programs, vegetation management strategies, and other disaster preparation activities in areas threatened by wildfire. Policy SN 5-4 would ensure that future development plans provide adequate evacuation routes, vegetation management policies, and fire-reduction design measures. Policy SN 5-5 would assess the adequacy of emergency response and evacuation routes. Policy SN 5-6 would explore the feasibility of extending Linda Vista to Browns Valley Road to serve areas north of Napa Fire Station 5 to improve provision of emergency fire service. Implementation of these policies combined with the California Building Code standards and the review of all new structures and land uses in the Planning Area, by the Napa Fire Department would ensure that hazards from

wildfire associated with future development would be less than significant, and no mitigation is required.

3.8.3 References Cited

3.8.3.1 Printed References

AirNav. 2021. KAPC, Napa County Airport, Napa, California, USA. Available: https://www.airnav.com/airport/KAPC. Accessed: March 15, 2021.

California Department of Forestry and Fire Protection. 2020. California *Fire Hazard Severity Zone Viewer*. Available: https://egis.fire.ca.gov/FHSZ/. Accessed: March 15, 2021.

City of Napa. 2019. *City of Napa Emergency Operations Plan*. Prepared by the Kelle Kroll Group. August.

City of Napa. 2019. *Napa 2040 General Plan Existing Conditions Report.* Prepared by Dyett & Bhatia, in association with DKS Associates, EPS, ICF, Page & Turnbull, and West Yost Associates. Available: https://napacity.granicus.com/MetaViewer.php?view_id=&clip_id=2123&meta_id=166470. Accessed: March 15, 2021.

City of Napa. 2000. *2040 Napa General Plan.* Available: https://www.countyofnapa.org/DocumentCenter/View/3334/Napa-County-General-Plan---Complete-Document-PDF. Accessed: September 28, 2021.

City of Napa Fire Department. 2021. *City of Napa Hazard Mitigation Plan Update*. Available: https://documentcloud.adobe.com/link/review?uri=urn:aaid:scds:US:63ce3249-f5a8-4ff2-b4d0-3224848a9a79#pageNum=1. Accessed: December 6, 2021.

Shutt Moen Associates. 2019. Napa County Airport Land Use Commission Airport Land Use Compatibility Plan. Adopted April 22, 1991. Available: https://www.countyofnapa.org/DocumentCenter/View/1980/Airport-Land-Use-Compatibility-Plan-PDF. Accessed: March 15, 2021.

3.9 Hydrology and Water Quality

This section describes the regulatory and environmental setting for hydrology and water quality in the Planning Area, analyzes effects to hydrology and water quality that would result from implementation of the General Plan update, and provides mitigation measures, if applicable, to reduce the effects of any significant impacts.

3.9.1 Existing Conditions

3.9.1.1 Regulatory Setting

Federal

Clean Water Act

The Clean Water Act (CWA) is the primary federal law that establishes regulations to protect the quality of the nation's surface waters, including lakes, rivers, and coastal wetlands. The act operates on the principle that all discharges into the nation's waters are unlawful unless specifically authorized by a permit. Permit review is the CWA's primary regulatory tool.

At the federal level, the CWA is administered by the U.S. Environmental Protection Agency (EPA). The EPA has delegated responsibility to the State Water Resources Control Board (State Water Board) as the state agency with primary responsibility for implementing portions of the CWA. Typically, the regulatory requirements are implemented by the State Water Board through nine regional water quality control boards (Regional Water Boards) established throughout the state. The Central Valley Regional Water Quality Control Board (Central Valley Water Board) is responsible for regulating discharges to the Sacramento River and its tributaries.

Sections 303(d) and 305(b)

CWA Section 303(d) requires states to develop lists of impaired waters for which technology-based regulations and other required controls are not stringent enough to meet the water quality standards set by states. Each state must establish priority rankings for waters on the list and develop total maximum daily loads (TMDLs) that indicate the maximum amount of a pollutant that a waterbody can receive and still safely meet water quality standards.

The State of California adopts water quality standards to protect beneficial uses of waters of the state as required by Section 303(d) and the Porter-Cologne Water Quality Control Act of 1969 (Porter-Cologne Act). To identify candidate waterbodies for TMDL analysis, a list of water quality–impaired segments is generated by the State Water Board that must be approved by the EPA. Waters on the list do not meet water quality standards, even after point sources of pollution have installed the minimum required levels of pollution control technology.

In addition to the impaired waterbody list required by CWA Section 303(d), CWA Section 305(b) requires states to develop a report assessing statewide surface water quality. Both CWA requirements are addressed in a 303(d)/305(b) integrated report, which provides an update to the 303(d) list and a 305(b) assessment of statewide water quality. The State Water Board developed California's statewide *2014/2016 Integrated Report Clean Water Act 303(d) List/305(b) Report* based

on the integrated reports from each of the nine Regional Water Boards (State Water Board 2018). After approval by the State Water Board, the 2014/2016 Integrated Report was approved by EPA on April 6, 2018.

Section 401—Water Quality Certification

Section 401 of the CWA requires that an applicant pursuing a federal permit to conduct an activity that may result in a discharge of a pollutant obtain a water quality certification (or waiver). A water quality certification requires the evaluation of water quality considerations associated with dredging or placement of fill materials into waters of the United States. Water quality certifications are issued by one of the Regional Water Boards. Under the CWA, the Regional Water Boards must issue a Section 401 water quality certification for a project to be permitted under CWA Section 404.

Section 402—National Pollutant Discharge Elimination System

The 1972 amendments to the federal Water Pollution Control Act established the National Pollutant Discharge Elimination System (NPDES) permit program to control discharges of pollutants from point sources (Section 402). The 1987 amendments to the CWA created a section devoted to stormwater permitting (Section 402[p]). EPA has granted the State of California (the State Water Board and Regional Water Boards) primacy in administering and enforcing the provisions of the CWA and NPDES. NPDES is the primary federal program that regulates point-source and nonpoint-source discharges to waters of the United States.

NPDES General Permit for Construction Activities

The NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (Order 2009-0009-DWQ as amended by Order No. 2010-0014-DWQ and Order No. 2012-0006-DWQ) (Construction General Permit) regulates stormwater discharges for construction activities (CWA Section 402). Dischargers whose projects disturb 1 or more acres of soil, or whose projects disturb less than 1 acre but are part of a larger common plan of development that in total disturbs 1 or more acres, are required to obtain coverage under the Construction General Permit. The Construction General Permit requires the applicant to file a notice of intent (NOI) to discharge stormwater and to prepare and implement a stormwater pollution prevention plan (SWPPP). The SWPPP includes a site map and a description of proposed construction activities, along with a demonstration of compliance with relevant local ordinances and regulations, and an overview of the best management practices (BMPs) that would be implemented to prevent soil erosion and discharge of other construction-related pollutants that could contaminate nearby water resources. Permittees are further required to conduct annual monitoring and reporting to ensure that BMPs are correctly implemented and effective in controlling the discharge of stormwater-related pollutants.

BMPs included in the SWPPP may include measures such as the following.

1. Providing permeable surfaces where feasible.
2. Retaining and treating stormwater onsite using catch basins and filtering wet basins.
3. Minimizing the contact of construction materials, equipment, and maintenance supplies with stormwater.

4. Reducing erosion through soil stabilization, watering for dust control, installing perimeter silt fences, placing rice straw bales, and installing sediment basins. In order to minimize potential impacts on wildlife, no monofilament plastic mesh or line will be used for erosion control.
5. Maintaining water quality by using infiltration systems, detention systems, retention systems, constructed wetland systems, filtration systems, biofiltration/bioretention systems, grass buffer strips, ponding areas, organic mulch layers, planting soil beds, sand beds, and vegetated systems such as swales and grass filter strips that are designed to convey and treat either fallow flow (swales) or sheetflow (filter strips) runoff.

In addition, a procedure for spill prevention and control is typically developed to minimize the potential for, and effects from, spills of hazardous, toxic, or petroleum substances during all construction activities. If a spill should occur during construction that causes a release of a hazardous material, including oil and radioactive materials, the proper agencies are typically notified, and an Emergency Release Follow-up Notice Reporting Form is submitted no more than 30 days following the release.

NPDES General Municipal Stormwater Permit

CWA Section 402 mandates programmatic permits for municipalities to address stormwater discharges, which are regulated under the *NPDES General Permit for Municipal Separate Storm Sewer Systems* (MS4) (MS4 Permit). Phase I MS4 regulations cover municipalities with populations greater than 100,000, certain industrial processes, or construction activities disturbing an area of 5 acres or more. Phase II (Small MS4) regulations require municipalities with populations smaller than 100,000 and construction activities disturbing 1 or more acres of land area to develop a stormwater management plan for its jurisdiction. The City of Napa is covered under the statewide Phase II Small MS4 General Permit (Order No. 2013-0001-DWQ as amended by Order WQ 2016-0069-EXEC, Order WQ 2018-0001-EXEC and Order WQ 2018-0007-EXEC).

The State Water Board is advancing low impact development (LID) in California as a means of complying with municipal stormwater permits. The NPDES permit requires an LID approach to the treatment and conveyance of runoff prior to entering the MS4 system. LID incorporates site design, including the use of vegetated swales and retention basins and minimizing impermeable surfaces, to manage stormwater to maintain a site's predevelopment runoff rates and volumes.

Section 404—Permits for Fill Placement/Dredging in Waters and Wetlands

CWA Section 404 regulates the discharge of dredged and fill materials into *waters of the United States*, which include oceans, bays, rivers, streams, lakes, ponds, and wetlands. Project proponents must obtain a permit from the U.S. Army Corps of Engineers (USACE) for all discharges of dredged or fill material into waters of the United States before proceeding with a proposed activity. Before any actions that may affect surface waters are implemented, a delineation of jurisdictional waters of the United States must be completed, following USACE protocols, to determine if a project contains wetlands or other waters of the United States that qualify for CWA protection.

Compliance with Section 404 requires compliance with several other environmental laws and regulations. USACE cannot issue an individual permit or verify the use of a general permit until the requirements of the National Environmental Policy Act (NEPA), the federal Endangered Species Act (ESA), and National Historic Preservation Act (NHPA) have been met. In addition, USACE cannot issue or verify any permit until a water quality certification, or a waiver of certification has been issued pursuant to CWA Section 401.

National Flood Insurance Program

The National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973 were intended to reduce the need for large, publicly funded flood risk management structures and disaster relief by restricting development on floodplains. The Federal Emergency Management Agency (FEMA) administers the National Flood Insurance Program (NFIP) to subsidize flood insurance to communities that comply with FEMA regulations limiting development in floodplains. FEMA issues Flood Insurance Rate Maps (FIRMs) for communities participating in the NFIP. These maps delineate flood hazard zones in the community. These maps are designed for flood insurance purposes only and do not necessarily show all areas subject to flooding. The maps designate lands likely to be inundated during a 100-year event and elevations of this flooding. A 100-year event is the level of flooding for which there is a 1 percent statistical chance of occurrence in any given year. The maps also depict areas between the limits affected by 100-year and 500-year events and areas of minimal flooding. These maps often are used to establish building pad elevations to reduce risk to new development from flooding effects. The locations of FEMA-designated floodplains in the City are described below in the *Flood Hazards* section.

Executive Order 11988 Floodplain Management

Executive Order 11988 addresses floodplain issues related to public safety, conservation, and economics. The order generally requires federal agencies constructing, permitting, or funding of a project must avoid incompatible floodplain development, be consistent with the standards and criteria of the NFIP, and restore and preserve natural and beneficial floodplain values.

State

Porter-Cologne Water Quality Control Act

The Porter-Cologne Act established the State Water Board and divided the state into nine Regional Water Boards, which are responsible for coordination and control of water quality within their respective jurisdictional boundaries. Waters of the state are defined more broadly than "waters of the United States;" they are defined as any surface water or groundwater, including saline waters, within the boundaries of the state. This includes waters in both natural and artificial channels. The act requires the Regional Water Boards to establish water quality objectives while acknowledging that water quality may be changed to some degree without unreasonably affecting beneficial uses. Designated beneficial uses, together with the corresponding water quality objectives, also constitute water quality standards under the federal CWA. The act also requires projects that are discharging, or proposing to discharge, wastes that could affect the quality of the state's water to file a waste discharge report with the appropriate Regional Water Board.

Sustainable Groundwater Management Act

The Sustainable Groundwater Management Act of 2014 (SGMA) is a comprehensive three-bill package that Governor Jerry Brown signed into California state law in September 2014. SGMA provides a framework for sustainable management of groundwater supplies by local authorities, with a limited role for state intervention only if necessary, to protect the resource. The plan is intended to ensure a reliable groundwater water supply for California for years to come. SGMA requires the formation of local groundwater sustainability agencies (GSA), which are required to adopt groundwater sustainability plans (GSPs) to manage the sustainability of groundwater basins. GSAs for all high- and medium-priority basins, as identified by the California Department of Water

Resources (DWR), must adopt a GSP, or submit an alternative to a GSP. SGMA also requires governments and water agencies of high- and medium-priority basins to halt overdraft and bring groundwater basins into balanced levels of pumping and recharge. GSPs for high- and medium-priority basins are due to DWR by January 31, 2022; however, GSPs for critically over drafted high- and medium-priority basins were due to DWR by January 31, 2020. The Project overlies the Napa Valley Subbasin within the larger Napa-Sonoma Valley Groundwater Basin, which is designated as a high-priority basin. The Napa County GSA is currently developing a GSP for the Napa Valley Subbasin. The Draft Napa Valley Subbasin GSP was released in October 2020 and provides a framework for regional groundwater management in the Napa Valley subbasin that sustains the beneficial use of the groundwater resource (Luhdorff & Scalmanini 2020). The final draft of the GSP is due to the GSA by November 1, 2021. More information regarding groundwater in relation to water supply is provided in Section 3.17, *Utilities and Service Systems*, of this Draft EIR.

San Francisco Bay Water Quality Control Plan (Basin Plan)

The *San Francisco Bay Basin (Region 2) Water Quality Control Plan* (Basin Plan) specifies region-wide and waterbody–specific beneficial uses and sets numeric and narrative water quality objectives for several substances and parameters in numerous surface waters in its region. The Project site lies within the jurisdiction of the San Francisco Bay Regional Water Board (San Francisco Bay Regional Water Quality Control Board 2019). Pursuant to the Clean Water Act NPDES program, the Regional Water Board issues permits for point source discharges that must meet the water quality objectives and must protect the beneficial uses defined in the Basin Plan. Beneficial uses, water quality objectives, and Section 303(d)-listed impairments are described for the Planning Area in the *Surface Water Quality* section in the *Environmental Setting*.

California Department of Fish and Wildlife 1602 Streambed Alteration Agreement

Under Chapter 6 of the California Fish and Game Code, the California Department of Fish and Wildlife (CDFW) is responsible for the protection and conservation of the state's fish and wildlife resources. Section 1602 et seq. of the code defines the responsibilities of CDFW and requires that public and private applicants obtain an agreement to "divert, obstruct, or change the natural flow or bed, channel, or bank of any river, stream, or lake designated by the CDFW in which there is at any time an existing fish or wildlife resource or from which those resources derive benefit, or will use material from the streambeds designated by the department." A streambed alteration agreement is required under Section 1602 of the California Fish and Game Code for all activities that involve temporary or permanent activities within state jurisdictional waters.

Local

Napa Countywide Stormwater Pollution Prevention Program

The Napa Countywide Stormwater Pollution Prevention Program (NCSPPP) is a joint effort of Napa cities, towns, and unincorporated areas to provide consistency in approaches to prevent stormwater pollution, protect and enhance water quality in creeks and wetlands, preserve beneficial uses of local waterways, and to comply with state and federal regulations. Though the entities of the NCSPPP carry out their own individual stormwater pollution prevention programs, the NCSPPP provides for the coordination and consistency of approaches between the individual participants and documents their efforts in annual reports.

All public or private construction or ground disturbing activities must take steps to prevent discharge of pollutants resulting from these activities. Projects that disturb less than 1 acre of soil may refer to the *Erosion and Sediment Plan Guidance* document adopted January 1, 2015. Post development BMPs must also be incorporated into project designs. The *Bay Area Stormwater Management Agencies Associated* (BASMAA) *Post-Construction Manual* provides measures to ensure compliance with stormwater requirements, facilitate review of applications, and promote integrated LID design.

Napa County Flood Control and Water Conservation District

Napa County Flood Control and Water Conservation District (District) is the local sponsor for the Napa River Flood Management Plan and administers water supply contracts, watershed management, and stormwater management programs throughout Napa County. The District's mission is to conserve and manage of flood and storm waters to protect life and property; maintain the County watershed using the highest level of environmentally sound practices; and to provide coordinated planning for water supply needs for the community. The District manages The Napa River and Creek Flood Project, watershed management and stream maintenance, and stormwater management programs.

The District, in conjunction with USACE, has improved flood measures along the Napa River. The Napa Creek Bypass Project was completed in 2012 and resulted in a large number of properties being mapped out of the floodway and floodplain. The Napa River Dry Bypass was completed in the fall of 2016 and was successfully put to the test several times during the 2016–2017 rainy season when the county received record amounts of rainfall. The City and Flood District have worked diligently with FEMA to produce a revised flood map that reflects the latest flood control improvements. The revised flood maps have been approved under the Napa Post-Bypass Letter of Map Revision (LOMR 16-09-1316P) with an effective date of January 22, 2019. Design guidelines for development in the floodway and floodplain are available under the City's Municipal Code Section 17.38-Floodplain Management Overlay District.

The Napa River/Napa Creek Flood Protection Project (NRNCFPP) includes improvements to six miles of the Napa River from Highway 29 at the Butler Bridge/Southern Crossing to near Trancas Street, and Napa Creek from its outfall to the Napa River for about 1 mile upstream. Elements of the Napa Project include bank terracing, bridge replacements, bypass channels, culverts, floodwalls, and levees. Several components of the NRNCFPP have been completed.

- Over 600 acres of wetlands have been restored in the South Wetlands Opportunity Area.
- The Third Street, First Street, and Maxwell Bridges have been replaced, and the new Soscol Avenue Bridge has been constructed.
- The contaminated properties in the Oil Company Road area, the east bank terracing, and the Hatt to First Floodwall and Promenade have been cleaned up and Veterans Memorial Park renovated.
- Railroad bridges over Napa River and future bypass and associated track realignment have been constructed.
- Napa Creek flood bypass culverts and terraces have been constructed
- The Napa River Dry bypass has been constructed.

The following NRNCFPP elements have not yet been constructed.

- Floodwalls/levees north of the Oxbow and bypass pump station.
- Floodwalls and trail on west side of Napa River (Imola to Hatt).
- Floodwalls around Oxbow and Floodwalls and trail on east side of Napa River (Tulucay Creek to Third Street).

In 2018, the District reanalyzed remaining project elements to more effectively compete for federal funding and determine priorities moving forward. In January 2021, USACE announced that $48.3 million of federal funds were available to substantially complete the NRNCFPP. This funding will be used for flood walls along the Napa River north and south of Lincoln Avenue and along Riverside Drive. Floodwalls in the Oxbow District area will also be constructed using local funds.

City of Napa Floodplain Management Program

The City of Napa Development Engineering Division manages the City's Floodplain Management Program and is responsible for managing the City's floodplains. The program ensures the City is in compliance with FEMA's NFIP. The City also participates in the voluntary incentive program through the NFIP called the Community Rating System (CRS). The CRS recognizes floodplain management programs by rewarding efforts that exceed the minimum NFIP requirements in the form of discounted flood insurance rates for its communities.

City of Napa General Plan

The following goals and policies identified in the *City of Napa General Plan's Natural Resource*, *Community Services*, and *Health and Safety Elements* (City of Napa 1998) pertain to hydrology and water quality.

Goal NR-1: To manage the natural resources, wetlands and open space areas in and around the City to preserve and enhance plant and wildlife habitats.

Policy NR-1.4: The City shall review all future waterway improvement projects (e.g., flood control, dredging, private development), as well as all projects that are within 100 feet of the waterway, to ensure that they protect and minimize effects on the riparian and aquatic habitats. The City shall also encourage native plantings along the river and creek banks to stabilize the banks, reduce sedimentation, reduce stormwater runoff volumes, and enhance aquatic habitats.

Policy NR-1.9: The City shall continue the existing program for hazardous waste collection events to allow the public to safely dispose of pollution-causing products.

Policy NR-1.10: The City shall pursue appropriate new management practices for reducing the impact of pollution from urban activities.

Policy NR-1.12: The City shall provide for the use of permeable or semi-permeable materials for parking lots and other off-street paved areas.

Goal NR-3: To educate and involve the public in the stewardship of the area's natural resources.

Policy NR-3.3: The City shall support stenciling storm drains to identify the location of direct inflow to waterways from storm drains.

Goal NR-4: To protect and enhance surface water and ground water quality.

Policy NR-4.1: The City shall support the maintenance and improvement of surface and ground water quality.

Policy NR-4.2: The City shall support the maintenance and improvement of water quality in the Napa River.

Policy NR-4.3: The City shall support the monitoring and assessment of the effects of dredging in the Napa River.

Policy NR-4.4: The City shall adopt standards and regulations for the reduction and/or elimination of nonpoint sources of pollution.

Policy NR-4.5: The City shall maintain and strengthen where feasible current efforts to eliminate point sources of pollution.

Policy NR-4.6: The City shall cooperate with Napa County to maintain the current program to identify and remove leaking underground storage tanks.

Policy NR-4.7: Encourage design of projects to avoid covering creeks and drainageways whenever possible.

Goal CS-11: To develop and maintain a safe, attractive and environmentally sensitive drainage system for handling runoff due to seasonal rainstorms.

Policy CS-11.1: The City shall address needed long-term improvements for the drainage system.

Policy CS-11.2: The City shall continue to collect a Storm Water System Service Fee for needed storm drainage improvements and maintenance.[1]

Policy CS-11.3: The City shall plan and build storm improvements within funding limits.

Policy CS-11.4: The City shall investigate the potential for establishing an impact fee to help accommodate the effects of additional runoff from new development.

Policy CS-11.5: The City shall develop stormwater management programs to reduce water borne pollution discharges to the maximum extent practicable.

Policy CS-11.6: The City shall require new development to obtain all necessary NPDES permits as required by federal law.

Policy CS-11.7: The City shall require all new development to implement feasible best management practices (BMP) in the design of stormwater systems.

Policy CS-11.8: The City shall require all projects in the floodplain to comply with applicable federal, state and local regulations.

Policy CS-11.9: The City shall work with the California Department of Fish and Game and Napa County Resource Conservation District to develop an acceptable and appropriate homeowners' stewardship program aimed at reducing flooding along creek and river side properties.

Goal HS-2: To minimize the hazards to people and property caused by soil erosion and landslides.

Policy HS-2.1: The City shall seek to minimize grading and impermeable surfaces in high-erosion areas. If grading or impermeable surfaces are necessary, they shall be properly engineered and drained to reduce runoff and erosion.

Policy HS-2.2: The City shall consider natural landform contours and geologic conditions in the development of roadways and individual project design.

Policy HS-2.3: The City shall continue to regulate development on hillsides to reduce the hazards posed by soil erosion and landslides.

Policy HS-2.4: The City shall require that an erosion control plan be prepared and approved for development on slopes of 15 percent or greater[2]. The plan should include limitations on

[1] Policy CS-11.2 was included in the City of Napa 1998 General Plan, incorporating the 2010 amendment, however The City of Napa no longer has a stormwater system service fee.

[2] The City of Napa uses the Napa Countywide Erosion and Sediment Control Plan Review, which requires an erosion and sediment control plan for project on slopes 5% or more.

vegetation removal, revegetation, and installation of other erosion and sedimentation control measures.

Policy HS-2.5: The City shall continue to apply its Hillside Development Guidelines to properties in sensitive hillside locations.

Goal HS-3: To reduce the risk to life and property from flooding.

Policy HS-3.1: The City shall continue to provide for floodplain management to protect its residents and property from the hazards of development in the floodplain of the Napa River and its tributaries.

Policy HS-3.2: The City shall continue to apply flood plain management regulations for development in the floodplain and floodway.

Policy HS-3.3: The City shall continue to participate in the Federal Emergency Management Agency's National Flood Insurance Program.

Policy HS-3.4: The City shall continue to utilize the Federal Emergency Management Agency's Flood Insurance Rate Map to define the flood hazard area, the floodway and the floodplain.

Policy HS-3.5: The City shall balance the housing needs of its residents against the risk from potential flood-related hazards.

Policy HS-3.6: The City shall support programs and methods to reduce the flooding of the Napa River and its tributaries.

Policy HS-3.7: The City shall continue to assist the Army Corps of Engineers, Napa County, other responsible agencies, and the public to maintain funding for the development of the Napa River Flood Management Project.

Policy HS-3.8: The City shall continue to cooperate with Napa County to maintain a reliable funding source for the local share of flood control costs.

Downtown Napa Specific Plan

The *Downtown Napa Specific Plan* provides the guiding framework for realizing the vision of a vibrant, healthy, and balanced pedestrian-oriented City center (MIG 2012). Chapter 5, Section 5.6 includes Sustainable Design and Stormwater Management Guidelines encouraging sidewalk planters and planter strips to serve as stormwater run-off collectors; permeable pavers around tree wells and along parking lanes and surface parking areas; open spaces for stormwater detention and infiltration; and native, drought-tolerant, low maintenance plant species for landscaping. The policies most applicable under hydrology and water quality are from Chapter 7, Section 4, *Stormwater* of the plan.

Policy 1: For redevelopment of previously developed sites, the post-development condition of the site must not increase the stormwater volume and runoff rate generated during a 25-year, 24- hour storm event.

Policy 2: Encourage site designs that optimize runoff capture and treatment via landscape features.

Policy 3: Encourage site designs that maximize permeable surface cover and infiltration potential.

Policy 4: Encourage demonstration projects that exemplify sustainable innovations and serve as environmental educational tools.

Policy 5: Work with developers to promote, approve and implement designs that include the integration of LID applications into the City's existing drainage system. To this end, establish an administrative team that is adequately trained and staffed to coordinate, manage, and maintain LID facilities.

Big Ranch Specific Plan

The 430-acre Big Ranch Specific Plan Area is in the northeastern portion of the City of Napa, extending from Big Ranch Road on the east to Jefferson Street on the west, from Trancas Street on the south to Trower Avenue on the north. The policies most applicable under hydrology and water quality are as follows.

C-4-h: As part of their applications for development approvals, project applicants shall prepare a map showing all native trees with trunk diameters exceeding 12 inches and all riparian habitat located on their property. The City shall review each such development proposal to determine whether the proposed development would adversely affect any sensitive vegetation resources. During such review, the City shall consider, among other things, whether changes in drainage or irrigation will cause harm either during the construction period or on a long-term basis.

C-4m: Where required, project applicants shall submit copies of any Streambed Alteration Agreement from the CDFG and a conditional acknowledgment or permit mitigation requirements from the Corps to the City of Napa Planning Department before issuance of any grading permit to ensure that possible mitigation requirements and any design modifications are incorporated into proposed development plans.

C-4n: Individual applicants' civil engineers shall prepare and submit to the City, and grading contractors shall implement, detailed erosion control plans for individual development projects to minimize sedimentation in the creek channels in the project area.

C-7: Protect, conserve and enhance (when feasible) the natural characteristics of the Salvador Channel and Gasser/Bel Aire Tributary while providing for 100-year flood flows. Development along the southwest bank of the Salvador Channel between Garfield Lane and the existing bridge over the Channel (shown on the land use map as the location of a proposed extension of Rubicon Street to Big Ranch Road) shall be required to address potential flooding by implementing either an "enhancement" or "fill" alternative as conceptually described in the Water Resources section of this Chapter.

C-8: All projects shall adopt, when feasible an appropriate selection of the construction Best Management Practices (BMPs) as presented in the California Storm Water Construction Activity Handbook.

PF/S-4: Adequate storm drainage shall be provided for all development projects. The Public Works Department shall determine that storm drainage has been adequately addressed by each proposed development.

PF/S-5: Storm drainage facilities shall be planned so as to have a minimum negative impact on the habitat of the Salvador Channel. Whenever feasible, Best Management Practices shall be incorporated into storm drainage facilities to minimize pollutant loads entering the Salvador Channel and Gasser/Bel Aire Tributary and Napa River.

PF/S-5a: Wherever feasible, grass-lined swales shall be provided to transport lot runoff rather than delivering all runoff to street drainage systems.[3]

PF/S-5b: The City shall require all projects of more than four units draining directly or indirectly to the Salvador Channel or Bel-Aire/Gasser Tributary to provide enough stormwater detention capacity to maintain post-project 100-year peak flows at pre-project levels. Such provisions can be developed on-site within the project or off-site in cooperation with neighboring developments.

PS/F-5c: Any fill or development activities within the Salvador Channel floodplain not supported by site specific flood analyses shall comply with creek setback distances, unless authorized by the terms of an approved habitat management plan.

[3] The NPDES permit requires an LID approach to the treatment and conveyance of runoff prior to entering the MS4 system, as discussed in Section 3.9.1.1, *Regulatory Setting*.

PS/F-5d: To preserve floodflow conveyance, the City shall enforce a zero net filling policy within the 100-year floodplain wherever filling of the Salvador Channel or Bel-Aire/Gasser Tributary floodplains is proposed within the listed setbacks and upstream flood elevations would increase by more than 0.05 foot. To minimize potential impacts on channel stability, all excavation intended to improve floodflow conveyance shall be designed as a floodplain terrace rather than a widening of the existing channel bed. The terrace shall be excavated to an elevation at or above that of the estimated two-year floodplain. Project sponsors implementing this policy shall submit hydrologic/hydraulic documents to the City to verify compliance with the zero net fill policy.

3.9.1.2 Environmental Setting

Climate

Napa has a mild, Mediterranean-type climate, with warm and dry days followed by cool evenings. Average annual temperature is 59°F. Maximum average annual summer temperatures measured from the Napa State Hospital (Weather Station 046074) range from 81.9 to 82.1°F. Winter temperature maximums vary from 57.6 to 65.0°F. Average low temperatures in the winter range from 38.8 to 42.0° F. Average annual precipitation is 24.66 inches, with approximately 83 percent of the total rainfall occurring between November and March. The month of January has the highest average rainfall at 5.14 inches. The driest month is July, with average rainfall of 0.02 inches (Western Regional Climate Center n.d.).

Surface Water

Regional Hydrology

The Planning Area is within the Napa River, Tulucay Creek-Frontal San Pablo Bay Estuaries, and the Carneros Creek-Frontal San Pablo Bay Estuaries watersheds, all within the larger San Pablo Bay watershed. The Napa River watershed extends in a northwesterly direction approximately 45 miles from San Pablo Bay to the hills north of Calistoga and includes a central valley floor and eastern and western mountains to either side of the valley floor. The Napa River and several major tributary creeks drain into the City. The Napa River crosses Napa from the northern City limits to the south near Kennedy Park. Several creeks flow to the river from the hills and mountains bordering the Napa Valley on both the west and the east. The Napa River watershed contains several tributaries including Salvador, Milliken, Browns, Redwood, Napa, and Tulucay Creeks. All drain to the Napa River, which flows to San Pablo Bay, and ultimately drains to San Francisco Bay.

River and creek flows in the region are highly seasonal, with annual flows occurring predominantly during the winter rainy season between November and April. Mean monthly discharge range from 1.6 cubic feet per second (ft^3/s; September) to 686 ft^3/s (February) (U.S. Geological Survey 2021). Flow in Napa River tributary streams are intermittent with many streams going dry during the middle or late summer. Although only 4.5 percent of the Napa River's average annual flow occurs during summer months (San Francisco Regional Water Board 2017), Napa River flows continue during months with little or no precipitation. Flow during dry periods is the result of groundwater discharge. The Napa River is tidally influenced from the City downstream to its mouth in San Pablo Bay (California Department of Water Resources 2014).

Local Runoff and Drainage

The City is part of the southern Napa Valley. The topography gradually slopes southeasterly from the Mayacamas Mountains to the Napa River, leveling off and remaining fairly flat between State Route (SR) 29 and SR 221. East of SR 221, the topography slopes southeasterly to the Napa River.

Impervious surfaces in the Planning Area include major and minor roadways, residential and commercial development, and an urbanized downtown area. Storm drains serve developed areas and roadways, and discharges into Salvador, Redwood, Browns, Napa, and Tulucay creeks, and the Napa River. The City of Napa storm drainage system consists of open ditches, culverts, and underground pipes of various sizes and capacities, encompassing an area of approximately 22 square miles (MIG 2012). Drainage collection operates on a gravity system, allowing stormwater runoff from low-lying or poorly graded areas into natural drainage channels. Runoff water enters the system through ditches or from street storm drains. The runoff is channeled through ditches, culverts, and buried pipes into natural channels that ultimately convey runoff to the Napa River or its tributaries.

Underground storm drainage pipes in the City's residential areas are designed to carry 10-year to 25-year storms depending on the drainage area and location of the facility. Storm drainage systems in commercial and high value districts are designed to accommodate a 25-year storm. Bridges are designed for a 100-year storm (City of Napa 1998). However, changes in hydrology, design criteria and development have affected many of the existing City storm drains. A significant number of City storm drains have capacities below the current recommended design flow.

The *City of Napa Storm Drain Master Plan* divided the City into eight basins. The Salvador Basin is a 4,900-acre area in the northwestern portion of the City. Most of the basin drains to the Salvador Channel, which conveys runoff east to the Napa River. The Redwood Creek Basin is the upstream extension of Napa Creek and drains 1,440 acres mostly west of the City. The Linda Vista Avenue drain is the major drain in the basin. The Tulucay Creek Basin is a 900-acre urban basin within the City limits that discharges both into Tulucay Creek and directly into the Napa River. Principal tributaries of Tulucay Creek include Murphy and Spencer Creeks, Kreuse Creek, and Cayatano Creek. Browns Valley Creek Basin is a 1,780-acre, mostly rural subbasin, that discharges into Napa Creek. The lower portion of the basin is within the City and mostly urbanized. The Napa Creek Basin consists of 1,067 acres on both sides of Napa Creek from the Browns Valley Creek confluence to the Napa River. The Trancas-Soscol Basin is an urban drainage located between the Salvador Basin and the Napa River. It comprises 1,270 acres that discharges to the Napa River. The Napa Southwest Basin is a 1,707-acre urban area with storm drains discharging to the Napa River. The basin is bounded on the south and west by a ridge line that define watershed boundaries draining away from the City. The Napa East Basin encompasses 1,033 acres in central Napa east of the river. It includes the area between the City’s eastern boundary and the Napa River, north of Tulucay Creek. The Napa South Bank includes 400 acres east of the river along the southern City boundary. A pipe drainage system drains to sloughs and to the Napa River (West Yost Associates 2006).

Water Quality

Surface Water

Water quality in a typical surface waterbody is influenced by processes and activities that take place within the watershed. The quality of the stormwater runoff in the Planning Area is typical of urban watersheds where water quality is affected primarily by discharges from both point and nonpoint

sources. Point-source discharges are discharges that one can point to as known sources of pollutants, while nonpoint source discharges generally result from diffuse sources, such as land runoff, precipitation, or seepage. Point and nonpoint sources include outfalls, winter storms, overland flow, exposed soil, roofs, parking lots, and streets.

The Porter-Cologne Act requires that the State Water Board or a Regional Water Board adopt basin plans for the protection of water quality. The *San Francisco Bay Basin (Region 2) Water Quality Control Plan* (Basin Plan) specifies region-wide and waterbody-specific beneficial uses and sets numeric and narrative water quality objectives in surface waters. Water quality objectives are set for surface waters in the San Francisco Bay Region (including the Napa River Basin) for the following substances and parameters: bacteria, bioaccumulation, biostimulatory substances, chemical constituents, color, dissolved oxygen, floating material, oil and grease, population and community ecology, pH, radioactivity, salinity, sediment, settleable material, suspended material, sulfide, tastes and odors, temperature, toxicity, turbidity, and unionized ammonia.

The Basin Plan also specifies beneficial uses that apply to waterbodies with potential to be affected by the Project. Salvador Creek, which drains into the Napa River, has the following beneficial uses: cold and warm freshwater habitat; habitat for rare, threatened, or endangered species; fish spawning; wildlife habitat; and contact and non-contact water recreation. Four channels that are tributaries off of the Napa River include Browns, Redwood, Napa, and Tulucay Creeks, which all share the same beneficial uses: cold and warm freshwater habitat; migration of aquatic organisms; rare, threatened, or endangered species; fish spawning; wildlife habitat; and contact and non-contact water recreation. Milliken Creek, which converges with the Napa River, shares the same benefits as the tributaries above but also serves as freshwater replenishment. The Napa River, which is the main waterway in the Planning Area, has the following beneficial uses when tidal: commercial and sport fishing; estuarine habitat; migration of aquatic organisms; rare, threatened, or endangered species; wildlife habitat; contact and non-contact water recreation; and navigation. The non-tidal portion of the Napa River's beneficial uses are agricultural supply; municipal and domestic supply; groundwater recharge; cold and warm freshwater habitat; commercial and sport fishing; migration of aquatic organisms; rare, threatened, or endangered species; fish spawning; wildlife habitat; navigation; and contact and non-contact water recreation.

Both the tidal and non-tidal portions of the Napa River are listed on the State Water Resources Control Board's 303(d) list. For the tidal portion, the Napa River is impaired for nutrients and pathogens relating to agriculture and on-site wastewater systems (septic tanks). The Napa River (tidal) Pathogens TMDL was approved by the EPA on November 1, 2001. The non-tidal portion is similarly listed as impaired for nutrients and pathogens relating to agriculture and onsite wastewater systems (septic tanks) but also is listed for sedimentation/siltation related to agriculture and road construction. The Napa River (non-tidal) Pathogens TMDL was approved by the EPA on December 6, 2007 (State Water Resources Control Board 2018). In the wet winter season, fecal and total coliform bacteria levels may exceed water quality objectives defined in the Basin Plan. Adverse water quality conditions are directly related to stormwater runoff (MIG 2012).

Groundwater

The Planning Area is within the Napa Valley Subbasin within the larger Napa-Sonoma Valley groundwater basin (Basin No. 2-2.01). Groundwater bearing volcanic areas in the Planning Area include the Napa-Sonoma Volcanic Highlands Basin (Basin No. 2-23). The Napa Valley Subbasin occupies a northwest trending structural depression in the central Coast Ranges. The Subbasin is

bounded to the north, east, and west by portions of the Coast Ranges and on the south by San Pablo Bay. The primary water-bearing formations include Recent and Pleistocene Alluvium, the Pleistocene Huichica Formation, and the Pliocene Sonoma Volcanics. Except for connate (water trapped in the pores of a rock) seawater and brackish water from San Pablo Bay, the source of all natural groundwater recharge in the Napa Valley is from precipitation on the alluvial plain, the adjacent hills, and mountains within the drainage basin of the valley. Groundwater storage in the Napa Valley Subbasin is estimated to be 300,000 acre-feet (California Department of Water Resources 2014).

Wells monitoring groundwater elevation conditions in the Napa Valley Groundwater Subbasin indicate variability in groundwater conditions due to complex hydrogeology, relative distance from major surface water systems, and surface recharge conditions. Areas in the upper Sonoma Volcanics and within younger, unconsolidated alluvial deposits historically have shown very stable groundwater elevation trends since the 1960s, likely due to its distance from and interaction with surface water from the Napa River. Generally, this stable trend is representative of wells located within the Napa Valley area (State of California et al. 2015). Although groundwater levels in the northern portion of the valley and generally within the shallow aquifer system show patterns of stability, long-term hydrographs show groundwater levels are in decline (California Department of Water Resources 2018). Areas in the less-permeable portion of the Sonoma Volcanics have shown considerable groundwater elevation decline, approximately 3 feet per year since the area was first monitored in 1949. This area is in a "groundwater-deficient area" and is subject to a countywide groundwater ordinance that was adopted in 1996 (State of California et al. 2015). Based on groundwater levels in the intermediate and deep aquifers, there are two pumping depressions, located west of El Verano and southeast of the City of Sonoma, that have existed for several decades and appear to be growing (California Department of Water Resources 2018).

Generally, groundwater quality throughout most of the region is suitable for most urban and agricultural uses with only local impairments. Water extracted from the alluvial aquifers is generally good for most uses. The primary chemical contaminants of concern in the region include high total dissolved solids (TDS), arsenic, nitrate, boron, and organic compounds (State of California et al. 2015). Beneficial uses of the Napa-Sonoma Valley groundwater basin include the following uses: municipal and domestic, industrial (process and service), and agricultural supply. The Napa-Sonoma Volcanic Highlands basin has no beneficial uses. The quality of groundwater in the subbasin is considered hard and bicarbonate in nature, with small concentrations of sulfate, chloride, and other minerals. The southern portion of the Napa Valley is tidally influenced. Saltwater intrusion has occurred in shallow wells in areas of concentrated pumping. Inorganic constituents with human-health benchmarks including arsenic, boron, and lead, were high in 14.0 percent of the primary aquifers, moderate in 35.8 percent, and low in 50.2 percent. Water from some wells have elevated boron concentrations making water unfit for agricultural uses such as irrigation. High to moderate concentrations of boron are primarily associated with hydrothermal activity or high-salinity waters in the Napa Sonoma lowlands. Groundwater from wells along Milliken and Tulucay Creeks have elevated iron concentrations (California Department of Water Resources 2014; Kulongoski et al. 2010).

Flood Hazards

The Planning Area includes the Napa River, a major waterway, and several tributaries, and as such is at risk for slow-rise and flash floods. Based on FEMA mapping, major areas containing the 100-year floodplain are located adjacent to the Napa River and all of the tributaries present within City

boundaries.[4] Areas at risk of flooding include Trancas Street, Imola Avenue, Coombs Street, and the Silverado Trail, and portions of Lincoln Avenue. The confluences of multiple tributaries to the Napa River present flood risk to those surrounding areas. The largest flood risks are prevalent where Napa Creek, Milliken Creek, Salvador Creek, and Tulucay Creek converge with the Napa River.

The City has mapped the region into four defined areas (phases) of greatest flood risk (see Figure 3.9-1). The phases are zoned from 1 to 4 with Phase 1 having the greatest risk. Phase 1 floods when the Napa Creek overflows its banks. Phase 2 is the first to flood when the Napa River leaves its banks and is generally bounded by railroad tracks, Soscol Avenue, and the Napa River to the west; Jackson Street and Lincoln Avenue to the north; the Napa River and Silverado Trail to the east; and Sousa Lane and Oil Company Road to the south. Phase 3 begins to flood if Phase 1 and Phase 2 are already flooded, and Phase 4 is inundated during severe floods.

The Napa River and Creek Flood Protection Project was passed in 1998 by Napa County voters to protect the City from 100-year flood events. The project is an ongoing series of projects administered by USACE in partnership with the District to address flooding along the Napa River and its tributaries. The project not only provides environmental restoration but also economic development by incorporating the following engineering components for flood protection: lowering of old dikes, marsh plain and floodplain terraces, oxbow dry bypass, Napa Creek floodplain terrace, upstream and downstream dry bypass culverts along Napa Creek, new dikes, new levees, new floodwalls, bank stabilization and protection (including a grade control structure), pump stations and detention facilities, and bridge replacements.

As shown in Figure 3.9-1, the Planning Area is predominantly outside of the 100-year floodplain, within FEMA Zone X (unshaded). FEMA Zone X is an area of minimal flood hazard, usually depicted on FIRMs as above the 500-year flood level. These areas are protected from the 1 percent chance (100-year) flood by dikes or other structures. However, the majority of downtown and areas within and adjacent to rivers and creeks are within the FEMA 100-year floodplain, the regulatory limits of the floodway (Zone AE), or both. Also, some portions of the Planning Area are within Zone X (shaded), areas between the limits of the base flood and the 0.2-percent-annual-chance (or 500-year) flood (Federal Emergency Management Agency 2019, 2016, 2014, 2012, 2010, 2008).

A tsunami is a series of ocean waves caused by displacement of a large volume of water, typically because of an undersea earthquake or landslide. At the shoreline, tsunami waves may range in height from a few inches to more than 30 feet. Due to the lack of bay front exposure within the City and as depicted on the Tsunami Inundation Map for Emergency Planning prepared by the California Emergency Management Agency and California Geological Survey, the Planning Area is not within a planned tsunami inundation area (California Emergency Management Agency et al. 2009). Seiche occurs in an enclosed or partially enclosed body of water, such as a lake or reservoir. No large bodies of water subject to seiches are within the Planning Area. There would be minimal to no risk of inundation from a seiche event in the Planning Area.

Dam Failure Inundation

The following dams serve the City: Rector Reservoir, Lake Hennessey, Milliken Reservoir, Conn Creek, and Eastside Reservoirs. The State owns Rector Reservoir, and the City owns Lake Hennessey, Milliken Reservoir, Conn Creek, and Eastside Reservoirs. If Lake Hennessey, the Milliken Reservoir,

[4] A 100-year floodplain is defined by FEMA as "the area that will be inundated by the flood event having a 1-percent chance of being equaled or exceeded in any given year."

Conn Creek, or the Rector Reservoir were to fail, parts of the Planning Area would be flooded (see Figure 3.9-2 in the Existing Conditions report).

3.9.2 Environmental Impacts

3.9.2.1 Methods for Analysis

The major sources used in this analysis are listed below.

- California Water Plan (California's Groundwater Update - San Francisco Bay Hydrologic Region)
- San Francisco Bay Regional Water Quality Control Board website
- State Water Board's list of impaired waterbodies
- DWR's "best available maps" of 200-year flood zones

Impacts related to hydrology, water quality, and water resources were assessed based on technical reports prepared for the Project, other available data (e.g., flood maps), and professional judgment.

Potential impacts were analyzed by comparing existing conditions, as described in Section 3.9.1.2, *Environmental Setting*, with conditions that could result from changes in land use designations under the General Plan update. The analysis assesses the following potential impacts related to surface water hydrology, flood hazards, groundwater recharge, and surface and groundwater quality.

- **Surface Water Hydrology:** The surface water hydrology impact analysis considered potential changes in the physical characteristics of waterbodies, impervious surfaces, and drainage patterns throughout the City as a result of Project implementation.
- **Flood Hazards:** The impact analysis for flood risk was conducted using FEMA NFIP and BAM maps to determine whether the City overlaps with existing designated 100-year and 200-year floodplains.
- **Groundwater Recharge:** Impacts on groundwater recharge were assessed by comparing existing sources of recharge versus recharge capabilities following Project implementation. Recharge is determined by the ability of water to infiltrate into the soil.
- **Surface and Groundwater Quality:** Impacts of the proposed Project on surface water and groundwater quality were analyzed using existing information on existing water quality conditions (i.e., CWA Section 303[d] listed waterbodies). These conditions were then compared to conditions under the General Plan update for potential project-related sources of water contaminants generated or inadvertently released during Project construction (e.g., sediments, fuel, oil, concrete) and operation. The potential for water quality objectives to be exceeded and beneficial uses to be compromised as a result of the General Plan update was also considered.

Relevant General Plan Update Goals and Policies

Applicable General Plan update goals and policies from the Land Use and Community Design, Transportation, Community Services Parks and Recreation, Climate Change and Sustainability, and Natural Resources Conservation Elements are as follows.

Land Use and Community Design Element

Community Character and Identity

Policy LUCD 3-2: Promote the community's river orientation by incorporating open spaces as part of flood-improvement projects and supporting development that is oriented toward the river. Limit blank facades, parking garages, parking lots, or imposing fencing along the river.

Soscol North Focus Area

Policy LUCD 17-4: Support flood improvement efforts to reduce flooding potential in this area.

Transportation Element

Air, Water, Truck and Rail Transport

Policy TE.8-2: Promote the use of the Napa River for recreational, transportation, and cultural uses.

Policy TE.8-4: To retain the public accessibility of the Napa River waterfront and to reduce potential adverse environmental impacts like noise and pollution runoff, , establish regulations that will minimize new private docks along the Napa River. Docks for public use may be approved provided they are compatible with the California State Lands Commission Public Use Doctrine and the design requirements of the Napa River – Napa Creek Flood Protection Project.

Climate Change and Sustainability Element

Utilities

Goal CSPR-5: Support utilities and infrastructure that deliver safe and reliable services for current and future residents and businesses.

Policy CSPR 5-1: Safely manage the water supply and services, wastewater, sewer, recycled water, and storm drain infrastructure in a manner that provides for future growth of the City.

Policy CSPR 5-3: Develop and maintain a safe, attractive, and environmentally-sensitive drainage system for handling runoff due to seasonal rainstorms, especially runoff in creeks and the Napa River.

Natural Resources Conservation Element

Goal NRC-1: Manage natural resources, including riparian corridors, wetlands, and open space areas in and around the City to preserve and enhance plant and wildlife habitats.

Policy NRC.1-1: Seek to protect and enhance the riparian habitat along waterways in the City and the Napa River.

Policy NRC.1-2: Review future waterway improvement projects (e.g., flood control, dredging, private development), as well as all development adjacent to the waterways, to protect and minimize effects on the riparian and aquatic habitats.

Policy NRC.1-4: Encourage native plantings along the river and creek banks to stabilize the banks, reduce sedimentation, reduce stormwater runoff volumes, and enhance aquatic habitats.

Water Quality

Goal NRC-9: Protect and enhance the City's potable water, surface water, and groundwater quality.

Policy NRC.9-1: Continue to participate in regional efforts to proactively manage surface and groundwater resources and ensure their long-term health and viability, including

implementation of the Napa-Sonoma Valley Groundwater Subbasin Groundwater Sustainability Plan being prepared by the Napa County Sustainability Agency.

Policy NRC.9-2: Continue efforts to educate the public on the importance of protecting the City's stormwater runoff from pollutants to protect the local creek and the Napa River.

Policy NRC.9-3: Continue to monitor and publish Annual Water Quality Reports.

Goal NRC-10: Promote utilization of green infrastructure and Low Impact Development (LID) strategies; water conservation, reuse, and collection; and other sustainability measures to limit pollution runoff.

Policy NRC.10-1: Support the continuation and expansion of existing recycled water systems into the City Limits. Seek incentive programs to encourage usage of recycled water systems.

Policy NRC.10-2: Explore options for water saving and treatment technology when planning future developments to conserve water and keep the City's water safe and clean.

Policy NRC.10-3 Preserve natural drainage courses in their natural state wherever feasible.

Policy NRC.10-4 Whenever feasible, incorporate the use of pervious surfaces in public spaces to permit the percolation of urban runoff while implementing best practices for stormwater pollution prevention.

Policy NRC.10-5 Facilitate groundwater recharge by encouraging development projects to use LID practices such as bioretention, porous paving, and rainwater harvesting systems, and by encouraging private property owners to design or retrofit landscaped or impervious areas to better capture stormwater runoff.

Policy NRC.10-6 Reduce stormwater runoff and pollution by incorporating green infrastructure and sustainability strategies for new development and redevelopment, such as trash capture technology in stormwater systems.

Hydrology and Flooding

Goal SN-3: Reduce risk to life and property due to flooding, including inundation resulting from the failure of water supply reservoir dams.

Policy SN 3-1: Seek opportunities to invest in flood prevention infrastructure, including extension of integrated flooding/open space solutions, to reduce impacts from flooding to Downtown Napa and other areas located along the Napa River.

Policy SN 3-2: Update the Storm Drain Master Plan focusing the City's effort on condition assessment and needed repairs, storm drain capacity improvements to reduce neighborhood flooding and assure it is complementary with the Napa River-Napa Creek Flood Protection Project (including both constructed and planned future improvements).

The master plan should be updated on a regular basis to identify capital improvements and associated costs of annual operations and maintenance activities. The plan should explore City and grant funding sources to implement the recommendations of the master plan.

Policy SN 3-3: Limit development in the 100-year floodplain to development which represents an acceptable use of the land in relation to the hazards involved and the costs of providing flood control facilities. Locate critical facilities, such as hospitals, fire stations, police stations, public administration buildings, and schools outside of flood hazard areas, to the extent feasible.

Policy SN 3-4: Require that all projects in floodplains, to the extent feasible, to adhere to strict design guidelines that ensure any proposed development will withstand a flooding event, and will not jeopardize the existing surrounding or downstream structures.

Policy SN 3-5: Maintain a program to review reservoir dam safety and continue to cooperate with other jurisdictions, such as the Division of Safety of Dams, in addressing needed dam maintenance or structural improvements to mitigate risks caused by dam failure and inundation.

Policy SN 3-6: Work with the State to minimize risk of damage from inundation due to failure of the Rector Reservoir by maintaining the dam in a safe condition.

Other Public Safety and Hazards

Goal SN-6: Help prepare for and mitigate various hazards that affect the Napa community.

Policy SN 6-4: Effectively coordinate disaster response and preparation strategies with County, regional, State, and federal agencies in the event of major seismic activity, flood, or wildland fire.

Sustainable Built and Natural Environments

Green Infrastructure

Goal CCS-3: Promote cost-effective, natural methods to improve the City's infrastructure and resilience to climate change, while furthering Napa's goal of a healthier and more sustainable urban environment.

Policy CCS 3-1: Study and incorporate green infrastructure practices to reduce pollution runoff into the Napa River, reduce stress on stormwater systems, recharge underground aquifers, and reduce urban heat island effects, while promoting greenery in the community.

Policy CCS 3-2: Require stormwater management techniques that minimize surface water runoff in public and private developments. Utilize low impact development techniques such as bioswales and other best management practices to manage stormwater. Promote technologically advanced stormwater management systems and practices where land area is limited.

Policy CCS 3-4: Develop standards for and encourage, recycled (grey) water use and stormwater capture systems in new and existing developments, and in areas that do not impact groundwater quality.

Urban Forest

Policy CCS 9-4: Utilize trees and vegetation as part of green infrastructure strategies along major roadways and areas with large impervious pavement surfaces to slow rainwater discharge in the Napa River watershed, provide flood-hazard reduction benefits, and help clean the stormwater.

Policy CCS 10-2: Recognize the importance and benefits of maintaining and improving the City's urban forest including community, environmental, and economic benefits that range from increasing property values to providing ecological services such as stormwater mitigation, air pollutant removal, and carbon sequestration

3.9.2.2 Thresholds of Significance

In accordance with Appendix G of the CEQA Guidelines, the General Plan update would have a significant hydrology and water quality impact if it would result in any of the conditions listed below.

- Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality.
- Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impeded sustainable groundwater management of the basin.
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:

- Result in substantial erosion or siltation on- or off-site;
- Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site;
- Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or
- Impede or redirect floodflows.

- In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation.
- Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.

3.9.2.3 Impacts and Mitigation Measures

Impact WQ-1: Violate any water quality standards or waste discharge requirements (less than significant)

The City of Napa's MS4 system often requires retention of runoff to avoid increasing downstream creek flows and associated erosion. The San Francisco Regional Water Quality Control Board (San Francisco Regional Water Board) also requires treatment of stormwater runoff for new developments, utilizing LID measures to treat and infiltrate stormwater runoff prior to discharging into waterways. Future projects associated with implementation of the General Plan would be required to comply with these requirements and would also be subject to environmental review under CEQA.

Construction

Project construction activities subsequent to the General Plan update such as demolition/material removal, grading, stockpiling of spoil materials, and other construction-related earth-disturbing activities could result in short-term water quality degradation associated with soil erosion and subsequent sediment transport to adjacent properties, roadways, or watercourses via storm drains. Sediment transport to local drainage facilities such as drainage inlets, culverts, and storm drains could result in reduced storm flow capacity, causing localized ponding or flooding during storm events. Construction activities could also generate dust, settlement, litter, oil, and other pollutants that could temporarily contaminate water runoff from a construction site.

Projects that would disturb more than 1 acre of land are required to prepare a SWPPP as part of compliance with the NPDES Construction General Permit. The purpose of a SWPPP is to reduce the amount of construction-related pollutants that are transported by stormwater runoff to surface waters. The SWPPP would emphasize standard temporary erosion control measures to reduce sedimentation and turbidity of surface runoff from disturbed areas within the Planning Area.

If dewatering for an individual project site is required, the SWPPP would include a dewatering plan, which would establish measures to prevent and minimize sediment and contaminant releases into groundwater during excavation. Dewatering activities would be required to comply with the NPDES Construction General Permit, San Francisco Bay Regional Water Board Waste Discharge Requirements for discharges of groundwater (Order No. R2-2018-0026), and local dewatering requirements to prevent potential water quality impacts on surface waters or ensure proper

treatment measures are implemented prior to discharge. In the event of dewatering during construction activities or before dewatering to surface water via a storm drain, the contractor would obtain coverage under the NPDES Construction General Permit from the Regional Water Board. Coverage under the NPDES Construction General Permit typically includes dewatering activities as authorized non-stormwater discharges, provided that dischargers prove the quality of water to be adequate and not likely to affect beneficial uses. All requirements of dewatering would be met to ensure water quality is not affected.

In addition to compliance with the latest NPDES and other water quality requirements (i.e., Construction General Permit, Small MS4 Permit, and the General Dewatering Permit) construction projects would also comply with other federal and State regulations, City standards, and other local ordinances, as noted in Section 3.9.1.1, *Regulatory Setting*. Compliance with grading permits and the NPDES Construction General Permit would require use of BMPs to restrict soil erosion and sedimentation and restrict non-stormwater discharges from the construction site as well as release of hazardous materials. As a performance standard, selected construction BMPs would represent the best available technology that is economically achievable and best conventional pollutant control technology to reduce pollutants. Therefore, potential construction-related water quality impacts, such as violations of water quality objectives, would be less than significant, and no mitigation is required.

Operation

At buildout, it is estimated that the General Plan update would accommodate about 7,811 new housing units and up to 3,784,298 square feet of commercial and industrial uses. The intensification of land uses by implementation of the General Plan update may increase impervious surface area and introduce new or additional pollutants to an existing area. Any increase in impervious areas that may occur as a result of the General Plan update would increase the volume of runoff during a storm, which would more effectively transport pollutants generated during operation into receiving waters. In addition, as the amount of impervious surface and runoff increases, less water would be able to infiltrate into the ground, and the velocity of flows to nearby waterbodies would be increased. This would facilitate the transport of sediment and other pollutants from the Planning Area to surface waters, thereby impairing water quality of the waterbody. Pollutants associated with the operation of new and/or redeveloped residential, commercial, and industrial structures generally include sediments, trash, petroleum products, metals, and chemicals that could potentially discharge into surface waters either directly or during stormwater runoff events. This could create new or exacerbate existing water quality impairments.

The General Plan update includes implementation programs that would improve stormwater management in the City and reduce impacts on water quality. Compared to the 1998 General Plan policies, implementation of the General Plan update policies would increase the emphasis on stormwater runoff reduction measures related to new development. Development of these management efforts as proposed in the General Plan update's goals and policies would help address the causes of increased stormwater from development described above and help minimize the potential for the release of pollutants and violation of water quality standards. As described in General Plan Policy NRC.10-6, green infrastructure and sustainability strategies would be incorporated for new development in order to reduce stormwater runoff. Additionally, as described in General Plan Policy CSS 3-2, the City would require stormwater management techniques that minimize surface water runoff in public and private developments. Furthermore, compliance with regional, State, and federal regulations would reduce the potential for new development to result in

violations of water quality standards. Therefore, this impact would be less than significant, and no mitigation is required.

Impact WQ-2: Substantially deplete groundwater supplies or interfere substantially with groundwater recharge, resulting in a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted) (less than significant)

Construction

For all future projects under to the General Plan update, in the event groundwater is encountered during construction, dewatering would be conducted on a one-time or temporary basis during the construction phase and would not result in a loss of water that would substantially deplete groundwater supplies. As described in Impact WQ-1, dewatering activities would be required to comply with the NPDES Construction General Permit, San Francisco Bay Regional Water Board Waste Discharge Requirements for discharges of groundwater (Order No. R2-2018-0026), and local dewatering requirements to prevent potential water quality impacts on surface waters or ensure proper treatment measures are implemented prior to discharge. After dewatering activities are completed, water levels would return to pre-construction conditions. The water supply for construction activities (e.g., dust control, concrete mixing, material washing) would most likely come from nearby hydrants and existing surface supplies and/or would be trucked to the site. Therefore, impacts would be less than significant, and no mitigation is required.

Operation

Changes in land use designations under the General Plan update could result in increased water supply demand. However, the City does not rely on groundwater and would continue to meet water supply demands from three surface water sources: Lake Hennessey, Milliken Reservoir, and the State Water Project. The Napa Sanitation District also delivers recycled water to customers within the City's potable water service area; however, recycled water is mainly used for irrigation. Implementation of the General Plan update would not result in a substantial depletion of groundwater resources from increased groundwater pumping or result in over-withdrawal.

Statewide groundwater management legislation passed in 2014 includes a long-term goal of reducing overdraft (AB 1739 and SB 1168). The legislation requires preparation of a groundwater sustainability plan that meets the content requirements established in Water Code Section 10727.2 and 10727.4. The Napa County Groundwater Sustainability Agency is currently developing a GSP for the Napa Valley Subbasin, which must be submitted to DWR by January 31, 2022.

The intensification of land uses by implementation of the General Plan update may increase impervious surface area and thereby interfere with groundwater recharge. As described in General Plan Policy NRC 10-5, the City will encourage development projects to use LID practices such as bioretention, porous paving, and rainwater harvesting systems to facilitate groundwater recharge. General Plan Policy CSS 3-1 would require the City to study and incorporate green infrastructure practices to recharge underground aquifers. Accordingly, the potential for substantial groundwater depletion as a result of the land use designation changes and proposed growth of the General Plan update would be less than significant, and no mitigation is required.

Impact WQ-3: Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner that would: result in substantial erosion or siltation on or off site; substantially increase the rate or amount of surface runoff in a manner that would result in flooding on or off site; create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or impede or redirect flood flows (less than significant)

Construction

During construction, site grading, trenching, and other activities could concentrate and redirect existing runoff patterns that could lead to erosion of temporarily exposed areas of bare soil during rainfall events with subsequent sedimentation onsite or offsite. The extent of the impact would depend on soil erosion potential, type of construction practice, extent of disturbed area, timing of precipitation events, and topography and proximity to drainage channels. However, as described in Impact WQ-1, compliance with grading permits and the NPDES Construction General Permit would require use of BMPs to restrict soil erosion and sedimentation and restrict non-stormwater discharges from construction sites as well as release of hazardous materials. As a performance standard, selected construction BMPs would represent the best available technology that is economically achievable and best conventional pollutant control technology to reduce pollutants. Therefore, implementation of the General Plan update would result in less than significant impacts, and no mitigation is required.

Operation

In urban areas, when rain falls on non-pervious surfaces like roofs, concrete patios, streets, and parking lots, the water cannot soak into the ground and must be channeled somewhere else—either through the City's stormwater sewer system or naturally into creeks—to prevent flooding. This causes stormwater to pick up pollutants from roads and other sources and can add to the pollution of major waterways, such as the Napa River, and during heavy rain can cause flooding. As described in Impact WQ-1, at buildout, it is estimated that the General Plan update would accommodate about 7,811 new housing units and up to 3,784,298 square feet of commercial and industrial uses. The intensification of land uses by implementation of the General Plan update may increase impervious surface area and introduce new or additional pollutants to an existing area. However, the General Plan update includes implementation programs that would improve stormwater management in the City and reduce impacts on water quality. Compared to the 1998 General Plan policies, implementation of the General Plan update policies would increase the emphasis on stormwater runoff reduction measures related to new development. As described in General Plan Policy NRC.10-6, green infrastructure and sustainability strategies would be incorporated for new development in order to reduce stormwater runoff. Additionally, as described in General Plan Policy CSS 3-2, the City would require stormwater management techniques that minimize surface water runoff in public and private developments.

Inadequate drainage systems can result in flooding when more surface water runoff arrives at a local watershed than the system is designed to handle. Typically, as urban development increases, so does runoff, requiring excess water to be channeled through engineered systems. This problem is exacerbated when development occurs in upstream areas, as the increased runoff generated in these areas would eventually converge downstream, further impacting existing systems. If larger ditches, channels, and pipes are not constructed to accommodate the larger runoff volumes, flooding would

result in the lower areas. There are various General Plan update policies that address this. General Plan Policy NRC.10-3 would require the preservation of natural drainage courses in their state whenever feasible. General Plan Policy CSPR 6-3 would require the City to develop and maintain an environmentally sensitive drainage system for handling runoff due to seasonal rainstorms. General Plan Policy SN 3-2 would require the City to update the Storm Drain Master Plan, focusing on condition assessment and needed repairs, storm drain capacity improvements, and consistency with the Napa River-Napa Creek Flood Protection Project. A new policy would be added to the *Safety and Noise Element* to ensure adequacy of the drainage system prior to future development of Opportunity Areas. The City would prepare storm drain capacity evaluations and storm drain replacement predesign evaluations to identify the required storm drain improvements to provide a 10-year level of drainage service for Opportunity Areas. The City would also modify the existing storm drain impact fee program or establish a new storm drain impact fee program to fund the needed storm drain improvements for the Opportunity Areas. The City would construct the needed storm drain improvements in coordination with redevelopment and development in the Opportunity Areas. Therefore, impacts would be less than significant.

Impact WQ-4: In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation (less than significant)

Due to proximity to the Napa River, much of the City is within the 100-year floodplain. The Lincoln & Soscol Avenue, Downtown Core, and Imola & Soscol Avenue Opportunity Areas are within the 100-year floodplain. A small portion of the Jefferson Street Corridor Opportunity Area lies within the 100-year floodplain. The Trancas Street Corridor Opportunity Area is not within the 100-year floodplain.

As described in Section 3.9.1.1, *Regulatory Setting*, the NRNCFPP aims to protect the existing City and the proposed future growth (which is within the current City limits) from flooding from the Napa River. However, the NRNCFPP is not yet fully constructed, and because the future floodplain map is uncertain at this time, there would be a potential impact of new growth being located in a floodplain. This would be a temporary impact, because the NRNCFPP is estimated to be completed in 2027.

As described in Impact WQ-1, stormwater BMPs would be implemented, as required by federal, county, and local policies to minimize degradation of water quality associated with stormwater runoff or construction-related pollutants. In addition, construction and maintenance activities would be subject to local stormwater ordinances, stormwater requirements established by San Francisco Bay Phase I MS4 Permit requirements, and regional WDRs. Other measures in the SWPPP would include a range of stormwater control BMPs (e.g., installing silt fences, staked straw wattles, geofabric) to prevent silt runoff to storm drains or waterways.

Compared to the 1998 General Plan policies, implementation of the General Plan update policies would increase the emphasis on flood control related to new development. General Plan Policy LUCD-3 would require the City to incorporate open spaces as part of flood-improvement projects. General Plan Policy SN 3-3 would limit development in the 100-year floodplain to development which represents an acceptable use of the land in relation to the hazards involved and the costs of providing flood control facilities. General Plan Policy SN 3-4 would require all projects in floodplains, to the extent feasible, to adhere to strict design guidelines to ensure that any proposed development will withstand a flooding event and will not jeopardize the existing surrounding or downstream structures.

Additionally, General Plan Policy SN 3-5 would require the City to maintain a program to review reservoir dam safety and continue to cooperate with other jurisdictions, such as the Division of Safety of Dams, in addressing needed dam maintenance or structural improvements to mitigate risks caused by dam failure and inundation. General Plan Policy SN 3-6 would require the City to work with the State to minimize risk of damage from inundation due to failure of Rector Reservoir by maintaining the dam in a safe condition. With implementation of these policies and adherence to the regulatory requirements described above, impacts related to a risk of release of pollutants due to Project inundation in a flood hazard, tsunami, or seiche zone would be less than significant, and no mitigation is required.

Impact WQ-5: Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan (less than significant)

As described in Impact WQ-1, construction projects would comply with the latest NPDES and other water quality requirements (i.e., Construction General Permit, Small MS4 Permit, and the General Dewatering Permit), as well as federal and State regulations, City standards, and other local ordinances, as noted in Section 3.9.1.1, *Regulatory Setting*. Compliance with grading permits and the NPDES Construction General Permit would require use of BMPs to restrict soil erosion and sedimentation and restrict non-stormwater discharges from the construction site as well as release of hazardous materials.

As described in Impact WQ-2, the intensification of land uses by implementation of the General Plan update may increase impervious surface area and thereby interfere with groundwater recharge. As described in General Plan Policy NRC 10-5, the City will encourage development projects to use LID practices such as bioretention, porous paving, and rainwater harvesting systems to facilitate groundwater recharge. General Plan Policy CSS 3-1 would require the City to study and incorporate green infrastructure practices to recharge underground aquifers. Implementation of the General Plan update would not substantially deplete groundwater resources from increased groundwater pumping or result in over-withdrawal as the City relies on surface water for its municipal drinking supply. Therefore, implementation of the General Plan update would not obstruct implementation of a water quality control plan or sustainable groundwater management plan. Impacts would be less than significant, and no mitigation is required.

3.9.3 References Cited

California Emergency Management Agency, the University of Southern California, and the California Geological Survey. 2009. *Tsunamic Inundation Map for Emergency Planning.* State of California, County of Napa*.* Cuttings Wharf Quadrangle. July 31.

California Department of Water Resources. 2014. *Napa-Sonoma Valley Groundwater Basin, Napa Valley Subbasin. Groundwater Basin Number 5-2.01*. June 30, 2014. Available: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Bulletin-118/Files/2003-Basin-Descriptions/2_002_01_NapaValleySubbasin.pdf. Accessed: March 16, 2021.

California Department of Water Resources. 2018. SGMA Basin Prioritization Dashboard. Available: https://gis.water.ca.gov/app/bp-dashboard/final/. Accessed: March 16, 2021.

City of Napa. 1998. *City of Napa General Plan Envision Napa 2020 Policy Document*. Adopted: December 1, 1998. Revised: September 3, 2015. Department of Community Development.

Federal Emergency Management Agency. 2008. National Flood Hazard Layer (NFHL) Viewer, Map Numbers 06055C0515E and 06055C0512E, dated September 26, 2008. Available: https://hazards-fema.maps.arcgis.com/apps/webappviewer/index.html?id=8b0adb51996444d4879338b5529aa9cd.

Federal Emergency Management Agency. 2010. National Flood Hazard Layer (NFHL) Viewer, Map Numbers 06055C0505F, 06055C0504F, 06055C0508F, 06055C0509F, 06055C0516F, and 06055C0517F, dated September 29, 2010. Available: https://hazards-fema.maps.arcgis.com/apps/webappviewer/index.html?id=8b0adb51996444d4879338b5529aa9cd.

Federal Emergency Management Agency. 2012. National Flood Hazard Layer (NFHL) Viewer, Map Number LOMR 11-09-3313P. Dated February 20, 2012. Available: https://hazards-fema.maps.arcgis.com/apps/webappviewer/index.html?id=8b0adb51996444d4879338b5529aa9cd.

Federal Emergency Management Agency. 2014. National Flood Hazard Layer (NFHL) Viewer, Map Number LOMR 14-09-2231P. Dated November 12, 2014. Available: https://hazards-fema.maps.arcgis.com/apps/webappviewer/index.html?id=8b0adb51996444d4879338b5529aa9cd.

Federal Emergency Management Agency. 2016. National Flood Hazard Layer (NFHL) Viewer, Map Numbers 06055C0518G, 06055C0519G, 06055C0606f, and 06055C0607F, dated August 3, 2016. Available: https://hazards-fema.maps.arcgis.com/apps/webappviewer/index.html?id=8b0adb51996444d4879338b5529aa9cd.

Federal Emergency Management Agency. 2019. National Flood Hazard Layer (NFHL) Viewer, Map Number LOMR 16-09-1316P. Dated January 22, 2019. Available: https://hazards-fema.maps.arcgis.com/apps/webappviewer/index.html?id=8b0adb51996444d4879338b5529aa9cd.

Kulongoski, J. T., Belitz, Kenneth, Landon, M. K., and Farrar, Christopher. 2010. *Status and understanding of groundwater quality in the North San Francisco Bay groundwater basins, 2004*. California GAMA Priority Basin Project: U.S. Geological Survey Scientific Investigations Report 2010–5089, 88 p.

Luhdorff & Scalmanini. 2020. *Draft Napa Valley Subbasin Groundwater Sustainability Plan*. October.

MIG. 2012. *City of Napa Downtown Napa Specific Plan Final*. Adopted May 2012.

San Francisco Bay Regional Water Quality Control Board. 2019. *Water Quality Control Plan (Basin Plan) for the San Francisco Bay Basin*. Available: https://www.waterboards.ca.gov/sanfranciscobay/basin_planning.html. Accessed: March 16, 2021.

State of California, Natural Resource Agency, and California Department of Water Resources. 2015. *California's Groundwater Update 2013*. A compilation of Enhanced Content for California Water Plan Update 2013 San Francisco Bay Hydrologic Region. April.

State Water Resources Control Board. 2018. *Final 2014/2016 California Integrated Report Clean Water Act 303(d) List/305(b) Report*. Available: https://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2014_2016.shtml. Accessed: March 11, 2021.

U.S. Geological Survey. 2021. Surface Water Data for California: USGS Surface-Water Monthly Statistics USGS Station 11458000 Napa River CA. Calculation Period: 1959-10-01 to 2020-09-30. Available: https://waterdata.usgs.gov/ca/nwis/monthly/?referred_module=sw&site_no=11458000&por_11458000_11270=2209953,00060,11270,1929-10,2020-10&format=html_table&date_format=YYYY-MM-DD&rdb_compression=file&submitted_form=parameter_selection_list. Accessed: March 16, 2021.

West Yost Associates. 2006. *Final Storm Drainage Master Plan Volume 1*. Prepared for the City of Napa. April.

Western Regional Climate Center. No Date. Period of Record Monthly Climate Summary Napa State Hospital, California (046074) Period of Record: 01/01/1893 to 06/10/2016. Available: https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca6074. Visited: March 15, 2021.

3.10 Land Use and Planning

This section provides an analysis of potential land use and planning impacts from future development allowed by the General Plan update, including evaluation of the Project's consistency with existing land use plans and regulations. This section describes existing land uses as well as relevant state and local regulations and programs. Population and growth inducement are evaluated in Section 3.12, *Population and Housing*.

3.10.1 Existing Conditions

3.10.1.1 Regulatory Setting

This section provides the relevant state, regional, and local regulations applicable to the Project. There are no federal regulations that apply to land use and planning.

State

Planning and Zoning Law

California Government Code Section 65300 requires cities and counties in the state to "adopt a comprehensive, long-term general plan for the physical development of the city." The general plan must include at least seven elements: land use, circulation, housing, conservation, open space, noise, and safety. The general plan is implemented by, among other things, the zoning and subdivision ordinances. California Government Code Sections 65919 to 65919.11 summarize procedures related to interagency referrals for different types of lead agency actions, including general plan updates. Among other referrals, this part of the Government Code provides a procedure and protocols for requesting counties to keep cities informed regarding land use actions within the unincorporated portions of spheres of influence (SOIs) and planning areas.

Senate Bill 375—Sustainable Communities and Climate Protection Act of 2008

Senate Bill (SB) 375 was passed to support the state's climate action goals related to reducing greenhouse gas (GHG) emissions. Under the act, the California Air Resources Board (CARB) sets regional GHG emissions reduction targets. Each of California's Metropolitan Planning Organizations must prepare a Sustainable Communities Strategy illustrating how that target will be met as an integral part of its Regional Transportation Plan. The joint Association of Bay Area Governments and the Metropolitan Transportation Commission (ABAG/MTC) adopted the Plan Bay Area 2050 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) in October 2021 (see *Regional* below).

SB 375 does not directly govern local general planning efforts. Instead, it requires consistency between regional transportation planning processes and local housing planning processes. Each Sustainable Communities Strategy must be consistent with the Regional Housing Needs Allocation (RHNA), a process established under State Housing Element law that requires a local agency's general plan to accommodate its share of the regional housing needs as determined by the regional council of governments. The California Department of Housing and Community Development provides housing need projections to each region. The regional council of governments must distribute to each jurisdiction in the region its fair share of the RHNA. ABAG is the regional council of

governments that includes the City of Napa. ABAG/MTC's RNHA allocation is discussed below and in Section 3.13, *Population and Housing.*

Regional

Regional Transportation Plan/Sustainable Communities Strategy

ABAG/MTC adopted its RTP/SCS, Plan Bay Area, in 2013. The RTP/SCS addresses various requirements, including those of SB 375 that call for reductions in GHG emissions from the transportation sector, and uses a performance-based planning approach. The RTP/SCS matches transportation investment priorities with the desired land use. The RTP/SCS itself does not control land use but is a long-range strategy for the nine-county San Francisco Bay Area that "discusses how the Bay Area will grow over the next two decades and identifies transportation and land use strategies to enable a more sustainable, equitable and economically vibrant future" (Plan Bay Area 2040). Since 2013, ABAG/MTC has prepared two comprehensive updates: Plan Bay Area 2040 was adopted in 2017, and Plan Bay Area 2050 was recently adopted on October 21, 2021.

Regional Housing Needs Allocation

On May 20, 2021, the ABAG Executive board approved the final RHNA Methodology and Draft Allocations for the sixth housing cycle, which embodies housing needs during the period from 2023 to 2031. The Final RHNA Methodology was approved by the State Department of Housing and Community Development (HCD) in April 2021. On November 22, 2021, ABAG issued the proposed Final RHNA Plan, which includes allocation adjustments for certain jurisdictions as a result of partially granted appeals. The Final Plan is anticipated to be adopted by the ABAG Executive Board in December 2021.

On August 25, 2015, the City and County entered a Memorandum of Agreement regarding transfer of some of the unincorporated County's RHNA obligation to the City of Napa for the sixth and subsequent housing element planning periods. Specifically, the City is responsible for growth related to development of the Napa Pipe property, which has been annexed into City limits as of November 18, 2019. The agreement has been amended to reflect these changes and was approved by the City on December 17, 2019 (R2019-145).

Napa County General Plan, Subdivision and Zoning Codes

Provisions of the General Plan, adopted in 2008 with a horizon year of 2030, apply to unincorporated areas of Napa County, including the SOI adjacent to the City limits analyzed in the Project and Draft EIR. The Agricultural Preservation and Land Use Element of the General Plan guide future development and revitalization efforts by designating the general distribution, location, and extent of uses on these lands and is the main mechanism for accommodating growth and change in unincorporated areas plus the conservation of agricultural land.

The County's Zoning Code, Subdivision Code, and zoning map are implementation tools of the General Plan that provide details on specific allowable uses, design and development standards, and procedures. Zoning and subdivision regulations govern the division, design, and use of individual parcels of land, including minimum lot size, lot configuration, access, height restrictions, and yard setback standards for structures. These apply to the unincorporated SOI portion of the Planning Area.

Napa County Airport Land Use Compatibility Plan

The Napa County Airport Land Use Compatibility Plan (1991, Revised 1999) establishes policies which the Napa County Airport Land Use Commission (ALUC) uses in evaluating land use plans and proposed development in the vicinity of three public airports in Napa County, including Napa County Airport, Calistoga Gliderport, and Parrett Field. Principal land use impacts and compatibility considerations fall under four categories, including noise, hazards to flight, safety on the ground, and overflights.

The Napa County Airport Land Use Compatibility Plan establishes five compatibility zones around the airport, which delineate land use standards and land development restrictions based on the zone's proximity to the airport. These zones are Zone A: Runway Protection Zone, Zone B: Approach/Departure Zone, Zone C: Extended Approach/Departure Zone, Zone D: Common Traffic Pattern, and Zone E: Other Airport Environs. Each of these zones impose different development conditions and prohibits certain land uses based on the individual zone's proximity to the airport. The closer the zone is to the airport, the stricter the development conditions are due to the greater the risk of accident and increased noise impacts.

The majority of the City is not within an airport compatibility zone and no portions of the Planning Area are within zones A and B, which are the most restrictive zones. A small portion of the Planning Area at the southern-most edge of the City limits within the Napa Valley Commons industrial park is in Zone C. In this zone, aircraft can be below 300 feet above ground level and all residential uses, schools, libraries, hospitals, nursing homes, day care centers, and other uses hazardous to flights are prohibited.

Local

General and Specific Plans

The City of Napa as it is known today was incorporated in 1874 and, nearly 100 years later, the City adopted its first General Plan in 1969. The existing General Plan was adopted in 1998 and had a planning horizon of 2020. The 1998 General Plan consists of the following elements: Land Use, Housing, Transportation, Community Services, Parks and Recreation, Historic and Cultural Resources, Natural Resources, Health and Safety, Administration and Implementation. These elements reflect the City's concern for its environment and the quality of life of its people, in addition to policies guiding future land use development. Major themes balanced between environmental protection and growth while encouraging a sustainable economy and continued investment into a healthy downtown.

The City's development policies are also expressed in a number of other specific plans that are subordinate to the General Plan. These include the Downtown Specific Plan, Cinedome Focus Area Master Plan, Downtown Riverfront Urban Design Plan, and the Big Ranch Specific Plan.

Downtown Specific Plan

The Downtown Specific Plan (DTSP) (City of Napa 2012) provides a framework for realizing the community's vision of a vibrant and healthy pedestrian-oriented city center, meeting the needs of residents and tourists alike. The DTSP Planning Area encompasses approximately 210 acres and is bounded on the east by the eastern bank of the Napa River, on the south by Division and Third Streets, on the west by Jefferson Street, and on the north generally by the edge of the Downtown

Commercial zoning district boundary. The DTSP Planning Area also contains the Oxbow Public Market and the Culinary Institute of America at Copia site east of Soscol Avenue.

The DTSP includes allowable land uses, overlay districts, development standards, development incentives, design guidelines, circulation patterns, a parking strategy, and required utility improvements. The greatest residential and commercial densities are allowed in the heart of Downtown, and gradually decrease as Downtown commercial uses transition into residential neighborhoods. The DTSP has six land use designations: Downtown Core Commercial, Downtown Mixed Use, Downtown Neighborhood, Downtown Public, Downtown Parks/Open Space, and Oxbow Commercial.

Cinedome Focus Area Master Plan

The primary goal of the Cinedome Focus Area Master Plan (City of Napa 2018) is to maintain and enhance Napa's pedestrian downtown core as a lively and walkable destination district. This goal is consistent with those expressed in the Downtown Specific Plan, which designates the focus area as connected to both the downtown and Oxbow Commons. This master plan also contains specific goals and objectives related to preferred land uses, circulation, and design and massing of future development.

The Cinedome Focus Area Master Plan is not a regulatory document. Instead, it seeks to clarify and expand on the aspirational qualities contained in the Downtown Specific Plan through the provision of a more precise vision for future development. The recommendations outlined in this master plan do not require amendments to the Napa Municipal Code or the Downtown Specific Plan.

Downtown Riverfront Urban Design Plan

The Downtown Riverfront Urban Design Plan guides near- and long-term riverfront design and revitalization efforts by the City of Napa and other agencies. The vision for the riverfront includes capital projects, programs, and coordination efforts with private development projects. Most of these elements would be implemented as part of the Napa River Flood Protection Project. Envisioned Downtown Riverfront Urban Design Plan key elements include urban and natural river edges, river trail and trail access points, private development sites, and the Downtown Reach and Oxbow subareas. (City of Napa 2003a)

Big Ranch Road Specific Plan

The Big Ranch Road Specific Plan area is in the northeast section of Napa, bounded by Trower Avenue to the north, Big Ranch Road on the east, Trancas Street to the south, and Jefferson Street to the west. The objectives of the plan are to provide for orderly development of land within this area, ensure infrastructure is adequate and available upon development, conserve and protect agricultural lands and natural resources, provide a variety of housing types, and ensure that parks, recreational facilities, fire protection, and other facilities are provided in a timely manner. Since adoption of the plan, new housing has been constructed along Big Ranch Road and on the former Gasser Ranch site. The plan identifies extending Trower Avenue to Big Ranch Road as a priority; however, as of 2021, this has not occurred. (City of Napa 1996)

City of Napa Zoning Ordinance

The Zoning Ordinance is an important tool for implementing General Plan policies on privately owned sites. The Zoning Ordinance provides permitted land uses and development standards for

each category of land use. In addition to zoning designations, specific plan and overlay areas are governed by detailed land use regulations. As with the General Plan, zoning designations do not always coincide with existing land uses and development intensities as built. The Zoning Ordinance only applies within City limits, whereas land within the SOI is under Napa County zoning regulations. However, the City can pre-zone land that is expected to be annexed to the City.

City of Napa Subdivision Ordinance

The City's Subdivision Ordinance, Title 16 of the Napa Municipal Code, implements and supplements the requirements of the California Subdivision Map Act. It also regulates subdivisions, land divisions, and mergers and ensures that the resulting lots or parcels are adequately served by the necessary utilities, that the required public improvements are made to meet present and anticipated future needs, and that proposed development will not adversely affect the character of the City or its immediate surroundings. The City is responsible for regulation and control of subdivision design and improvement, including proper grading and erosion control and adequate traffic circulation, within its jurisdiction.

3.10.1.2 Environmental Setting

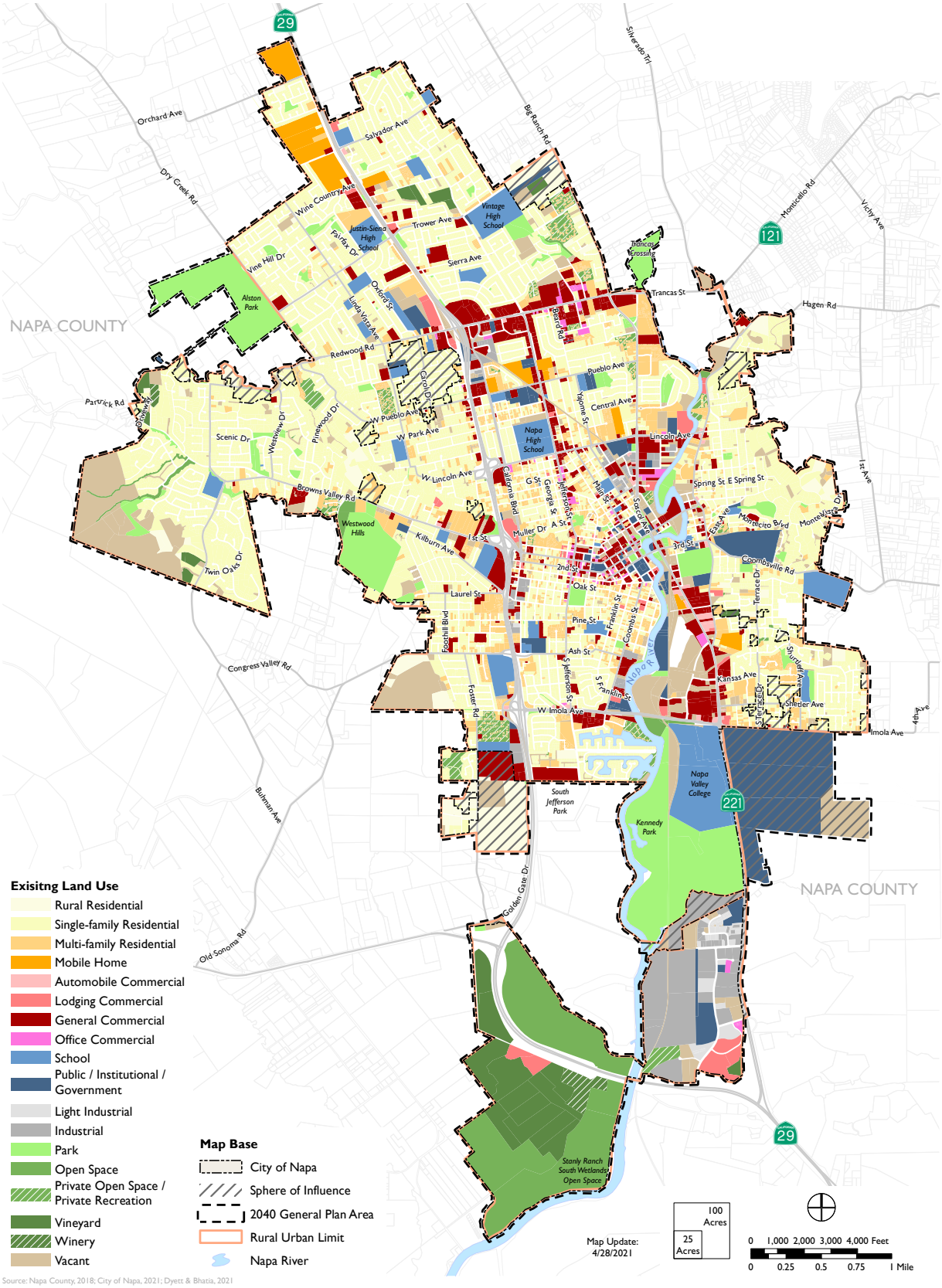
The City is characterized by a compact development pattern, with a historic Downtown core, and the surrounding natural topography of the Mayacamas Mountains to the west and the Vaca Range to the east. The Rural Urban Limit, initially established in the 1970s, limits the extent of outward growth into the unincorporated county, where some of the world's most valuable agricultural lands are located. The City structure is further defined by the existing residential neighborhoods, parks and open spaces, commercial centers, and industrial districts along with the transportation corridors and infrastructure that link them. The Napa River and its tributaries weave throughout the City, providing recreational enjoyment, habitat, and scenic views. Existing land uses are summarized in Table 3.10-1, and Figure 3.10-1 shows the overall pattern of existing land uses in the Planning Area.

The City's Downtown is laid out in a gridiron plan that is rotated approximately 30 degrees to align with the Napa River. Most of the City's residential neighborhoods are located outside of Downtown, with historic neighborhoods just to the north, south, and east of Downtown. While many of Napa's neighborhoods also conform to a grid-like pattern, geographical barriers such as creeks and steep terrain that are costly to traverse have resulted in dead-end streets that impede neighborhood walkability and connectivity. Each neighborhood has a different block pattern and character.

Table 3.10-1. Existing Land Uses in the Planning Area

	City of Napa		Sphere of Influence		Total Planning Area	
Existing Land Use Category	Acres	Percent	Acres	Percent	Acres	Percent
Agriculture	**381.6**	**3.9%**	**10.4**	**1.0%**	**392**	**3.7%**
Vineyard	343.8	3.5%	10.4	1.0%	354.2	3.3%
Winery	37.8	0.4%	0.0	0.0%	37.8	0.4%
Commercial	**806.3**	**8.2%**	**32.6**	**3.3%**	**838.9**	**7.8%**
Automobile Commercial	24.3	0.3%	0.0	0.0%	24.3	0.2%
Lodging Commercial	120.5	1.2%	0.0	0.0%	120.5	1.1%
General Commercial	620.1	6.4%	32.6	3.3%	652.7	6.1%
Office Commercial	41.4	0.3%	0.0	0.0%	41.4	0.4%
Industrial	**311.1**	**3.2%**	**94.5**	**9.5%**	**405.6**	**3.8%**
Light Industrial	46.8	0.5%	0.0	0.0%	46.8	0.4%
Industrial	264.3	2.7%	94.5	9.5%	358.8	3.4%
Parks/Open Space	**1,659.2**	**17.1%**	**3.5**	**0.4%**	**1,662.7**	**15.5%**
Parks	891.6	9.2%	3.5	0.4%	895.1	8.4%
Open Space	595.2	6.1%	0.0	0.0%	595.2	5.6%
Private Open Space/Private Recreation	172.4	1.8%	0.0	0.0%	172.4	1.6%
Public/Institutional	**742.8**	**7.7%**	**362.7**	**36.3%**	**1,105.5**	**10.3%**
Public/Institutional/Government	235.4	2.4%	362.7	36.3%	598.1	5.6%
School	507.4	5.2%	0.0	0.0%	507.4	4.7%
Residential	**4,920.0**	**50.7%**	**395.1**	**39.6%**	**5,315.1**	**49.7%**
Mobile Home	165.8	1.7%	0.0	0.0%	165.8	1.5%
Multi-Family Residential	760.7	7.8%	22.1	2.2%	782.8	7.3%
Rural Residential	173.0	1.8%	172.0	17.2%	345.0	3.2%
Single-Family Residential	3,820.5	39.4%	201.0	20.1%	4,021.5	37.6%
Vacant	**921.3**	**9.5%**	**99.0**	**9.9%**	**1,020.3**	**9.5%**
Total	**9,742.3**	**100.0%**	**997.8**	**100.0%**	**10,740.1**	**100.0%**

Sources: City of Napa, 2018; Napa County Office of the Assessor, 2018; Dyett & Bhatia, 2018.
Note: Totals may not add due to rounding.



Graphics... 00494.17 (10/28/21) AB

ICF

Figure 3.10-1
Existing Land Use

Residential

Residential uses are the most common land use in the Planning Area (49.7 percent of land area), as shown in Table 3.10-1. Single-family residential is the most common type of residential development, comprising about 37.6 percent of the Planning Area, followed by multifamily residential (7.3 percent), rural residential (3.2 percent) and mobile homes (1.5 percent). Multifamily residential uses are more widespread in the City of Napa than in the SOI; multifamily residential uses occupy 760 acres (8 percent) of the City of Napa but only 22 acres (2 percent) of the SOI. Ninety-eight percent of housing within the SOI is either single-family residential or rural residential.

Commercial

Commercial uses occupy 7.8 percent of the Planning Area. Most commercial uses—including retail, lodging, and offices—are located along major corridors, including State Route (SR) 29, SR 221, Trancas Street, and Soscol Avenue. Downtown, approximately centered along Third Street to the west of the Napa River, contains a mix of primarily general commercial uses. Most automobile commercial uses are located along Soscol Avenue, forming Napa County's sole "auto row." Major commercial retail centers include Bel Aire Plaza, located at the northeast corner of Trancas Street and SR 29; Silverado Plaza, located at the southeast corner of Trancas Street and Soscol Avenue; South Napa Marketplace and Century Center, located at the northwest corner of Imola Avenue/SR 121 and Soscol Avenue/SR 221; Napa Premium Outlets, located at the southwest corner of First Street and SR 29; and Jefferson Square, located at the southwest corner of Trancas and Jefferson streets. Office commercial uses (0.4 percent of the Planning Area), which are generally buildings used solely for non-public or institutional office uses, are mostly located along Jefferson Street and Trancas Street. There are other office uses in Napa, but these office uses are generally located in mixed-use buildings and are accounted for in the general commercial land use category.

Parks, Open Space, and Public/Institutional

Parks and open spaces account for 15.5 percent of current land uses. The Planning Area includes many public facilities, including City and County offices and facilities, schools, and hospitals. Altogether, public facilities comprise 10.3 percent of the Planning Area. Napa State Hospital is located at the southeast corner of Imola Avenue/SR 121 and Soscol Avenue/SR 221 and is the largest public/institutional use in the Planning Area. Napa Valley College is located across SR 221 from Napa State Hospital, while elementary, middle, and high schools are distributed throughout the Planning Area. Most City and County offices are in Downtown, with a few facilities, including the Napa County Health and Human Services Department and the Napa County Social Services Department, located outside of Downtown.

Other Uses and Vacant Land

Less-common land uses include agriculture and industrial. Agricultural land uses—including vineyard and winery uses—are generally located at the edges of the Planning Area and comprise 4.7 percent of the Planning Area. Industrial uses comprise 3.8 percent of land in the Planning Area and are generally located to the south of Imola Avenue, with smaller pockets of industrial uses near the intersection of Lincoln and Soscol Avenues and along California Boulevard. About 9.5 percent of the land in the Planning Area is vacant. Large vacant parcels are typically in areas that have environmental constraints, such as terrain and steep slopes at Timberhill and the property west of Foster Road, or flood potential along the west bank of the Napa River and Soscol Avenue. Smaller

vacant parcels are dispersed throughout the Planning Area and are typically cleared or undeveloped land, such as parking lots found in Downtown, or land that is being preserved for development, such as the properties at the Silverado Trail, First Street, and Juarez Street, which are being held for a hotel. There are a few small vacant sites that have the potential for infill development in single-family residential areas, both along the eastern portion of the City in the Alta Heights and Terrace/Shurtleff neighborhoods, and west of SR 29 in the Linda Vista and Pueblo neighborhoods.

3.10.2 Environmental Impacts

3.10.2.1 Methods for Analysis

The policies of the General Plan update, as represented in its text and land use map, were compared to existing conditions to determine the level of change that would occur with development under the update. The analysis was undertaken at a program level—that is, at a general rather than a parcel-specific level of detail. This approach is consistent with CEQA Guidelines Section 15146(b), which states:

> An EIR on a project such as the adoption or amendment of a comprehensive zoning ordinance or a local general plan should focus on the secondary effects that can be expected to follow from the adoption or amendment, but the EIR need not be as detailed as an EIR on the specific construction projects that might follow.

The planning horizon for the General Plan update is 2040. The following analyses generally consider the level of development that may reasonably be expected to occur by that time.

3.10.2.2 Relevant General Plan Update Goals and Policies

Land Use and Community Design Element

Goal LUCD-3: Enhance Napa's community character by promoting walkability, inclusivity, and connections between neighborhoods, key centers, and the Napa River.

Policy LUCD 3-6: Where feasible, incorporate the following design strategies into new development to support multimodal transportation, community cohesion and connectivity:

- Locate commercial buildings close to the streets with parking tucked behind to present a cohesive street appearance and enable better pedestrian and transit accessibility.
- Provide greater street, pedestrian, and bicycle connectivity with connections to adjacent developments, trails, bicycle and pedestrian paths, and transit stops.
- Share design features between adjacent developments, such as shared parking and cross-access (to reduce curbcuts), shared building design features, shared signing, consistent landscape treatments across frontages, and other integrating features.
- Avoid exclusive development typologies such as gated, walled, or fenced-off developments which do not support a cohesive neighborhood environment.

Goal LUCD-9: Recognize the importance of annexing unincorporated islands as a City services and equity issue.

Policy LUCD 9-1: Support annexation of unincorporated islands to improve delivery of municipal services, support compatible land use planning, promote community cohesion, and enable representation in City municipal matters.

Goal LUCD-18: Transform Soscol Avenue south of First Street into a well-designed boulevard that acts as an attractive gateway into the Napa community.

Policy LUCD 18-2: Analyze opportunities to extend existing streets in the street grid to improve connectivity and accessibility as new development occurs.

Transportation Element

Goal TE-1: Foster a comprehensive network of accessible roads, trails, sidewalks, and pathways that emphasize a Complete Streets approach, while reducing vehicle miles traveled (VMT) and dependence on single-occupancy vehicles.

Policy TE 1-2: Foster a more connected system of streets, pedestrian facilities, and bicycle facilities as new development and redevelopment is undertaken, or as opportunities are presented.

Goal TE-2: Keep Napa moving with livable streets that provide a balanced, cost-effective, multi-modal transportation system (vehicles, pedestrians, bikes, transit), accommodating the mobility needs of all ages and abilities.

Policy TE 2-2: Evaluate methods and undertake transportation facility improvements to promote biking, walking, and safer street crossings. Establish a target date for buildout of currently planned active transportation network improvements.

Goal TE-3: Promote active transportation, support active lifestyles, and encourage physical activity by providing, safe pedestrian and bicycle infrastructure citywide.

Policy TE 3-2: Collaborate with the Napa Valley Unified School District (NVUSD) in creating a Safe Routes to Schools plan and securing dedicated funding in order to provide safe and equitable access for students to local schools.

Policy TE 3-3: Promote a connected pedestrian and bicycle network that provides safe and direct access between destinations, such as from existing residential areas, schools and Napa Valley College, shopping, employment centers, and connections to regional trail systems, such as the Napa River Trail, the Vine Trail, and the Bay Trail.

Policy TE 3-5: Improve connections to existing pedestrian and bicycle facilities from existing neighborhoods.

Natural Resources Conservation Element

Goal NRC-1: Manage natural resources, including riparian corridors, wetlands, and open space areas in and around the City, to preserve and enhance plant and wildlife habitats.

Policy NRC 1-1: Seek to protect and enhance the riparian habitat along Napa's waterways and the Napa River.

Policy NRC 1-2: Review future waterway improvement projects (e.g., flood control, dredging, private development), as well as all development adjacent to the waterways, to protect and minimize effects on the riparian and aquatic habitats.

Policy NRC 1-3: Support restoration of degraded ecosystems to enhance the natural adaptive capacity of biological communities where feasible.

Policy NRC 1-4: Encourage native plantings along the river and creek banks to stabilize the banks, reduce sedimentation, reduce stormwater runoff volumes, and enhance aquatic habitats.

Policy NRC 1-5: Seek controlled access points in designated areas to prevent unrestricted public access to riparian habitat.

Policy NRC 1-6: Support areas of habitat and biodiversity conservation as the River Trail is completed.

Policy NRC 1-7: Identify and protect wildlife habitat corridors from being severed or significantly obstructed. Prioritize the re-establishment of disconnected habitat corridors wherever feasible, including in conjunction with stormwater management improvements.

Policy NRC 1-8: Require development projects to provide protection for significant on-site natural habitat whenever feasible, and protect significant species and groves or clusters of trees on project sites. Establish and support citywide training and support programs that provide the tools to help existing homeowners associations and residents accomplish habitat protection.

Goal NRC-2: Recognize and support the preservation of rare, endangered, and threatened species.

Policy NRC 2-1: Continue to consult with, and refer development proposals in sensitive areas to, state and federal wildlife agencies for review and comment.

Policy NRC 2-2: As part of development review on sites with sensitives species, require project proponents to either conserve any habitat areas or identify any feasible means of avoiding any net loss of habitat or habitat value for endangered, threatened, and rare species. Establish programs that provide for the use of off-site mitigation when in the best interest of the public.

Goal NRC-3: Develop a balanced and integrated open space network reflecting a variety of considerations—resource conservation, production of resources, recreation, and aesthetic and community identity—as well as connections between various open space components, and compatibility with land use planning.

Policy NRC 3-1: Maintain land designated as Open Space in Figure 7-2 in natural and/or recreational use and require that development or grading on hillsides (if allowed) preserves the integrity and appearance of natural hillsides and other landforms wherever possible. Development shall conform to the City of Napa Hillside Overlay District requirements with the goal to prevent cut-and-fill and other destructive developmental practices.

Policy NRC 3-2: Encourage, at the time of any discretionary approval, development in sensitive areas to cluster development, or to build up, rather than spread out, so as to retain natural areas and habitat.

Goal NRC-4: Support public and private efforts for preserving open spaces and biological environments—particularly unique and fragile biological environments—around the City.

Policy NRC 4-1: Coordinate with Napa County and other agencies to preserve unique and fragile biological environments on unincorporated lands outside the Rural Urban Limit (RUL), including areas such as the Napa-Sonoma Marsh.

Policy NRC 4-2: Collaborate with the Napa County Parks and Open Space District to preserve and protect open spaces within and outside of the City, including mutual support in securing resources for open space and habitat preservation.

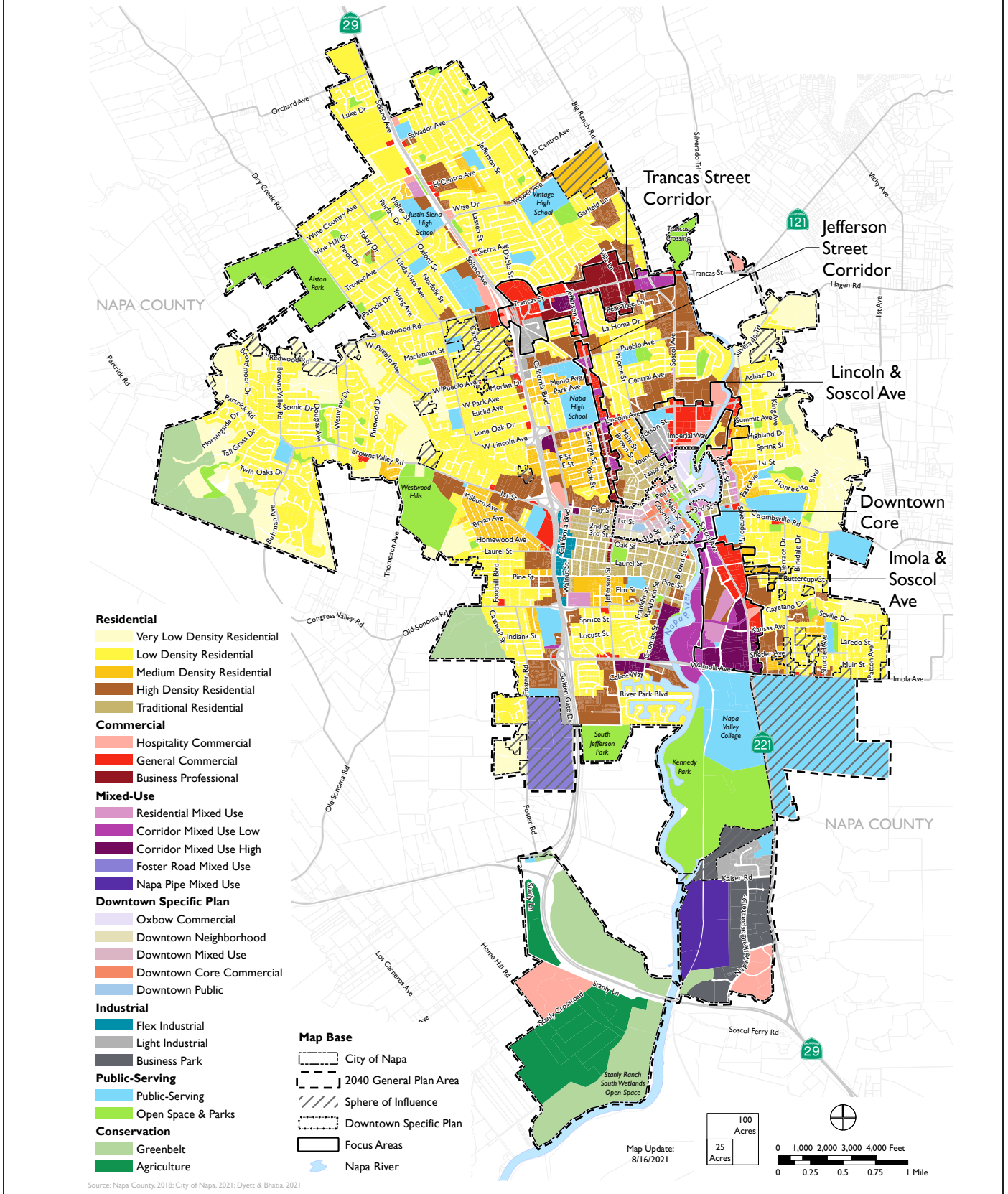
Policy NRC 4-3: Support the Napa Land Trust and other community or non-profit organizations seeking to purchase outright privately held land designated as Agriculture or Greenbelt in the General Plan or other land for habitat conservation used to further conservation goals, such as protecting riparian habitat, expanding/connecting open space, and preserving, protecting, or restoring wildlife corridors.

Goal NRC-10: Promote utilization of green infrastructure and Low Impact Development (LID) strategies; water conservation, reuse, and collection; and other sustainability measures to limit pollution runoff.

Policy NRC 10-3: Preserve natural drainage courses in their natural state wherever feasible.

Policy NRC 10-4: Whenever feasible, incorporate the use of pervious surfaces in public spaces to permit the percolation of urban runoff while implementing best practices for stormwater pollution prevention.

Policy NRC 10-6: Reduce stormwater runoff and pollution by incorporating green infrastructure and sustainability strategies for new development and redevelopment, such as trash capture technology in stormwater systems.



Sources: City of Napa, 2021; Napa County, 2018; Dyett & Bhatia, 2021.

Figure 3.10-2
General Plan Land Use

Graphics ... 00494.18 (8/25/21) AB

Safety and Noise Element

Goal SN-3: Reduce risk to life and property due to flooding, including inundation resulting from the failure of water supply reservoir dams.

Policy SN 3-1: Seek opportunities to invest in flood prevention infrastructure, including extension of integrated flooding/open space solutions, to reduce impacts from flooding to Downtown Napa and other areas located along the Napa River.

Goal SN-4: Protect public health and welfare by minimizing exposure of sensitive uses to noise and preventing significant degradation of the acoustic environment.

Policy SN 4-3: Discourage the use of berms and sound walls for noise mitigation; rather, encourage the use of project design techniques, such as increasing the distance between the noise source and the noise-sensitive receiver and use non-noise-sensitive structures (e.g., a garage) to shield noise-sensitive areas. If a berm or wall is determined necessary to mitigate noise, discourage exclusive use of walls in excess of six feet in height and encourage use of natural barriers, such as site topography or constructed earthen berms. When walls are determined to be the only feasible solution to noise mitigation, then the walls shall be designed to limit aesthetic impacts.

Goal SN-5: Work to prevent urban fires and exposure to wildfires, as well as protect life and property from fire dangers.

Policy SN 5-1: Implement best practices to aggressively address wildfire prevention on open space land within and around the City.

3.10.2.3 Thresholds of Significance

In accordance with Appendix G of the CEQA Guidelines, the Project would be considered to have a significant effect if it would result in any of the conditions listed below.

- Physically divide. an established community.
- Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the Project (including, but not limited to, a general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect.

3.10.2.4 Impacts and Mitigation Measures

Impact LU-1: The Project would have a significant impact if future development would physically divide an established community (less than significant)

The Project is a comprehensive update of the City of Napa's current General Plan. As explained in Chapter 2, *Project Description*, the General Plan update would revise some land use designations to provide for more intensive levels of development, including mixed-use development within the Trancas, Jefferson, Soscol North, and Soscol South focus areas as well as within Downtown and specific sites at the City's edges.

The General Plan's emphasis on development of key corridors as walkable mixed-use community spines would help with community cohesion and integration. Furthermore, street improvements outlined in the General Plan seek to enhance and improve connectivity to the existing road network. The General Plan also includes an extensive array of policies for new bikeways and trails, including for establishing a more cohesive and inter-connected system of trails along the Napa River, with

better connections to other open space and to neighborhoods. The General Plan discourages sound walls or barriers along local streets that would prevent movement.

The General Plan update includes numerous policies intended to avoid dividing established communities and ensuring that new development remains interconnected. Such key policies are included in the proposed Land Use and Community Design, Transportation, and Safety and Noise elements. For example, policies LUCD 3-6, LUCD 9-1, and LUCD 18-2 support improving street grid and community connectivity, cohesion, and accessibility. Policies TE 1-2, TE 2-2, TE 3-2, TE 3-3, and TE 3-5 foster building connected and safe multimodal transportation networks. Policy SN 4-3 discourages sound walls or barriers when other design techniques can minimize exposure to noise.

With implementation of these policies by future development projects, the General Plan update would not result in the physical division of existing communities. Therefore, this impact would be less than significant, and no mitigation is required.

Impact LU-2: The Project would have a significant impact if it conflicted with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the Project adopted for the purpose of avoiding or mitigating an environmental effect (less than significant)

The City regulates land uses within the City Limits through its zoning and subdivision ordinances and, indirectly, through enforcement of the goals and policies of its General Plan that guide development. The Planning Division has the primary responsibility for administering the laws, regulations, and requirements that pertain to the physical development of the City. Specific duties relating to implementation of the General Plan update would include preparing zoning and subdivision ordinance amendments, reviewing development applications, conducting investigations, and making reports and recommendations on planning and land use, zoning, subdivisions, development plans, and environmental regulations.

The City's Zoning Ordinance would be revised to implement the Project, as required by State Law (Government Code Section 65860[a]), and it would translate the General Plan update policies into specific use regulations, development standards, and performance criteria to govern development on individual properties. The Zoning Ordinance would ultimately prescribe standards, rules, and procedures for development and the Zoning Map would provide more detail than the proposed General Plan Land Use Diagram. Accordingly, the City is the only entity with jurisdiction over the Project with regard to land use and the avoidance of environmental effects. At a project-specific level, individual developments under the General Plan update may be subject to federal and State regulations such as those that protect waters of the United States, special-status species, and water quality. See Sections 3.4, *Biological Resources*, and 3.9, *Hydrology and Water Quality*, for a discussion of these requirements.

The Project is also consistent with other regional plans as well as other local plans. The General Plan update seeks to maintain consistency with the policies of the Napa County General Plan and Napa County Code of Ordinances adopted for the purpose of avoiding or mitigating an environmental effect within unincorporated areas of the Planning Area outside City limits, particularly regarding the conservation of open space and agricultural land. Development under the General Plan update would also be subject to the City of Napa Hillside Overlay District requirements (proposed Policy NRC 3-1) with the goal to prevent cut-and-fill and other destructive developmental practices. In addition, certain entities have an advisory role in protecting the environment. The City must refer certain proposed land uses to the ALUC for a determination of consistency with the Napa County Airport Land Use Compatibility Plan. The RTP/SCS embodies compact growth principles intended to

reduce GHG emissions from future development. While these principles are not binding on the City, many of these principles are incorporated into the policies of the General Plan update, including those related to mixed uses, higher densities/intensities, and transit access and pedestrian network improvements.

The General Plan update would not conflict with any existing specific plans in Napa or regulations that protect the environment. General Plan update policies CSS 1-1, CSS 1-2, CSS 1-3, CSS 1-4, and CSS 1-5 seek to develop a climate action plan (CAP) and reduce the City's GHG emissions to achieve carbon neutrality by 2040. The CAP would be consistent with the RTP/SCS principles and statewide SB 375 requirements, as is the General Plan update.

Additionally, the proposed Safety and Noise, and Natural Resources Conservation elements of the General Plan include numerous policies that protect the environment. Such relevant policies include NRC 1-1, NRC 1-2, NRC 1-3, NRC 1-4, NRC 1-5, NRC 1-6, NRC 1-7, NRC 1-8, NRC 2-1, NRC 2-2, NRC 3-1, NRC 3-2, NRC 4-1, NRC 4-2, NRC 4-3, NRC 10-3, NRC 10-4, and NRC 10-6. These General Plan policies aim to preserve and enhance wildlife habitats; support the preservation of rare, endangered, and threatened species; develop a balanced open space network; and support efforts for preserving open spaces around the City. Moreover, Policies SN 3-1 and SN 5-1 seek to protect and reduce impacts on open space from flooding and wildfires. Policy considerations of these environmental impacts would be part of the development review process under the General Plan update and would require continued coordination and collaboration with the County and other regional agencies.

With implementation of these policies in future development projects, the General Plan update would not conflict with other agencies' applicable land use plans, policies, or regulations intended to protect the environment. Therefore, this impact would be less than significant, and no mitigation is necessary.

3.10.3 References Cited

Association of Bay Area Governments. 2013. *ABAG Regional Housing Need Plan 2015–2023.*

City of Napa. 1996. *Big Ranch Road Specific Plan*. SCH Number 1996105320. City of Napa. October 31, 1996.

City of Napa. 2003a. *Downtown Riverfront Urban Design Plan*. Available: https://www.cityofnapa.org/DocumentCenter/View/392/Downtown-Riverfront-Urban-Design-Plan-PDF. Accessed: October 22, 2021.

City of Napa. 2003b. Napa Valley College Facilities Master Plan. Updated 2017. Available: https://www.napavalley.edu/AboutNVC/Documents/FMPfinalapproved.pdf. Accessed: October 22, 2021.

City of Napa. 2012. Downtown Specific Plan. Available: https://www.cityofnapa.org/258/Downtown-Specific-Plan#:~:text=The%20City%20Council%20adopted%20The,balanced%20pedestrian%2Doriented%20city%20center. Accessed: October 22, 2021.

City of Napa. 2018. Cinedome Focus Area Master Plan. Planning Commission Staff Report September 6, 2018. Available:

http://napacity.granicus.com/MetaViewer.php?view_id=2&clip_id=2014&meta_id=156897. Accessed: October 26, 2021.

Metropolitan Transportation Commission & Association of Bay Area Governments. 2017. Plan Bay Area 2040. Available: http://2040.planbayarea.org/files/2020-02/Final_Plan_Bay_Area_2040.pdf. Accessed: October 14, 2021.

Napa County. 1991. Napa County Airport Land Use Commission Airport Land Use Compatibility Plan (ALUCP). Last revised: 1999. Available: https://www.countyofnapa.org/DocumentCenter/View/1980/Airport-Land-Use-Compatibility-Plan-PDF. Accessed: October 14, 2021.

3.11 Noise

3.11.1 Existing Conditions

3.11.1.1 Fundamentals of Environmental Noise and Vibration

Noise is commonly defined as unwanted sound that annoys or disturbs people and potentially causes an adverse psychological or physiological effect on human health. Because noise is an environmental pollutant that can interfere with human activities, an evaluation of noise is necessary when considering the environmental impacts of a proposed project.

Sound is mechanical energy (vibration) transmitted by pressure waves over a medium such as air or water. Sound is characterized by various parameters, including the rate of oscillation of sound waves (frequency), the speed of propagation, and the pressure level or energy content (amplitude). In particular, the sound pressure level is the most common descriptor for characterizing the loudness of an ambient (existing) sound level. Although the decibel (dB) scale, a logarithmic scale, is used to quantify sound intensity, it does not accurately describe how sound intensity is perceived by human hearing. The human ear is not equally sensitive to all frequencies in the entire spectrum, so noise measurements are weighted more heavily for frequencies to which humans are sensitive. This process is called *A-weighting*, written as *dBA,* and referred to as *A-weighted decibels*. Table 3.11-1 defines sound measurements and other terminology used in this section, and Table 3.11-2 summarizes typical A-weighted sound levels for different noise sources.

In general, human sound perception is such that a change in sound level of 1 dB cannot typically be perceived by the human ear, a change of 3 dB is barely noticeable, a change of 5 dB is clearly noticeable, and a change of 10 dB is perceived as doubling or halving the sound level as it increases or decreases, respectively.

Different types of measurements are used to characterize the time-varying nature of sound. These measurements include the equivalent sound level (L_{eq}), the minimum and maximum sound levels (L_{min} and L_{max}), percentile-exceeded sound levels (such as L_{10}, L_{20}), the day-night sound level (L_{dn}), and the community noise equivalent level (CNEL). L_{dn} and CNEL values differ by less than 1 dB. As a matter of practice, L_{dn} and CNEL values are considered to be equivalent and are treated as such. These measurements are defined in Table 3.11-1.

For a point source, such as a stationary compressor or a piece of construction equipment, sound attenuates (i.e., lessens in intensity), based on geometry, at a rate of 6 dB per doubling of distance. For a line source, such as free-flowing traffic on a freeway, sound attenuates at a rate of 3 dB per doubling of distance (California Department of Transportation 2013). Atmospheric conditions, including wind, temperature gradients, and humidity, can change how sound propagates over distance and can affect the level of sound received at a given location.

Table 3.11-1. Definition of Sound Measurements

Sound Measurements	Definition
Decibel (dB)	A unitless measure of sound on a logarithmic scale that indicates the squared ratio of sound pressure amplitude with respect to a reference sound pressure amplitude. The reference pressure is 20 micropascals.
A-weighted decibel (dBA)	An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.
C-weighted decibel (dBC)	The sound pressure level in decibels as measured using the C-weighting filter network. The C-weighting is very close to an unweighted or *flat* response. C-weighting is used only in special cases (i.e., when low-frequency noise is of particular importance). A comparison of measured A- and C-weighted level gives an indication of low-frequency content.
Maximum sound level (L_{max})	The maximum sound level measured during the measurement period.
Minimum sound level (L_{min})	The minimum sound level measured during the measurement period.
Equivalent sound level (L_{eq})	The equivalent steady-state sound level that in a stated period of time would contain the same acoustical energy.
Percentile-exceeded sound level (L_{xx})	The sound level exceeded *xx* % of a specific time period. L_{10} is the sound level exceeded 10% of the time, and L_{90} is the sound level exceeded 90% of the time. L_{90} is often considered to be representative of the background noise level in a given area.
Day-night level (L_{dn})	The energy average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the A-weighted sound levels occurring during the period from 10 p.m. to 7 a.m.
Community noise equivalent level (CNEL)	The energy average of the A-weighted sound levels occurring during a 24-hour period, with 5 dB added to the A-weighted sound levels occurring during the period from 7 p.m. to 10 p.m. and 10 dB added to the A-weighted sound levels occurring during the period from 10 p.m. to 7 a.m.
Vibration velocity level (or vibration decibel level, VdB)	The root-mean-square velocity amplitude for measured ground motion expressed in dB.
Peak particle velocity (peak velocity or PPV)	A measurement of ground vibration, defined as the maximum speed (measured in inches per second) at which a particle in the ground is moving relative to its inactive state. PPV is usually expressed in inches/second.
Frequency: Hertz (Hz)	The number of complete pressure fluctuations per second above and below atmospheric pressure.

Table 3.11-2. Typical A-weighted Sound Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	—110—	Rock band
Jet flyover at 1,000 feet		
	—100—	
Gas lawnmower at 3 feet		
	—90—	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	—80—	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawnmower at 100 feet	—70—	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	—60—	
		Large business office
Quiet urban daytime	—50—	Dishwasher in next room
Quiet urban nighttime	—40—	Theater, large conference room (background)
Quiet suburban nighttime		
	—30—	Library
Quiet rural nighttime		Bedroom at night, concert hall (background)
	—20—	
		Broadcast/recording studio
	—10—	
	—0—	

Source: California Department of Transportation 2013a.

The degree to which the ground surface absorbs acoustical energy also affects sound propagation. Sound that travels over an acoustically absorptive surface such as grass attenuates at a greater rate than sound that travels over a hard surface such as pavement. The increased attenuation is typically in the range of 1–2 dB per doubling of distance. Barriers such as buildings or topographic features that block the line of sight between a source and receiver also increase the attenuation of sound over distance.

Community noise environments are generally perceived as *quiet* when the 24-hour average noise level is below 45 dBA, *moderate* in the 45–60 dBA range, and *loud* above 60 dBA. Very noisy urban residential areas are usually around 70 dBA CNEL. Along major thoroughfares, roadside noise levels are typically between 65 and 75 dBA CNEL. Incremental changes of 3–5 dB in the existing 1-hour L_{eq}, or the CNEL, are commonly used as thresholds for an adverse community reaction to a noise increase. However, there is evidence that incremental thresholds in this range may not be sufficiently protective in areas where noise-sensitive uses are located and CNEL is already high (i.e., above 60 dBA). In these areas, limiting noise increases to 3 dB or less is recommended (Federal Transit Administration 2018). Noise intrusions that cause short-term interior noise levels to rise above 45 dBA at night can disrupt sleep. Exposure to noise levels greater than 85 dBA for 8 hours or longer can cause permanent hearing damage.

Overview of Groundborne Vibration

Operation of heavy construction equipment, particularly pile-driving equipment, and other impact devices (e.g., pavement breakers), create seismic waves that radiate along the surface of and downward into the ground. These waves can be felt as ground vibration. Vibration from the operation of this type of equipment can result in effects that range from annoying people to damaging structures. Variations in geology and distance result in different vibration levels, including different frequencies and displacements. In all cases, vibration amplitudes decrease with increased distance.

Perceptible groundborne vibration is generally limited to areas within a few hundred feet of construction activities. As seismic waves travel outward from a vibration source, they cause rock and soil particles to oscillate. The actual distance that these particles move is usually only a few ten-thousandths to a few thousandths of an inch. The rate or velocity (in inches per second) at which these particles move is the commonly accepted descriptor of vibration amplitude, referred to as peak particle velocity (PPV).

Vibration amplitude attenuates over distance. This is a complex function of how energy is imparted into the ground and the soil or rock conditions through which the vibration is traveling. The following equation is used to estimate the vibration level at a given distance for typical soil conditions (California Department of Transportation 2020). PPV_{ref} is the reference PPV at 25 feet (Table 3.11-3).

$$PPV = PPV_{ref} \times (25/Distance)^{1.1}$$

Table 3.11-3 summarizes typical vibration levels generated by construction equipment at the reference distance of 25 feet.

Table 3.11-3. Vibration Source Levels for Construction Equipment

Equipment	PPV at 25 Feet	PPV at 50 Feet	PPV at 75 Feet	PPV at 100 Feet	PPV at 175 Feet
Pile driver (impact)	1.518	0.5367	0.2921	0.1898	0.0820
Pile drive (sonic)	0.734	0.2595	0.1413	0.0918	0.0396
Vibratory Roller	0.21	0.0742	0.0404	0.0263	0.0113
Hoe Ram	0.089	0.0315	0.0171	0.0111	0.0048
Large bulldozer	0.089	0.0315	0.0171	0.0111	0.0048
Caisson drilling	0.089	0.0315	0.0171	0.0111	0.0048
Loaded trucks	0.076	0.0269	0.0146	0.0095	0.0041
Jackhammer	0.035	0.0124	0.0067	0.0044	0.0019
Small bulldozer	0.003	0.0011	0.0006	0.0004	0.0002

Source: Federal Transit Administration 2018 for PPV values at 25 feet. Other distances calculated using the PPV formula above.
PPV = peak particle velocity

Tables 3.11-4 and 3.11-5 summarize the guidelines developed by the California Department of Transportation (Caltrans) for damage and annoyance potential from the transient and continuous vibration that is usually associated with construction activity. Activities that typically cause single-impact (transient) or low-rate, repeated impact vibration include drop balls, blasting, and the use of impact pile drivers, “pogo stick” compactors, and crack-and-seat equipment. Activities that typically generate continuous vibration include the use of excavation equipment, static compaction

equipment, tracked vehicles, vehicles on a highway, vibratory pile drivers, pile-extraction equipment, and vibratory compaction equipment (California Department of Transportation 2020).

Table 3.11-4. Vibration Damage Potential Threshold Criteria Guidelines

	Maximum PPV (in/sec)	
Structure and Condition	Transient Sources	Continuous/Frequent Intermittent Sources
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

Source: California Department of Transportation 2020.

Note: Transient sources create a single, isolated vibration event (e.g., blasting or drop balls). Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

PPV = peak particle velocity

Table 3.11-5. Vibration Annoyance Potential Criteria Guidelines

	Maximum PPV (in/sec)	
Structure and Condition	Transient Sources	Continuous/Frequent Intermittent Sources
Barely perceptible	0.04	0.01
Distinctly perceptible	0.25	0.04
Strongly perceptible	0.9	0.10
Severe	2.0	0.4

Source: California Department of Transportation 2020.

Note: Transient sources create a single, isolated vibration event (e.g., blasting or drop balls). Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

PPV = peak particle velocity

Groundborne vibration can also be quantified by the root-mean-square (RMS) velocity amplitudes, which is useful for assessing human annoyance. The RMS amplitude is expressed in terms of the velocity level in decibel units (VdB). The background vibration velocity level in residential areas is usually around 50 VdB or lower. The vibration velocity level threshold of perception for humans is approximately 65 VdB. Most perceptible indoor vibration is caused by sources within buildings, such as the operation of mechanical equipment, movement of people, or the slamming of doors. Typical outdoor sources of perceptible groundborne vibration are heavy construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the groundborne vibration from traffic is rarely perceptible.

Table 3.11-6 summarizes the typical groundborne vibration velocity levels and average human response to vibration that may be anticipated when a person is at rest in quiet surroundings. If the person is engaged in any type of physical activity, vibration tolerance increases considerably. The duration of the event has an effect on human response, as does its daily frequency of occurrence.

Generally, as the duration and frequency of occurrence increase, the potential for adverse human response increases.

Table 3.11-6. Typical Levels of Groundborne Vibration

Human or Structural Response	Vibration Velocity Level (VdB)	Typical Sources (50 feet from source)
Threshold for minor cosmetic damage to fragile buildings	—100—	Blasting from construction project
		Bulldozer or heavy-tracked construction equipment
Difficulty in reading computer screen	—90—	
		Upper range of commuter rail
Threshold for residential annoyance for occasional events (e.g., commuter rail)	—80—	Upper range of rapid transit
Threshold for residential annoyance for frequent events (e.g., rapid transit)		Typical commuter rail Bus or truck over bump
	—70—	Typical rapid transit
Approximate threshold for human perception of vibration; limit for vibration-sensitive equipment		Typical bus or truck on public road
	—60—	
		Typical background vibration
	—50—	

Source: Federal Transit Administration 2018.

Groundborne noise is a secondary component of groundborne vibration. When a building structure vibrates, noise is radiated into the interior of the building. Typically, this is a low-frequency sound that can be perceived as a low rumble. The magnitude of the sound depends on the frequency characteristic of the vibration and the way the room surfaces in the building radiate sound. Groundborne noise is quantified by the A-weighted sound level inside the building. The sound level accompanying vibration is generally 25 to 40 dBA lower than the vibration velocity level in VdB. Groundborne vibration levels of 65 VdB can result in groundborne noise levels of up to 40 dBA, which can disturb sleep. Groundborne vibration levels of 85 VdB can result in groundborne noise levels of up to 60 dBA, which can be annoying to daytime noise-sensitive land uses such as schools (Federal Transit Administration 2018).

Table 3.11-7 summarizes the criteria developed by the Federal Transit Administration (FTA) for assessing groundborne vibration from train passages. The criteria vary, depending on the frequency of events.

Table 3.11-7. Groundborne Vibration Impact Criteria

Land Use Category	Groundborne Vibration Impact Level (VdB)		
	Frequent Events[a]	Occasional Events[b]	Infrequent Events[c]
Category 1: Buildings where vibration would interfere with interior operations	65[d]	65[d]	65[d]
Category 2: Residences and buildings where people normally sleep	72	75	80
Category 3: Institutional land uses with primarily daytime uses	75	78	83
Theater	72	80	N/A

Source: Federal Transit Administration 2018.

[a] *Frequent Events* is defined as more than 70 vibration events of the same source per day. Most rapid transit projects fall into this category.

[b] *Occasional Events* is defined as between 30 and 70 vibration events of the same source per day. Most commuter trunk lines have this number of operations.

[c] *Infrequent Events* is defined as fewer than 30 vibration events of the same kind per day. This category includes most commuter rail branch lines.

[d] This criterion limit is based on levels that are acceptable for most moderately sensitive equipment, such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the heating, ventilation, and air-conditioning systems and stiffened floors.

N/A = not applicable

3.11.1.2 Regulatory Setting

Federal, state, and local agencies regulate different aspects of environmental noise. Generally, the federal government sets noise standards for transportation-related noise sources that are closely linked to interstate commerce. These sources include aircraft, locomotives, and trucks. No federal noise standards are directly applicable to the General Plan update. The state government sets noise standards for transportation noise sources such as automobiles, light trucks, and motorcycles. Noise sources associated with industrial, commercial, and construction activities are generally subject to local control through performance standards for noise and General Plan policies. Local general plans identify general principles that are intended to guide and influence development plans. The state and local noise policies and regulations that are applicable to the General Plan update are described below.

California Code

Title 24 of the California Code of Regulations, Part 2, California Noise Insulation Standards, establishes minimum noise insulation standards to protect persons within new hotels, motels, dormitories, long-term care facilities, apartment houses, and dwellings other than single-family residences. Under this regulation, interior noise levels that are attributable to exterior noise sources cannot exceed 45 L_{dn} in any habitable room.

Local

Implementation of the General Plan update may affect noise-sensitive uses in Napa. The following local policies related to noise may apply to the General Plan update.

Municipal Noise Code

Chapter 8.08 of the City of Napa's (City) Municipal Code contains the City's Noise Control Regulations, also known as a noise ordinance (Chapter 8.08). The noise ordinance establishes the times of day and other conditions that specific noise sources in the City must abide by. These sources include outdoor sound systems, commercial activity, and construction activity.

The current noise ordinance limits most construction activity to between the hours of 8:00 a.m. and 5:00 p.m. Monday through Friday; and 8:00 a.m. to 4:00 p.m. on weekends and holidays. Some construction-related activities, such as material delivery, cleaning of machines, and equipment servicing can occur slightly earlier and later than these hours. For activities that occur outside of these hours, a permit from the City Manager is required.

Additionally, the noise ordinance also places the following limits on construction activity in the city.

- All muffler systems on construction equipment shall be properly maintained.
- All construction equipment shall not be placed adjacent to developed areas unless said equipment is provided with acoustical shielding.
- All construction and grading equipment shall be shut down when not actively in use.
- Construction activity by or on behalf of a public agency, which is necessary to avoid a disruption of a public project or to protect the public health, safety, and welfare, shall be exempt from the time limitations of this section.
- As a separate, distinct, and cumulative remedy established for a violation of this section, the Police and/or the Code Enforcement Officer may issue a stop work order for violation of this section. Such order shall become effective immediately upon posting of the notice. After service of the stop work order, no person shall perform any act with respect to the subject property in violation of any of the terms of the stop work order, except such actions the city determines are reasonably necessary to render the subject property safe and/or secure until the violation has been corrected.

The hourly restrictions and other limitations set forth in the noise ordinance would continue to be in place with approval of the General Plan update.

Additionally, the City's municipal code specifies requirements for new nonresidential projects in Section 17.52.310.D.2. The relevant provision of the municipal code for this requirement is shown below.

> 17.52.310 Noise Standards.
>
> D. Development Projects. Development projects shall address noise standards and policies in the General Plan as follows:
>
> > 2. Proposed nonresidential projects that in the opinion of the Community Development Director could generate noise that would, at the boundary of adjacent residential district properties, increase ambient noise levels by five dB CNEL or more, or in excess of 60 dB CNEL, shall prepare a noise analysis as part of the project's CEQA review to identify anticipated noise levels and recommend noise attenuation measures to maintain ambient levels and to keep levels below 60 dB CNEL. Such measures shall be incorporated into the project approval.

Existing Napa General Plan

In the City's current General Plan, Chapter 8, *Health and Safety*, includes land use compatibility noise standards that define the type of land uses that can acceptably be developed in a given ambient noise environment. Depending on the type of land use to be built and ambient noise level at the site, new development is considered normally acceptable, conditionally acceptable, normally unacceptable, or clearly unacceptable. These compatibility noise standards from the City's current General Plan are shown in Table 3.11-8 (City of Napa 2010).

Table 3.11-8. Existing General Plan Noise Compatibility Standards

	Community Noise Exposure (L_{dn} or CNEL, db)			
Land Use Category	Normally Acceptable[a]	Conditionally Acceptable[b]	Normally Unacceptable[c]	Clearly Unacceptable[d]
Residential – Low Density Single Family, Duplex, Mobile Homes	<60	55-70	70-75	>75
Residential – Multi Family	<65	60-70	70-75	>75
Transient Lodging Motels and Hotels	<65	60-70	70-80	>80
Schools, Libraries, Churches, Hospitals and Nursing Homes	<70	60-70	70-80	>80
Auditoriums, Concert Halls, Amphitheaters		<70		>65
Sports Arena, Outdoor Spectator Sports		<75		>70
Playgrounds and Neighborhood Parks	<70	<75	67.5-75	>72.5
Golf Courses, Ridding Stables, Water Recreation and Cemeteries	<75		70-80	>80
Office Buildings, Business Commercial and Professional	<70	67.5-77.5	>75	
Industrial, Manufacturing Utilities and Agriculture	<75	70-80	>75	

[a] Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

[b] New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning features included in the design.

[c] New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

[d] New construction or development should generally not be undertaken.

3.11.1.3 Environmental Setting

Napa is in southern Napa County near San Pablo Bay and is part of the San Francisco Bay Area region. The study area for this analysis corresponds to the Planning Area. Existing land uses range from single-family residences to industrial complexes.

Residential uses are the most common land use within the Planning Area. Commercial uses also comprise a sizable portion of the Planning Area, and most commercial uses are located along major transportation corridors, such as State Route (SR) 29, SR 221, Trancas Street, and Soscol Avenue. Downtown Napa, approximately centered along Third Street west of the Napa River, contains a mixture of primarily general commercial uses. Most automobile commercial uses are located along

Soscol Avenue. Other land uses in the Planning Area include parks and open spaces and public facilities, such as City and County of Napa (County) offices and facilities, schools, and hospitals.

Less common land uses include agriculture, industrial, and office uses. Agricultural land uses—including vineyard and winery uses—are generally located at the edges of the Planning Area, while industrial uses are generally located to the south of Imola Avenue. Office commercial uses are mostly located along Jefferson Street and Trancas Street. Vacant land is spread throughout the Planning Area.

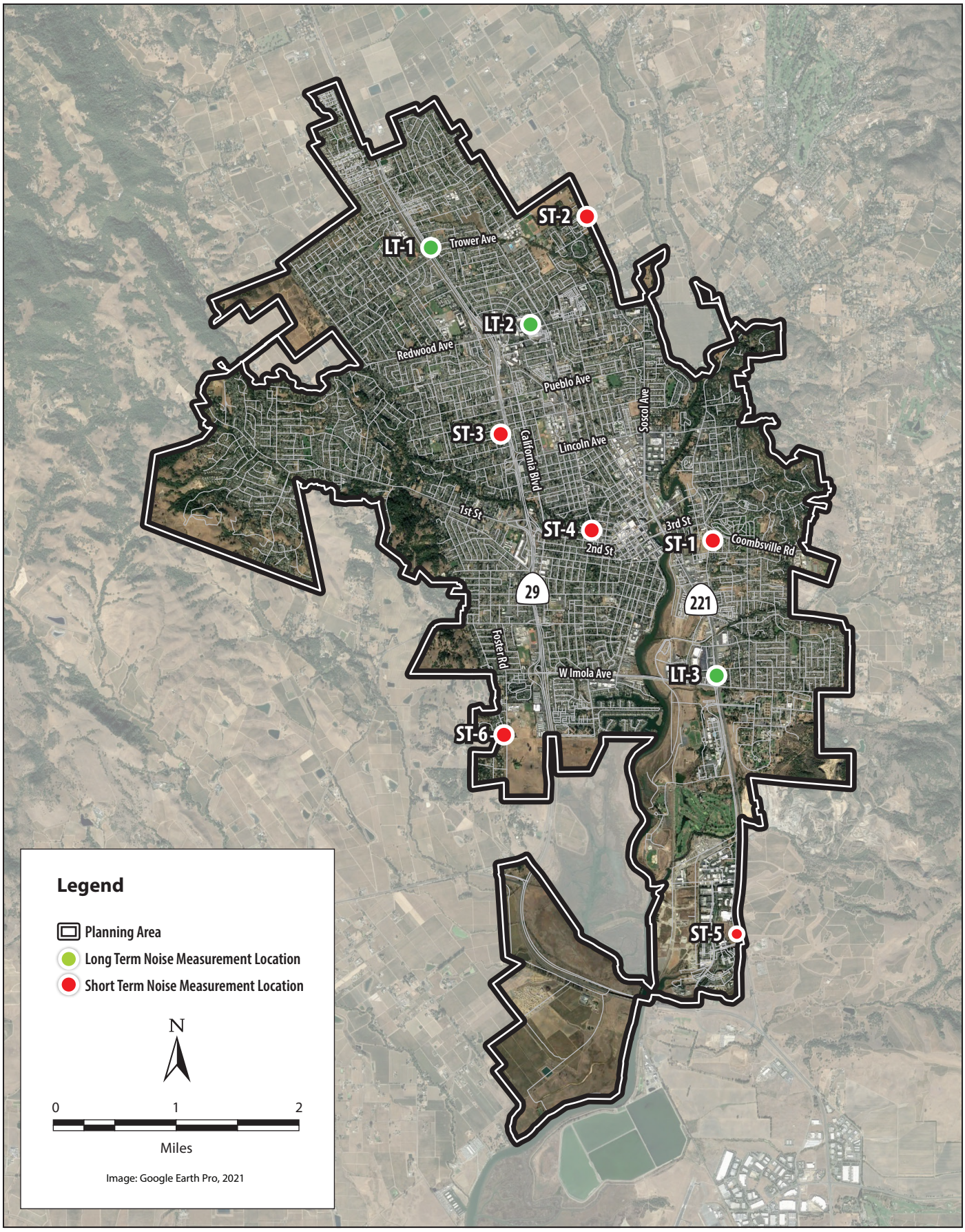
Existing Noise Levels

Long-term noise monitoring was conducted in three locations in the city. Continuous (24-hour) ambient noise measurements were taken starting on May 26 and ending on May 27, 2021. Short-term measurements were also conducted for 15-minute measurement periods at six locations in Napa. Figure 3.11-1 shows the locations of the long-term and short-term noise monitoring sites. Table 3.11-9 summarizes the measured long-term noise levels (L_{dn}).

Table 3.11-9. Long-Term and Short-Term Noise Measurement Data

Long-Term Location	**Date**	**CNEL**
LT-1	5/26/2021–5/27/2021	62.2
LT-2	5/26/2021–5/27/2021	69.8
LT-3	5/26/2021–5/27/2021	73.9
Short-Term Location	**Date**	**L_{eq}**
ST-1	5/27/2021	71.8
ST-2	5/26/2021	71.8
ST-3	5/26/2021	63.9
ST-4	5/26/2021	64.4
ST-5	5/26/2021	72.0
ST-6	5/26/2021	61.2

LT = long-term
ST = short-term



Graphics ... 00494.18 (8/31/21) AB

Figure 3.11-1
Noise Measurement Locations in the Planning Area

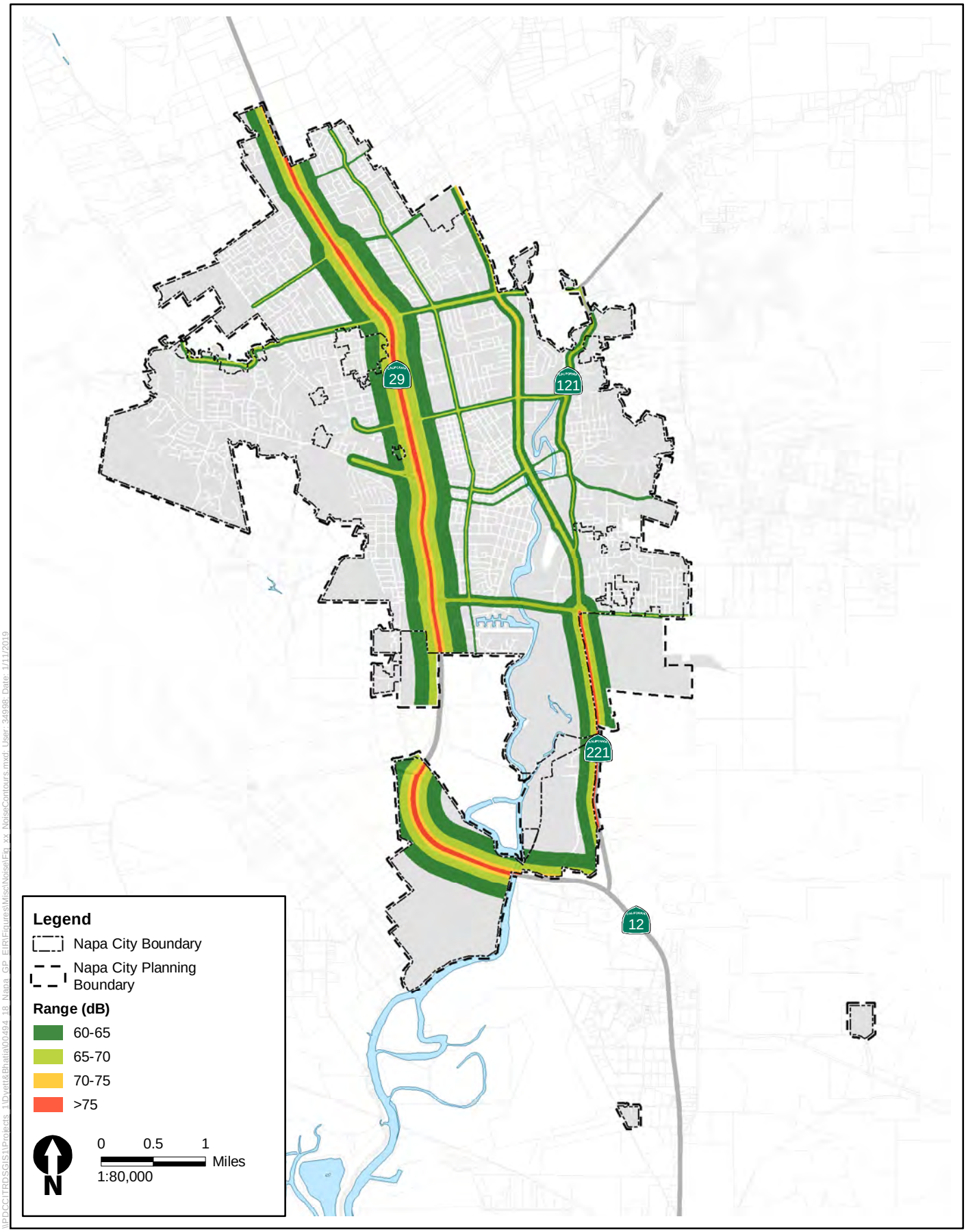


Figure 3.11-2
Existing Transportation Noise Contours

Existing Noise Sources

Existing noise sources are summarized in this section. Sources of noise include motor vehicle traffic, rail operations, aircraft overflights, and typical activities at commercial and industrial uses.

Motor Vehicle Traffic

The dominant source of noise in the Planning Area and in most urban areas is noise from vehicle traffic on roadways. There are several major highways in and adjacent to the Planning Area, including SR 12, SR 29 (St. Helena Highway), SR 121/West Imola Avenue, and SR 221 (Napa Vallejo Highway). Major local roadways in the Planning Area include California Boulevard, First Street, Jefferson Avenue, Lincoln Avenue, Redwood Road, Silverado Trail, Soscol Avenue, and Trancas Street. Existing traffic noise levels on roadway segments located throughout the Planning Area have been characterized using a spreadsheet model, based on the Federal Highway Administration (FHWA) Traffic Noise Model (TNM), Version 2.5 and the traffic volumes, posted speeds, and heavy truck percentages provided by DKS Associates. Using these tools, existing traffic noise was modeled at a reference distance of 50 feet from the centerline of each roadway segment. Twenty-four-hour, day-night noise levels (L_{dn}) from all roadways in the Planning Area range from a low of 52 dBA to a high of 77 dBA.[1] Figure 3.11-2 provides a noise contour map, which visually depicts the ambient noise levels in the Planning Area from roadway traffic sources.

Rail Operations

Railroad activity in the Planning Area is limited to one excursion rail line, the Napa Valley Wine Train, and no freight lines. The Napa Valley Wine Train operates on an 18-mile segment of track from downtown Napa north to St. Helena. There are typically two separate trains that traverse the rail line per day, and each train makes a round trip between downtown Napa and St. Helena. Approximately 4 miles of the rail line are in the Planning Area, though the tracks extend south of the McKinstry Street Station in downtown Napa and through the southern boundary of the Planning Area. This section of track is not used as frequently, however. For land uses in the Planning Area near the railroad tracks, noise from the train horn and bell, and crossing gates are part of the ambient noise environment. The locomotive generates engine noise that is approximately 78 dBA at a distance of 50 feet and horn noise of approximately 100 dBA at a distance of 100 feet. In residential areas near the train tracks, these noise sources from the Napa Valley Wine Train could result in an L_{dn} level of 59 dBA (County of Napa 2007a).

Aircraft Operations

The Napa County Airport, located 5 miles south of the Planning Area in the unincorporated part of the county, is a public airport for non-commercial air travel and is owned and operated by the County. The airport's three runways are oriented in the southwest-northeast directions and in the west-south directions. In 2001, there were a total of 126,080 takeoffs and landings, with those numbers anticipated to increase to an estimated range of 210,000 to 260,000 aircraft operations recorded at Napa County Airport. Of these operations, 48 percent were itinerant operations (i.e., flights that originated or terminated at an airport other than Napa County Airport) and 52 percent were local operations (i.e., flights that began and ended at Napa County Airport, including touch-and-go and other similar training operations) (County of Napa 2007b). Although it is not located in

[1] Traffic noise levels were calculated by ICF, using peak hour intersection volumes collected in October 2018 and provided by DKS Associates.

the Planning Area, aircraft arrivals and departures from this airport affect land uses in the Planning Area. As discussed in Section 3.8, *Hazards and Hazardous Materials*, portions of the Planning Area are located in two of the five designated compatibility zones that delineate land use standards and land development restrictions based on the zone's proximity to the airport.

In the Napa County Airport Master Plan, prepared in 2007, contemporaneous and future noise levels in the area around the airport were modeled and visually depicted in contour maps (Figures 5A and 5B in the Master Plan). Based on these airport contour maps no portions of the Planning Area are located within the modeled airport noise contours. The quietest modeled contour, 55 dBA CNEL, is considered the maximum acceptable level in the Airport Land Use Compatibility Plan (ALUCP) for residential uses (Napa County Airport Land Use Commission 1991). All Planning Area uses are outside of this contour and thus experience noise levels that are lower than 55 dBA CNEL from the Napa County Airport. Occasional aircraft overflight noise may be audible to people in the Planning Area; however, 24-hour average noise levels from airport operations in the Planning Area are compatible with the airport's compatibility plan.

Existing Noise-Sensitive Land Uses

There are a wide variety of land uses located throughout the Planning Area, including noise-sensitive land uses. Noise-sensitive land uses are those uses that are most sensitive to high noise levels, including residences, religious facilities, schools, childcare centers, hospitals, long-term health care facilities, convalescent centers, and retirement homes. All of these land use types occur within the Planning Area.

3.11.2 Environmental Impacts

3.11.2.1 Methods for Analysis

Potential noise impacts associated with implementation of the General Plan update were assessed at a program level of detail. Potential construction and operational (traffic and stationary sources) noise effects on existing noise-sensitive land uses were analyzed.

As noted in *Environmental Setting*, existing noise levels are characterized based on noise monitoring, and traffic noise modeling. For Project impact evaluation, traffic noise modeling was conducted using the methods described above, which uses traffic data provided by DKS Associates and spreadsheet modeling based on TNM. Future traffic noise levels with the Project were evaluated along the major roadway segments in the city.

Construction noise and vibration levels were determined based on typical levels using equipment noise and vibration reference levels developed by the U.S. Environmental Protection Agency, FTA, and Caltrans. Stationary source noise impacts were addressed qualitatively with respect to the City's municipal code. Transportation noise impacts were assessed based on the incremental increase in traffic noise and with respect to the City's proposed compatibility standards.

Relevant General Plan Update Goals and Policies

Applicable General Plan update goals and policies from the *Safety and Noise Element* are as follows.

GOAL SN-4: Protect public health and welfare by minimizing exposure of sensitive uses to noise and preventing significant degradation of the acoustic environment.

Policy SN 4-2: For all projects that have noise exposure levels that exceed the standards in Table 8-3, site planning and architecture should incorporate noise-attenuating features. With mitigation, development should meet the allowable outdoor and indoor noise exposure standards in Table 8-4, or California Building Code, whichever is stricter. When a building's openings to the exterior are required to be closed to meet the interior noise standard, then mechanical ventilation should be provided.

Policy SN 4-3: Discourage the use of berms and sound walls for noise mitigation; rather, encourage the use of project design techniques such as increasing the distance between the noise source and the noise sensitive receiver and use non-noise sensitive structures (e.g., a garage) to shield noise-sensitive areas. If a berm or wall is determined necessary to mitigate noise, discourage exclusive use of walls in excess of six feet in height and encourage use of natural barriers such as site topography or constructed earthen berms. When walls are determined to be the only feasible solution to noise mitigation, then the walls shall be designed to limit aesthetic impacts.

Policy SN 4-7: Address appropriate construction noise and vibration control measures, standards, and monitoring procedures for future development in the City's Municipal Code to reduce impacts to nearby uses.

See 8.08.025 Noise—Construction activity in the Municipal Code for additional information.

Policy SN 4-8: Require all construction within 1,000 feet of noise-sensitive uses to undertake measures to reduce noise impacts. Within 100 feet of pile driving locations and 25 feet of construction sites using other impact or non-impact equipment (e.g., dozers, excavators, etc.), require all construction to undertake measures to prevent possible exposure of vibration-sensitive buildings and receptors to substantial ground borne vibration levels.

3.11.2.2 Thresholds of Significance

In accordance with Appendix G of the CEQA Guidelines, the General Plan update would be considered to have a significant effect if it would result in any of the conditions listed below.

- Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.
- Generation of excessive groundborne vibration or groundborne noise levels.
- For a Project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, the Project exposes people residing or working in the Project area to excessive noise levels.

3.11.2.3 Impacts and Mitigation Measures

Impact NOI-1: Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies (less than significant)

Construction

The General Plan update would result in construction activities that could generate temporary noise. Table 3.11-10 summarizes typical noise levels produced during key construction phases for various types of projects (U.S. Environmental Protection Agency 1971).

Table 3.11-10. Noise Levels of Key Construction Phases at Distances of 50, 100, 200, and 400 feet

Construction Phase and Distance	Housing	Industrial	Public Works	Non-Residential
Sound Level at 50 Feet (dB)				
Ground clearing	85	87	88	91
Excavation	89	90	90	87
Foundations	82	89	92	87
Building/facility construction	81	85	88	88
Finishing and clean-up	86	89	90	87
Maximum at 50 feet	*89*	*90*	*92*	*91*
Sound Level at 100 Feet (dB)				
Ground clearing	79	81	82	85
Excavation	83	84	84	81
Foundations	76	83	86	81
Building/facility construction	75	79	82	82
Finishing and clean-up	80	83	84	81
Maximum at 100 feet	*83*	*84*	*86*	*85*
Sound Level at 200 Feet (dB)				
Ground clearing	73	75	76	79
Excavation	77	78	78	75
Foundations	70	77	80	75
Building/facility construction	69	73	76	76
Finishing and clean-up	74	77	78	75
Maximum at 200 feet	*77*	*78*	*80*	*79*
Sound Level at 400 Feet (dB)				
Ground clearing	67	69	70	73
Excavation	71	72	72	69
Foundations	64	71	74	69
Building/facility construction	63	67	70	70
Finishing and clean-up	68	71	72	69
Maximum at 400 feet	*71*	*72*	*74*	*73*

Source: U.S. Environmental Protection Agency 1971
Notes: Assumes geometric attenuation based on 6 dB per doubling of distance.

The General Plan update does not propose any specific development projects but outlines what future development is expected to look like in Napa; future development under the General Plan update would be required to comply with the noise control regulations specified in Section 8.08.025 (Noise—Construction Activity) of the City's Municipal Code. As noted in *Regulatory Setting*, the Municipal Code requires that construction activity adhere to several limitations, including requiring muffler systems that are properly maintained and locating equipment adjacent to developed areas only if acoustical shielding is used.

The Project would support a series of disparate construction activities associated with new development and redevelopment in the Planning Area, which would require heavy-duty machinery and equipment. Construction activities would be temporary and related noise impacts would be

short-term. Each individual construction activity would generate noise that can be approximated by the noise levels for various project types shown in Table 3.11-10.

As documented in Table 3.11-9, the noise measurement data show that CNEL noise ranges from approximately 62 to 74 dBA and that L_{eq} noise measured in short-term intervals ranges from approximately 61 to 72 dBA. At 50 feet, construction noise for all project types and phases would be above 80 dBA and could be as high as 92 dBA for certain projects, which would be a substantial increase in noise relative to the existing noise levels measured and shown in Table 3.11-9. Additionally, the construction noise levels shown in Table 3.11-10 could cause noise to temporarily exceed the land use compatibility standards proposed in the existing General Plan and General Plan update. General Plan compatibility standards are typically intended to evaluate the compatibility of land use development relative to the typical ambient noise levels in an area rather than evaluating construction noise. Nevertheless, new construction in Napa could make land use compatibility more difficult for existing and new land uses.

As such, construction activities have the potential to substantially increase ambient noise levels at noise-sensitive locations and result in excess noise in the vicinity of sensitive receptors that could exceed noise standards set forth in both the existing General Plan and General Plan update.

To protect future and existing sensitive land uses from substantial temporary noise increases during construction activities, policies in the General Plan update would serve to minimize impacts. General Plan Policy SN 4-7 includes a requirement for future development to implement noise control measures, standards, and monitoring procedures to reduce impacts on nearby uses. General Plan Policy SN 4-8 requires measures to reduce noise impacts for construction activity that is within 1,000 feet of noise-sensitive uses.

The potential for construction-related noise effects would depend on the proximity of construction activities to sensitive receptors, the presence of intervening barriers, the number and types of equipment used, and the duration of the activity, features that cannot be identified with accuracy in a program-level analysis. Compliance with the time-of-day restrictions and noise muffling requirements for construction activity in the City's noise ordinance, as well as the noise-reducing policies included in the General Plan update, would reduce impacts on sensitive receptors. Measures to reduce noise may include using enclosures around noise-generating equipment, locating equipment as far away from adjacent land uses as possible, and requiring a procedure for tracking and responding to noise complaints received from affected sensitive receptors. Because measures to reduce noise would be implemented, the increases in noise from construction activities would not be considered substantial. Therefore, this impact would be less than significant.

Traffic Noise

Future development occurring as part of the General Plan update would result in changes to the land use development patterns in Napa. Consequently, the General Plan update would change traffic volumes and the associated traffic noise in the city relative to existing conditions and to future conditions without the General Plan update.

Incremental Noise Increase from Traffic

Traffic noise modeling was conducted for 103 roadway segments in Napa, using average daily traffic volumes provided by the Project traffic engineers and the FHWA TNM. Table 3.11-11 shows the results of the analysis and compares existing traffic noise and future traffic noise in 2040 with the traffic noise that would occur in 2040 with the Project.

Table 3.11-11. Traffic Noise Modeling Results for City Roadway Segments

Roadway	Existing L_{dn}	Year 2040 L_{dn} (No Project)	Year 2040 L_{dn} (With Project)	Noise Change: Existing to 2040 With Project	Noise Change: 2040 No Project to 2040 With Project
1. CA 29 north of Trower Ave	78	79	79	< 1	< 1
2. CA 29 south of Trower Ave	79	79	79	< 1	< 1
3. Trower Avenue east of CA 29	64	67	67	**3**	< 1
4. Trower Avenue West of CA 29	66	67	67	< 1	< 1
5. Solano Avenue North of Redwood Rd	58	59	60	1	< 1
6. Solano Avenue south of Redwood Rd	56	58	57	< 1	< 1
7. Redwood Road east of Solano Ave	67	67	67	< 1	< 1
8. Redwood Road west of Solano Ave	67	67	67	< 1	< 1
9. CA 29 Off Ramp North of Redwood Rd	66	66	65	< 1	< 1
10. CA 29 Off Ramp south of Redwood Rd	70	69	69	< 1	< 1
11. Redwood Road east of CA 29 Off Ramp	68	68	68	< 1	< 1
12. Redwood Road west of CA 29 Off Ramp	67	67	67	< 1	< 1
13. CA 29 On Ramp north of Trancas St	66	66	66	< 1	< 1
14. CA 29 On Ramp south of Redwood Rd	69	69	70	< 1	< 1
15. Trancas Street east of CA 29 On Ramp	68	68	69	< 1	< 1
16. Redwood Road west of CA 29 On Ramp	72	72	72	< 1	< 1
17. Bel Aire Plaza north of Trancas St	54	55	55	< 1	< 1
18. California Boulevard south of Trancas St	56	58	59	**3**	1
19. Trancas Street east of Bel Aire Plaza/California Blvd	67	67	67	< 1	< 1
20. Trancas Street west of Bel Aire Plaza/California Blvd	67	67	67	< 1	< 1
21. Jefferson Street north of Trancas St	65	66	65	< 1	< 1
22. Jefferson Street south of Trancas St	64	65	65	< 1	< 1
23. Trancas Street east of Jefferson St	67	67	68	< 1	< 1
24. Trancas Street west of Jefferson St	67	67	67	< 1	< 1
25. Big Ranch Road north of Trancas St	64	65	67	2	1
26. Soscol Avenue south of Trancas St	65	66	67	2	< 1

Roadway	Existing L_{dn}	Year 2040 L_{dn} (No Project)	Year 2040 L_{dn} (With Project)	Noise Change: Existing to 2040 With Project	Noise Change: 2040 No Project to 2040 With Project
27. Trancas Street east of Big Ranch Rd/Soscol Ave	66	66	67	< 1	< 1
28. Trancas Street west of Big Ranch Rd/Soscol Ave	66	66	67	1	< 1
29. California Boulevard north of Lincoln Ave	65	67	68	**3**	< 1
30. California Boulevard south of Lincoln Ave	66	69	68	2	< 1
31. Lincoln Avenue east of California Blvd	73	74	74	< 1	< 1
32. Lincoln Avenue west of California Blvd	74	75	74	< 1	< 1
33. Jefferson Street north of Lincoln Ave	70	70	71	< 1	< 1
34. Jefferson Street south of Lincoln Ave	68	70	70	2	< 1
35. Lincoln Avenue east of Jefferson St	70	70	70	< 1	< 1
36. Lincoln Avenue west of Jefferson St	69	71	70	1	< 1
37. Soscol Avenue north of Lincoln Ave	68	70	70	2	< 1
38. Soscol Avenue south of Lincoln Ave	67	69	69	2	< 1
39. Lincoln Avenue east of Soscol Ave	64	66	65	< 1	< 1
40. Lincoln Avenue west of Soscol Ave	63	63	63	< 1	< 1
41. Jefferson Street north of 1st St	63	64	65	2	< 1
42. Jefferson Street south of 1st St	64	65	65	1	< 1
43. 1st Street east of Jefferson St	55	55	54	< 1	< 1
44. 1st Street west of Jefferson St	59	58	57	< 1	< 1
45. Soscol Avenue north of Pearl St	68	69	70	2	< 1
46. Soscol Avenue south of Pearl St	68	70	70	2	< 1
47. Pearl Street west of Soscol Ave	58	61	61	**3**	< 1
48. Soscol Avenue north of 1st St	68	70	70	2	< 1
49. Soscol Avenue south of 1st St	68	69	69	1	< 1
50. 1st Street east of Soscol Ave	60	61	62	1	< 1
51. 1st Street west of Soscol Ave	61	63	63	2	< 1
52. Silverado Trail north of 1st St	68	69	69	< 1	< 1
53. Silverado Trail south of 1st St	67	68	68	< 1	< 1
54. 1st Street east of Silverado Trl	53	54	54	< 1	< 1
55. 1st Street west of Silverado Trl	60	60	61	< 1	< 1

Roadway	Existing L_{dn}	Year 2040 L_{dn} (No Project)	Year 2040 L_{dn} (With Project)	Noise Change: Existing to 2040 With Project	Noise Change: 2040 No Project to 2040 With Project
56. Soscol Avenue north of 3rd St	68	70	70	1	< 1
57. Soscol Avenue south of 3rd St	70	71	72	2	< 1
58. 3rd Street east of Soscol Ave	62	64	62	< 1	< 1
59. 3rd Street west of Soscol Ave	64	64	64	< 1	< 1
60. Silverado Trail north of 3rd St	67	69	68	< 1	< 1
61. Silverado Trail south of 3rd St	67	68	68	1	< 1
62. Coombsville Road east of Silverado Trl	61	64	64	2	< 1
63. 3rd Street west of Silverado Trl	62	63	62	< 1	< 1
64. East Avenue southeast of Silverado Trl	56	58	57	1	< 1
65. Soscol Avenue north of Silverado Trl	70	71	71	2	< 1
66. Soscol Avenue south of Silverado Trl	70	71	71	1	< 1
67. Silverado Trail east of Soscol Ave	68	69	69	< 1	< 1
68. CA 29 north of W Imola Ave	71	72	72	< 1	< 1
69. CA 29 south of W Imola Ave	68	70	70	**3**	< 1
70. West Imola Avenue east of CA 29	65	67	67	1	< 1
71. West Imola Avenue west of CA 29	65	67	67	2	< 1
72. CA 29 north of W Imola Ave	71	71	72	1	< 1
73. CA 29 south of W Imola Ave	66	69	70	**3**	< 1
74. West Imola Avenue east of CA 29	68	69	69	1	< 1
75. West Imola Avenue west of CA 29	65	66	66	1	< 1
76. South Jefferson Street north of W Imola Ave	61	64	64	**3**	< 1
77. South Jefferson Street south of W Imola Ave	60	60	61	< 1	1
78. West Imola Avenue east of S Jefferson St	68	69	69	1	< 1
79. West Imola Avenue west of S Jefferson St	67	69	69	1	< 1
80. Soscol Avenue north of W Imola Ave	69	71	71	2	< 1
81. Soscol Avenue south of W Imola Ave	71	74	74	**3**	< 1
82. West Imola Avenue east of Soscol Ave	64	64	65	< 1	< 1
83. West Imola Avenue west of Soscol Ave	68	69	69	< 1	< 1
84. Solano Avenue north of Trower Ave	53	59	58	**5**	< 1

Roadway	Existing L_{dn}	Year 2040 L_{dn} (No Project)	Year 2040 L_{dn} (With Project)	Noise Change: Existing to 2040 With Project	Noise Change: 2040 No Project to 2040 With Project
85. Solano Avenue south of Trower Ave	61	60	59	< 1	< 1
86. Trower Avenue east of Solano Ave	66	66	66	< 1	< 1
87. Trower Avenue west of Solano Ave	65	66	66	1	< 1
88. CA 121 north of Lincoln Ave	68	68	68	< 1	< 1
89. CA 121 south of Lincoln Ave	68	69	69	< 1	< 1
90. Lincoln Avenue east of CA 121	56	56	57	< 1	< 1
91. Lincoln Avenue west of CA 121	63	65	65	1	< 1
92. CA 29 north of Salvador Ave	76	77	77	< 1	< 1
93. CA 29 south of Salvador Ave	77	78	78	< 1	< 1
94. Salvador Avenue east of CA 29	58	57	54	< 1	< 1
95. Salvador Avenue west of CA 29	61	60	60	< 1	< 1
96. Solano Avenue north of Salvador Ave	65	66	65	< 1	< 1
97. Solano Avenue south of Salvador Ave	56	62	59	**3**	< 1
98. Salvador Avenue east of Solano Ave	61	60	60	< 1	< 1
99. Salvador Avenue west of Solano Ave	47	47	48	1	1
100. CA 29 north of 1st St	45	47	47	**3**	< 1
101. CA 29 south of 1st St	62	62	63	< 1	< 1
102. 1st Street east of CA 29	67	68	67	< 1	< 1
103. 1st Street west of CA 29	66	66	65	< 1	< 1

Notes:
All values are in units of dB
Values bolded and underlined represent noise increases that may be noticeable, because these values are greater than or equal to 3 dB.

As summarized in Table 3.11-11, the Project would result in traffic noise increases at many of the roadway segments, but the Project's contributions would generally be below the increase in noise considered to be noticeable to the human ear (i.e., 3 dB). With respect to future conditions in 2040 without the Project, 99 of 103 segments would experience an increase in noise of less than 1 dB. At the other four segments, there would be an increase of approximately 1 dB in the 2040 Project scenario relative to the 2040 scenario without the Project. As noted above, a 1 dB change in sound level cannot typically be perceived by the human ear; consequently, the Project would not result in noticeable changes in traffic noise levels relative to 2040 conditions without the Project at any roadway segment. No substantial permanent increase in the ambient noise level would occur from vehicle traffic.

Relative to existing conditions, traffic noise levels predicted under the Project in 2040 would result in greater increases in traffic noise. The increase in traffic noise would be less than 1 dB at 57 of 103 segments relative to existing conditions, which is the majority of segments. At 42 segments, the increase in traffic noise would be less than 3 dB, which is the change in sound level that is considered barely noticeable to the human ear. Consequently, the increase in traffic noise relative to existing conditions would not be noticeable at nearly all roadway segments (57+42 = 99 of 103 segments). Of the remaining four segments, three would experience an increase equal to approximately 3 dB, which would be barely noticeable, while at one segment, the increase would be 5 dB. The segment where the 5 dB increase would occur (segment 84, *Solano Avenue north of Trower Avenue*) would experience an increase in noise even in the absence of the Project, because growth in the city and thus traffic would increase regardless of whether the Project is implemented.

This background increase in traffic noise at segment 84 can be determined using Table 3.11-11, by comparing the noise levels from the 2040 no Project scenario to the existing conditions. The increase in noise in 2040 at this segment without the Project would be approximately 6 dB, while the increase in 2040 with the Project would be 5 dB. Although the increase in traffic noise at Solano Avenue north of Trower Avenue may be noticeable relative to existing conditions, there would be no increase in noise relative to 2040 conditions without the Project. Because background growth and corresponding traffic noise would occur in the absence of the Project, the increase in noise of 5 dB relative to existing conditions would be a lower increase than if the Project were not implemented.

Compatibility Standard Consistency from Traffic Noise

In the draft Safety and Noise Element, Table 8-3 shows the compatibility standards for various land uses. These standards determine what levels of noise are considered acceptable or not acceptable. This discussion focuses on the noise levels that would result from the General Plan update and whether those noise levels would be consistent with the City's proposed compatibility standards from the draft Safety and Noise Element.

Although not all segments are located within 50 feet of a noise-sensitive land use, a reference distance of 50 feet was utilized in the traffic noise modeling to conservatively assess potential noise impacts. The Project would result in roadway segments potentially exceeding compatibility thresholds. Table 3.11-12 tabulates the changes in the number of roadway segments that would exceed the applicable compatibility standards for the City.

Table 3.11-12. Traffic Noise Modeling Results Relative to Compatibility Standards

Compatibility Standard	Existing L_{dn}	Year 2040 L_{dn} (No Project)	Year 2040 L_{dn} (With Project)
Number of segments above 60 L_{dn}	87	88	88
Number of segments above 65 L_{dn}	63	71	68
Number of segments above 70 L_{dn}	10	17	20
Number of segments above 75 L_{dn}	4	4	4

As shown in Table 3.11-12, the modeling results indicate that 87 of 103 roadway segments result in traffic noise levels at 50 feet that exceed 60 L_{dn} under existing conditions.[2] In 2040, the number of segments above 60 L_{dn} would increase to 88 for both the no Project and with Project scenarios.

For the 65 L_{dn} standard, the Project would increase in the number of segments above 65 L_{dn} by five relative to existing conditions and would decrease the number of segments above 65 L_{dn} by three relative to 2040 no Project conditions.

For the 70 L_{dn} standard, the Project would increase the number of segments above this threshold by 10 relative to existing conditions and by 3 relative to 2040 no Project conditions. Importantly, many of these changes in noise levels with respect to the compatibility standards would occur in the absence of the Project because Napa would experience growth in population and traffic regardless of whether the Project is implemented.

Although the Project could cause there to be additional inconsistencies with the City's compatibility standards, the actual increases in noise would not be noticeable at any segments relative to 2040 no Project conditions. For example, small increases in traffic noise could cause a segment that is currently less than 70 L_{dn} to be above 70 L_{dn}, and this would be above what is considered a normally acceptable noise level for a school or hospital.[3] However, the increase in noise could be less than what is noticeable to the human ear (i.e., less than 3 dB) and thus not substantial. As shown in Table 3.11-11, the existing noise level at segment 80 (*Soscol Avenue north of West Imola Avenue*) is 69 L_{dn}, and in 2040 both with and without the Project the noise level would be 71 L_{dn}. The increase from the Project would be 1.8 dB, but that increase would technically cause a compatibility standard inconsistency for a school or hospital at 50 feet from the roadway. The 1.8 dB increase would not be noticeable, however. Based on the discussion above that focuses on traffic noise level increases, the changes in traffic noise from the Project in 2040 would not be detectable at any roadway segment, relative to 2040 no Project conditions.

Furthermore, the noise levels in Table 3.11-11 are estimates based on modeled traffic volumes only. Other sources of noise in the Planning Area, such as industrial facilities, landscaping equipment, and recreational uses, may result in noise levels that are higher than those shown in Table 3.11-11. For example, existing traffic noise at segment 80 is modeled as 69 L_{dn}; however, there may be non-traffic noise sources that contribute to the ambient noise environment and the actual L_{dn} could be more than 1 dB higher and thus above 70 L_{dn}. In this hypothetical example, the increase from the Project (e.g., 1.8 dB) would not cause an inconsistency with any compatibility standards, because the noise level would already be above 70 L_{dn}. As such, this analysis does not rely on the precise adherence of the modeled noise levels to specific noise compatibility standards; rather, the finding of significance

[2] 60 L_{dn} is the upper limit of the "normally acceptable" range for most residential uses in Napa, based on the Table 8-3 in the Safety and Noise Element.

[3] Based on the noise levels in Table 8-3 from the Safety and Noise Element.

relies on the change in noise that would be experienced at roadway segments, because that is more representative of the direct effect of the General Plan update.

The General Plan update would not cause noticeable increases in traffic noise at any roadway segment relative to 2040 no Project conditions. Although four segments would experience noticeable noise increases relative to existing conditions, these increases would occur in 2040 with or without the Project. For these reasons, there would be no substantial permanent increase in traffic noise, and the impact would be less than significant.

Train Noise

As discussed in *Existing Noise Sources*, railroad activity in the Planning Area is limited to one excursion rail line, the Napa Valley Wine Train, and no freight lines. The Napa Valley Wine Train operates on an 18-mile segment of track from downtown Napa north to St. Helena. There are typically two separate trains that traverse the rail line per day, and each train makes a round trip between downtown Napa and St. Helena. Approximately 4 miles of the rail line are located within the Planning Area, though the tracks extend south of the McKinstry Street Station in downtown Napa and through the southern boundary of the Planning Area; however, this section of track is not used as frequently but could be activated at any time. For land uses in the Planning Area near the railroad tracks, noise from the train horn and bell, and crossing gates are part of the ambient noise environment.

The General Plan update is not expected to directly result in an increase of train operations in the city. However, new development that could occur with the General Plan update could result in land uses being exposed to train noise that exceeds applicable land use compatibility standards. The Napa Valley Wine Train can result in an L_{dn} level of 59 dBA in residential areas in Napa, which is close to the upper limit of what is normally acceptable for most residential uses (County of Napa 2007a). The California Supreme Court concluded in the *California Building Industry Association vs. Bay Area Air Quality Management District* (*CBIA v. BAAQMD*) decision that "CEQA generally does not require an analysis of how existing environmental conditions will impact a project's future users or residents." Because noise from trains is an existing condition in the Planning Area, and the General Plan update would not increase train operations, this impact is not significant under CEQA.

Stationary Source Noise

Development under the General Plan update would have the potential to result in increased noise levels from the development of new stationary noise sources, which could occur near sensitive land uses. Additionally, the development of new residences close to existing noise-generating land uses could also cause exposure to noise that exceeds the City's existing noise standards. Stationary sources of noise could include sources such as car washes, recycling yards, and heating, ventilation, and air conditioning equipment. Because this is a program-level analysis, it is not feasible at this time to determine the extent that noise sensitive land uses would be exposed to noise from equipment, because the specific layout and type of equipment are not known.

The General Plan update includes a policy that would help reduce potential noise effects from stationary sources. General Plan Policy SN 4-3 includes the goal for new development not to generate noise in excess of the performance standards in the General Plan update. This guiding principle for new development would reduce operational sources of noise that may affect existing noise-sensitive land uses, because new development would be designed with the performance standards in mind. Because the goal of Policy SN 4-3 is for new development not to cause existing

development to exceed the performance standards from the General Plan update, development that meets this goal would not cause a permanent increase in ambient noise levels in excess of standards in the existing General Plan.

For new development that is built in accordance with the General Plan update, Policy SN 4-2 would apply, which has the goal of new projects being designed with mitigation to meet the allowable outdoor and indoor allowable noise exposure standards from Table 8-4 of the General Plan update. This policy would lead to noise-sensitive land uses being less affected by stationary source noise levels that arise from future development.

Additionally, Section 17.52.310.D.2 of the City's Municipal Code requires that new nonresidential projects built out as part of the General Plan update that may increase ambient noise levels by 5 dB CNEL or more or in excess of 60 dB CNEL shall prepare a noise analysis as part of the project's CEQA review.[4] The noise analysis will identify anticipated noise levels and recommend noise attenuation measures to maintain ambient levels and to keep levels below 60 dB CNEL. Additionally, Section 17.52.310.D.3 requires that nonresidential projects adjacent to residential districts must locate or design potential noise generation areas (e.g., truck parking, loading docks, garbage collection area) to minimize impacts on adjacent noise-sensitive uses to the extent feasible. These components of the Municipal Code would minimize the effects of stationary source noise from new nonresidential development projects on existing land uses such that there would not be a substantial permanent increase and the impact would be less than significant.

Impact NOI-2: Generation of excessive groundborne vibration or groundborne noise levels (less than significant)

Stationary Source Vibration

As development occurs, there is generally a potential for more operational vibration sources to be developed. However, the General Plan update would not directly result in an increase of operational sources of vibration in the Planning Area. The vast majority of uses in the Planning Area are land use types that are not typically associated with substantial groundborne vibration (e.g., residential units, commercial space, parks). However, it is possible that within the Planning Area, vibration-generating mechanical equipment could be installed. Vibration effects from any stationary equipment would be localized to the immediate surrounding area. It would be speculative to determine the precise types and numbers of vibration-generating equipment that would be present at commercial or industrial land uses at the program level of analysis. However, as shown in Table 3.11-3, the vibration levels from heavy-duty impact construction equipment attenuates substantially within a relatively short distance. It is unlikely that any stationary equipment would interact with the ground surface as intensely as a jackhammer or the other construction equipment listed in Table 3.11-3. Nevertheless, at the relatively short distance of 50 feet, the vibration level from a jackhammer is considered to be barely perceptible (see Table 3.11-3). Thus, even if a commercial or industrial use installs mechanical equipment that interacts with the ground as intensely as a jackhammer at the perimeter of the site property, and that equipment is within 50 feet of a sensitive land use, the vibration effect would be barely perceptible.

[4] The potential for projects to increase ambient noise levels by these thresholds is based on the opinion of the Community Development Director, per the Municipal Code.

Given the specific and unlikely circumstances required for vibration to be more than barely perceptible to sensitive land uses, it is unlikely that there would be adverse effects from stationary source–generated groundborne vibration. Stationary source vibration impacts associated with the Project would be less than significant.

Construction Vibration

The General Plan update would result in construction activities that could result in temporary groundborne vibration. Construction activity can result in varying degrees of vibration, depending on the type of machinery used. Typical vibration levels are shown in Table 3.11-3 for various equipment types at increasing distances and, given the broad level of analysis required for program-level documents, can be considered an accurate approximation for the vibration levels that would occur during any future construction activity (Federal Transit Administration 2018). Pile driving may occur but is not as likely to occur as other types of activity. Construction activities, including pile driving, associated with new development would be temporary, and the corresponding vibrational impacts would be relatively short-term.

Nevertheless, heavy duty equipment associated with some construction activities can produce vibration that may be felt by adjacent uses. The main concern associated with this type of vibration is annoyance; however, vibration-sensitive instruments and operations that might be used in a medical or research setting can be disrupted at much lower levels than would typically affect other uses.

Activities such as pile driving, blasting, drilling, and excavation have the highest potential for creating groundborne vibration impacts. The potential construction-related vibration impacts depend on the proximity of construction activities to sensitive receptors, the presence of intervening barriers, the number and types of construction equipment, and duration of construction equipment use. In general, perceptible groundborne vibration is limited to areas within a few hundred feet of construction activities. Future and existing development adjacent to construction sites could be exposed to excessive groundborne vibration temporarily (i.e., vibration that is distinctly perceptible or stronger, based on Table 3.11-5) when vibration exceeds 0.04 PPV. At 50 feet, all other non-pile-driving equipment would be 0.0315 PPV or less and thus perceptible but not distinctly perceptible, based on Table 3.11-3. However, pile driving could cause vibration that is strongly perceptible at distances of nearly 100 feet, and most other construction equipment could cause distinctly perceptible vibration at distances less than 50 feet, which may occur occasionally. Consequently, because there are circumstances that could occur where noise-sensitive uses are exposed to distinctly perceptible vibration or greater, the impact with respect to vibration annoyance is potentially significant.

In extreme cases, vibration can also cause damage to buildings, particularly those that are old or otherwise fragile. In general, fragile, and extremely fragile buildings are rare. For buildings that are older or historic, construction activity could cause building damage in some cases, because as shown in Table 3.11-4, vibration levels at 0.25 PPV could exceed the damage threshold for historic and older buildings. Vibration at this level (0.25 PPV) could be caused by pile-driving activity (at distances up to 50 feet) or other construction equipment at distances less than 25 feet, based on Table 3.11-3. Pile driving is a relatively uncommon method of construction in an urban area without high-rise buildings, and it is very unlikely that there would be instances where pile driving would occur next to older or historic buildings at distances of 50 feet or less. The impact with respect to building damage is therefore less than significant.

To protect future and existing sensitive land uses from excessive groundborne vibration during construction activities, policies in the General Plan update would serve to minimize impacts. General Plan Policy SN 4-7 includes a requirement for future development to implement vibration control measures, standards, and monitoring procedures to reduce impacts on nearby uses. General Plan Policy SN 4-8 requires measures to prevent exposure of vibration-sensitive receptors to substantial groundborne vibration levels, for receptors within 100 feet of pile-driving locations and 25 feet of non-impact equipment.

As such, future developments would be required to sufficiently reduce vibration through a combination of measures to prevent adversely affecting nearby vibration-sensitive land uses. For these reasons, the increases in vibration from construction activities would not be considered substantial. Therefore, this impact would be less than significant.

Traffic Vibration

Groundborne vibration generated by traffic traveling on roadways is usually below the threshold of perception at adjacent land uses unless there are severe discontinuities in the roadway surface. Discontinuities in the roadway include segments where the pavement has settled or cracked. Caltrans has determined that only heavy trucks typically result in appreciable ground vibration when they travel over discontinuities in the roadway, and the vibration that results has a duration of only a fraction of a second (California Department of Transportation 2013b). Roadways in the Planning Area would not likely have substantial settling or cracking and would be reasonably maintained with no severe discontinuities. Additionally, truck traffic on the roadways in Napa is estimated to be a minimal portion of total vehicle volumes. Given the specific set of circumstances required for traffic vibration to be noticeable (i.e., severe roadway discontinuities and high truck volumes) and the duration of the impact that would result under these circumstances (i.e., a fraction of a second), it is unlikely that traffic vibration would be perceived by any land uses. A detailed analysis of vibration generated by operational traffic is not provided, because it would be too speculative to accurately identify any impacts. However, for the reasons discussed in this section, perceptible groundborne vibration from vehicle traffic is not likely to be a common occurrence; therefore, the impact is less than significant.

Train Vibration

The California Supreme Court concluded in the *CBIA v. BAAQMD* decision that "CEQA generally does not require an analysis of how existing environmental conditions will impact a project's future users or residents." Because train vibration is an existing condition in the Planning Area, and the General Plan update would not appreciably increase train operations, it is not necessary to evaluate the impacts of train vibration on the Planning Area. However, the discussion in this section is provided for informational purposes to provide comprehensive context of the noise and vibration sources in the Planning Area.

Typical locomotive-powered passenger or freight trains traveling at 50 miles per hour (mph) produce a vibration level of about 85 VdB at a distance of 50 feet, based on the vibration curves shown in Figure 10-1 of the FTA's guidance document *Transit Noise and Vibration Impact Assessment* (Federal Transit Administration 2006). The vibration level at 50 feet produced by a light rail train traveling at the same speed is about 73 VdB (Federal Transit Administration 2006:Figure 10-1). In general, noise- and vibration-sensitive land uses located adjacent or close to railroad tracks can be exposed to vibration levels in excess of FTA vibration standards shown in Table 3.11-7. However,

the Napa Valley Wine Train is a low-speed leisure train and thus travels at speeds well below 50 mph through Napa. Because vibration from passing trains is an existing condition in the Planning Area, and the General Plan update would not increase train operations, this impact is less than significant.

Impact NOI-3: For a Project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, will the Project expose people residing or working in the Project area to excessive noise levels (less than significant)

The California Supreme Court concluded in the *CBIA v. BAAQMD* decision that "CEQA generally does not require an analysis of how existing environmental conditions will impact a project's future users or residents." Because aircraft noise is an existing condition in the Planning Area, and the General Plan update would not appreciably increase aircraft operations, it is not necessary to evaluate the impacts of aircraft noise on the Planning Area. However, the discussion in this section is provided for informational purposes to provide comprehensive context of the noise sources in the Planning Area.

The Napa County Airport, located 5 miles south of downtown Napa in the unincorporated part of the county, is a public airport for non-commercial air travel and is owned and operated by the County. The airport's three runways are oriented in the southwest-northeast directions and in the west-south directions. Although it is not located in the Planning Area, aircraft arrivals and departures from this airport affect land uses in the Planning Area. The airport is located approximately 1.4 miles from the southernmost portion of the Planning Area that is located along Napa Valley Corporate Drive and north of SR 12.

In the Napa County Airport Master Plan, prepared in 2007, contemporaneous and future (2022) noise levels in the area around the airport were modeled and visually depicted in contour maps (County of Napa 2007b). Based on these airport contour maps the Planning Area is not substantially affected by the modeled airport noise contours. The quietest modeled contour, 55 dBA CNEL, is considered the maximum acceptable level in the ALUCP for residential uses, and this contour is in close proximity to the southernmost portion of the Planning Area near the junction of SR 12 and SR 221 (Napa County Airport Land Use Commission 1991). It is thus possible that a very small portion of the Planning Area may experience aircraft noise levels near or above 55 dBA CNEL but less than 60 dBA CNEL from aircraft operations in 2022. All other portions of the Planning Area are outside the 55 dBA CNEL contour and thus experience noise levels that are lower than 55 dBA CNEL from the Napa County Airport. Occasional aircraft overflight noise may be audible to people in the Planning Area; however, 24-hour average noise levels from airport operations in the Planning Area are compatible with the ALUCP.

Additionally, no other public or private airfields are within 2 miles of the Planning Area. The General Plan update would not worsen the levels of noise that residents and employees within the Planning Area would be exposed to. The impact would be less than significant.

3.11.3 References Cited

California Department of Transportation. 2013a. Technical Noise Supplement to the Traffic Noise Analysis Protocol. September. Available: https://dot.ca.gov/-/media/dot-

media/programs/environmental-analysis/documents/env/tens-sep2013-a11y.pdf. Accessed: March 31, 2021.

Caltrans. 2013b. *Transportation and Construction Vibration Guidance Manual*. Available: https://www.contracosta.ca.gov/DocumentCenter/View/34120/Caltrans-2013-construction-vibration-PDF. Accessed: October 13, 2021.

———. 2020. *Transportation and Construction Vibration Guidance Manual*. April. Available: https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/tcvgm-apr2020-a11y.pdf.

City of Napa. 2010. *Envision Napa 2020, Policy Document – Chapter 8 Health and Safety*. Available: https://www.cityofnapa.org/DocumentCenter/View/452/Chapter-8---Health-and-Safety-PDF. Accessed: March 31, 2021.

County of Napa. 2007a. *Napa County General Plan Update – Draft Environmental Impact Report – 4.7 Noise.* https://www.countyofnapa.org/DocumentCenter/View/7959/47-Noise-General-Plan-DEIR-PDF. Accessed: October 7, 2021.

———. 2007b. Napa County Airport Master Plan. March. Available: <https://www.countyofnapa.org/DocumentCenter/View/1985/Napa-County-Airport-Master-Plan-PDF>. Accessed: March 30, 2021.

Federal Transit Administration. 2006. *Transit Noise and Vibration Impact Assessment*. Available: https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/FTA_Noise_and_Vibration_Manual.pdf. Accessed March 31, 2021.

Federal Transit Administration. 2018. *Transit Noise and Vibration Impact Assessment*. FTA Report No. 0123. Office of Planning and Environment. May. Available: https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf. Accessed: March 31, 2021.

Napa County Airport Land Use Commission. 1991. Airport Land Use Compatibility Plan. April 22, 1991. https://www.countyofnapa.org/DocumentCenter/View/1980/Airport-Land-Use-Compatibility-Plan-PDF. Accessed: January 9, 2019.

U.S. Environmental Protection Agency. 1971. *Noise from Construction Equipment and Operations, Building Equipment and Home Appliances*. December 31.

3.12 Population and Housing

This section provides an analysis of potential population and housing impacts from future development allowed by the City of Napa General Plan update, including evaluation of the Project's potential to induce displacement of people and housing units. This section describes the existing population and housing units in the Planning Area as well as relevant state and local regulations and programs. No comments were received in response to the notice of preparation and recirculated notice of preparation regarding topics covered in this section.

3.12.1 Existing Conditions

3.12.1.1 Regulatory Setting

This section provides the relevant state, regional, and local regulations applicable to the Project. No federal regulations apply to population and housing.

State

Housing Element Law

California Planning Law requires each city and county to adopt a housing element as part of its general plan (Government Code Sections 65580–65590). Government Code Section 65583 explains as follows.

> The housing element shall consist of an identification and analysis of existing and projected housing needs and a statement of goals, policies, quantified objectives, financial resources, and scheduled programs for the preservation, improvement, and development of housing. The housing element shall identify adequate sites for housing, including rental housing, factory-built housing, mobile homes, and emergency shelters, and shall make adequate provision for the existing and projected needs of all economic segments of the community.

The California Department of Housing and Community Development (HCD) is responsible for assigning quantified regional housing shares to the various councils of government for allocation to the individual cities and counties within their region. HCD is also responsible for reviewing and certifying the adequacy of the housing elements adopted by the cities and counties. The Association of Bay Area Governments (ABAG) is responsible for determining the regional housing needs of the individual cities in Napa County through the Regional Housing Needs Allocation (RHNA) process. Unlike other elements of a general plan, the housing element must be updated on a regular 8-year schedule (referred to as a housing element cycle). ABAG's current housing element cycle is in effect until 2023, and the next cycle will be from 2023 to 2031. In May 2021, ABAG approved the 2023–2031 Draft RHNA Plan, which is undergoing the final phase of the RHNA process and will conclude with adoption of the final allocations in December 2021.

The proposed General Plan update does not include changes to the Housing Element because the City of Napa's Housing Element is still in effect until 2023.

California Relocation Law, Public Resources Code Section 7260 et seq.

The California Relocation Law requires the fair and equitable treatment of persons displaced as a direct result of programs or projects undertaken by a public entity. The law requires agencies to prepare a relocation plan, provide relocation payments, and identify substitute housing opportunities for any resident who is to be displaced by a public project.

Senate Bill 375

Senate Bill (SB) 375, enacted in 2008, links regional transportation plans (RTP) to policies for reducing greenhouse gas emissions and providing housing within the region. RTPs are adopted for purposes of identifying and prioritizing funding for regional transportation improvements. SB 375 requires Metropolitan Planning Organizations to include a sustainable communities strategy (SCS) in their RTPs and provides details regarding the contents of that strategy. The purpose of the SCS is to align land use and transportation planning by creating policies and prioritizing funding for development in transit-accessible places, to reduce greenhouse gas emissions from automobiles and light trucks in each Metropolitan Planning Organization's region.

Under SB 375, the Metropolitan Transportation Commission is responsible for linking the quantified RHNA housing objectives to the land use strategy of the RTP/SCS for the San Francisco Bay Area (Bay Area). The City's RHNA obligation was the underlying focus of the City's 2015 update of the General Plan Housing Element.

Regional

Regional Transportation Plan/Sustainable Communities Strategy (Plan Bay Area)

The Metropolitan Transportation Commission and ABAG jointly prepared the region's RTP/SCS for the Bay Area, known as Plan Bay Area, which was adopted in 2013 for the horizon year 2040. Plan Bay Area 2050 was adopted on October 21, 2021. Plan Bay Area is a long-range planning document that focuses on the economy, the environment, housing, and transportation to make the nine-county Bay Area region more equitable and resilient for all residents. The plan outlines strategies for growth and investment through the horizon year while simultaneously meeting federal and state requirements. Plan Bay Area itself does not directly control land use within local jurisdictions or exert power over city land use decisions but, rather, is a steering document for ABAG and the Metropolitan Transportation Commission's vision: that the Bay Area is affordable, connected, diverse, healthy, and vibrant for all (Metropolitan Transportation Commission and Association of Bay Area Governments 2021.

Regional Housing Needs Allocation and the Housing Element

HCD assigns a numerical share of the projected statewide housing needs to ABAG, which ABAG then divides among the region's cities and counties. As shown in Table 3.12-1, the allocation for the City's 2015–2023 Housing Element is 835 dwelling units. The City's current 2015–2023 Housing Element has adequate sites (sites for 3,130 dwelling units) to accommodate housing development in excess of the RHNA. As shown in the table, the City's greatest housing need is for affordable units at or below the moderate-income category followed by the above-moderate-income category. The City's 2023–2031 RHNA allocation obligations for the upcoming Housing Element update total 1,939 units of new construction. This number of units is a significant increase from the RHNA allocations of the previous housing cycle.

Table 3.12-1. City of Napa Regional Housing Need Allocation for 2015–2023

Income Level[a]	City of Napa Need	Percentage
Very Low	185	22
Low	106	13
Moderate	141	17
Subtotal of Affordable Units	432	52
Above Moderate	403	48
Total	**835**	**100**

Source: Association of Bay Area Governments 2013.

[a] Very low = less than 50% of area median income (AMI).
Low = 50 to 80% of AMI.
Moderate = 80 to 120% of AMI.
Above moderate = above 120% of AMI.

Local

City of Napa 2015–2023 Housing Element

The City adopted its current Housing Element in March 2015, which has been duly certified as being adequate by HCD. The 2015–2023 Housing Element contains the goals and policies that drive the land use and zoning designations to ensure that adequate land is available for a balanced range of housing; maintenance, improvement, and rehabilitation of housing; energy efficiency; balance of employment and housing; adequate services for residential development; and equal housing opportunity.

Downtown Napa Specific Plan

The Downtown Napa Specific Plan, adopted in 2012, covers the downtown core area between Jefferson Street and the Napa River and roughly between River Terrace Lane, Caymus Street, and Polk Street to the north and Third and Division Streets to the south. The plan established a vision for downtown Napa in 2030, featuring public spaces, attractive streets, shops and eateries, entertainment venues, public art, historic buildings, sustainable new buildings, and an array of housing options. Development capacity under the specific plan projected a net increase of 627 dwelling units, 303 hotel rooms, about 109,000 square feet of retail space, and about 471,000 square feet of office uses on top of the existing (as of 2012) 125 dwelling units, 526 hotel rooms, 1.09 million square feet of retail and restaurant space, and 763,000 square feet of office space.

3.12.1.2 Environmental Setting

As described in Chapter 5.0, *Historic and Cultural Resources,* of the General Plan update, the City's population experienced initial growth in the Gold Rush and Victorian eras. The City continued to grow steadily beyond the postwar era, reaching a population of 37,000 by 1970. The decline of manufacturing, redevelopment, and the rebirth of the wine industry were the major forces that affected the City's modern population. The City is still Napa Valley's population center, but it is a very different place than it was in the nineteenth and early twentieth centuries. The City has since been transformed from a blue-collar manufacturing town into a service-based, majority-crop

community. With a population of 79,300 in 2020 and an area of 19.5 square miles, the City's economy today remains connected to wine production and tourism.

Table 3.12-2 details projected citywide growth from buildout following the General Plan update. The General Plan update is expected to result in approximately 7,800 new housing units and 10,800 new jobs. This increase would result in a total citywide population of 97,200, or an addition of 17,900 residents. Although the General Plan update has a 2040 horizon, it does not specify or anticipate when buildout will occur, as long-range demographic and economic trends are difficult to predict. The designation of a site for a certain use also does not necessarily mean that the site will be developed or redeveloped with that use during the planning period, as development would depend on initiative taken by property owners.

Table 3.12-2**. Existing and Projected Development**

	Existing (2020)[a]	Change[b]	2040 Total	Percent Growth
Commercial Building Area (square feet)[c]				
Retail[d]	4,712,000	631,000	5,343,000	13
Office	2,463,000	817,000	3,280,000	33
Industrial	7,979,000	1,799,000	9,778,000	23
Total	15,154,000	3,247,000	18,401,000	21
Jobs[e]	**51,200**	10,800	62,000	21
Housing Units	**30,700**	**7,800**	38,500	25
Pipeline Project	-	3,170	-	-
Net New Development	-	4,630	-	-
Jobs/Employed Residents	1.19		1.17	-2
Population[f]	**79,300**	**17,900**	**97,200**	23

Sources: CoStar/Economic and Planning Systems, Inc. 2019; California Employment Development Department 2019; California Department of Finance 2020; City of Napa 2021; Dyett and Bhatia 2021.

[a] Existing numbers sourced from California Department of Finance, California Employment Development Department, and CoStar/Economic and Planning Systems, Inc. Hotel data provided by the City of Napa.

[b] Change includes potential net new development over the General Plan planning period in addition to major projects that are currently in the pipeline.

[c] Building area rounded to the nearest 1,000. Other values rounded to the nearest 100. Totals may not add up due to rounding.

[d] Retail includes other commercial uses, such as hotels.

[e] Jobs are calculated based on Exhibit 2 in the City of Napa Economic Development Action Strategy from April 2019 and prorated based on recent County growth trends.

[f] Population calculated based on household size (2.66), vacancy rate (6.7%), and group quarters proportion (1.60%).

Jobs-Housing Balance

Jobs-housing balance—quantified in this Draft EIR by the jobs/employed residents ratio—is the quantitative relationship between jobs located within a city and residents of the city who are employed, whether within the city limits or elsewhere. A ratio of 1.0 indicates a balance (i.e., the number of in- and out-commuters is equal); a ratio of less than 1.0 indicates lower jobs availability relative to the city's available workforce, while a ratio greater than 1.0 indicates a jobs surplus.

Given today's specialized economy and employers' needs for workers with specific skills, large numbers of two-income households with jobs located in different cities, and potential mismatch

between housing affordability and type available near jobs, or even complete parity between local jobs and local workers, would not prevent the need for commuting. This situation is especially true in the technology-centric Bay Area, with its high cost of housing. Undersupply of housing close to workplace centers and mismatch between jobs and housing needs is one of the principal causes of increasing commute lengths in the Bay Area (Cervero 1989). Nonetheless, a balanced jobs/employed residents ratio is generally associated with benefits such as reduced driving and congestion; fewer air pollution emissions; lower costs to businesses and commuters; lower public expenditures on facilities and services; greater family stability; and a higher quality of life (Southern California Association of Governments 2001, pp. 19–20).

Information on total jobs within the city is not reported by either the U.S. Census Bureau or the California Economic Development Department. Based on a recent detailed analysis conducted by the City, Napa is estimated to have a job/employed residents ratio of 1.19, which means that the city has more jobs than employed residents.[1] General Plan projections indicate that this ratio will be lowered slightly to 1.17, reflecting a better balance by 2040. Table 3.12-2 provides more detail on existing and projected jobs/employed residents ratios. The General Plan update provides for a significant increase in housing capacity in the city; thus, the jobs/employed residents ratio could improve in the future if additional new housing is built above what is assumed in the Project buildout.

3.12.2 Environmental Impacts

3.12.2.1 Methods for Analysis

This analysis considers population and household impacts that would occur with implementation of the General Plan update. The citywide growth from the projected buildout under the General Plan update was compared to existing conditions to determine the level of change that would occur with development. The analysis of the Project's impacts on population and housing uses a review of the most current population and housing statistics and projections available for Napa (California Economic Department; California Department of Finance; City of Napa). The planning horizon for the General Plan update is 2040. The following analyses generally consider the level of development that may reasonably be expected to occur by that time.

3.12.2.2 Relevant General Plan Update Goals and Policies

Land Use and Community Design Element

Goal LUCD-4: Promote flexibility in parking and other development requirements, especially in areas targeted for higher intensity, mixed-use, and pedestrian-oriented development, such as in downtown and along corridors.

Policy LUCD 4-1: Encourage mixed-use development by establishing flexible parking requirements, setbacks, and other development standards in the Zoning Ordinance.

Goal LUCD-6: Promote a balanced land use program and ensure the City remains a "complete community" with a diverse array of uses, housing types, and employment opportunities, while recognizing the City's linkages to the broader Bay Area region.

[1] Calculated by dividing total jobs by the number of employed residents in the Planning Area (Table 2-4). Employed residents was calculated based on total population and the existing proportion of employed residents in the county (54.3 percent) (CoStar/Economic Planning Systems, Inc.; California Economic Development Department; California Department of Finance; and City of Napa).

Policy LUCD 6-1: Maintain a balance of land uses, including residential and commercial uses, and—given the city's position as the principal urban center of Napa County—industrial and service commercial uses that support the broader Napa Valley economic needs.

Policy LUCD 6-2: Promote a diversity of compatible land uses throughout the City to enable people to live close to job locations, have adequate and convenient commercial services, and enjoy public amenities and services such as transit, parks, trails, and schools.

Policy LUCD 6-3: Foster production of a range of housing types to meet the needs of the City's increasingly diverse and changing population and enable a greater share of the workforce to live in the community.

Policy LUCD 6-4: Support flexibility in the land use designations to respond to changing and evolving economic needs. Promote a mix of uses in appropriate locations and settings.

Policy LUCD 6-5: Strive to achieve a jobs/housing balance by prioritizing workforce housing for local workers and the creation of job opportunities.

Policy LUCD 6-6: Encourage large employers, including Napa Valley College and the Queen of the Valley Medical Center, to provide housing to meet workforce needs on their campuses.

Goal LUCD-7: Ensure continued economic vibrancy, with land use strategies linked to the City's overall economic objectives, local business needs, and workforce development.

Policy LUCD 7-1: Prioritize local needs and economic diversity while recognizing the importance of tourism for the local economy.

Policy LUCD 7-2: Accommodate a diversity of business establishments in appropriately-scaled settings that reflect Napa's position as the center of commerce in the Napa Valley, provide employment for Napa residents, and promote economic growth in the city.

A range of uses encompass industrial, research, and development uses; regionally scaled retail and neighborhood-serving commercial centers; and small-sized stores, restaurants, and offices to meet community needs, while also providing enhanced opportunities for visitor services in desirable locations.

Policy LUCD 7-3: Promote a range of business establishments, including small businesses, incubator uses, live-work spaces, artist studios, and small home-based businesses, to foster entrepreneurship, workforce development, and increased workforce participation.

Policy LUCD 7-4: Promote home occupation uses to enable working from home and small-scale enterprises while maintaining the quality and character of existing residential neighborhoods.

Goal LUCD-8: Support the preservation and enhancement of the City's existing housing stock to be used as primary residences and homes.

Policy LUCD 8-2: Support rehabilitation of vacant and derelict homes to bring them back into productive use as residences.

Goal LUCD-10: Enhance the City's character and image as a desirable residential, active, and sustainable community, and celebrate the diversity of residents who reside in Napa.

Policy LUCD 10-2: Provide balanced neighborhoods that accommodate a variety of housing types and density ranges to meet the diverse demographic, economic, and social needs of residents.

Policy LUCD 10-3: Allow for convenient supporting services and alternative residential types to meet special needs by permitting recreational uses, public and quasi-public uses, public assembly, day care and congregate living facilities, and single room occupancy units in residentially-designated areas, when they meet the neighborhood development, design and compatibility standards.

Policy LUCD 10-4: Encourage the development of housing for elderly, disabled, and low-income households in all parts of the community.

Goal LUCD-11: Encourage attractive, well-located commercial development to serve the needs of City residents, workers, and visitors.

Policy LUCD 11-1: Allow for a range of goods and services and establishments of various sizes convenient to Napa residents while seeking to improve the character and viability of commercial areas.

Goal LUCD-12: Promote diverse industrial opportunities in suitable locations to provide employment for Napa residents and promote economic growth in the city.

Policy LUCD 12-1: Promote a wide range of job opportunities and a healthy economy by encouraging industry in appropriate locations, as shown on the Land Use Diagram.

Policy LUCD 12-2: Support retention of industrial uses within the City when possible.

Policy LUCD 12-3: Encourage development of supporting services, such as dining, recreation, and childcare, in the City's industrial areas to provide convenient access to services for workers.

Goal LUCD-13: Promote housing and business growth as infill development in Focus Areas in keeping with the City's scale, services, and environment.

Policy LUCD 13-1: Promote infill development in Focus Areas that makes efficient use of limited land supply while ensuring compatibility and integration with adjacent uses. Ensure that uses and intensities of infill development support a cohesive development pattern.

Goal LUCD-21: Promote a vital Downtown that is healthy, sustainable, and contributes to the City's economic vibrancy, for the enjoyment of residents and visitors.

Policy LUCD 21-1: Foster a complementary mix of commercial, hospitality/tourism, and residential uses in downtown; promote additional opportunities for residential mixed-use development, including workforce and affordable housing, with ground-floor commercial uses and residential uses above.

Policy LUCD 21-3: Promote location of establishments that offer everyday goods and services—including a grocery store, a theater, cafes, and dining—to attract residents and workers, in addition to visitors, to downtown on a regular basis.

Community Services, Parks, and Recreation Element

Goal CSPR-1: Maintain safety services that are responsive to community needs and provide a safe and secure environment for people and property in the City.

Policy CSPR 1-4: Require that new development contributes funds to offset the proportionate impact of development on the provision of City facilities needed to provide adequate police and fire services.

Goal CSPR-4: Support schools and education-related facilities as contributors to neighborhood quality of life.

Policy CSPR 4-2: Work cooperatively with the Napa Valley Unified School District (NVUSD) to cohesively plan for future school facility needs and for the reuse of school sites that may no longer be needed.

Goal CSPR-5: Provide for utilities and infrastructure that deliver safe and reliable services for current and future residents and businesses.

Policy CSPR 5-1: Safely manage the water supply and services, wastewater, sewer, recycled water, and storm drain infrastructure in a manner that provides for future growth of the City.

Policy CSPR 5-2: Work with power and dry utility providers, property owners, and developers of underground service lines in existing neighborhoods and require underground service lines for new projects where feasible.

Goal CSPR-7: Provide for solid waste and recycling services to meet the needs of current and future residents and businesses.

Policy CSPR 7-1: Safely manage solid waste management services in a manner that provides for future growth of the City.

Goal CSPR-9: Provide, improve, and maintain a comprehensive system of City parks, trails, and recreational facilities to meet the needs of the City's current and future residents, businesses, property owners, and visitors.

Policy CSPR 9-1: Maintain a parkland provision standard of 10.0 acres of overall parkland per 1,000 residents, 1.5 acres of Community Parks & Facilities per 1,000 residents, and 0.5 acres of Neighborhood Parks per 1,000 residents. Overall parkland includes Natural Areas & Open Space, Community Parks & Facilities, Neighborhood Parks, Mini Parks, Special Use Parks & Facilities, Civic Spaces, Trails, and School Sites.

Policy CSPR 9-2: Strive to ensure that all residents are within a 1.5 to two-mile radius of a community-serving park, which includes the Community Park & Facility or Natural Area & Open Space categories.

Policy CSPR 9-3: Given that the city has sufficient parkland to meet the needs of the City's existing and projected population, focus capital projects on sustaining or improving existing parks and facilities to ensure long-term services to the community.

Policy CSPR 9-5: Offer a wide variety of park facilities designed to provide educational benefits, and encourage active and passive participation by users of all ages and interests to existing and future residents, including but not limited to: senior services, health and wellness, and youth sports.

Policy CSPR 9-6: Maintain a diverse range of publicly-available recreation and leisure programs and community centers that serve the needs of all sectors of Napa's population, including youth, adult, senior, and family-oriented activities.

Goal CSPR-10: Continue the development of integrated open space and flooding solutions that also result in new recreational open space for the community, building on the momentum and success of Oxbow Commons.

Policy CSPR 10-1: When feasible, seek opportunities to integrate parks and public open space into major infrastructure projects.

Goal CSPR-11: Design and improve parks and recreational facilities to reflect the community's changing demographics and user needs.

Policy CSPR 11-1: Update the Napa Parks and Facilities Master Plan (PFMP) to reflect current and future needs, including maintenance management planning and capital improvement planning, and General Plan parkland provision and access standards.

Policy CSPR 11-5: Reflect changing demographics and community needs and desires as part of parks and facilities improvements and programming by including diverse community participants in parks and recreation planning efforts.

Public Health and Equity Element

Goal PHE-4: Promote "complete neighborhoods"—where residents have safe and convenient access to goods and services on a daily or regular basis—that address unique neighborhood needs and support physical activity, including walking, bicycling, active transportation, recreation, and active play.

Policy PHE 4-4: Prioritize bicycle and pedestrian infrastructure and safety improvement projects that improve access for underserved communities, particularly those reliant on walking, biking, and transit for transportation. Identify and plan for improvements collaboratively with existing neighborhoods and businesses to address concerns about gentrification and displacement.

Goal PHE-6: Continue to support stable and integrated communities through housing opportunities that provide safe, high-quality, and affordable housing for all segments of the community in locations near amenities, public transportation, parks, and recreational opportunities.

Policy PHE 6-7: Continue to engage the community in developing new, and refining existing, affordable housing and anti-displacement strategies.

Economic Development Element

Goal ED-1: Promote a diversified economic base to foster economic resiliency and vibrancy, as well as a healthy mix of employment opportunities, that match the needs and skills of the local workforce.

Policy ED 1-1: Encourage and strengthen industry clusters, emerging sectors, and strategies to incentivize, attract, and retain industries, as well as foster entrepreneurial activities that represent the future of the city, including healthcare and wellness, manufacturing/maker space, business incubation, and satellite work environments.

Policy ED 1-3: Preserve the City's limited industrial uses and other employment-generating uses in key geographic areas to foster growth of targeted economic clusters and uses identified herein, including spaces for innovation, collaborative workspaces, business incubators/accelerators, and maker spaces.

Policy ED 1-5: Review land use and zoning tools—such as building intensity/density, height, and parking requirements—to make adjustments as necessary to establish regulations that do not constrain, while creating incentives for, desired uses.

Policy ED 1-6: Support linkages with the broader Bay Area economy, particularly linkages that enhance the viability of existing local industry clusters, such as viticulture and other agriculture-related activity; health and wellness; and small-scale production, distribution, and supply.

Policy ED 1-7: Develop collaborative relationships between private and public entities (e.g., Napa Valley College (NVC), the Culinary Institute of America, Workforce Alliance of the North Bay (WANB), and the small Business Development Center) to affect and maintain a comprehensive and coordinated economic development process that advances City initiatives and priorities, especially in production, manufacturing, information technology, healthcare, and culinary arts. These efforts should prioritize small and locally based enterprises.

Policy ED 1-8: Provide incentives to new businesses that meet certain criteria, such as create high-quality jobs (at least 75% of median income); generate a net positive impact on the City's General Fund; rehabilitate, improve, and locate within older or vacant buildings; fall within one of the City's targeted industries; and/or facilitate housing opportunities for their employees.

Policy ED 1-9: Study and promote methods of streamlined permitting, and market the City as a business- and technology-friendly jobs center.

Policy ED 1-10: Seek to diversify the City's housing stock to bolster affordability as an integral aspect of the City's economic development strategy. In particular, seek ways to accommodate workers employed in industries that have difficulty finding affordable housing in the city.

Policy ED 1-11: Consider establishing tax increment financing or other similar funding tools and resources to provide significant public benefits by creating funding for infrastructure, affordable housing, and public facilities.

Goal ED-2: Promote training, education, and labor support programs that enhance the quality of the City's workforce and support more equitable economic opportunities.

Policy ED 2-4: Encourage developers and tenants to establish local hiring targets and preferences where feasible, with particular emphasis on the Hispanic and Latinx communities (e.g., through development agreements and/or community benefit programs).

Policy ED 2-5: Continue and expand local-hire initiatives, training, apprenticeships, and partnerships with employers, WANB, NVC, and others to develop a job pipeline in targeted and growth industry sectors in Napa.

Policy ED 2-6: Support efforts to develop an equitable procurement policy for the City to prioritize certified underrepresented business enterprises, including businesses owned by people of color, women, LGBTQ+ community members, veterans, and individuals with disabilities, and locally-owned businesses.

Goal ED-3: Strengthen the city as a global viticultural, agricultural, and culinary hub and resource center to foster linkages and innovation along the entire production, distribution, and marketing chain.

Policy ED 3-1: Form partnerships with NVC and the Culinary Institute of America, wineries, restaurants and hospitality, and other "cross-sector" relationships.

Policy ED 3-2: Work closely with NVC to strengthen its hospitality and tourism management program and develop an agricultural resource center.

Policy ED 3-3: Support the production and sale of local viticultural and agricultural products through land use flexibility.

Policy ED 3-4: Continue to pursue marketing and branding efforts that promote Napa's locally-produced agricultural products, working with Visit Napa Valley, the Napa Chamber of Commerce, Artspace, DoNapa, and other groups.

Goal ED-4: Support growth of jobs and businesses related to healthcare and research innovation in and around existing clusters, and encourage healthcare businesses to launch, relocate, and thrive within the City.

Policy ED 4-1: Work with partners from NVC and WANB to create training programs for registered nurses (RNs), medical assistants, lab technicians, and other healthcare professions and strengthen connections to biotechnology and medical device sectors.

Policy ED 4-2: Work with partners at Queen of the Valley Hospital, OLE Health, and Kaiser Permanente to attract medical professionals and identify methods of addressing regulatory or market constraints that are within the City's jurisdiction (e.g., potential modification to Zoning Ordinance).

Policy ED 4-3: Support efforts to create a viable and recognizable medical district with branding, wayfinding, zoning, and related regulatory initiatives, including linkages to the City's "maker" economy and the arts, culinary, and hospitality sectors, as appropriate.

Policy ED 4-4: Recognize and support the economic contributions of non-medical and alternative health and wellness related businesses, including gyms, meditation centers, yoga studios, spas, acupuncture practices, and nutrition related activities. This policy should also seek to accommodate home-based businesses and occupations in coordination with policies PHE 4-2, LUCD 7-3, and LUCD 7-4.

Policy ED 4-5: Support related health and innovation industries, such as biotechnology, manufacturing, and research and development.

Goal ED-5: Reinforce local production, including small-batch, artisanal production—a growing trend in manufacturing—by capitalizing on the City's existing strength as a global destination and brand.

Policy ED 5-1: Maintain land for industrial uses, including additional consideration of locations such as the intersection of Jefferson Street and Lincoln Avenue, the area south of Lincoln Avenue

along the Napa River, along Coombs Street near Tannery Row, in between State Route (SR) 29 and Downtown, at Napa Valley Commons, and along California Boulevard.

Policy ED 5-2: Study the creation of a Priority Production Area within the city limits at industrial centers that will support and sustain growth in local manufacturing employment.

Policy ED 5-3: Partner with entrepreneurs and maker-oriented associations—such as the City's participation in the Bay Area Urban Manufacturing Initiative or California's Manufacturing Network—to spur partnerships with industrial developers by identifying underutilized real estate.

Policy ED 5-4: Support incubator and/or otherwise affordable space in vacant or under-utilized buildings to support innovative start-ups, particularly those focused on "Napa Made" goods and services.

Policy ED 5-5: Promote Napa Made products as a high-quality brand and association—similar to SF Made for San Francisco and CA Made for California—to celebrate, build, and promote a vibrant manufacturing sector and highlight employment opportunities.

Policy ED 5-6: Work with local workforce organizations, the Napa Valley Unified School District (NVUSD), and higher educational institutions to ensure that appropriate training programs exist for current and projected local manufacturing sector jobs.

Goal ED-7: Develop and nurture a small business ecosystem through programs, tools, and incentives to enable them to thrive in the City.

Policy ED 7-1: Develop and facilitate access to financial resources and regulatory incentives for existing businesses looking to expand or make improvements and to incubate locally- or regionally-owned start-ups.

Policy ED 7-2: Improve the ease of doing business with the City by streamlining permitting and processing for targeted small and local businesses, including a portal and one-stop shop for addressing business needs within the City's purview.

Policy ED 7-3: Consider updates to the Temporary Use Permit Ordinance for short-term or "popup" small businesses in appropriate locations to spur innovation and concept testing, activate empty storefronts/lots, and/or pique community interest.

Policy ED 7-4: Pursue partnerships across the County and region with business support organizations (e.g., WANB, Chambers of Commerce, the Small Business Development Center, NVC, NVUSD, etc.) to provide culturally competent technical resources and assistance to small businesses.

Policy ED 7-5: Work with local workforce organizations, NVUSD, and higher educational institutions to develop links between education providers and local businesses and industries to promote educational programs that reflect the needs of the local economy.

Policy ED 7-6: Develop a Commercial Displacement Strategy as part of the implementation process, to be informed by best practices and culturally competent stakeholder outreach and engagement focused on small businesses and those catering to local community needs. In particular, the greatest need for this would be along Jefferson Street, if sites that currently have small stores and businesses are redeveloped with mixed-use buildings.

Policy ED 7-7: Coordinate with the Housing Element and housing policy and implementation efforts to expand workforce housing opportunities.

Goal ED-8: Support Downtown Napa as a multi-cultural, event, and food destination, anchored by hospitality uses, and with a supportive mix of civic, office, retail, entertainment, and residential uses to promote vibrancy, authenticity, and cultural diversity.

Policy ED 8-1: Support the continued growth of the Oxbow District for both residents and visitors, focusing on strengthening the district's culinary and maker space themes, programming

and market efforts, connections to Downtown and the Napa River, and sale of locally-produced goods and services.

Policy ED 8-2: Support nightlife activities as part of economic development to improve vibrancy and revenue for Downtown businesses while balancing public safety and public services to support such activity.

Policy ED 8-3: Support the downtown entertainment and retail experience for both residents and visitors while highlighting products, services, traditions, and cultures that are unique to Napa and are "Napa Made."

Policy ED 8-4: Consider providing financial and regulatory incentives for certain types of development that help create and sustain a vibrant mixed-use district, including offices, retail, entertainment, or housing (including live-work, mixed-use, and workforce housing, in particular), provided they meet a minimum threshold size and fulfill community needs.

Policy ED 8-7: Expand Downtown's family-friendly feel through placemaking and activities (e.g., plazas, play fountains, water features, and seasonal amenities such as an ice-skating rink), and promote services and amenities (such as a proximate full-service supermarket) to make Downtown an attractive place to live.

3.12.2.3 Thresholds of Significance

In accordance with Appendix G of the CEQA Guidelines, the Project would be considered to have a significant effect relating to population and housing if it would result in any of the conditions listed below.

- Inducement of substantial population growth in an area, either directly (e.g., by proposing new homes and businesses) or indirectly (e.g., through extension of roads or other infrastructure).
- Displacement of a substantial number of existing housing units or people, necessitating the construction of replacement housing elsewhere.

3.12.2.4 Impacts and Mitigation Measures

Impact POP-1: The Project would have a significant impact if future development allowed by the Napa General Plan 2040 would induce substantial unplanned population growth in an area, either directly (e.g., by proposing new homes and businesses) or indirectly (e.g., through extension of roads or other infrastructure) (less than significant)

In 2020, the city and its SOI had an estimated population of 79,300 and contained 30,700 housing units. As noted in Table 3.12-1, the Project is projected to result in approximately 7,800 new housing units, which would increase the city's population by approximately 17,900 to 97,200 by 2040. This increase in population would be accompanied by an increase in employment opportunities to expand the city's employment base, providing an additional 10,800 jobs by 2040.

The regional planning growth projections from the Plan Bay Area 2040 RTP/SCS shows that Napa County will grow from a population of 141,240 in 2020 to 158,050 by 2040. Likewise, the city is projected to grow from a population of 77,158 in 2020 to 86,715 by 2040. Between 2020 and 2040, the city is projected to maintain its current share of the countywide population of 54 percent. New homes and business developed in the Planning Area as a result of the Project would accommodate growth in Napa that is commensurate with the city's size, growth rate, and place in the region. As a programmatic land use plan, the General Plan update and its policies are designed to accommodate

future growth. That is, the plan itself does not propose development of new housing; rather, it guides future development in response to anticipated population growth, as discussed below.

The City's 2023–2031 RHNA allocation obligations for the upcoming Housing Element update total 1,939 units, which is more than 2.3 times the 835 units established under the 2015–2023 RHNA allocation. Given that a housing cycle has a planning period of 8 years, extrapolating this RHNA requirement to the Project's 2040 horizon would result in about 4,120 new units. Recognizing that market trends are difficult to predict, that RHNA numbers are subject to change in the future, and that growth is not a linear process, the General Plan update is expected to accommodate the city's growth needs while ensuring adequate housing availability to support anticipated job growth. As discussed in Chapter 2, *Project Description,* pipeline projects include 3,170 units, many of which would be developed during this current housing cycle. Development opportunities resulting from the General Plan update are projected to provide an additional 4,630 units, less than 1.5 times the amount of development already in the pipeline.

Additionally, the Project seeks to achieve a greater balance in the jobs/employed residents ratio to improve affordability and reduce residents' vehicle miles traveled by allowing more opportunities to locate employed residents and their jobs within the city. The existing jobs/employed residents ratio is 1.19, indicating that more jobs exist within the city than do employed residents, resulting in more employees commuting from outside the city. An increase of 7,800 housing units would lower the jobs/employed residents ratio slightly to 1.17.

The General Plan update anticipates all growth within Napa's existing Rural Urban Limit. New residential opportunities are a result of targeted residential density increases in mixed-use designations within Focus Areas, along corridors, and in downtown to provider higher density housing near jobs and community-serving retail and services. This type of infill development is designed to focus on redevelopment and revitalization of areas already served by infrastructure and would not require extensions of roads or other infrastructure. Although some road extensions and improvements are anticipated, this work is largely to improve connectivity within the existing city structure and would not result in unplanned growth. Areas outside the Focus Areas that are planned for growth (i.e., Big Ranch Road, Foster Mixed Use, and the Napa Pipe Project) would include the necessary street and infrastructure improvements to accommodate planned growth. Thus, no new road extensions, improvements, or infrastructure would indirectly result in substantial unplanned population growth.

In summary, Project buildout allows the General Plan update to plan for future growth, and, accordingly, proposed policies in the General Plan ensure that infrastructure, facilities, and utilities would be appropriately sized for future growth. Further, environmental impacts that result from new development would be identified as part of individual project review. As such, the Project would not induce substantial unplanned population growth, either directly or indirectly, and this impact is considered less than significant with no mitigation required.

Impact POP-2: The Project would have a significant impact if future development allowed by the Napa General Plan 2040 would displace substantial numbers of existing people or housing units, necessitating the construction of replacement housing elsewhere (less than significant)

A substantial portion (about 50 percent) of developed land in the Planning Area consists of residential uses, which are not anticipated to undergo significant land use changes under the

Project. The Project concentrates new high-density and mixed-use development in downtown, in Focus Areas located along major corridors, and in opportunity sites in different parts of the city. Therefore, the Project focuses on providing infill development housing opportunities while seeking to preserve existing housing and neighborhoods. New land use classifications, as described and discussed in Section 3.10*, Land Use and Planning*, introduce greater flexibility of uses and allow a higher intensity of residential uses in more areas of the city. As such, the Project is projected to increase the overall number of housing units and provide additional housing opportunities to serve the diverse needs of the community at various socioeconomic levels.

The Project includes land use and zoning changes but does not propose specific development that would result in the displacement of existing housing units or people, necessitating the construction of replacement housing elsewhere. The Project's land use designations and policies would increase allowable intensities and residential densities in more areas of the city, thereby increasing capacity for new housing. Additionally, the proposed Public Health and Equity Element of the General Plan update includes policies to prevent displacement. Relevant policies include PHE 4-4 and PHE 6-7, which aim to work with communities to address concerns about gentrification, displacement, and affordable housing. Therefore, any displacement impact on existing housing units or people would be less than significant with no mitigation required.

3.12.3 References Cited

Association of Bay Area Governments. 2013. *ABAG Regional Housing Need Plan 2015–2023.*

Bay Area Council Economic Institute. 2019. *City of Napa Economic Development Action Strategy.* Available: http://www.bayareaeconomy.org/files/pdf/NapaEconDevStrategy.pdf . Accessed: October 15, 2021.

California Department of Finance. 2020. *Demographic Research Unit, Population Estimates for Cities, Counties, and the State, January 1, 2020 and 2021*. Available: https://www.dof.ca.gov/forecasting/demographics/estimates/e-1/.

California Employment Development Department. 2019.

Cervero, R. 1989. Jobs-Housing Balancing and Regional Mobility. *Journal of the American Planning Association* 55(2):136–150. DOI: 10.1080/01944368908976014.

City of Napa. 2019. *City of Napa Economic, Demographic, and Real Estate Profile.* Available: https://static1.squarespace.com/static/5b566dd931d4dff47aa7864a/t/5cbdfb25971a18245224998a/1555954477078/City+of+Napa+Economic%2C+Demographic%2C+and+Real+Estate+Profile+4.2.19.pdf . Accessed: October 15, 2021.

CoStar/Economic and Planning Systems, Inc. 2019.

Dyett and Bhatia. 2021.

Metropolitan Transportation Commission and Association of Bay Area Governments. 2017. *Plan Bay Area 2040.* Available: http://2040.planbayarea.org/files/2020-02/Final_Plan_Bay_Area_2040.pdf. Accessed: October 14, 2021.

Metropolitan Transportation Commission and Association of Bay Area Governments. 2018. *Plan Bay Area Projections 2040.* Available: http://mtcmedia.s3.amazonaws.com/files/Projections_2040-ABAG-MTC-web.pdf. Accessed: October 19, 2021.

Metropolitan Transportation Commission and Association of Bay Area Governments. 2021.

Southern California Association of Governments. 2001. The New Economy and Jobs-Housing Balance in Southern California.

3.13 Public Services

3.13.1 Existing Conditions

3.13.1.1 Regulatory Setting

This section describes the state and local regulations related to public services that would apply to the General Plan update. There are no applicable federal regulations.

State

Senate Bill 50

Senate Bill (SB) 50 (also known as Proposition 1A, codified in California Government Code Section 65995 et seq.) was enacted in 1998 to address how schools are financed and how development projects may be assessed for associated school impacts. SB 50 sets forth the "exclusive methods of considering and mitigating impacts on school facilities" resulting from any state or local planning and/or development project, regardless of whether its character is legislative, adjudicative, or both (Government Code Section 65996[a]). Section 65995 provides that "[t]he payment or satisfaction of a fee, charge, or other requirement levied or imposed pursuant to Section 17620 of the Education Code in the amount specified in Section 65995…is hereby deemed to be full and complete mitigation of the impacts of any legislative or adjudicative act, or both, involving, but not limited to, the planning, use, or development of real property, or any change in governmental organization…on the provision of adequate school facilities" (Government Code Section 65995[h]). The reference in Section 65995(h) to fees "imposed pursuant to Section 17620 of the Education Code in the amount specified in Section 65995" is a reference to per-square-foot school fees that can be imposed by school districts on new residential or commercial/industrial construction at three levels. Education Code Section 17620 provides the basic authority for school districts to levy fees against construction for purposes of funding construction or reconstruction of school facilities, subject to limits set forth in Government Code Section 65995.

California Building Code

Part 2 of Title 24 of the California Code of Regulations (CCR) refers to the California Building Code, which contains complete regulations and general construction building standards of state adopting agencies, including administrative, fire and life safety, and field inspection provisions. Part 2 was updated in 2019 to reflect changes in the base document from the Uniform Building Code to the International Building Code. Part 9 refers to the California Fire Code, which contains fire safety–related building standards referenced in other parts of Title 24.

California Health and Safety Code

State fire regulations are set forth in Section 13000 et seq. of the California Health and Safety Code. These regulations address building standards (as also set forth in the California Building Code), fire protection and notification systems, fire protection devices such as extinguishers and smoke alarms, high-rise building and childcare facility standards, and fire suppression training.

Regional

Metropolitan Transportation Plan/Sustainable Communities Strategy

The Metropolitan Transportation Commission (MTC) is the transportation planning, financing, and coordinating agency for the nine-county San Francisco Bay Area, including Marin, Sonoma, Napa, Solano, Contra Costa, Alameda, Santa Clara, San Mateo, and San Francisco Counties. The MTC *Plan Bay Area 2040* is a state-mandated, integrated long-range transportation and land use plan created in a joint effort by MTC and the Association of Bay Area Governments (ABAG). *Plan Bay Area 2040* was adopted in 2017 as a long-range Regional Transportation Plan and Sustainable Communities Strategy for the nine-county area. *Plan Bay Area 2040* also provides a roadmap for accommodating projected household and employment growth in the Bay Area by 2040, as well as a transportation investment strategy for the region. *Plan Bay Area 2040* details how the Bay Area can make progress toward the region's long-range transportation and land use goals while meeting greenhouse gas reduction targets set by the California Air Resources Board (Metropolitan Transportation Commission and Association of Bay Area Governments 2017). *Plan Bay Area 2040* sets a roadmap for future transportation investments and identifies how to accommodate expected growth. Preparation of *Plan Bay Area 2050* was initiated in 2019, and the new plan is anticipated to be adopted by ABAG and MTC in the fall of 2021 (Marin Transportation Commission and Association of Bay Area Governments 2020).

Local

City of Napa General Plan, Envision Napa 2020

The following goals in the Community Services chapter of the current General Plan pertain to public services.

Community Services - General

Goal CS-1: To ensure the timely development of public facilities and the maintenance of adequate service levels for these facilities to meet the needs of existing and future City residents.

Policy CS-1.1: The City shall plan and build infrastructure improvements that will: (1) accommodate growth demands without lowering levels of service; (2) support central City revitalization efforts; and (3) provide aesthetic enhancements to the City's major gateways and scenic corridors.

Policy CS-1.2: Where new development requires the construction of new public facilities, the new development shall fund its fair share of the construction of those facilities. The City shall require dedication of land within newly developing areas for required public facilities, as allowed by law.

Policy CS-1.3: The City shall ensure through the development review process that adequate public facilities and services are available to serve new development.

Policy CS-1.4: The City shall require, to the extent legally possible, that new development pays the cost of providing new public facilities and services and/or the costs for upgrading of all existing facilities that it uses, based on the demand for these facilities attributable to the new development; exceptions may be made when new development generates significant public benefits (e.g., low-income housing, significant primary wage earner employment) and when alternative sources of funding can be identified to offset foregone revenues.

Policy CS-1.5: The City shall seek broad-based funding sources for public facilities and services that benefit both current and future residents of the City.

Policy CS-1.6: The City shall establish a feasible five-year Capital Improvement Program (CIP) that gives high priority to projects identified as needed in the General Plan. The City shall also give high priority to projects that will reduce or eliminate existing deficiencies in the City's public facilities system.

Policy CS-1.7: The City shall require that all new development meet adopted service levels for public facilities as established in the General Plan.

Public Safety and Emergency Services - General

Goal CS-2: To ensure community order and public safety in Napa.

Policy CS-2.1: The City shall provide services and personnel necessary to maintain community order and public safety.

Policy CS-2.2: The City shall endeavor to maintain a police and fire force sufficiently staffed and deployed to strive to provide a five-minute maximum response time to any call involving an immediate danger of loss of life or serious injury (response time means from the time the call is received in dispatch to the time the first emergency unit is on the scene).

Responsive Police Services

Goal CS-3: To maintain an adequate police force to ensure a safe and secure community.

Policy CS-3.1: The City shall continue a priority system for calls for service to ensure availability of sworn officers to respond to life safety incidents while allowing Community Service Officers to respond to lower priority needs. The City shall explore the availability of other personnel resources to assist with lower priority matters.

Policy CS-3.2: The City shall continue to provide training programs for both sworn officers and other staff to maintain a level of personnel resources capable of responding to future call volumes.

Policy CS-3.3: The City shall continue efficient mobilization of trained personnel to prioritized incidents, using new equipment and technology when available.

Proactive Police Services

Goal CS-4: To reduce and prevent crime through the use of community-oriented education and involvement programs.

Policy CS-4.1: The City shall provide training and support for community-oriented educational and involvement programs and services. The City shall assist in expanding the City's Neighborhood Watch and Neighborhood Improvement programs to encompass all areas of the City desiring to participate.

Policy CS-4.2: The City shall continue programs such as Ride Along, Cadets, Youth Services/Diversion Program, and Drug Awareness and Resistance Education (DARE) to increase youth awareness of and involvement in police operations.

Policy CS-4.3: The City shall continue to direct services and outreach programs toward youths in the community.

Policy CS-4.4: The City shall continue its problem-solving approach to law enforcement in an effort to reduce calls for service.

Responsive Fire Services

Goal CS-5: To provide emergency fire suppression services to protect life and property within the City.

Policy CS-5.1: The City shall maintain adequate personnel and equipment necessary to provide fire suppression services for the City of Napa.

Policy CS-5.2: The City shall continue to provide personnel training to maintain optimum preparedness for emergency response.

Policy CS-5.3: The City shall maintain and upgrade equipment as needed to continue efficient mobilization of trained personnel to life safety incidents.

Policy CS-5.4: The City shall provide for adequate emergency vehicle access and public egress in new development.

Policy CS-5.5: The City shall provide for well-designed and standardized address systems to facilitate efficient emergency response.

Policy CS-5.6: The City shall provide for an adequate fire flow system throughout the community, to meet the fire flow requirements of the California Fire Code.

Policy CS-5.7: The City shall continue to require built-in fire protection using automatic fire sprinklers, Class A roofing, fire-resistant building materials, and similar measures.

Policy CS-5.8: The City shall continue to maintain mutual and/or automatic aid agreements with CalFire, the County of Napa, and other local agencies.

Proactive Fire and Code Enforcement Services

Goal CS-6: To prevent fires and maintain safe neighborhood conditions through the use of community-oriented educational and involvement programs.

Policy CS-6.1: The City shall minimize potential property damage, injuries, and loss of life due to fire through fire prevention practices and ongoing educational and public involvement programs.

Policy CS-6.2: In areas with inadequate fire flows, including those above 300-feet in elevation, the City shall require new development to incorporate design alternatives that will provide the necessary fire flows for both building fire sprinklers and fire hydrants.

Policy CS-6.3: The City shall continue to improve the availability and clarity of fire standards and promote early consultation between the development community and fire prevention staff to ensure that fire protection concerns are considered during project design.

Policy CS-6.4: The City shall analyze the most common causes of fire within the City and focus fire prevention training exercises and community outreach programs accordingly.

Policy CS-6.5: The City shall continue to provide fire safety demonstrations and presentations at public and private schools, civic and social organizations and other public gatherings. Where possible, the City shall establish an annual schedule for such events.

Policy CS-6.6: The City shall maintain the current required annual inspection program for commercial, industrial, assembly occupancies, institutional, multi-family residential, educational and vacation rentals. Engine companies will make an effort to inspect non-required inspections of all businesses in the City every 2 to 5 years. and office spaces within the City limits based on hazard classification.

Policy CS-6.7: The City shall continue to participate in and support the Napa Communities Firewise Foundation in their efforts to inform, educate and prepare individuals from the effects of wildfire.

Policy CS-6.8: The City, as the need arises and funding permits, should initiate the use of a multi-agency resource team working with neighborhood groups to improve and clean up neighborhoods.

Policy CS-6.9: The City shall continue to provide staffing and support for code enforcement as means of reducing citizen exposure to risk and improving the general conditions of

neighborhoods. The City shall continue to conduct code enforcement primarily on a complaint basis, and shall formalize the process for response and prioritization of complaints.

Policy CS-6.B The City shall develop Fire Department Development Guidelines for typical residential, commercial and industrial development. Responsibility: Fire Department Time Frame: FY 11-12.

Emergency Medical Services

Goal CS-7: To provide emergency medical services adequate to meet the call demands within the City.

Policy CS-7.1: The City shall maintain personnel and equipment necessary to provide medical emergency response services for the City of Napa.

Policy CS-7.2: The City shall maintain personnel to seek to provide a maximum response time of five minutes to any call involving an immediate danger of loss of life as a result of a medical emergency.

Policy CS-7.3: The City shall equip staff with state-of-the-art medical and rescue equipment as needed to meet demands for emergency medical services.

Policy CS-7.4: The City shall continue to maintain certification and provide continuing education for firefighters to function as emergency medical technicians or paramedic.

Policy CS-7.5: The City shall explore additional medical service funding, including insurance company reimbursement, patient transport capability, and other sources, to help address the costs of providing emergency medical services.

Schools

Goal CS-8: To provide for the educational needs of all Napa residents.

Policy CS-8.1: The City shall work cooperatively with the Napa Valley Unified School District in monitoring housing, population, and school enrollment trends and in planning for future school facility needs.

Policy CS-8.2: The City shall work cooperatively with the Napa Valley Unified School District to use existing school facilities for non-school-related and child care activities.

Policy CS-8.3: The City shall support enactment of state legislation to finance the construction and maintenance of schools.

Parks and Recreation

Goal PR-1: To develop a system of well-maintained and fully improved local and Citywide serving parks and recreation facilities which meet the needs of the residents of Napa.

Policy PR-1.1: The City shall provide 12 acres of active and passive parkland per 1,000 residents. This total figure includes Citywide, community, neighborhood, and other special park sites and recreational amenities incorporated into the public parks and recreational open space system.

Downtown Napa Specific Plan

The Downtown Napa Specific Plan provides the guiding framework for realizing the vision of a vibrant, healthy, and balanced pedestrian-oriented City center and outlines a set of recommended improvements to cultivate a physically attractive, economically healthy, and socially animated City center. It does not contain any recommendations specific to public services.

City of Napa Municipal Code

Chapter 15.68 of the City's Municipal Code requires the developer of each new dwelling unit to dedicate land and/or pay fees into a special City fund used to provide park and recreational facilities reasonably related to serving the park and recreational needs generated by the development.

Chapter 15.78 of the City's Municipal Code requires the developer of each new dwelling unit to pay the fire and paramedic development impact fee for the purpose of funding public facilities that mitigate the impacts of development projects on the City's ability to provide Citywide fire and paramedic services.

Chapter 15.80 of the City's Municipal Code requires all owners of real property in the City who are issued a building permit for a new dwelling unit to pay fees into a school fund to be used by the Napa Valley Unified School District to alleviate over-crowded conditions caused by the dwelling units.

Chapter 15.84 of the City's Municipal Code requires every person, firm, or corporation constructing new development to pay a street improvement fee to pay for street improvements.

Chapter 15.94 of the City's Municipal Code imposes impact fees on development projects to provide direct funding, subsidies, and incentives to increase, improve, or preserve the supply of housing units affordable to extremely low, very low, and low income households.

Chapter 15.104 of the City's Municipal Code requires that each developer for a nonresidential development project pay the parking impact fee.

Chapter 15.04 of the City's Municipal Code adopts by reference the 2019 edition of the California Building Standards Code, as adopted by the California Building Standards Commission, and published in California Code of Regulations, Title 24. The chapter includes amendments to the Building Code, Residential Code, Electrical Code, Mechanical Code, Plumbing Code, Fire Code, and Green Building Standards Code.

Fire Standards for Design Professionals

The City of Napa Fire Department (NFD) maintains fire standards for building and road design. These include standards related to the numbering and display of addresses, the replacement of fire alarms, lane and curb marking, residential and commercial cul-de-sac design, underground piping, along with road width and turning radii.

City of Napa Park and Facilities Master Plan

The City adopted the Park and Facilities Master Plan in February 2010. The plan provides a roadmap for providing high-quality parks and recreation facilities for residents and visitors to the City of Napa, with a detailed examination of existing parks and facilities. The plan includes recommendations and implementation tools designed to guide investments toward targeted, sustainable improvements to the City's park and facilities system.

Napa Valley Unified School District

The Planning Area is served by the Napa Valley Unified School District (NVUSD). The school district is empowered to collect statutory fees from the construction of residential and commercial development to mitigate the impact of new development on school facilities. The current fees are

$4.08/square foot for residential development and $0.66/square foot for commercial development (NVUSD 2021).

3.13.1.2 Environmental Setting

Fire Protection and Emergency Services

This section focuses on urban fire prevention; wildland fire hazards are discussed in Section 3.18, *Wildfire*, of this document.

NFD provides fire protection and emergency medical services within Napa's jurisdictional boundary. NFD serves approximately 18 square miles (representing five zones) and almost 80,000 residents within the City limits. NFD also provides services as needed to nearby unincorporated areas through reciprocal agreements with other neighboring service providers. This includes a formal automatic aid agreement with Napa County in which NFD immediately responds to service calls to the county's "island communities" (areas in the county Sphere of Influence [SOI], but within the City boundary), while Napa County Fire Department immediately responds to service calls in the outlying areas on the west and south sides of the City.

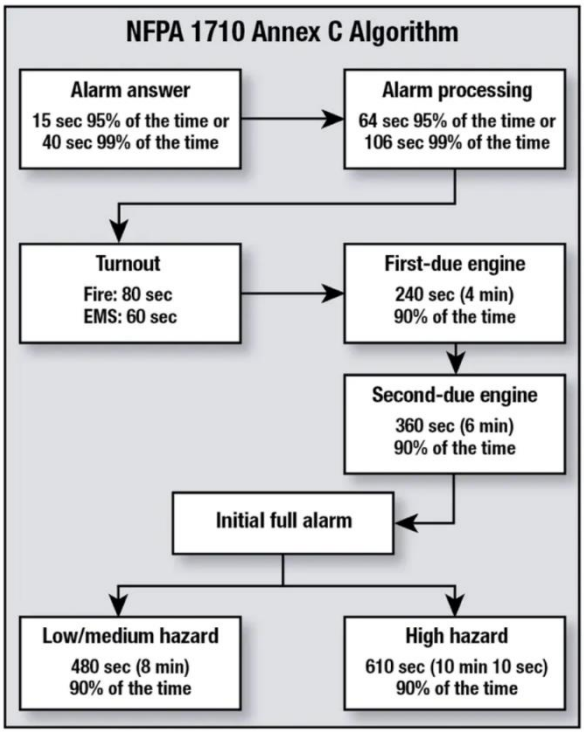
As shown in Table 3.13-1, within the five fire stations in the Planning Area, there are 18 firefighters on duty per day, with each station responsible for a different mapped zone of the City.

Table 3.13-1. City of Napa Fire Stations

Facility Name	Address	Staff	Equipment	Primary Response Area
Fire Station 1	930 Seminary Street	6	Ladder truck	Map ZONE 1
Fire Station 2	1501 Park Avenue	3	Engine	Map ZONE 2
Fire Station 3	2000 Trower Avenue	3	Engine	Map ZONE 3
Fire Station 4	251 Gasser Drive	3	Engine	Map ZONE 4
Fire Station 5	3001 Browns Valley Road	3	Engine	Map ZONE 5

Source: Napa Fire Department 2020, pers. comm.

Fire departments respond to a variety of life-threatening and non-life-threatening calls, including emergency calls for service and other fire-related calls. National Fire Protection Association (NFPA) US Fire Department Profile – 2018 research document indicates that United States (U.S.) cities of 50,000 to 99,000 population have a median of 1.32 firefighters per 1,000 population. The ratio for the City of Napa is approximately 0.825 firefighters per 1,000 population. (Napa Fire Department pers. comm.). The Napa Fire Department shall strive to maintain response time compliance to current NFPA 1710 recommendations (see image at right) (response time means from the time the call is received in dispatch to the time the first emergency unit is on the scene).



The Insurance Services Office (ISO) is a third-party independent agency that evaluates fire departments, water departments, and communications systems. It rates the results on a national scale from one to ten (one being the best and highest). According to ISO, its Public Protection Classification Program plays an important role in the underwriting process with insurance companies. As of 2020, NFD has an ISO rating of 2/2X (Napa Fire Department pers. comm.).

NFD anticipates that additional development, growth, density, diversity of building types, and an increasing senior population will increase its daily staffing and unit needs. The department anticipates a possible need for a sixth fire station in south Napa, due to the Napa Pipe and the Stanley Lane developments, as well as the possibility of enhanced staffing levels at current fire stations. NFD anticipates that growth and development in the Stanley Lane area and in the 154-acre former Napa Pipe plant site, where a Costco Wholesale store and up to 945 homes are planned (North Bay Business Journal 2020), both in the south portion of the City (Station 4 Zone), will pose challenges to the department in terms of anticipated call volume and its current staffing levels (Napa Fire Department pers. comm.). NFD expects negative impacts to response time compliance, as well as mitigation outcomes for fire and emergency services, and recommends that appropriate planning for development in this area would require an increase in department resources, up to and including the addition of a fire station, fire apparatus (front line and reserve), and nine personnel. ISO analysis of the deployment of fire stations in the City recommends fire station distribution at 1.5 road miles. The Napa Pipe development is approximately 2.6 miles from the nearest station, and the Stanley Lane development is approximately 4.5 miles from the nearest station (Napa Fire Department pers. comm.).

Police Protection

The Napa Police Department (NPD), first established in 1875, is one of the oldest police departments in California and is responsible for enforcing the laws of the State of California and local ordinances,

while providing a variety of public services to the community. NPD's mission is to promote and maintain a peaceful, safe, and secure environment.

Police services in the City of Napa jurisdiction are provided by NPD, headquartered at 1539 First Street. NPD also provides police protection services as needed to some of the surrounding unincorporated lands through reciprocal agreements with other neighboring service providers. This includes a formal automatic aid agreement with Napa County in which NPD responds to service calls in the unincorporated island communities, and in turn, the County Sheriff responds to service calls in the Hagan Road/Silverado Trail area.

NPD employs 76 sworn personnel and 71 professional staff, divided into an Operations and an Administration/Support Services Division. The department responds to calls for service 7 days a week throughout the year. The Operations division includes detectives, youth services bureau, traffic/parking officers, homeless outreach services, and patrol officers, and employs most of the sworn personnel. The Patrol Bureau responds to calls for police assistance and employs over 40 officers. Officers arrest and book offenders, conduct investigations, facilitate problem-solving efforts with members of the community, and respond to emergencies among other duties. Officers may also perform ancillary assignments such as bicycle patrol, crime scene specialist, crisis negotiator, DARE officer, field training officer, and honor guard. The Investigations Bureau includes a sergeant, six detectives, and a forensic specialist. The Special Enforcement Unit focuses on ongoing community problems, such as gang crimes and quality-of-life issues. The unit comprises one sergeant and four detectives. The Youth Services Unit consists of one sergeant and three school resource officers. In addition, NPD has a youth services specialist, who is a certified social worker, and a part time diversion specialist. The unit provides school resource officers to NVUSD schools within the City of Napa at the middle school and high school level. The Diversion Unit provides services to first-time nonviolent juvenile offenders, working in concert with the juvenile justice system. (Napa Police Department 2021)

According to NPD in 2018, the Napa station has no established service ratios (e.g., officers per 1,000 residents) for police services. The national average of police officers to peak population is 16.6 officers for every 10,000 people (Governing 2019). Based on Napa's 2019 population of approximately 80,000 people, NPD has approximately 9.5 sworn personal per 10,000, below the national average.

NPD does not have a response time standard, though it plans to produce a strategic plan, which will include a service time report (Napa Police Department pers. comm.). The existing General Plan, however, establishes a response time standard of 5 minutes for emergency calls. The City of Napa is in the planning stages of a new Police Department/Essential Services Building. Napa police will operate from a manufactured 25,000-square-foot building at the City's Corporation Yard at 770 Jackson Street as the City of Napa plans for a new Police Department/Essential Services Building at a location unconfirmed as of 2018 (Napa Valley Register 2018).

California Highway Patrol

The California Highway Patrol (CHP) is responsible for enforcing traffic laws on county and state highways. CHP's primary mission is the management and regulation of traffic to achieve safe, lawful, and efficient use of the highway transportation system. As a major statewide law enforcement agency, CHP's secondary mission is to assist in emergencies exceeding local capabilities. CHP also provides disaster and lifesaving assistance. Additional responsibilities include truck and bus inspections, air operations (both airplanes and helicopters), and vehicle theft investigation and

prevention. The 1995 merger with the California State Police increased the areas of responsibility to include protection of state property and employees, the governor, and other dignitaries. In addition to its enforcement responsibilities, CHP also provides a variety of programs to educate the public on driver safety issues. CHP operates two offices in Napa: 975 Golden Gate Drive and 3500 Airport Road. The Airport Road location houses the CHP's Air Operations Unit (California Highway Patrol 2021).

Schools

Publicly funded primary and secondary education in the City of Napa is provided by NVUSD, which is a separate governmental body from the City of Napa. As it is separate from the City, NVUSD is responsible for school facilities planning, closures, enrollment, maintenance, and asset management. Within the Planning Area, there are 15 elementary schools (kindergarten or pre-kindergarten through fifth grade), four middle schools (grades six through eight) four high schools and alternative schools (grades nine through 12), 12 private schools, one juvenile hall/high school, and one community college. NVUSD oversees two dependent charter schools: Napa Valley Language Academy and the River School. Public school enrollment and capacity for schools in Napa is shown in Table 3.13-2.

Table 3.13-2. Napa Valley Unified School District Enrollment and Capacity

School Name	Total Enrollment 2020–2021	Enrollment Capacity
Elementary Schools (K-5)	**7,058**	**8,214**
Alta Heights Elementary School	339	375
Bel Aire Park Magnet Elementary School	448	525
Browns Valley Elementary School	463	550
Canyon Oaks Elementary School[a]	674	675
Donaldson Way Elementary School[a]	524	600
McPherson Elementary School	382	625
Napa Junction Magnet Elementary School[a]	420	550
Napa Valley Language Academy[b]	650	675
Northwood Elementary School	378	350
Phillips Magnet Elementary School	410	525
Pueblo Vista Magnet Elementary School	440	350
Shearer Elementary School	434	650
Snow Elementary School	388	527
Vichy Elementary[a] School	366	375
West Park Elementary School	273	337
Willow Magnet Elementary School[a]	469	600
Middle Schools (6-8)	**3,716**	**4,731**
American Canyon Middle School[a]	1,011	1,064
Harvest Magnet Middle School (closing)	685	1,048
Redwood Middle School	808	1,036
River School[b]	479	500
Silverado Middle School	733	1,083

School Name	Total Enrollment 2020–2021	Enrollment Capacity
High Schools (9-12)	**6,070**	**7,056**
American Canyon High School[a]	1,707	2,176
Napa High School	1,914	2,099
New Technology High School	389	432
Valley Oak High School	178	378
Vintage High School	1,882	1,971
Non-Traditional Schools		
Napa Valley Independent Studies	114	N/A
Stone Bridge Charter[a]	269	280
Total Enrollment[c]	16,844	20,001

[a] School is not in the Planning Area, though students from the Planning Area may attend.
[b] Napa Valley Language Academy and the River School are dependent charter schools operated by NVUSD.
[c] Total enrollment does not include nontraditional schools.
Sources: Napa Valley Unified School District 2019; California Department of Education 2021.
N/A = not applicable

As shown in the table, total enrollment in NVUSD for the 2020–2021 school year is about 7,100 elementary, 3,700 middle, and 6,100 high school students, and the current enrollment capacity is about 8,200 for elementary, 4,700 for middle, and 7,100 for high schools. NVUSD's total capacity, therefore, exceeds its enrollment; however, there are particular schools that are over or near capacity, including Canyon Oaks (American Canyon), Northwood, and Pueblo Vista Magnet Elementary Schools.

In April 2021, the Napa Valley Unified Board of Education approved the closure of Harvest Middle School for the 2022–2023 school year. This will redistribute around 685 students across American Canyon, Redwood, Silverado Middle Schools, and the River School language academy (also planned for reconfiguration in 2022). Based on current enrollment, the decrease in facility capacity resulting from the closure of Harvest Middle School of about 1,050 students would result in insufficient capacity to meet current middle school enrollment by 35 students. Furthermore, planned future population could result in an increase in current population to about 97,200, which would yield a projected student population of about 11,920 total students (kindergarten through grade 12) in the Planning Area (1.4 percent more than 2020 total enrollment).

NVUSD has numerous facilities in need of modernization, including permanent buildings more than 20 years old and portable classrooms more than 25 years old. In March 2021, NVUSD updated its facilities capacity study to assess enrollment trends in relationship to school capacities. Despite increasing enrollment throughout the 2008 economic recession and subsequent recovery, districtwide enrollment has generally been decreasing since 2015. Consequently, future enrollment is expected to decrease over the next 7 years.

Parks

Residents of the City of Napa have access to 1,086.4 acres of existing parks and joint-use facilities within and just beyond the Planning Area, which include over 800 acres of parks and open space at park and open space sites, as well as landscaped areas throughout the City. Much of the City's park acreage is concentrated in large facilities, including the signature Kennedy Park and Altson Park,

which together, constitute approximately 588 acres. City of Napa residents can also access over 4,000 acres of regional and state parks and open space just outside the Planning Area, including the South Jefferson property, Skyline Regional Park, Lake Hennessey/Moore Creek Park, and Lake Milliken. The typical industry standard for a City providing parks ranges from 3 to 5 acres per 1,000 residents (Moeller 1965). The current General Plan park standard is to provide 12 acres of active and passive parkland per 1,000 residents.

Considering the above-mentioned parks, joint-use facilities, and open space within and just beyond the City, the City's overall park service ratio is approximately 18.1 acres per 1,000 people, which exceeds the current general plan standard. Relative to other cities in Napa County, the City of Napa has a significantly higher service standard for public parks than American Canyon, Calistoga, St. Helena, and Yountville in 2010.

Other Public Facilities

The City of Napa is served by the Napa County Library system, which provides library services to each community in Napa County (except for St. Helena), with a service population of approximately 131,643[1] (Napa County Library pers. comm.). The Napa County Library is governed by state law and operates under the supervision of the Napa County Board of Supervisors, with an eight-member Library Commission serving as the library's policy advisory board. The library is funded through a dedicated portion of annual county tax revenues with additional funding coming from the Napa County Library Foundation and the Friends of the Library.

The 32,000-square-foot Napa Main Library is located at 580 Coombs Street and provides access to books, magazines, DVDs, CDs, and audiobooks, as well as eReaders, flip cameras, learning tablets, and computers for public use (County of Napa 2021). The Napa Main Library employs 40 full-time staff members and contains approximately 150,000 physical items and 950,000 digital items. The library provides 100 "reader seats"[2] and 38 public computers. The Community Meeting Room has a seating capacity of 185, the Lifeworks Room of 45, and the four study rooms each provide capacity for four. The library has 39 parking spaces and two handicapped spaces. The Napa County Library system currently lacks library services in the north part of the City and it is exploring a remote book return and automated locker retrieval option. The Napa County Library currently struggles with those experiencing homelessness and behavior and mental health issues and is exploring options to help those residents (Napa County Library pers. comm.).

Neither the Napa County Library nor the California State Library system has a formal standard to measure adequacy of facility and services. However, guidelines for determining minimum library space requirements are maintained by the American Planning Association (APA). An evaluation of building size and condition is necessary to determine whether each structure can provide the necessary services. The standards for building size are generally expressed in terms of square feet per capita. The Experience Formula for Library Size and Costs used by APA suggest minimum sizes that range from 0.3 square foot per capita for libraries that serve 50,000 people or more to 0.6 or 0.65 square foot for those that serve 10,000 to 35,000 people (American Planning Association 1968). The Napa County Library currently provides approximately 0.24 square foot per capita, below the APA minimum suggested size.

[1] Napa County 137,744; St. Helena 131,643 = 131,643

[2] Numbers are for 2021 and lower than historic levels due to continued spacing for social distancing requirements.

3.13.2 Environmental Impacts

This section describes the environmental impacts associated with public services that would result from implementation of the General Plan update. It describes the methods used to determine the effects of the General Plan update and lists the thresholds used to conclude whether an impact would be significant. Measures to mitigate (i.e., avoid, minimize, rectify, reduce, eliminate, or compensate for) significant impacts are provided, if applicable.

3.13.2.1 Methods for Analysis

The General Plan update was evaluated to determine if fire, police, school, park, and library facilities are staffed and located to continue to adequately serve the City's residents and if additional resources or facilities may be needed. Potential impacts from the additional facilities were assessed by comparison with the significance criteria established in the CEQA Guidelines. For the purposes of this analysis, the future population growth resulting from the General Plan update buildout for the City of Napa would be approximately 97,200 by 2040, an increase in 17,900 residents (23%) from the existing population.

Relevant General Plan Update Goals and Policies

Applicable General Plan update goals and policies from the Land Use and Community Design Element are as follows.

Unincorporated Islands

GOAL LUCD-9: Recognize the importance of annexing unincorporated islands as a City services issue.

LUCD 9-1: Support annexation of unincorporated islands to improve delivery of municipal services, support compatible land use planning, promote community cohesion, and enable representation in City municipal matters.

Applicable General Plan update goals and policies from the Community Services, Parks and Recreation Element are as follows.

Public Safety and Emergency Services

GOAL CSPR-1: Maintain safety services that are responsive to community needs and provide a safe and secure environment for people and property in the City.

Policy CSPR 1-1: Provide responsive, efficient, and effective police and fire services that promote a high level of public safety.

Policy CSPR 1-2: Provide fire prevention and emergency response services that minimize fire risks and protect life and property, including fire prevention, fire-related law enforcement, and public education and information programs.

Policy CSPR 1-3: Locate and maintain police and fire equipment, facilities, and staffing at locations and levels that facilitate effective service delivery.

Policy CSPR 1-4: Require that new development contributes funds to offset the proportionate impact of development on the provision of City facilities needed to provide adequate police and fire services.

Policy CSPR 1-5: Continue to incorporate input from the police and fire departments in the development review process to include requirements for development projects to be designed

and operated in a manner that minimizes the potential for criminal activity and fire hazards, and maximizes the potential for responsive police and fire services.

Policy CSPR 1-6: Employ community-based policing strategies in partnership with community groups, and utilize non-sworn personnel (such as Community Service Officers) for non-emergency or non-life-threatening calls.

Policy CSPR 1-7: Explore options for volunteer programs and initiatives that continue to strengthen community policing.

Policy CSPR 1-8: Continue to provide community programs, volunteer opportunities, and fire safety education to residents of appropriate age.

Policy CSPR 1-9: Periodically review and update the Fire Department Strategic Plan as conditions warrant.

Policy CSPR 1-10: Increase transparency in the Police Department by supporting creation of a Strategic Plan to inform citizens about responsible law enforcement.

Policy CSPR 1-11: Establish suitable response times for the Police and Fire departments as part of the strategic planning process for each department.

GOAL CSPR-2: Reduce and prevent crime through the use of community-oriented education and involvement programs, including techniques developed through Crime Prevention Through Environmental Design (CPTED)..

Policy CSPR 2-1: Apply CPTED principles in the design of new development in order to enhance public safety and reduce calls for service. Encourage the provision of adequate public lighting, windows overlooking streets or parking lots, and paths to increase pedestrian activity within private development projects and public facilities..

GOAL CSPR-3: Improve disaster preparedness for wildfires, including plans for evacuation routes, meeting spots, wildfire mitigation strategies, and coordination with the California Department of Forestry and Fire Protection and Napa County Fire Department

Policy CSPR 3-1: Maintain mutual aid agreements and communication links with the CAL FIRE, Napa County Fire Department, and other surrounding jurisdictions that allow for supplemental aid from other police, fire, and public works personnel in the event of emergencies.

Policy CSPR 3-3: Support efforts to provide enhanced alerts and communications to vulnerable and underserved communities during fire and evacuation events.

Schools and Education

GOAL CSPR-4: Support schools and education-related facilities as contributors to neighborhood quality of life.

Policy CSPR 4-1: Plan for the siting of community centers, arts/cultural facilities, senior centers and other public facilities and programs, in a manner that facilitates convenient and equitable access throughout the City.

Policy CSPR 4-2: Work cooperatively with the Napa Valley Unified School District (NVUSD) to cohesively plan for future school facility needs and for the reuse of school sites that may no longer be needed.

Policy CSPR 4-3: Consider public/private partnership opportunities for school development, including preschools and higher education.

Policy CSPR 4-4: Promote opportunities for higher learning and education to enhance community development and workforce diversification.

Policy CSPR 4-5: Where appropriate, co-locate City facilities with other public facilities (e.g., schools, libraries, post offices, hospitals/clinics) so that multiple services may be delivered from a single location.

Policy CSPR 4-6: Partner with public and private entities to provide educational community services that support families and meet the diverse needs of community members of all ages, backgrounds, and interests.

Policy CSPR 4-7: Support efforts for high-quality and affordable preschool and childcare in order to reduce the equity divide in education.

Parks and Recreation Facilities

GOAL CSPR-9: Provide, improve, and maintain a comprehensive system of City parks, trails, and recreational facilities to meet the needs of the City's current and future residents, businesses, property owners and visitors.

Policy CSPR 9-1: Maintain a parkland provision standard of 10.0 acres of overall parkland per 1,000 residents, 1.5 acres of Community Parks & Facilities per 1,000 residents, and 0.5 acres of Neighborhood Parks per 1,000 residents. Overall parkland includes Natural Areas & Open Space, Community Parks & Facilities, Neighborhood Parks, Mini Parks, Special Use Parks & Facilities, Civic Spaces, Trails, and School Sites.

Policy CSPR 9-2: Strive to ensure that all residents are within a 1.5- to two-mile radius of a community-serving park, which includes the Community Park & Facility or Natural Area & Open Space categories.

Policy CSPR 9-3: Given that the City has sufficient parkland to meet the needs of the City's existing and projected population, focus capital projects on sustaining or improving existing parks and facilities to ensure long-term services to the community.

Policy CSPR 9-4: Pursue public/private partnerships for privately owned public spaces to include requirements for maintenance obligations.

Policy CSPR 9-5: Offer a wide variety of park facilities designed to provide educational benefits, and encourage active and passive participation by users of all ages and interests to existing and future residences, including but not limited to senior services, health and wellness, and youth sports.

Policy CSPR 9-6: Maintain a diverse range of publicly-available recreation and leisure programs and community centers which serve the needs of all sectors of Napa's population, including youth, adult, senior, and family-oriented activities.

Policy CSPR 9-7: Provide Natural Areas & Open Spaces that are utilized primarily for their natural resource value, and secondarily for passive recreational use such as hiking and picnicking. Natural Areas & Open Spaces may include wetlands, wildlife habitats, steep hillsides, or stream corridors. The size and shape of each natural area will vary depending on the resource it protects.

Policy CSPR 9-8: Provide Community Parks & Facilities that provide both active and passive recreation opportunities such as hiking, sport fields, outdoor courts, group picnic shelters, skate parks, or recreation centers. Community parks shall generally be larger than 15 acres but may range from five to 50 acres in extent. The service area for community parks is a 1.5 to two-mile radius catchment, although community park facilities will attract and serve residents throughout the City.

Policy CSPR 9-9: Provide Neighborhood Parks that offer close-to-home recreation opportunities to surrounding neighborhoods and are designed primarily for non-supervised, non-organized recreation activities, supported by facilities such as playground equipment, outdoor courts, picnic tables, pathways, and multi-use open grass areas or small sport fields. These parks are

generally two to 10 acres in size, though some existing neighborhood park sites cover a smaller acreage, and serve residents within a quarter- to half-mile distance. The target standard for provision of neighborhood parkland shall be 0.5 acres per 1,000 residents. Neighborhood park service may also be provided by community parks, or located on schools or other property where appropriate joint-use agreements exist.

Policy CSPR 9-10: Provide Mini Parks that serve residents in immediately adjacent neighborhoods. Mini parks provide basic recreation amenities, such as playgrounds, benches, and landscaping. Mini parks generally are 0.5 to two acres in size and have a limited-service area due to the minimal facilities provided.

Policy CSPR 9-11: Provide Special Use Parks & Facilities that are community-serving, single-purpose sites, such as ballfields, community centers, or boat ramps. Since special use areas vary widely in function, there is no average size, but special use areas must be large enough to accommodate the intended use. Special Use Parks & Facilities are categorized separately as they are located outside of larger parks and designed to be stand-alone facilities.

Policy CSPR 9-12: Provide Civic Spaces that function as small, landscaped spaces and gathering areas located within higher-density urban areas and include amenities such as benches, tables, landscaping, public art, water features, or other amenities to support community events. Civic Spaces are typically smaller than one acre in size and easily traversed on foot.

Policy CSPR 9-13: Provide Trails that serve the entire community and offer opportunities for people to hike, walk, run or ride, and connect with nature or other land uses. Trails can be soft-surfaced, such as crushed rock or wood chips, or hard-surfaced, such as asphalt, concrete, crushed rock, or soil.

Future Park and Facility Needs

GOAL CSPR-10: Continue the development of integrated open space and flooding solutions that also result in new recreational open space for the community, building on the momentum and success of Oxbow Commons.

Policy CSPR 10-1: When feasible, seek opportunities to integrate parks and public open space into major infrastructure projects.

GOAL CSPR-11: Design and improve parks and recreational facilities to reflect the community's changing demographics and user needs.

Policy CSPR 11-1: Update the Napa Parks and Facilities Master Plan (PFMP) to reflect current and future needs, including maintenance management planning and capital improvement planning, and General Plan parkland provision and access standards.

Policy CSPR 11-2: Continue to partner with NVUSD, and consider partnerships with other agencies such as Napa Valley College (NVC) or the County to expand public use of school facilities (such as sports fields, pools, and community meeting facilities) and explore funding mechanisms for use.

Policy CSPR 11-3: Develop an asset management plan that prioritizes improvements to existing parks, and access to existing parks from residential neighborhoods, while maintaining prescribed park acreage per capita standards.

Policy CSPR 11-4: Focus infrastructure improvements or access improvement projects in existing parks and facilities to meet the diversified and long-term needs of residents of all ages.

Policy CSPR 11-5: Reflect changing demographics and community needs and desires as part of parks and facilities improvements and programming by including diverse community participants in parks and recreation planning efforts.

Connections to Parks and Recreation Facilities

GOAL CSPR-12: Prioritize widely accessible parks and recreational facilities.

Policy CSPR 12-1: Identify and develop linkages, corridors, and other connections to provide an aesthetically pleasing and functional network of parks, open space areas, and bike paths throughout the City with connections to surrounding County and State parks.

Policy CSPR 12-2: Prioritize adequate public transportation to key parks, recreational facilities, and community centers throughout the City, especially in vulnerable or under-served communities.

Policy CSPR 12-3: Seek opportunities to partner with public and private entities to, improve multi-modal transportation systems and pathways in neighborhoods with barriers or safety issues.

GOAL CSPR-13: Support trail connections to natural areas and the Napa River in order to improve community health, support a high quality of life, and an active lifestyle.

3.13.2.2 Parks and Recreation Funding

GOAL CSPR-14: Seek funding and distribution mechanisms to support the City's existing and future parks and recreational needs.

Policy CSPR 14-1: Support the development or enhancement of the Napa Parks and Recreation Foundation to help promote and fund parks and recreation improvements, awareness, and volunteers.

Policy CSPR 14-2: Develop an asset management program and funding plan that maintains and improves upon existing parkland and facilities, and that is periodically revised to reflect improvements, funding availability, and changing recreational needs.

Policy CSPR 14-3: Identify cost recovery targets for parks and recreational facilities, services, and maintenance needs to ensure the long-term sustainability of recreational programming and park operations; adjust these targets as needed.

Policy CSPR 14-4: Invest in data gathering, analysis, and upgraded technology to improve capital planning, operations, and social inclusion.

Policy CSPR 14-5: Continue identifying adequate and diverse funding sources for developing and maintaining parks and recreational facilities and programming.

Policy CSPR 14-6: Update the City's park development and parkland dedication impact fee ordinances to reflect the City's new policy direction of prioritizing park improvements, updated park access guidelines, and consideration of impact fees for commercial and industrial development.

Policy CSPR 14-7: Monitor federal, State, local, and nonprofit parks and recreation funding sources. The City shall continue to pursue appropriate grant funding.

Policy CSPR 14-8: Consider the use of tax measures or bond financing to assist in the implementation of the parks and recreation improvements program.

Policy CSPR 14-9: Consider use of benefit assessments for the improvement and long-term maintenance of civic spaces when civic spaces are located to provide benefits to adjacent commercial properties.

Applicable General Plan update goals and policies from the Safety and Noise Element are as follows.

Safety and Noise

GOAL SN-5: Work to prevent urban fires and exposure to wildfires, as well as protect life and property from fire dangers.

Policy SN 5-1: Implement best practices to address wildfire prevention on open space land within and around the City.

Policy SN 5-2: Facilitate communication and education to the community about around fire safety, wildland fire protection measures, and evacuation/emergency response to wildland fires.

Policy SN 5-3: Continue to educate property owners and the public about local fire hazard prevention programs, vegetation-management strategies, and other disaster preparation activities in areas threatened by wildfire.

Policy SN 5-4: Ensure that future development plans provide adequate evacuation routes, vegetation management policies, and fire-reduction design measures, as appropriate.

Policy SN 5-5: Regularly assess adequacy of emergency response and evacuation routes and identify any need for road extensions to serve neighborhoods that do not have sufficient evacuation routes or access for emergency /services.

Policy SN 5-6: Support feasibility of extending Linda Vista Avenue to Browns Valley Road to serve areas north of Napa Fire Station 5 to improve the provision of emergency services.

3.13.2.3 Thresholds of Significance

In accordance with Appendix G of the CEQA Guidelines, the General Plan update would be considered to have a significant effect if it would result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities or a need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the following public services.

- Fire protection
- Police protection
- Schools
- Parks
- Other public facilities

3.13.2.4 Impacts and Mitigation Measures

Impact PS-1: Potential to result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities (less than significant)

Fire Protection and Emergency Services

Buildout under the General Plan update is projected to increase the population of the City of Napa by approximately 17,900 residents, resulting in a 2040 population of 97,200, a 23% increase over current levels. Consequently, it is a reasonable expectation that population and housing within the Planning Area would increase demand on fire protection and emergency services.

To maintain or achieve acceptable staffing and response-time objectives for fire protection, it is reasonably foreseeable that new or expanded fire stations would be needed. Construction and operation of these facilities would have the potential to result in adverse environmental impacts. Under Chapter 15.78 of the City's Municipal Code, the developer of each new dwelling unit would pay a fire and paramedic development impact fee for the purpose of financing new facilities and/or enhanced staffing and equipment associated with increased service demands from the new development.

As described in Section 3.13.1, *Existing Conditions, Environmental Setting*, Napa Fire Department shall strive to maintain response time compliance to current NFPA 1710 recommendations (see image "NFPA 1710 Annex C Algorithm") (response time means from the time the call is received in dispatch to the time the first emergency unit is on the scene). Currently the Napa Fire Department response times are NFPA 1710 compliant which is a result of appropriate station distribution and unit deployment. NFD does not have an established service ratio; however, NFD is currently staffed with .85 firefighters per 1,000 population, below the 1.32 firefighters per 1,000 population US median. (NFPA US Fire Department Profile –2018 research document). The 2040 population of 97,200 projected by the General Plan update would further reduce this ratio to .67 firefighters per 1,000 population. This growth in population, and particularly the planned development in the south of the City, is expected to reduce response times, and may require staffing and equipment increases as well as the construction or relocation of fire stations.

The number, locations, physical sizes, equipment assignments, and designs of both future fire stations and the expansion or relocation of existing stations would be developed in association with future development projects and would not be directly authorized under the General Plan update. Consequently, the potential environmental impacts of these future developments and expansions cannot be evaluated at this time.

Typical operational impacts of fire stations include intermittent noise from the sirens on fire trucks leaving the station on calls, as well as temporary traffic interruptions as vehicles are leaving the station. Construction of fire stations seldom results in significant effects requiring preparation of an EIR, because any potential environmental impacts can usually be mitigated to a less-than-significant level. Mitigation, if necessary, would be site- and project-specific. Because site- and project-specific information is not available for future fire stations, mitigation measures cannot be developed at this time.

Typical environmental impacts associated with construction of new fire stations include construction noise and potential temporary disruption of access, as well as potential impacts related to site-specific conditions, such as biological or cultural resources, depending on the site location. As noted above, such impacts can generally be mitigated to a less-than-significant level. Mitigation measures for impacts of the General Plan update are presented in the relevant resource sections of this Draft EIR. These measures would ensure that impacts of construction and operation of new fire stations would be less than significant.

The current General Plan sets forth goals and policies to ensure adequate levels of service and funding for fire protection services as development occurs. Goal CS-1 includes policies related to the planning and building of public facilities to support growth (CS-1.1), funded by fair share contributions from new development (CS-1.2, CS-1.4), which would meet adopted service levels (CS-1.7). Goal CS-2 includes policies to ensure public safety and sufficient staffing of fire personal to meet response times (SC-2.1, CS-2.2). Goal CS-5 includes specific fire-suppression related policies

aimed at maintaining adequate personnel and equipment (CS-5.1) and upgrades to equipment (CS-5.3). Goal CS-6 includes many policies related to community education and code enforcement (CS-6.1–CS-6.10). Similar policies are in place under Goal CS-7, related to emergency medical services equipment (CS-7.1, CS-7.3) and response times (CS-72).

General Plan update policies, listed above under *Relevant General Plan Update Goals and Policies*, would continue to support adequate infrastructure, services, and facilities relevant to fire protection services. Goal CSPR-1 includes policies related to providing public facilities to meet community needs (CSPR-1). Goal CSPR-1 includes policies aimed at maintaining effective fire services (CSPR-1-1), establishing suitable response times (CSPR 1-11), and locating fire equipment, facilities, and staffing at locations and at levels that would facilitate efficient service delivery (CSPR 1-3). The goal includes policies related to developer fees to fund fire protection services (CSPR 1-4) and consultation with the fire department during development review process (CSPR 1-5). The goal includes policies related to creating community programs and volunteer opportunities related to fire safety (CSPR 1-7). Goal CSPR-3 includes policies related to maintain mutual aid agreements related to fire protection (CSPR 3-1). Accordingly, this impact is expected to be less than significant, and no mitigation is proposed.

Police Protection

Buildout under the General Plan update is projected to increase the population of the City of Napa by approximately 17,900 residents, resulting in a 2040 population of 97,200, a 23% increase over current levels. Consequently, it is a reasonable expectation that population and housing within the Planning Area would increase demand on police protection services, decreasing current service level ratios.

As described in Section 3.13.1, *Existing Conditions, Environmental Setting*, NPD does not have an established service ratio; however, NPD is currently staffed with 9.5 sworn personnel per 10,000, below the 16.6 sworn personnel per 10,000 national average. The 2040 population of 97,200 projected by the General Plan update would further reduce this ratio to 7.8 sworn personnel per 10,000, likely resulting in reduction to response times, necessitating an increase in staffing and the expansion of future police facilities or the construction of new facilities.

The number, locations, physical sizes, equipment assignments, and designs of future police facilities, as well as the expansion of existing facilities are unknown. Consequently, the potential environmental impacts of increased facilities or stations cannot be evaluated at this time. Typical operational impacts of police stations include minor traffic generation during shift changes when police vehicles enter or leave the station grounds and short bursts of noise if police test their patrol car sirens prior to leaving on patrol. Construction and operation of police stations does not typically result in significant effects requiring preparation of an EIR, because any potential construction impacts can usually be mitigated to less-than-significant levels, and potential operational impacts can usually be avoided by project design and operating protocols limiting the use of sirens. Mitigation, if necessary, would be site- and project-specific. Because site- and project-specific information is not available for future police stations, mitigation measures cannot be developed at this time.

Typical environmental impacts associated with construction or expansion of future police facilities include construction noise and potential temporary disruption of access, as well as potential impacts related to site-specific conditions, such as biological or cultural resources, depending on the site location. As noted above, such impacts can generally be mitigated to a less-than-significant level.

Mitigation measures for impacts of implementation of the General Plan update are presented in the relevant resource sections of this Draft EIR. These measures would ensure that impacts of construction or expansion of future police facilities would be less than significant.

The current General Plan sets forth goals and policies to ensure adequate levels of services and funding for police protection services as development occurs. Goal CS-1 includes policies related to the planning and building of public facilities to support growth (CS-1.1), funded by fair share contributions from new development (CS-1.2, CS-1.4), which would meet adopted service levels (CS-1.7). Goal CS-2 includes policies to ensure public safety and sufficient staffing of fire personal to meet response times (SC-2.1, CS-2.2). Goal CS-5 includes specific fire-suppression related policies aimed at maintaining adequate personnel and equipment (CS-5.1) and upgrades to equipment (CS-5.3). Goal CS-6 includes many policies related to community education and code enforcement (CS-6.1 – CS-6.10). Similar policies are in place under Goal CS-7, related to emergency medical services equipment (CS-7.1, CS-7.3) and response times (CS-72). Goal CS-3 includes polices to maintain an adequate police force, including a priority system to ensure priority to life safety incidents (CS-3.1), training for sworn officers and other staff (CS-3.2), and the efficient mobilization of personnel and equipment (CS-3.3). Goal CS-4 includes policies that focus on community-oriented education and involvement programs (CS-4.1, CS-4.2, CS-4.3).

General Plan update policies, listed above under *Relevant General Plan Update Goals and Policies*, would continue to support adequate infrastructure, services, and facilities relevant to police protection services. Goal CSPR-1 includes policies related to providing public facilities to meet then-current and future community needs (CSPR-1). Goal CSPR-1 includes policies aimed at maintaining effective police services (CSPR-1-1), establishing suitable response times (CSPR 1-11), and locating police equipment, facilities, and staffing at locations and at levels that would facilitate efficient service delivery (CSPR 1-3). The goal includes policies related to developer fees to fund police services (CSPR 1-4) and consultation with police during development review process (CSPR 1-5). The goal includes policies related to creating police strategies in partnership with community groups (CSPR 1-6), options for volunteer programs (1-7), and policies related to increased transparency (CSPR 1-9). Accordingly, this impact is expected to be less than significant, and no mitigation is proposed.

Schools

Growth resulting from the General Plan update is expected to increase the population of the City of Napa by approximately 17,900 residents by 2040, for a total population of 97,200. As discussed in Section 3.13.1, *Existing Conditions*, Environmental *Setting*, a population of 97,200 would be expected to yield a projected student population of approximately 11,920 total students in the Planning Area (1.4% more than the 2020 total enrollment). While NVUSD capacity currently exceeds enrollment, the projected 2040 student population would significantly exceed this current capacity, putting pressure on NVUSD to create new or expanded facilities. In addition, many existing NVUSD facilities are over 20 years old and in need of modernization.

The current General Plan sets forth goals and policies to cooperate with NVUSD in its mission to provide for the educational needs of Napa residents. Goal CS-8 includes policies related to the City's cooperation with NVUSD in terms of monitoring housing, population, and enrollment trends to inform planning (CS-8-1) and in support of enacting state legislation to finance the construction and maintenance of schools (CS-8.3).

General Plan update policies, listed above under *Relevant General Plan Update Goals and Policies*, would continue to support schools and education within the City of Napa. Goals and policies support working with NVUSD to plan for future school facility needs, the co-location of City and other public facilities (i.e., schools and libraries), and supporting efforts for high-quality and affordable preschool.

NVUSD collects fees levied on developers (aka Developer Fees). The current fees are $4.08/square foot for residential development and $0.66/square foot for commercial development. Future development under the General Plan update would be subject to developer fees, which are deemed by law to fully mitigate impacts of new development on school districts.[3]

The types, number, locations, physical sizes, and designs of future public schools, as well as the expansion of existing schools to accommodate future growth are unknown. Consequently, the potential environmental impacts of future schools and school expansions cannot be evaluated at this time. The typical environmental impacts of new or expanded schools include aesthetic impacts (particularly if there will be lighted athletic fields), loss of agricultural land (where the school is located on agricultural land), increased noise, and increased traffic. Construction of schools often result in significant effects that require preparation of an EIR, depending on the size and location. EIRs are typically required for new high schools because of significant impacts—for example, those related to aesthetics, noise, and traffic. Future new or expanded public schools would be subject to CEQA analysis by the school district. Potential impacts would be disclosed, and site- and project-specific mitigation measures, if necessary, would be developed during the CEQA review process. Because new schools often require an EIR, implying the potential for significant impacts, this impact is foreseeably significant. However, because public school approval is outside the authority of the City, construction of public schools is not a component of the General Plan update. Accordingly, for this General Plan update, this impact is expected to be less than significant, and no mitigation is proposed.

Parks

As discussed above, the City of Napa currently exceeds the existing General Plan service standard of 12 acres of active and passive parkland per 1,000 residents. As discussed in Section 3.12, *Population and Housing*, the City's population is expected to increase by approximately 17,900 residents by 2040, for a total population of 97,200. The construction of housing (i.e., single- and multi-family residences) would increase the demand for parks in the City. While a population increase of 17,900 residents would reduce the current service ratio from the current 18.1 acres per 1,000 people to approximately 14.8 acres per 1,000 people, it would still be above the existing General Plan service standard. The General Plan update includes policy CSPR 9-1, which would set the General Plan park standard at a lower 10.0 acres of parkland per 1,000 residents. However, the increased population projected by 2040 would provide a ratio, which would exceed this standard. Accordingly, this impact is expected to be less than significant, and no mitigation is proposed.

Other Public Facilities

As discussed above, the Napa County Library system currently serves a population of approximately 131,643, providing approximately 0.24 square foot per capita, below the APA minimum suggested size. Additionally, the library currently lacks services in the north part of the City. The General Plan

[3] Government Code Section 65995(b)(3).

update would be expected to increase the population of the City of Napa by 17,900 residents, putting further strain on library services and further diminishing the ratio pertaining to square footage per service population. To achieve acceptable ratios pertaining to square footage per capita, it is reasonably foreseeable that the provision of new or physically altered library facilities could be required, with the potential to result in adverse environmental impacts. The number, locations, and designs of future libraries and library expansions are unknown. Consequently, the potential environmental impacts of future libraries, if any, cannot be evaluated at this time.

Typical library impacts include a reduction in the parking supply on adjoining streets if off-street parking is insufficient. Mitigation, if necessary, would be site- and project-specific. Because site- and project-specific information is not available about future libraries, mitigation measures cannot be developed at this time.

Typical environmental impacts associated with construction or expansion of libraries include construction noise and potential temporary disruption of access, as well as potential impacts related to site-specific conditions, such as biological or cultural resources, depending on the site location. Future new or expanded public libraries would be subject to CEQA analysis by the County. Potential impacts would be disclosed, and site- and project-specific mitigation measures, if necessary, would be developed during the CEQA review process Such impacts can generally be mitigated to a less-than-significant level. Mitigation measures for impacts of implementation of the General Plan update are presented in the relevant resource sections of this Draft EIR. These measures would ensure that impacts of construction or expansion of future library facilities would be less than significant, and no mitigation is proposed.

3.13.3 References Cited

3.13.3.1 Printed References

Association of Bay Area Governments and Municipal Transit Commission (ABAG and MTC). 2020. *2050 Plan Bay Area, Plan*. Last Revised: November 4, 2020. Available: https://www.planbayarea.org/plan-bay-area-2050-1. Accessed: August 25, 2021.

American Planning Association. 1968. *Planning the Public Library*. Last revised: 12/1/1968. Available: https://www.planning.org/pas/reports/report241.htm. Accessed: March 8, 2021.

California Highway Patrol. 2021. *Find an Office*. Available: https://www.chp.ca.gov/find-an-office. Accessed: August 25, 2021.

City of Napa Fire Department. 2020 Annual Report. Available: https://www.Cityofnapa.org/DocumentCenter/View/7547/2020-Annual-Report-PDF. Accessed: May 2021.

City of Napa Police Department. 2021. *About the Department*. Available: https://www.Cityofnapa.org/463/About-the-Department. Accessed: March 2, 2021.

County of Napa. 2021. *Using the Library. About us*. Available: https://www.countyofnapa.org/897/About-Us. Accessed: March 8, 2021.

Governing. 2019. Police Employment, Officers per Capita Rates for U.S. Cities. Available: https://www.governing.com/gov-data/safety-justice/police-officers-per-capita-rates-employment-for-City-departments.html.

Moeller, John. "Standards for Outdoor Recreational Areas". American Planning Association, Planning Advisory Service (PAS) Report 194. Published January 1965. Available: https://www.planning.org/pas/reports/report194.htm. Accessed: July 2021.

Metropolitan Transportation Commission and Association of Bay Area Governments (MTC and ABAG). 2017. *Plan Bay Area 2040*. Adopted: July 26, 2017. Available: https://www.planbayarea.org/plan-bay-area-2040. Accessed: August 25, 2021.

Napa Valley Register. "Napa Police to move into new Corporation Yard building in 2019 for 2-year stay," 2018. Available: https://napavalleyregister.com/news/local/napa-police-to-move-into-new-corporation-yard-building-in-2019-for-2-year-stay/article_bf478f97-983a-585e-b0c2-fa99f651650a.html. Accessed: July 8, 2021

North Bay Business Journal. 2020. "15 years in progress, Napa Pipe redevelopment project speeds toward possible final green light for Costco construction." January 14. Available: https://www.northbaybusinessjournal.com/article/article/15-years-in-progress-napa-pipe-redevelopment-project-speeds-toward-possibl/. Accessed: July 8, 2021

Napa Valley Unified School District (NVUSD). 2021. Developer Fees. Available: https://www.nvusd.k12.ca.us/developerfees. Accessed: March 3, 2021

3.13.3.2 Personal Communications

Halstead, Anthony. Director of Library Services & Community Outreach. Napa County Library. July 15, 2021—personal communication.

Curren, Zach. Fire Chief. Napa Fire Department. July 6, 2021—personal communication.

Plummer, Robert. Police Chief. Napa Police Department. 2018—personal communication.

3.14 Recreation

This section provides an analysis of potential recreation impacts from future development allowed by the General Plan update, including evaluation of the Project's consistency with existing plans and regulations. This section describes existing recreational uses as well as relevant state and local regulations and programs.

3.14.1 Existing Conditions

3.14.1.1 Regulatory Setting

This section describes the state and local regulations and policies that are applicable to the General Plan update. There are no federal regulations that apply to recreational resources.

State

State Public Park Preservation Act

The State Public Park Preservation Act is the primary instrument for protecting and preserving parkland. Under the Public Resources Code, cities and counties may not acquire any real property that is in use as a public park for any non-park use unless compensation or land or both is provided to replace the parkland acquired. This act ensures no net loss of parkland and facilities.

Subdivision Map Act

The Subdivision Map Act (California Government Code 66410 et seq.) sets forth the conditions for approval of a subdivision map and requires enactment of subdivision ordinances by which local governments have direct control over the types of subdivision projects to be undertaken and the physical improvements to be installed. The act requires a subdivision's design to coordinate with community plans and ensures that subdividers will properly complete areas dedicated for public purposes.

Quimby Act

The Quimby Act (California Government Code 66477), enacted in 1966, is a state law, applied at the local level, that specifies the parkland dedication requirements for new residential subdivisions. The Quimby Act authorizes local jurisdictions to require developers of new residential subdivisions to dedicate up to 3 acres of park area per 1,000 persons or, if the amount of existing neighborhood and community park area exceeds that limit, the jurisdiction can require that existing ratio, not to exceed 5 acres of land per 1,000 persons, or to pay in-lieu fees for park or recreational purposes. The local jurisdiction must adopt Quimby Act provisions as part of its subdivision ordinance in order to impose the exactions allowed by the act. Alternatively, if the local jurisdiction has Quimby Act standards in its general plan, it can impose park and recreation exactions on subdivisions through the requirement that the subdivision be consistent with the general plan (California Government Code 66474(a)). Although the Quimby Act authorizes the dedication of new parkland, it does not address the development, operation, or maintenance of new park facilities. Therefore, the Quimby Act provides open space needed to develop park and recreational facilities but does not ensure the development of the land or the provision of a park.

Joint Exercise of Powers Act

The Joint Exercise of Powers Act (California Government Code 6500 et seq.) authorizes public agencies to enter into agreements for the joint exercise of powers, which are common to the contracting parties with the approval of their governing bodies. The City and the Napa Valley Unified School District (NVUSD) have a long-standing agreement to organize, promote, and conduct joint access to recreational facilities at school sites. A park does not have to be adjacent to a school (e.g., share a common boundary) for an agreement to be viable.

Streets and Highways Code

The State Streets and Highways Code (Section 105) and California Vehicle Code (Section 21805) assist in providing equestrian and hiking trails within the right-of-way of county roads, streets, and highways.

Local

City of Napa Municipal Code

Park Land Dedication Fees

Section 16.32.040 of the City's Municipal Code imposes a park land dedication or in-lieu fee as a condition of approval for all tentative subdivision parcel maps, excluding commercial and industrial subdivisions, condominium projects, or stock cooperatives. This section sets a dedication standard of 2.5 acres of parkland per 1,000 residents. The City may either accept land dedication or require payment of a fee in lieu thereof, or a combination of both, determined by whether a park or recreational facility would be located to serve the immediate and future needs of the residents of the subdivision. Fees collected pursuant to Section 16.32.040 are used to finance the acquisition, development, renovation, improvement, and replacement of parks and recreational facilities and their development.

City of Napa Parks and Facilities Master Plan

The City updated its Parks and Facilities Master Plan in 2010 (City of Napa 2010). This plan includes a detailed examination of existing park sites and recreation facilities, summarizes community input and a needs assessment; provides recommendations for expansion of the park system; and provides recommendations for improving park amenities, improving trail connections, and non-capital projects such as creating a capital reinvestment fund. The Parks and Facilities Master Plan also identifies and prioritizes improvements to barriers identified in the 2008 City of Napa Americans with Disabilities Act Self Evaluation and Transition Plan (City of Napa 2008) and classifies parks as varying priorities for accessibility improvements.

John F. Kennedy Park Master Plan

John F. Kennedy Park (Kennedy Park) is a 350-acre park and open space amenity, with river access, sports parks, and trails. The 2010 Parks and Facilities Master Plan (City of Napa 2010) identified Kennedy Park as a signature recreational facility and recommended an individual site master plan to consider additional amenities for the park as a first phase project. The Kennedy Park Master Plan was adopted in 2015 (City of Napa 2015), and outlines a vision for the park, areas for improvement, and an implementation framework. The plan's vision for the park includes development of premier athletic facilities as well as passive-use amenities and adaptable spaces to allow for maximum

programming flexibility. Strategies for implementation include phasing that correlates with use zones (e.g., entry, garden, center, arrival) as outlined in the plan. A variety of funding strategies are recommended including approaches such as self-sustaining sports, leisure, and entertainment facilities that generate revenue as well as targeting non-traditional grant funds.

Napa Open Space District Master Plan

The Napa County Regional Park and Open Space District adopted its first Master Plan in 2009. The Plan was updated in 2019 (Napa County Regional Park & Open Space District 2019). The focus of the plan is to protect, restore and preserve open space lands and their associated resources for current and future generations. Key aspects of this overarching goal include protection of water supplies and quality, maintaining and improving ecosystem health and protection of wildlife habitat including both core areas and connecting corridors. The plan describes maintenance efforts for committed improvement projects, enhanced conservation projects, and implementation measures.

City of Napa General Plan

The current Parks and Recreation Element, updated in 1998, includes parkland classifications, parkland dedication requirements, funding mechanisms for the planning and development of recreational facilities, and guidance for issuance of development fees. It notes the City's efforts to produce master plans for citywide and community parks and calls for the protection of natural resources and sensitive habitats within the parks and open space system. Equitable parks access is promoted, as are shared-use arrangements between the City and NVUSD to make the most of the City's limited land for new parks. The plan's major parks and recreation policy objectives are listed below:

- Extensive and diverse opportunities for passive and active recreational activities
- A comprehensive, multi-use trail system
- Integration of natural open space and historic resources into the park and open space system
- Provide a broad range of recreation and leisure programs for all sectors of Napa's population

3.14.1.2 Environmental Setting

The study area for this analysis is the Planning Area. The parks and recreation discussion considers parks, recreational facilities, joint use facilities, and trails within the Planning Area.

Parks

Park Classification

The City categorizes parks into ten categories, defined below.

- **Natural Areas & Open Space** are undeveloped spaces that serve the entire community and are utilized primarily for their natural resource value, and secondarily for recreational use. These parks may preserve or protect environmentally sensitive areas, such as unique or endangered plant species. These spaces can provide opportunities for nature-based recreation, such as trail use, bird watching and environmental education. The size and shape of each natural area varies depending on the resource it protects.

- **Community Parks & Facilities** are larger parks that provide both active and passive recreation opportunities that serve the entire community and often visitors from around the region and beyond. Typically, these sites are designed for active recreation, supported by facilities such as sport fields, outdoor courts, skate parks, and recreation centers. Community parks shall generally be larger than 15 acres but may range from 5 to 50 acres in extent.
- **Neighborhood Parks** are generally 2 to 10 acres in size (though some existing neighborhood park sites cover a smaller acreage) and serve residents within a 0.25- to 0.5-mile distance. Located within walking and bicycling distance of most users, neighborhood parks provide close-to-home recreation opportunities for surrounding neighborhoods. These parks are designed primarily for non-supervised, non-organized recreation activities, supported by facilities such as playground equipment, outdoor courts, picnic tables, pathways and multi-use open grass areas or small sport fields.
- **Mini Parks** are small parks that serve residents in immediately adjacent neighborhoods. Mini parks provide basic recreation amenities, such as playgrounds, benches, and landscaping. Mini parks generally are up to 2 acres in size and have a limited service area due to the minimal facilities provided. Due to the high cost of developing and maintaining very small parks, the City will generally not accept new mini parks of less than 2 acres into the park system unless they include specialized recreation facilities or unique resources.
- **Special Use Parks & Facilities** are community-serving assets but are categorized separately because they are located outside of larger parks and designed to be standalone facilities. These can include single-purpose sites, such as ballfields, community centers, or boat ramps. Since special use areas vary widely in function, there is no average size, but special use areas must be large enough to accommodate the intended use.
- **Civic Spaces** include small, landscaped spaces and gathering areas. Generally smaller than 1 acre in size and easily traversed on foot, civic spaces provide social space that is often supported by amenities such as benches, tables, landscaping, public art, water features, or other amenities for community events.
- **Trails** are categorized as linear parks that serve the entire community and offer opportunities for people to hike, walk, run, ride, and connect with nature or other land uses. Trails help make the region more livable and provide communities with access to increased health and fitness activities.
- **School Sites.** Under the Joint Exercise of Powers Act, the City and NVUSD have a long-standing agreement to organize, promote, and conduct joint access to recreational facilities at school sites. A park does not have to be adjacent to a school (e.g., share a common boundary) for an agreement to be viable. Various school facilities are available to the public after school hours or are utilized for recreational programming.
- Additionally, **Citywide Landscape Assessment Districts** and **Private Recreational Facilities** play significant roles in meeting recreational needs. Citywide Landscape Maintenance Assessment Districts (LADs), refer to landscaping improvements along streets in new subdivisions. Under this program, the associated developer of a given subdivision is required to install landscaping and irrigation improvements as part of the subdivision development. The acreage per LAD is not listed and counted in the City's overall park service ratio, given that these landscaped areas are not generally trafficked by pedestrians. Due to the high cost of developing and maintaining LADs, the City will generally not accept new LADs into the park system unless

they include specialized recreation facilities or unique resources. Private recreational facilities, consisting of churches, health and fitness clubs, and other organizations that offer programs and facilities, are important to quality of life and public health, but are not credited toward the City's acreage goals for public parks.

There are currently 67 parks, recreation facilities, and trail segments in the Planning Area, totaling 1,086.4 acres of publicly accessible parkland, as detailed in Table 3.14-1 and mapped in Figure 3.14-1.

Table 3.14-1. Existing Parks and Recreational Facilities in the Planning Area (2021)

Park	Acres
Natural Areas and Open Space	**422.3**
Alston Park	160.0
Westwood Hills	125.0
Timberhill Park	20.0
Trancas Crossing	35.0
Oxbow Commons	10.0
Oxbow Preserve	15.0
South Jefferson	57.3
Community Parks and Facilities	**407.0**
Kennedy Park[a]	362.4
Century Oaks Park	12.4
Fuller Park	10.6
Las Flores Park	3.1
Las Flores Community Center	5.0
Pelusi Center	5.0
O'Brien Park	8.5
Neighborhood Parks	**70.3**
Abruzzini Park	2.8
Buhman Park	3.5
Camille Park	4.9
Dry Creek Park	2.4
Esther Deaver Park	1.9
Fairview Park	2.2
Hidden Glen (undeveloped)	2.2
Kensington Park	1.5
Klamath Park	2.4
Lake Park	9.1
Lakeview Park	9.5
Laurel Park	2.3
Monarch Park	1.3
Shurtleff Park	5.0
Solomon Park	1.8
Springwood Park	2.4
Summerfield Park	1.3
Sunrise Park	2.1
Sutherland Park	2.9
Valley Park	2.0

Park	Acres
Vinehill Park	4.2
Vineyard Park	2.6
Mini Parks	**3.2**
Beckworth Tot Lot	0.1
Evans Tot Lot	0.4
Harkness Park	0.6
Knolls (undeveloped)	0.8
Monroe (undeveloped)	0.1
Montclair Tot Lot	0.1
Norfolk Tot Lot	0.2
North Jefferson Park	0.6
Jefferson Park (undeveloped)	0.1
Sequoia Tot Lot	0.1
Tallac Tot Lot	0.1
Special Use Parks and Facilities	**24.4**
Kiwanis Park	*1.7*
Main Street Boat Dock	*0.1*
Riverside Park	*2.0*
Playground Fantastico	*1.8*
Napa Senior Center	*3.2*
Garfield Park	*14*
Downtown Skate Park & Playground	*1.6*
Civic Spaces	**4.3**
Brown Street Plaza	*0.1*
Coombs Street Plaza	*0.4*
China Point Park	*0.6*
Opera House Plaza	*0.7*
Dwight Murray Plaza	*0.2*
9/11 Memorial Garden	*0.3*
Napa Riverfront Green	*0.8*
Heritage Park	*0.3*
Veterans Memorial Park	*0.9*
Trails[2]	**24.0**
Napa River Trail[c]	*3.1*
Vine Trail	*12.2*
San Francisco Bay Ridge Trail (within City Limits)	*5.3*
Harry T. Price Riverwalk	*0.5*
Other City-Wide Trails	*2.9*
School Sites[d]	**130.9**
Alta Heights Elementary	*0.9*
Bel-Aire Park Elementary	*2.6*
Browns Valley Elementary	*5.0*
Willow Elementary	*3.2*
McPherson Elementary	*2.5*
Northwood Elementary	*2.7*

Park	Acres
Phillips Elementary	*2.4*
Pueblo Vista Elementary	*2.5*
Shearer Elementary	*2.3*
Snow Elementary	*3.4*
West Park Elementary	*2.7*
Napa Valley Language Academy Elementary	*5.2*
Silverado Middle School	*13.8*
Redwood Middle School	*10.3*
Harvest Middle School	*9.0*
River Middle School	*2.2*
Valley Oak High School	*1.0*
Napa High School	*7.9*
Vintage High School	*10.5*
Memorial Stadium	*36.6*
Napa Valley College	*4.2*
Landscape Assessment Districts[e]	**N/A**
Oak Ridge Subdivision	-
Hillview Park Subdivision	-
Sunrise Meadows Subdivision	-
Foxridge Subdivision	-
Trancas Street Median Landscaping	-
Oxford Gardens Subdivision	-
Glencar Estates Subdivision	-
Dry Creek Village Subdivision	-
Rancho Las Flores Subdivision	-
Woodside Gardens Subdivision	-
Hyde Park II Subdivision	-
Walnut Grove Subdivision Unit 1	-
Vineyard Vista Estates Subdivision	-
Orchard Estates Subdivision	-
Chaudhary Estates Subdivision	-
Mills Subdivision	-
Overall Acreage[f,g]	**1,086.4**

[a] Kennedy Park includes Skate Park and Golf Course.

[b] Trail acreage is calculated based on an average 8-foot-wide trail.

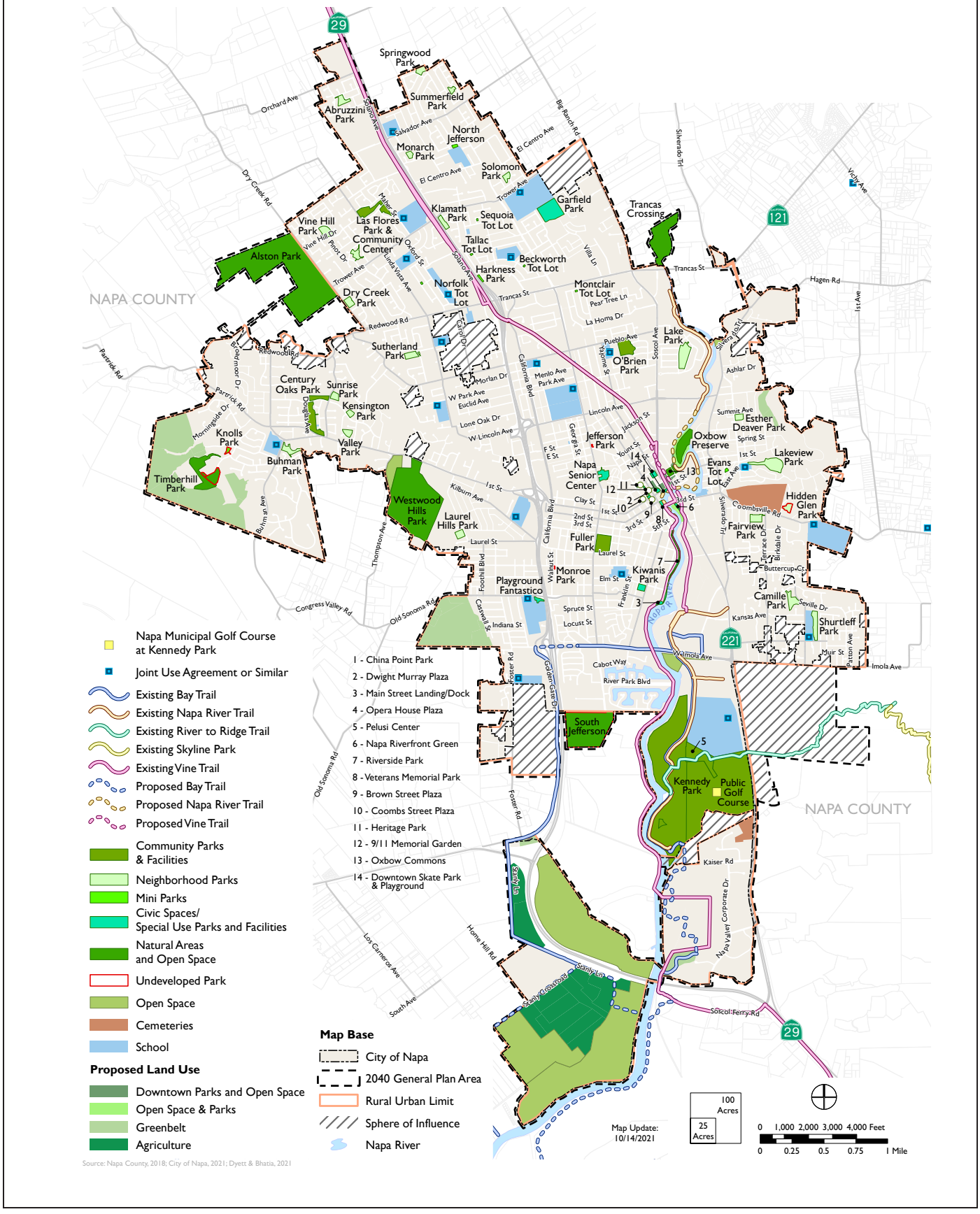
[c] Acreage for Napa River Trail does not include section that overlaps with Vine Trail (starting at Coombsville Road and terminating at the southern end of Kennedy Park).

[d] Acreage included for School Sites is 50 percent of actual acreage given that facilities are open to the public after school hours; and 20 percent of Napa Valley College is included given that a joint use agreement is to be developed.

[e] Acreage for Landscape Assessment Districts not included given that maintenance areas are not accessed by pedestrians.

[f] Additional parkland is anticipated to be built as part of future private development projects such as Napa Pipe. This parkland would contribute to the overall park service ratio.

[g] Numbers may not sum due to rounding.



Graphics... 00494.17 (10/28/21) AB

Figure 3.14-1
Parks, Recreational Facilities, Open Space, and Trails

Oxbow Commons

The Oxbow Bypass is a key part of the Napa River Flood Control Project, which began in the mid-1990s to address local flooding issues. The bypass was designed as a wet/dry bypass channel that would be inundated with high flows of the Napa River during winter months to reduce the high river flows that normally back up while making their way through the Oxbow bend and cause flooding in downtown Napa. In 2000, the bypass channel was designated as Oxbow Commons. Design for the park/flood project started in 2010 and was under construction between 2013 and 2015. The project was funded by the Measure A bond passed in 1998. The Oxbow Commons opened as a recreational facility in 2015 and has been a huge success with community members, adding 10 acres of Community Parks & Facilities to the City's park acreage, including a walking and biking path and an amphitheater used for the popular Oxbow River Stage music festival.

Parkland Ratio

Given a City population of approximately 80,000 people in 2020, the current overall parkland service ratio is around 13.6 acres per 1,000 residents. The proposed General Plan sets a park service ratio standard of 10 acres per 1,000 residents, with a standard of 1.5 acres per 1,000 residents for Community Parks & Facilities, and 0.5 acre per 1,000 residents for Neighborhood Parks.

Other Recreational Facilities

The City's Parks and Recreation Department offers classes, sports leagues, activities, and camps for residents of all ages and abilities within the Planning Area. The City owns a variety of recreational facilities, including a golf course, skate park, boat ramps, and ballfields. Additionally, the City has long-standing lease agreements with NVUSD to utilize school sites for community programming, as well as with local sports and youth organizations, including but not limited to North Bay BMX and Napa Little League, to manage programs at City facilities. A primary goal of the City's joint use agreements with NVUSD is to avoid duplication of public agency efforts by efficiently using taxpayer resources toward common facilities that are typically accessible and located near residential areas. As such, many local recreational facilities—for example, pools or turf fields—are owned and maintained by NVUSD. Some local bond measures, most recently Measure H, have gone toward improving recreational facilities at school sites.

Indoor recreational facilities owned by the City and available for rentals include the following.

- **Pelusi Recreation Building:** The 1,600-square-foot facility is in Kennedy Park and features a large meeting/event space, kitchenette, and restrooms. The building supports recreational programming and can be rented to groups for meetings, receptions, parties, or other activities.
- **Las Flores Community Center:** The 8,000-square-foot building is in north Napa and includes a 5,000-square-foot gym and multipurpose room as well as one classroom, a kitchen, office, and restrooms. More than 40 programs are offered at the center, with childcare/preschool and volleyball being two of the more popular programs.
- **The Senior Activity Center:** The 7,300-square-foot Senior Activity Center houses a variety of senior activities and provides meeting space for numerous Napa social and activity groups. The 1,600-square-foot Senior Center Annex, adjacent to the Senior Activity Center, is used for recreational and senior programs. Two small houses are also included in the site. The Senior Activity Center can be rented for private or nonprofit groups for meetings and other activities. The Senior Activity Center has recently undergone a major renovation that was completed in

2019. The renovation keeps the building's footprint but modernizes and reconfigures its interior, including the multi-use rooms, kitchen, entrance, lighting, wall treatments and floors. The second phase of the construction project would enlarge the footprint to include additional facility space and outdoor site improvements.

Outdoor recreational facilities owned or managed by the City include the following.

- **Main Street Boat Dock:** Located at the Riverfront on Main Street between 3rd and 5th Street downtown, the Main Street Boat Dock is a floating concrete dock that is 176 feet long and 10 feet wide. The dock acts under the authority of the City and the Napa Parks and Recreation Department and the daily commercial activities are managed by a third party.
- **Boat Docks and Launches:** The City oversees five boat docks and launches including the Jim Hench Memorial Kayak Launch, the Kennedy Park Boat Launch, the Main Street Boat Dock, the Riverside Park Boat Launch, and the Trancas Crossing Boat Launch.
- **Napa Golf Course at Kennedy Park:** Napa Golf Course is a full-service, daily-fee golf course with 18 holes and practice facilities consisting of an 8,500-square-foot putting green, modest chipping green, and 22-individual-stall driving range.

Trails

There are a number of trails that run throughout Napa and connect the city to the surrounding region. In cooperation with the National Park Service and several other agencies, the City continues to develop the Napa River Trail, a linear trail corridor along the length of the Napa River. Other important trail resources are the Bay Trail, the River to Ridge Trail, and the Napa Valley Vine Trail. There are a number of other plans and agencies that coordinate trails throughout Napa and the surrounding region, including Napa County Regional Park and Open Space District, the Metropolitan Transportation Commission, the Napa Valley Vine Trail, the Napa Downtown Riverfront Urban Design Plan, and the Napa River Trail Plan prepared by the National Park Service.

3.14.2 Environmental Impacts

3.14.2.1 Methods for Analysis

The analysis of the General Plan update's impacts on recreational resources was conducted based on a review of proposed goals and policies of the General Plan update, the City of Napa's 2010 Parks and Facilities Master Plan, the City's previous General Plan, and direction from the City's Parks and Recreation Department.

Total acres of parkland needed at Project buildout were calculated by applying the proposed parkland standards to the projected population of 97,200. The projected population was divided by 1,000 and then multiplied by the proposed citywide park standard of 10.0 acres per 1,000 residents, as well as by the proposed Community Parks & Facilities standard of 1.5 and the proposed Neighborhood Parks standard of 0.5. Based on this analysis, the projected population growth is not anticipated to result in a need for new parkland and recreational facilities.

Relevant General Plan Update Goals and Policies

Community Services, Parks and Recreation Element

Goal CSPR-9: Provide, improve, and maintain a comprehensive system of City parks, trails, and recreational facilities to meet the needs of the City's current and future residents, businesses, property owners and visitors.

Policy CSPR 9-1: Maintain a parkland provision standard of 10.0 acres of overall parkland per 1,000 residents, 1.5 acres of Community Parks & Facilities per 1,000 residents, and 0.5 acres of Neighborhood Parks per 1,000 residents. Overall parkland includes Natural Areas & Open Space, Community Parks & Facilities, Neighborhood Parks, Mini Parks, Special Use Parks & Facilities, Civic Spaces, Trails, and School Sites.

Policy CSPR 9-2: Strive to ensure that all residents are within a 1.5 to two-mile radius of a community-serving park, which includes the Community Park & Facility or Natural Area & Open Space categories.

This replaces the quadrant method utilized in the previous General Plan.

Policy CSPR 9-3: Given that the City has sufficient parkland to meet the needs of the City's existing and projected population, focus capital projects on sustaining or improving existing parks and facilities to ensure long-term services to the community.

Policy CSPR 9-4: Pursue public/private partnerships for privately owned public spaces to include requirements for maintenance obligations.

Policy CSPR 9-5: Offer a wide variety of park facilities designed to provide educational benefits, and encourage active and passive participation by users of all ages and interests to existing and future residents, including but not limited to: senior services, health and wellness, and youth sports.

Policy CSPR 9-6: Maintain a diverse range of publicly-available recreation and leisure programs and community centers which serve the needs of all sectors of Napa's population, including youth, adult, senior, and family-oriented activities.

Policy CSPR 9-7: Provide Natural Areas & Open Spaces that are utilized primarily for their natural resource value, and secondarily for passive recreational use such as hiking and picnicking. Natural Areas & Open Spaces may include wetlands, wildlife habitats, steep hillsides, or stream corridors. The size and shape of each natural area will vary depending on the resource it protects.

Policy CSPR 9-8: Provide Community Parks & Facilities that provide both active and passive recreation opportunities such as hiking, sport fields, outdoor courts, group picnic shelters, skate parks, or recreation centers. Community parks shall generally be larger than 15 acres but may range from five to 50 acres in extent. The service area for community parks is a 1.5- to two-mile radius catchment, although community park facilities will attract and serve residents throughout the City.

Policy CSPR 9-9: Provide Neighborhood Parks that offer close-to-home recreation opportunities to surrounding neighborhoods and are designed primarily for non-supervised, non-organized recreation activities, supported by facilities such as playground equipment, outdoor courts, picnic tables, pathways, and multi-use open grass areas or small sport fields. These parks are generally two to 10 acres in size, though some existing neighborhood park sites cover a smaller acreage, and serve residents within a quarter- to half-mile distance. The target standard for provision of neighborhood parkland shall be 0.5 acre per 1,000 residents. Neighborhood park service may also be provided by community parks, or located on schools or other property where appropriate joint-use agreements exist.

Policy CSPR 9-10: Provide Mini Parks that serve residents in immediately adjacent neighborhoods. Mini parks provide basic recreation amenities, such as playgrounds, benches, and landscaping. Mini parks generally are 0.5 to two acres in size and have a limited-service area due to the minimal facilities provided.

Policy CSPR 9-11: Provide Special Use Parks & Facilities that are community-serving, single-purpose sites, such as ballfields, community centers, or boat ramps. Since special use areas vary widely in function, there is no average size, but special use areas must be large enough to accommodate the intended use. Special Use Parks & Facilities are categorized separately as they are located outside of larger parks and designed to be stand-alone facilities.

Policy CSPR 9-12: Provide Civic Spaces that function as small, landscaped spaces and gathering areas located within higher-density urban areas and include amenities such as benches, tables, landscaping, public art, water features, or other amenities to support community events. Civic Spaces are typically smaller than one acre in size and easily traversed on foot.

Policy CSPR 9-13: Provide Trails that serve the entire community and offer opportunities for people to hike, walk, run or ride, and connect with nature or other land uses. Trails can be soft-surfaced, such as crushed rock or wood chips, or hard-surfaced, such as asphalt, concrete, crushed rock, or soil.

Goal CSPR-10: Continue the development of integrated open space and flooding solutions that also result in new recreational open space for the community, building on the momentum and success of Oxbow Commons.

Policy CSPR 10-1: When feasible, seek opportunities to integrate parks and public open space into major infrastructure projects.

Goal CSPR-11: Design and improve parks and recreational facilities to reflect the community's changing demographics and user needs.

Policy CSPR 11-1: Update the Napa Parks and Facilities Master Plan (PFMP) to reflect current and future needs, including maintenance management planning and capital improvement planning, and General Plan parkland provision and access standards.

Policy CSPR 11-2: Continue to partner with NVUSD, and consider partnerships with other agencies such as Napa Valley College (NVC) or the County to expand public use of school facilities (such as sports fields, pools, and community meeting facilities), and explore funding mechanisms for use.

Policy CSPR 11-3: Develop an asset management plan that prioritizes improvements to existing parks, and access to existing parks from residential neighborhoods, while maintaining prescribed park acreage per capita standards.

Policy CSPR 11-4: Focus infrastructure improvements or access improvement projects in existing parks and facilities to meet the diversified and long-term needs of residents of all ages.

Policy CSPR 11-5: Reflect changing demographics and community needs and desires as part of parks and facilities improvements and programming by including diverse community participants in parks and recreation planning efforts.

Goal CSPR-12: Prioritize widely accessible parks and recreational facilities.

Policy CSPR 12-1: Identify and develop linkages, corridors, and other connections to provide an aesthetically pleasing and functional network of parks, open space areas, and bike paths throughout the City with connections to surrounding County and State parks.

Policy CSPR 12-2: Prioritize adequate public transportation to key parks, recreation facilities, and community centers throughout the City, especially in vulnerable or under-served communities.

Policy CSPR 12-3: Seek opportunities to partner with public and private entities to, improve multimodal transportation systems and pathways in neighborhoods with barriers or safety issues.

Goal CSPR-13: Support trail connections to natural areas and the Napa River in order to improve community health, support a high quality of life, and an active lifestyle.

Policy CSPR 13-1: Complete the multi-use trail and amenities along the Napa River as the signature element of the City's trail system, particularly the Flood Control Project, while protecting and enhancing the natural resources along the trail corridor.

Policy CSPR 13-2: Utilize greenways and trails as new development takes place along the river to connect the City's open space network and fill in gaps in the existing network.

Policy CSPR 13-3: Identify trail connection opportunities and improvements for vulnerable or under-served communities

Policy CSPR 13-4: Include a mixture of activities, including active and passive recreation, open space, and supportive businesses and facilities, that face along the Napa River and along the Napa River Trail to improve the trail's accessibility and increase amenities for trail users.

Policy CSPR 13-5: Promote the Napa Valley Vine Trail as a regional attraction for locals and visitors alike and provide facilities to make enjoyment convenient and easy.

Policy CSPR 13-6: Incorporate convenient access to trails, including the Napa Valley Vine Trail, as new development and redevelopment occurs.

Policy CSPR 13-7: Require visual and public access when developments occur along the Napa River, especially in the Oxbow area.

Policy CSPR 13-8: Partner with other jurisdictions or establish public/private partnerships to implement wayfinding, signage, and educational placards along the Napa River and pedestrian trails.

Goal CSPR-14: Seek funding and distribution mechanisms to support the City's existing and future parks and recreational needs.

Policy CSPR 14-1: Support the development or enhancement of the Napa Parks and Recreation Foundation to help promote and fund parks and recreation improvements, awareness, and volunteers.

Policy CSPR 14-2: Develop an asset management program and funding plan that maintains and improves upon existing parkland and facilities, and that is periodically revised to reflect improvements, funding availability, and changing recreational needs.

Policy CSPR 14-3: Identify cost recovery targets for parks and recreational facilities, services, and maintenance needs to ensure the long-term sustainability of recreational programming and park operations; adjust these targets as needed.

Policy CSPR 14-4: Invest in data gathering, analysis, and upgraded technology to improve capital planning, operations, and social inclusion.

Policy CSPR 14-5: Continue identifying adequate and diverse funding sources for developing and maintaining parks and recreational facilities and programming.

Policy CSPR 14-6: Update the City's park development and parkland dedication impact fee ordinances to reflect the City's new policy direction of prioritizing park improvements, updated park access guidelines, and consideration of impact fees for commercial and industrial development.

Policy CSPR 14-7: Monitor federal, State, local, and nonprofit parks and recreation funding sources. The City shall continue to pursue appropriate grant funding.

Policy CSPR 14-8: Consider the use of tax measures or bond financing to assist in the implementation of the parks and recreation improvements program.

Policy CSPR 14-9: Consider use of benefit assessments for the improvement and long-term maintenance of civic spaces when civic spaces are located to provide benefits to adjacent commercial properties.

Natural Resources Conservation Element

Policy NRC 1-2: Review future waterway improvement projects (e.g., flood control, dredging, private development), as well as all development adjacent to the waterways, to protect and minimize effects on the riparian and aquatic habitats.

Policy NRC 1-5: Seek controlled access points in designated areas to prevent unrestricted public access to riparian habitat.

Policy NRC 1-6: Support areas of habitat and biodiversity conservation as the River Trail is completed.

Policy NRC 2-2: As part of development review on sites with sensitives species, require project proponents to either conserve any habitat areas, or identify any feasible means of avoiding any net loss of habitat or habitat value for endangered, threatened, and rare species. Establish programs that provide for the use of off-site mitigation when in the best interest of the public.

Goal NRC-3: Develop a balanced and integrated open space network reflecting a variety of considerations—resource conservation, production of resources, recreation, and aesthetic and community identity—as well as connections between various open space components, and compatibility with land use planning.

Policy NRC 3-1: Maintain land designated as Open Space in Figure 7-2 in natural and/or recreational use and require that development or grading on hillsides (if allowed) preserves the integrity and appearance of natural hillsides and other landforms wherever possible. Development shall conform to the City of Napa Hillside Overlay District requirements with the goal to prevent cut-and-fill and other destructive developmental practices.

Policy NRC 3-2: Encourage, at the time of any discretionary approval, development in sensitive areas to cluster development, or to build up, rather than spread out, so as to retain natural areas and habitat.

Policy NRC 3-3: Utilize greenways and trails to connect the City's open space network.

Policy NRC 3-4: Continue to improve and/or create new access to the Napa River for personal watercrafts.

Policy NRC 4-2: Collaborate with the Napa County Parks and Open Space District to preserve and protect open spaces within and outside of the city, including mutual support in securing resources for open space and habitat preservation.

Policy NRC 10-2: Explore options for water saving and treatment technology when planning future developments to conserve water and keep the city's water safe and clean.

Policy NRC 10-3: Preserve natural drainage courses in their natural state wherever feasible.

Policy NRC 10-4: Incorporate the use of pervious surfaces in public spaces to permit the percolation of urban runoff while implementing best practices for stormwater pollution prevention.

Policy NRC 10-5: Facilitate groundwater recharge by encouraging development projects to use LID practices such as bioretention, porous paving, and rainwater harvesting systems, and by encouraging private property owners to design or retrofit landscaped or impervious areas to better capture storm water runoff.

Policy NRC 10-6: Reduce stormwater runoff and pollution by incorporating green infrastructure and sustainability strategies for new development and redevelopment, such as trash capture technology in stormwater systems.

Climate Change and Sustainability Element

Goal CCS-3: Promote cost-effective, natural methods to improve the City's infrastructure and resilience to climate change, while furthering Napa's goal of a healthier and more sustainable urban environment.

Policy CCS 3-1: Study and incorporate green infrastructure practices to reduce pollution runoff into the Napa River, reduce stress on stormwater systems, recharge underground aquifers, and reduce urban heat island effects, while promoting greenery in the community.

Policy CCS 3-2: Require stormwater management techniques that minimize surface water runoff in public and private developments. Utilize low impact development techniques such as bioswales and other best management practices to manage stormwater. Promote technologically advanced stormwater management systems and practices where land area is limited.

3.14.2.2 Thresholds of Significance

In accordance with Appendix G of the CEQA Guidelines, the Project would be considered to have a significant effect if it would result in any of the conditions listed below.

- Potential to increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.
- Construction or expansion of recreational facilities that might have an adverse physical effect on the environment.

3.14.2.3 Impacts and Mitigation Measures

Impact REC-1: Potential to increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated (less than significant)

The Project is expected to result in a buildout population of 97,200—an increase of approximately 22.7 percent from the population of approximately 79,200 in 2020. Additional population would be expected to place added physical demands on existing park facilities by increasing the number of people using the parks, lengthening the periods of time during which the parks would be in active use, and/or increasing the intensity of use over the course of a typical day. Without proper maintenance, important park features such as vegetation, water resources, built structures, paths, sport facilities, and others would face increased wear over the planning period, and their useful lives could be shortened.

The City's existing General Plan sets a park service standard of 12 acres of active and passive parkland per 1,000 residents; the General Plan update amends this standard to 10 acres of parkland per 1,000 residents. As described in the setting section, the General Plan update further specifies that the City should provide 1.5 acres of Community Parks & Facilities and 0.5 acre of Neighborhood Parks per 1,000 residents. These standards seek to provide all residents with access to both large and small parks by locating these recreation opportunities within 0.25- to 0.5-mile distance from residential areas.

In 2020, the City offered 1,086.4 acres of publicly accessible parkland within the Planning Area, which include the following categories: Natural Areas & Open Space (422.3 acres), Community Parks & Facilities (407.0 acres), Neighborhood Parks (70.3 acres), Mini Parks (3.2 acres), Special Use Parks & Facilities (24.4 acres), Civic Spaces (4.3 acres), Trails (24.0 acres), and School Sites (130.9 acres), described in Table 3.14-1. Therefore, Napa currently exceeds its parkland provision standards, offering approximately 13.6 acres of parkland per 1,000 residents, including 5.0 acres of Community Parks & Facilities per 1,000 residents, and 0.9 acre of Neighborhood Parks per 1,000 residents.

To meet the needs of its estimated buildout population such that existing facilities are not subject to physical deterioration, in 2040 the City should provide 972 acres of additional parkland, for a total of 10 acres per 1,000 residents, as well as 146 acres of Community Parks & Facilities, and 48.6 acres of Neighborhood Parks. The City would be able to meet these projected needs with its current inventory of existing parks and joint use facilities, resulting in a future overall park service ratio of 11.2 acres per 1,000 residents, a Community Parks & Facilities service ratio of 4.2 acres per 1,000 residents, and a Neighborhood Park service ratio 0.7 acre per 1,000 residents. City-owned parkland alone (without including joint-use facilities) would still be sufficient to meet the proposed overall park standard, with 12 acres per 1,000 current population and 10 acres per 1,000 projected population at buildout. Further, this analysis does not include future parkland that is anticipated to be a part of the City's park system, including the parks and trail connections at Napa Pipe or other future private development projects, which would further increase future parkland ratios.

Given this analysis, the City has determined that existing residents are, and projected future residents would continue to be, well-served by existing parks and joint use facilities. Therefore, proposed policies prioritize improvements and maintenance of existing parks (Policies CSPR 10-3, 12-1, 12-3, and 15-6). The General Plan update's policies further incorporate flexibility to respond to changing demographics and user needs, ensuring that park and facility improvements are reflective of the needs and desires of Napa's diverse community through 2040 (Goal CSPR-12, policies CSPR 12-4, 12-5, and 15-2).

The General Plan update additionally updates the City's park distribution system with new standards, requiring all residents be within a 1.5- to 2-mile radius of a Community Park and a 0.25- to 0.5-mile distance of a Neighborhood Park (Policies CSPR 10-2, 10-8, 10-9, and 10-10). These measures, in addition to Goal CSPR-13 and Policies CSPR 13-2 and 13-3—which prioritize widely accessible parks via adequate transportation connections, especially in vulnerable or underserved neighborhoods—would allow for a more even distribution of park amenities throughout the city and may prevent accelerated physical deterioration of parks due to higher usage by providing residents with greater access to parks within their own neighborhoods.

The City's regional parks and trails would likely see an increase in use under buildout of the General Plan update. Many of these sites contain sensitive natural resources, including protected species, wetland, and riparian habitat. Increased traffic to these recreation areas could have a negative impact on these resources unless access is properly tended and appropriate conservation protections are enforced. The General Plan update promotes protecting and enhancing these natural resources to ensure that they receive the necessary attention to prevent degradation (Policy CSPR 14-1).

Given that the park acreage is sufficient to meet future demand, and that the General Plan update directs the City to focus capital projects on sustaining and improving existing parks and includes policies and standards that ensure residents are within close access to parks, the General Plan

update would not increase the use of existing recreational facilities such that it would result in the substantial deterioration or the acceleration of the deterioration of existing parks and recreational facilities. This impact would be less than significant, and no mitigation would be necessary.

Impact REC-2: Construction or expansion of recreational facilities that might have an adverse physical effect on the environment (less than significant)

As noted in the discussion of Impact REC-1, the City currently exceeds its park service standards and is projected to continue to meet these standards under buildout of the General Plan update. Therefore, the General Plan update would not result in a need for the construction of new parks or recreational facilities. Nevertheless, construction of any future parks has the potential to negatively affect the environment. Impacts may include habitat disturbance and water pollution during construction, increased exposure of sensitive habitats to human activity and traffic, installation of impermeable surfaces, introduction of invasive species, and the conversion of open space that could otherwise have been preserved.

Proposed Policies NRC 3-1 and NRC 4-2 maintain existing publicly owned parks and land designated as open space and promote coordination with regional partners to preserve and protect existing open spaces in the Planning Area, respectively. As such, urban development is not anticipated in these areas, and the General Plan update is expected to result in very minimal loss of natural habitat or impacts on natural resources on public lands. Proposed policies discussed under Impact REC-1 direct the City to prioritize maintenance and enhancement of existing parkland and recreational facilities over the development of new parks; these policies would help to ensure that existing parks would function at their highest capacity and would not require expansion or replacement over the course of the planning horizon. Policy CSPR 10-7 protects natural resources in open space areas by classifying Natural Areas & Open Spaces as parkland that should be utilized primarily for their natural resource value, and secondarily for passive recreational use such as hiking or picnicking. Finally, Policy CSPR 12-2 continues the City's partnership with NVUSD to continue offering joint use of school facilities, prioritizing efficient use of existing amenities and facilities over the development of new parks or recreational facilities.

The Project would promote the incorporation and expansion of recreational open space into major infrastructure projects, building on the success of the Oxbow Commons. The inclusion of low-impact development and green infrastructure strategies for new projects, outlined in Policies NRC 10-2 through 10-6 and Policies CCS 3-1 and 3-2, in addition to Policies NRC 2-1 through 2-4, which provide protection for rare, endangered, and threatened species by requiring development proposals and review on sites with sensitive species, would help mitigate environmental impacts associated with the construction of these facilities. Additionally, this type of future project fulfills one of the General Plan update's guiding principles—foster connections to nature and open space—and by design would prioritize the preservation of existing open space and ecological corridors, provide cleaner air, water, and soil than traditional gray infrastructure projects, and efficiently add recreational facilities such as trails and open space that further increase parkland ratios.

The General Plan update also encourages the City to identify and develop new paths, trails, and greenways as new development takes place, to connect and fill in gaps in the city's open space network. Proposed Policy CSPR 14-1 directs the City to protect and enhance the natural resources along the Napa River trail corridor as new trails and amenities are built. Policy NRC 1-6 supports areas of biodiversity and habitat conservation as the River Trail is completed, and Policies NRC 1-2, 1-5, and 2-2 provide further protection for sensitive species and riparian habitat.

Given that population growth under the General Plan update would result in a service ratio that meets the City's park service standards (thereby limiting the extent to which new recreational facilities would be constructed or existing facilities expanded) and because the proposed policies detailed above—as well as laws and codes and programs discussed elsewhere in this Draft EIR—would protect sensitive resources and habitats, adoption of the General Plan update would not result in a significant impact from construction or expansion of recreational facilities, and no mitigation would be necessary.

3.14.3 References Cited

City of Napa. 2008. *City of Napa Americans with Disabilities Act Self-evaluation & Transition Plan*. August.

City of Napa. 2010. *Parks and Facilities Master Plan*. Available: https://www.cityofnapa.org/DocumentCenter/View/3888/Parks-and-Facilities-Master-Plan-Content-PDF. Accessed: October 2021.

City of Napa. 2015. *John F. Kennedy Park Master Plan*. Available: https://www.napavalley.edu/AboutNVC/Trustees/Documents/Meeting%20Agendas/2016%20agendas%20and%20com%20agendas/2%2011%2016%20regular/9.1%20JFK%20park%20master%20plan.pdf. Accessed: October 26, 2021.

Napa County Regional Park & Open Space District. 2019. *Renewal 2019 Update to the Napa Open Space District 2008 Master Plan*. Adopted July 8, 2019. Available: https://napaoutdoors.org/wp-content/uploads/2019/07/2019-Update-adopted-20190708.pdf. Accessed: October 26, 2021.

3.15 Transportation

3.15.1 Existing Conditions

3.15.1.1 Regulatory Setting

Streets and Roadways

The transportation system in the City of Napa is regulated by a number of agencies at the federal, state, and local levels. In addition to the City of Napa, which is responsible for constructing and maintaining non-state and non-federal transportation facilities in the City, major federal and state regulatory bodies pertinent to the City's transportation system are described below.

Federal

The Federal Highway Administration (FHWA) is the agency of the U.S. Department of Transportation (DOT) responsible for the federally funded roadway system, including the interstate highway network and portions of the primary state highway network. FHWA funding is provided through the Moving Ahead for Progress in the 21st Century Act (MAP-21). MAP-21 can be used to fund local transportation improvement projects, such as projects to improve the efficiency of existing roadways, traffic signal coordination, bikeways, and transit system upgrades.

State

The California Department of Transportation (Caltrans) is responsible for planning, designing, constructing, and maintaining all state highways. The jurisdictional interest of Caltrans includes state highways and facilities and extends to improvements to roadways at the interchange ramps serving area freeways. Any federally funded transportation improvements would be subject to review by Caltrans staff and the California Transportation Commission.

The Planning Area is located in Caltrans District 4 and is connected to the region via several state highway routes, including State Route (SR) 29, SR 12, SR 221, and SR 121. Some of the Caltrans facilities within the Planning Area have been included in corridor study planning documents, including a portion of SR 29 that is detailed in the *State Route 29 Comprehensive Multimodal Corridor Plan* (GHD 2020) and a portion of SR 121 along Imola Avenue that is detailed in the Imola Avenue Corridor Complete Streets Improvement Plan (GHD 2020). As of July 1, 2020, per Senate Bill (SB) 743, traffic congestion is no longer considered a significant impact on the environment but will be evaluated by vehicle miles traveled (VMT) instead as explained herein.

CEQA Section 21099(b)(1) (Senate Bill 743)

The California Environmental Quality Act (CEQA), Section 21099(b)(1), required that the California Governor's Office of Planning and Research develop revisions to the CEQA Guidelines establishing criteria for determining the significance of transportation impacts of projects that "promote the reduction of greenhouse gas emissions, the development of multimodal transportation networks, and a diversity of land uses." CEQA Section 21099(b)(2) states that upon certification of the revised guidelines for determining transportation impacts pursuant to Section 21099(b)(1), automobile

delay, as described solely by level of service (LOS) or similar measures of vehicular capacity or traffic congestion, shall not be considered a significant impact on the environment under CEQA.

In December 2018, the Office of Planning and Research published the *Technical Advisory on Evaluating Transportation Impacts in CEQA*, which identifies technical recommendations regarding assessment of VMT, thresholds of significance, and mitigation measures that agencies can use while assessing transportation impacts for CEQA projects (OPR 2018). Beginning July 1, 2020, the provisions of SB 743, Section 15064.3(c) went into effect statewide. However, CEQA Section 1099(b)(2) states that, "upon certification of the guidelines by the Secretary of the Natural Resources Agency pursuant to this section, automobile delay, as described solely by level of service or similar measures of vehicular capacity or traffic congestion, shall not be considered a significant impact on the environment pursuant to this division, except in locations specifically identified in the Guidelines."

Although the Governor's Office of Planning and Research provides recommendations for adopting new VMT analysis guidelines, lead agencies have the final say in designing their methodology. Lead agencies must select their preferred method of estimating and forecasting VMT, their preferred significance thresholds for baseline and cumulative conditions, and the mitigation strategies they consider feasible. Lead agencies must prove that their selected analysis methodology aligns with the SB 743 goals to promote infill development, reduce greenhouse gases, and reduce VMT.

Regional

Plan Bay Area 2040

The Metropolitan Transportation Commission (MTC) is the transportation planning, financing, and coordinating agency for the nine-county San Francisco Bay Area, including Marin, Sonoma, Napa, Solano, Contra Costa, Alameda, Santa Clara, San Mateo, and San Francisco Counties. The MTC *Plan Bay Area 2040* (MTC and ABAG 2017) is a state-mandated, integrated long-range transportation and land use plan created in a joint effort by MTC and the Association of Bay Area Governments (ABAG). *Plan Bay Area 2040* was adopted in 2017 as a long-range Regional Transportation Plan and Sustainable Communities Strategy for the nine-county area. *Plan Bay Area 2040* also provides a roadmap for accommodating projected household and employment growth in the Bay Area by 2040, as well as a transportation investment strategy for the region. *Plan Bay Area 2040* details how the Bay Area can make progress toward the region's long-range transportation and land use goals while meeting greenhouse gas reduction targets set by the California Air Resources Board (MTC and ABAG 2017).

Plan Bay Area 2040 neither funds specific transportation projects nor changes local land use policies. Importantly, individual jurisdictions retain all local land use authority. However, *Plan Bay Area 2040* does set a roadmap for future transportation investments and identifies how to accommodate expected growth. Preparation of *Plan Bay Area 2050* was initiated in 2019 and the new plan is anticipated to be adopted by ABAG and MTC in the fall of 2021 (ABAG and MTC 2020).

City of Napa

Level of Service

As of July 2020, per SB 243, LOS impacts are no longer considered transportation impacts for the purposes of CEQA. However, the City will continue to use LOS for local planning purposes to analyze

whether intersection improvements are needed as a result of a project. Thus, the following information regarding LOS is included.

LOS describes the operating conditions experienced by motorists. LOS is a qualitative measure of the combinative effect of speed and travel time, traffic interruptions, freedom to maneuver, driving comfort, and convenience. LOS designations A through F (from best to worst) are determined using the criteria shown in Table 3.15-1.

Table 3.15-1. Level of Service Criteria—Intersections

Level of Service (LOS)	Average Control Delay (seconds/vehicle)	
	Signalized Intersections	Unsignalized Intersections
A	≤ 10	≤ 10
B	> 10 and ≤ 20	> 10 and ≤ 15
C	> 20 and ≤ 35	> 15 and ≤ 25
D	> 35 and ≤ 55	> 25 and ≤ 35
E	> 55 and ≤ 80	> 35 and ≤ 50
F	> 80	> 50

Source: Highway Capacity Manual: A Guide for Multimodal Mobility Analysis, 2016.

The City's current General Plan Level of Service policy is that average vehicle delay at signalized intersections on arterial and collector streets should not exceed a midrange LOS D, with some exceptions. A midrange LOS E is permitted in the downtown area bounded by Soscol Avenue, First Street, California Boulevard, and Third Street; on Jefferson Street between Third Street and Old Sonoma Road; and on Silverado Trail between Soscol Avenue and First Street. For signalized intersections on state highway facilities within Napa, LOS E is also permitted.

For consistency with SB 743, the Transportation Element of the City's current General Plan was amended to include significance thresholds for VMT. While the City will use VMT to analyze transportation impacts of a project for CEQA purposes, it will continue to use LOS for local planning purposes to analyze whether intersection improvements are needed as a result of a project.

Vehicle Miles Traveled

As of July 2020, SB 743 directs that LOS impacts may no longer be considered transportation impacts for the purposes of the California Environmental Quality Act (CEQA). In its place, vehicle miles traveled (VMT) should be used to assess the transportation-related impacts from projects subject to CEQA analysis.

Technical guidance published by the Governor's Office of Planning and Research (OPR) specifies that land use plans may use the same threshold of significance as recommended for land use projects, which is 85 percent of the region's existing VMT per capita. In other words, if a project would generate new VMT per capita that exceeds 85 percent of the existing, average VMT per capita in the region, the Project may have a significant transportation impact. In addition, a general plan may have a significant impact on transportation if it is not consistent with the relevant Regional Transportation Plan Sustainable Community Strategy.

OPR provided recommendations regarding significance thresholds under SB 743 as part of a Technical Advisory on Evaluating Transportation Impacts in CEQA. The document made the following significance threshold recommendations for residential, office, and retail projects.

- **Residential Projects.** A proposed project exceeding a level of 15 percent below existing VMT per capita may indicate a significant transportation impact.
- **Office Projects.** A proposed project exceeding a level of 15 percent below existing regional VMT per employee may indicate a significant transportation impact.
- **Retail Projects.** A net increase in total VMT may indicate a significant transportation impact.

The City of Napa adopted VMT thresholds of significance on May 4, 2021, consistent with OPR's recommendations. The City's adopted VMT thresholds of significance are as follows:

- **Residential Projects.** A proposed project exceeding a level of 15 percent below existing regional VMT per capita may indicate a significant transportation impact.
- **Office Projects.** A proposed project exceeding a level of 15 percent below existing regional VMT per employee may indicate a significant transportation impact.
- **Retail Projects.** A net increase in total VMT may indicate a significant transportation impact.

For the General Plan update, the City is using the currently adopted significance thresholds for VMT. The source for existing VMT data that the City is using is the updated Solano-Napa Activity Based Model. The Solano-Napa Activity Based Model is a regional travel demand model and provides baseline VMT data for the County of Napa. The City would use the average Napa County VMT as the existing regional VMT baseline information consistent with the OPR Technical Advisory document.

Per the Solano-Napa Activity Based Model, Napa County's current average daily VMT per capita is 17.3 and its current average daily VMT per employee is 26.9. Under the City's adopted thresholds for residential and office projects, which requires a 15 percent reduction from baseline, a residential project would cause a significant impact if it generated daily VMT per capita levels higher than 14.7, and an office project would cause a significant impact if it generated daily VMT per employee levels higher than 22.87.

The OPR technical advisory also specifies that agencies should, "analyze VMT outcomes of land use plans over the full area over which the plan may substantively affect travel patterns, including beyond the boundary of the plan or jurisdiction's geography." This requirement to look at VMT impacts beyond jurisdictional boundaries may pose a challenge in comparing alternative future scenarios using the Citywide Travel Demand Model. Calculation of VMT that takes place within the City is a simple multiplication of traffic volume by length of each segment in the model's roadway network. Travel demand with an origin or destination outside the City, however, is represented by a fixed level of external travel demand coming from or going to an "external station" and is not sensitive to alternative land use scenarios within the model. Full assessment of regional VMT impacts may require using another tool, such as a regional travel demand model. Alternatively, a qualitative comparison of VMT impacts may be done that compares factors such as jobs-housing balance, which could influence the level of long-distance commuting and VMT. However, the VMT analysis for the General Plan update was completed using the regional Solano Napa Activity based Model instead of the Citywide Travel Demand Model. The Solano Napa Activity Based Model, which is a regional model, captured regional commute patterns and provided a better estimate of total VMT to or from the City.

City of Napa Traffic Calming Guidelines

In July 2005, the Traffic Advisory Committee adopted the C*itywide Guidelines for Traffic Calming and Neighborhood Traffic Management* (City of Napa Public Works Department 2005). These guidelines

provide a framework for selection, funding, design, and application of traffic-calming programs throughout the City and serves as a process for neighborhoods to study particular traffic issues and identify solutions (City of Napa Public Works Department 2005).

Bicycle Transportation

The City is responsible for constructing and maintaining the bicycle transportation system in Napa. However, regional and state agencies, such as MTC and Caltrans, influence implementation, particularly through funding resources.

State

State bicycle funding is available to cities with a bicycle master plan that meets Caltrans requirements.

Regional

MTC and ABAG, prepare a regional plan, the latest of which was adopted in July 2017, *Plan Bay Area 2040*, which is a long-range regional transportation plan and sustainable communities strategy for the San Francisco Bay Area. It discusses growth through 2040 and features key transportation actions needed to reach growth estimates.

City of Napa

The importance of alternative modes of transportation continues to increase as air pollution, fuel costs, and traffic congestion increase. The Planning Area's mostly flat topography, relatively small land area, and development density create many opportunities for residents and visitors to bicycle throughout the community, as well as to the surrounding county, area vineyards, open space, and hills. The current City of Napa Bicycle Plan was adopted by City Council and incorporated into the City's General Plan in 2021. The City of Napa Bicycle Plan was developed as a subset of the Napa Countywide Bicycle Plan prepared by Napa Valley Transportation Authority. In 2017, the Napa Valley Transportation Authority began the process of updating the Napa Countywide Bicycle Plan (NVTA 2019), which included updates to the City of Napa Bicycle Plan (NVTA 2019: Chapter 9). The Napa Countywide Bicycle Plan was updated to align with current best practices in bicycle facility design and the state's Active Transportation Program requirements.

The Napa Countywide Bicycle Plan is a long-range planning document intended to guide development of bicycle infrastructure, programs and policies that improve the bicycling environment for all residents and visitors in Napa Valley. The City of Napa Bicycle Plan functions as both a component of the comprehensive Napa Countywide Bicycle Plan, and as a stand-alone document with a specific City of Napa focus.

The City of Napa Bicycle Plan establishes four main goals related to the topics of connectivity, equity, safety, and education and encouragement. The four plan goals are as follows (City of Napa 2021).

- Connectivity: Develop a well-designed low Level of Traffic Stress (LTS) connected bicycle network.
- Equity: Improve bicycle access for disadvantaged and/or underserved communities.
- Safety: Improve safety for all ages and abilities.
- Education and Encouragement: Increase mode share of bicycling.

One of the main purposes of the City of Napa Bicycle Plan is to identify a future bicycle network for the City of Napa that is safe and connected. The plan identified 49 existing miles of bicycle facilities and proposes an additional 59.2 miles of bicycle facilities, as well as 13.2 miles of study corridor area. The resulting network proposes high-quality bicycle infrastructure facilities that connect to key community destinations and neighborhoods and close network gaps.

Pedestrian Circulation

All public agencies must adhere to the Americans with Disabilities Act (ADA), which sets design standards and guidelines for pedestrian facilities, such as sidewalks and curb ramps, to provide access for all users.

The Napa Countywide Pedestrian Plan, adopted by Napa Valley Transportation Authority in August 2016, identifies projects for potential pedestrian improvements throughout Napa County. The Napa Countywide Pedestrian Plan provides guidance for pedestrian infrastructure, policies, programs, and development standards (Napa Valley Transportation Authority 2016).

Developed as a subset of the Napa County Pedestrian Plan, the City of Napa Pedestrian Plan functions as both a component of the Napa County Pedestrian Plan, as well as a stand-alone document specific to the City of Napa. The City of Napa Pedestrian Plan was adopted by City Council in 2017 (City of Napa 2017)

Public Transit

Local public transit in Napa is provided by the Napa Valley Transportation Authority through the Vine Bus System. Vine provides fixed-route service, para-transit services, and on-demand and fixed route community shuttles in nearby Napa County communities. Vine has eight local routes within Napa city limits, and four regional routes with three inter-county service express routes with connections to Solano County, Bay Area Rapid Transit (BART), and the San Francisco Ferry in Vallejo. Routes 1 to 8 provide local service. Routes 10 and 11 provide intercity service to Calistoga and Vallejo, respectively. Routes 21 and 29 provide express intercity commuter service to Fairfield/Suisun City and the El Cerrito BART station. During the COVID-19 pandemic the fixed-route service in the City was run as on-demand service, and as of December 2021 is still partially being served as on-demand, but some fixed-routes are back in operation.

Air Transportation

There are no airports within the City. The closest airports that provide commercial airlines services close to the City are Sonoma County (Santa Rosa), Oakland International, Sacramento International and San Francisco International.

3.15.1.2 Environmental Setting

Street and Road System

Roadways and highways are typically organized hierarchically as summarized below.

- **Freeway (State Highway):** Serves longer intra- and interregional trips. Carrying capacity up to 55,000 annual average daily traffic (AADT). Directional traffic is divided by a median with fully controlled access (no at-grade intersection). State Highways are typically owned and operated by Caltrans.

- **Principal Arterial (State Highway, Boulevard):** Serves major activity centers, longer and through trips. Carrying capacity up to 27,000 AADT. There is partial or controlled access to the corridor. Boulevards have enhanced design and pedestrian-friendly characteristics such as landscaped medians, wide sidewalks, and shade trees.
- **Minor Arterial (Boulevard):** Serves trips of moderate length and smaller geographic areas, interconnect principal arterials. Carrying capacity up to 14,000 AADT. Directional traffic is undivided with uncontrolled access.
- **Major Collector:** Gathers traffic from local roads and channels to arterial network. Serves both land access and traffic circulation in higher-density areas. Carrying capacity up to 6,300 AADT. Directional traffic is undivided with uncontrolled access.
- **Minor Collector:** Serves both access and traffic circulation in lower-density areas. Carrying capacity up to 1,110 AADT. Directional traffic is undivided with uncontrolled access. Additional minor collectors operate at lower speeds and fewer signalized intersections than major collectors.
- **Local Street.** Provides direct access to abutting land uses; minimal through traffic. Carrying capacity up to 700 AADT. Directional traffic is undivided with uncontrolled access.

Figure 4-3 in the Existing Conditions report**Error! Bookmark not defined.** shows the City's existing street and highway system according to the functional classifications as described above. The designation is based on the functional character of the streets within the overall street system, even if these functions differ from official designations. The specific highways and roads are described in Section 4.2, Roadway Network, in the Existing Conditions report. Table 3.15-2 lists the existing highways and roadways in the City by classification.

Table 3.15-2. Classification of Roadway System in the City of Napa

Freeways State Route 29 from southern city limits to Trower Avenue **State Highways** State Route 12 State Route 29 from Trower Avenue to the northern city limits State Route 121 State Route 221 **Major Arterials** Jefferson Street from Third Street to Trower Avenue Soscol Avenue from Silverado Trail (Highway 121) to Trancas Street Redwood Road from Dry Creek Road to SR 29 Lincoln Avenue from SR 29 to SR 121 First Street from Browns Valley Road to California Boulevard Trancas Street from SR 29 to eastern city limits	**Minor Arterials** Dry Creek Road from Redwood Road to Trower Avenue Jefferson Street from Trower Avenue to Salvador Avenue Jefferson Street from Third Street to southern terminus Big Ranch Road from Trancas Street to northern city limits Browns Valley Road from Buhman Avenue to First Street Main Street from Fifth Street to Pearl Street Salvador Avenue from SR 29 to eastern city limits Trower Avenue from Dry Creek Road to approximately six-hundred (600) feet east of Stover Street Redwood Road from western city limits to Dry Creek Road First Street from Silverado Trail to California Boulevard Second Street from California Boulevard to Main Street Third Street from Silverado Trail to California Boulevard Coombsville Road from Silverado Trail to eastern city limits Fourth Street from Third Street to Coombs Street Old Sonoma Road from western city limits to Jefferson Street Imola Avenue from Foster Road to SR 29 Imola Avenue from SR 221 to eastern city limits

Collectors	Collectors (Continued)
Austin Way-Pinewood Drive	Orchard Avenue
Beard Road	Old Soscol Way
Brown Street from Vallejo Street to Clinton Street	Partrick Road
Browns Valley Road from Buhman Avenue to Redwood Road	Pearl Street
Buhman Avenue	Pueblo Avenue
Byway East	Randolph Street from Pearl Street to Fourth Street
California Boulevard-Ornduff Street	Robinson Lane
California Way	Saratoga Drive
Calistoga Avenue	Seminary Street from Calistoga Avenue to Third Street
Clark Street	Sierra Avenue
Coombs Street from First Street to Imola Avenue	Shetler Avenue
Dry Creek Road from city limits to Trower Avenue	Shurtleff Avenue
East Avenue	Solano Avenue
El Centro Avenue	Spruce Street
Fifth Street from Coombs Street to Main Street	Stanly Lane
Foothill Boulevard	Terrace Drive
Foster Road	Terra Verde Drive
Franklin Street	Thompson Avenue
Gasser Drive	Trower Avenue from Big Ranch Road to approximately six-hundred (600) feet east of Stover Street
Golden Gate Drive	Vallejo Street
Kansas Avenue	Villa Lane
Laurel Street	Walnut Street
Linda Vista Avenue	West Pueblo Avenue
Main Street from Pueblo Avenue to Pearl Street	Westview Drive
Montecito Boulevard	Wine Country Avenue
	Yajome Street

Traffic Conditions

Traffic Volumes

Traffic counts were performed by the City's traffic consultant as described in the Circulation section of the Existing Conditions report to identify existing levels of traffic congestion.

Traffic Operating Conditions

For the General Plan update, 27study intersections were chosen. Turning movement volumes during the morning (7:00 to 9:00 a.m.) and afternoon (4:00 to 6:00 p.m.) peak periods were collected at the study intersections in October 2018 in the Circulation section of the Existing Conditions report.

Table 3.15-3 summarizes the results of the intersection LOS analysis. As shown in bolded text, 10 of the 27 intersections are currently experiencing higher levels of delay (or worse conditions) than the General Plan standard during the peak hours. Of particular concern are those locations operating at

LOS E or F. These intersections would need to be analyzed carefully to see whether planned or additional improvements can accommodate future levels of traffic.

Table 3.15-3. Study Intersection Level of Service

	Policy Threshold[a]		Observed Conditions			
			AM Peak		PM Peak	
Intersection	LOS	Avg. Delay	Delay[b]	LOS	Delay[b]	LOS
Trower Avenue/SR 29	E	80	**129.2**	**F**	69.9	E
Redwood Road/Solano Avenue	mid D	45	33.6.6	C	42	D
Trancas Street/SR 29 SB Ramps	E	80	21.6	C	21.7	C
Trancas Street/SR 29 NB Ramps	E	80	24.3	C	25.1	C
Trancas Street/California Boulevard	mid D	45	30.1	C	37.4	D
Trancas Street/Jefferson Street	mid D	45	40.3	D	44.4	D
Trancas Street/Soscol Avenue	mid D	45	**47.4**	**D**	**48.6**	**D**
Lincoln Avenue/California Boulevard	mid D	45	34.7	C	**61.4**	**E**
Lincoln Avenue/Jefferson Street	mid D	45	35.6	D	**50.2**	**D**
Lincoln Avenue/Soscol Avenue	mid D	45	**73.9**	**E**	**54.2**	**D**
First Street/Jefferson Street	mid E	67	35.7	D	**73.4**	**E**
First Street/Soscol Avenue	mid E	67	22.4	C	32.3	C
First Street/Silverado Trail (SR 121)	E	80	15	B	33.6	C
Third Street/Soscol Avenue	mid E	67	37.8	D	43.5	D
Third Street/Silverado Trail (SR 121)	E	80	**84.5**	**F**	79.4	E
Soscol Avenue/Silverado Trail (SR 121)	E	80	20.8	C	14.5	B
Imola Avenue/SR 29 SB Ramps	C	35	32.9	C	18.3	B
Imola Avenue/SR 29 NB Ramps	C	35	19.9	B	8.2	A
Imola Avenue/(SR 121)/S Jefferson Street	E	80	41	D	52.3	D
Imola Avenue (SR 121)/ Soscol Avenue (SR 221)	E	80	56.4	E	65.2	E
Trower Avenue/Solano Avenue	mid D	45	**46.6**	**D**	33.6	C
Lincoln Avenue/Silverado Trail (SR 121)	E	80	27.7	C	33.8	C
Salvador Avenue/SR 29	E	80	76.4	E	46.4	D
Salvador Avenue/Solano Avenue	mid D	45	26.8	C	23.8	C
First Street/Freeway Drive	mid D	45	**64**	**E**	**46.2**	**D**

Source: DKS Associates 2018.

Note: The intersections of Coombsville/Silverado Trail and Soscol Avenue/Pearl had no 2018 observed conditions; therefore, they are not included in this table.

[a] Policy thresholds as defined in the General Plan and detailed in *Policy Guidelines: Traffic Level of Service Criteria* (July 23, 2004).

[b] Delay is in seconds per vehicle and is based on average stopped delay for signalized intersections using Highway Capacity Manual methods.

BOLD text indicates intersection performance does not meet policy standard.

Bicycle and Pedestrian System

The City of Napa has an active pedestrian and biking environment. Downtown covers a grid network that allows for easy and accessible use for pedestrian and bicycle trips. The City has completed several pathways along the Napa River and plans to develop additional connections that would further improve circulations. The Napa Downtown Specific Plan has robust guidelines that aim to create a pedestrian and bicyclist-oriented environment in the downtown core. Outside of downtown, there are challenges related to the pedestrian and bicycle network that need to be addressed, such as safety along high-speed automobile arterials, intersection crossing locations, and freeway ramp intersections.

Existing and proposed bike facilities are located in Figure 4-9 in the Existing Conditions report.

Public Transit Service

Local public transit in Napa is provided by the Napa Valley Transportation Authority through the Vine Bus System. Vine has eight local routes within Napa city limits, and four regional routes with three inter-county service express routes with connections to Solano County, Bay Area Rapid Transit (BART) and the San Francisco Ferry in Vallejo. Routes 1 to 8 provide local service. Routes 10 and 11 provide intercity service to Calistoga and Vallejo, respectively. Routes 21 and 29 provide express intercity commuter service to Fairfield/Suisun City and the El Cerrito BART station.

Park and Ride

There is one park-and-ride lot in Napa County known as the Imola Park and Ride. It is located under the SR 29 underpass on Imola Avenue, and is serviced by the VINE on Route 29. There are 76 parking spaces and bike storage lockers (Caltrans 2021).

3.15.2 Environmental Impacts

This section summarizes the findings of the *Transportation Impact Report* (DKS 2021) that assessed the future operational performance of the local roadway network with and without the proposed package of transportation improvements and analysis of the VMT effects associated with the Plan. The report is presented in Appendix C.

3.15.2.1 Methods for Analysis

The *Transportation Impact Report* (DKS 2021). The horizon year of 2040 was used to project future growth, and specific growth projections as described in Appendix C formed the basis for traffic projections.

Relevant General Plan Update Goals and Policies

Applicable General Plan update goals and policies from the Transportation Element are as follows.

Street Network

Goal TE-1: Foster a comprehensive network of accessible roads, trails, sidewalks, and pathways that emphasize a Complete Streets approach, while reducing vehicle miles traveled (VMT) and dependence on single-occupancy vehicles.

TE 1-1: Maintain a roadway network that reflects not just automobile operations, but also multi-modal movement and adjacent land uses. Explore opportunities to develop multi-modal level of service (LOS) objectives and performance targets with differing priorities depending on road types.

TE 1-2: Foster a more connected system of streets, pedestrian facilities, and bicycle facilities as new development and redevelopment is undertaken, or as opportunities are presented.

Goal TE-2: Keep Napa moving with livable streets that provide a balanced, cost-effective, multi-modal transportation system (vehicles, pedestrians, bikes, transit), accommodating the mobility needs of all ages and abilities.

TE 2-1: Work towards safer streets to reduce and eventually eliminate fatal and severe injury collisions among vehicles, pedestrians and bicyclists by adopting a Vision Zero Plan.

TE 2-2: Evaluate methods and undertake transportation facility improvements to promote biking, walking, and safer street crossings. Establish a target date for buildout of currently planned active transportation network improvements.

TE 2-3: Apply traffic calming principles where appropriate with consideration of functional classification, emergency access, and vehicular traffic volumes to support livable and complete streets.

TE 2-6: Study and prepare designs for the following Study Corridors to evaluate future pedestrian and bicycle improvements in coordination with existing bike, pedestrian, and transportation plans. Coordinate with other agencies (e.g., NVTA, Caltrans, County of Napa, etc.) as needed for study development.

- Silverado Trail between Trancas Street and Soscol Avenue
- Jefferson Street between Salvador Avenue and Southern City Limits
- Soscol Avenue Corridor between Third Street and Imola Avenue
- Trancas Street between SR 29 and Soscol Avenue
- Browns Valley Road/First Street between Partrick Road and Freeway Drive
- Terrace Drive between Coombsville Road and Imola Avenue
- Foster Road (study connection at Ghisletta/Horsemen's properties from Golden Gate Drive up to Old Sonoma Road)
- Coombs Street between Imola Avenue and Division Street
- Redwood Road between Dry Creek Road and SR 29
- Salvador Avenue between Solano Avenue and Jefferson Street

TE 2-7: Employ traffic management strategies to encourage the use of arterials and collectors to reduce vehicle use on residential neighborhood streets.

Goal TE-3: Promote active transportation, support active lifestyles, and encourage physical activity by providing, safe pedestrian and bicycle infrastructure citywide.

TE 3-5: Improve connections to existing pedestrian and bicycle facilities from existing neighborhoods.

TE 3-6: Follow the current, adopted City of Napa Bicycle Plan and work to implement the bicycle facilities shown in Figure 3-2.

Automobile Movement

Goal TE-5: Maintain levels of traffic service that provides for efficient movement of people, goods, and services within the City, and adequate connections to the region and state.

TE 5-1: Improve the accessibility, safety, and traffic signal synchronization of intersections and access points along major corridors with an emphasis on creating Complete Streets while accommodating adequate motor vehicle traffic flow consistent with prescribed levels of service.

TE 5-3: Maximize the efficiency of the existing automobile infrastructure and manage the major arterials and boulevards so that they provide shorter travel times than parallel neighborhood streets.

TE 5-4: Maintain the automobile Level of Service (LOS) performance targets described herein as a local standards to determine where transportation improvements may be needed or required as part of the development approval process. Automobile LOS should not be below a mid-range LOS D, with the following exceptions. A mid-range LOS E is permitted in the Downtown area bounded by Soscol Avenue, First Street, California Boulevard, and Third Street; on Jefferson Street between Third Street and Old Sonoma Road; and on Silverado Trail between Soscol Avenue and First Street. LOS E is also permitted for signalized intersections on State Highway facilities within Napa.

TE 5-5: Continue efforts to reduce VMT—such as through pedestrian and bikeway improvements, streetscape design to promote non-vehicle transportation, mixed-use developments, flexibility in parking standards, and transportation demand management—to reduce automobile traffic and GHG emissions, while recognizing that the City has limited control over regional economic and travel patterns that influence VMT.

Emergency Evacuation Routes

Goal TE-9: Provide safe evacuation routes in case of emergencies and natural disasters, including flooding, earthquake, and fire.

TE 9-2: Coordinate with the Fire and Police Departments on traffic calming projects to ensure adequate access for emergency responders.

3.15.2.2 Thresholds of Significance

In accordance with CEQA, the effects of a project are evaluated to determine if they would result in a significant adverse impact on the environment. The standards of significance in this analysis are based on current practice of the appropriate regulatory agencies. The following thresholds were used to determine if an impact would be significant or if mitigation would be required.

- Conflict with transportation program, plan, ordinance, or policy.
- Conflict with CEQA Guidelines Section 15064.3, subdivision (b).
- Increase transportation hazards.
- Result in inadequate emergency access.

3.15.2.3 Impacts and Mitigation Measures

Impact TRA-1: Conflict with transportation program, plan, ordinance or policy (less than significant)

MTC and the ABAG provides transportation planning and funding for the region. MTC and the ABAG adopted the Plan Bay Area 2020 Final Plan to provide the platform for identifying and funding transportation needs for the next 20 years. The General Plan update incorporates strategies from the Plan Bay Area 2020, including the development of a system of roadways to allow more efficient people and goods movement, and continues to recognize the importance of the cities' general plans in guiding land use. The General Plan update is consistent with the Plan Bay Area 2020 Final Plan.

The Transportation Element of the General Plan update focuses on enhancing transportation options for Napa residents, workers, and visitors and improving mobility through increased connectivity and efficient management of existing infrastructure. The Transportation Element looks at improving transportation options and connectivity within the City, as well as furthering the goals of the Napa Vision and Guiding Principles, including environmental sustainability, connected neighborhoods, increased travel options, balancing tourism and local needs, and achieving a healthy and safe community for all. In addition, the Land Use and Transportation Elements of the General Plan update have been designed to complement one another to create compact and mixed-use development areas that support walking, bicycling, and transit service.

The General Plan update includes new bicycle connections within the Planning Area. These new connections support the General Plan update policies that promote multimodal transportation and provide a biking infrastructure. The General Plan update also supports and expands upon the improvements identified in the City of Napa Bicycle Plan as well as the Napa Countywide Bicycle Plan.

The General Plan update includes policies to improve traffic signalization, implement traffic signal management, and coordination techniques to improve traffic flow. The proposed Transportation Element includes a list of planned roadway improvements throughout the City. Intersection improvement projects, such as the ones planned at the intersections of Jefferson Street and Laurel Street and Jefferson Street and Old Sonoma Road, would add signalization to these intersections and allow for safer conditions for pedestrians and bicyclists. These projects would also improve traffic flow. In addition, the General Plan Update is proposing a capacity expansion project to widen a corridor in order to provide turn lane improvements. This project would also allow for an improvement in traffic flow.

With respect to traffic flow, the City's proposed policy is that average vehicle delay at signalized intersections on arterial and collector streets should not exceed a midrange LOS D, with some exceptions. A midrange LOS E is permitted in the downtown area bounded by Soscol Avenue, First Street, California Boulevard, and Third Street; on Jefferson Street between Third Street and Old Sonoma Road; and on Silverado Trail between Soscol Avenue and First Street. For signalized intersections on State Highway facilities within Napa, LOS E is also permitted.

Twenty-seven study intersections were analyzed for the General Plan update, as listed in Table 3.15-3. Turning movement volumes during the morning (7:00 to 9:00 a.m.) and afternoon (4:00 to 6:00 p.m.) peak periods were collected at the study intersections in October 2018 to serve as the basis for the existing conditions analysis. Intersection operations were analyzed for AM and PM peak hour conditions using Synchro (version 10) traffic analysis software, in concert with outputs from the travel demand model.

The LOS analysis presented in the *Transportation Impact Report* was conducted to assess what improvements will be required throughout the City. The analysis included below is a summary of the *Transportation Impact Report* and describes the roadway network LOS under forecast With Project (i.e., the General Plan update is adopted) conditions. With Project traffic has been assessed over the City's proposed LOS standards as discussed in Section 3.15.1.1, *Regulatory Setting*, to identify circulation deficiencies that are forecast to occur under With Project conditions. This would assist in identifying improvements required to support growth anticipated for the City of Napa and the region. Identification of these improvements would help in developing the recommended citywide General Plan transportation system.

The City's traffic consultants evaluated future intersection operations with the proposed package of transportation improvements and planned land use scenarios. As shown in Table 3.15-4, out of the 27 intersection locations evaluated, 11 intersections would exceed the LOS policy standards under the No Project (i.e., General Plan update is not adopted and the City continues to rely on the existing General Plan) conditions.

As shown in Table 3.15-4, after implementation of the Transportation Element, the number of deficient segments would be reduced from 11 segments to nine intersections, as listed below. As a result, a significant impact would occur at these nine roadway segments.

- Trower Avenue/SR 29
- Trancas Street/California Boulevard
- Trancas Street/Jefferson Street
- Trancas Street/Soscol Avenue
- Lincoln Avenue/California Boulevard
- Lincoln Avenue/Jefferson Street
- Lincoln Avenue/Soscol Avenue
- Imola Avenue/SR 29 southbound ramps
- Imola Avenue (SR 121)/Soscol Avenue (SR 221)

Table 3.15-4. Future Peak Hour Intersection Level of Service

	Policy Threshold[a]		No Project (2040)				With Project (2040)			
			AM Peak		PM Peak		AM Peak		PM Peak	
Intersection	LOS	Avg. Delay	Delay[b]	LOS	Delay[b]	LOS	Delay[b]	LOS	Delay[b]	LOS
Trower Avenue/SR 29	E	80	**129.4**	**F**	**83.8**	**F**	**123.3**	**F**	**81.8**	**F**
Redwood Road/Solano Avenue	mid D	45	29.7	C	31.0	C	28.8	C	31.1	C
Trancas Street/SR 29 SB Ramps	E	80	43.4	D	40.3	D	21.8	C	21.2	C
Trancas Street/SR 29 NB Ramps	E	80	28.7	C	28.2	C	27.9	C	27.4	C
Trancas Street/California Boulevard	mid D	45	29.1	C	**47.7**	**D**	29.3	C	**47.0**	**D**
Trancas Street/Jefferson Street	mid D	45	40.4	D	**72.0**	**E**	40.2	D	**68.1**	**E**
Trancas Street/Soscol Avenue	mid D	45	**45.7**	**D**	**48.3**	**D**	44.7	D	**47.7**	**D**
Lincoln Avenue/California Boulevard	mid D	45	30.0	C	**48.5**	**D**	30.9	C	**48.2**	**D**
Lincoln Avenue/Jefferson Street	mid D	45	33.2	C	**51.9**	**D**	31.9	C	**48.6**	**D**
Lincoln Avenue/Soscol Avenue	mid D	45	**78.5**	**E**	**62.5**	**E**	**81.0**	**F**	**56.2**	**E**
First Street/Jefferson Street	mid E	67	23.4	C	27.7	C	23.7	C	27.5	C
Soscol Avenue/Pearl Street	mid E	67	19.0	B	30.6	C	18.2	B	28.9	C
First Street/Soscol Avenue	mid E	67	21.9	C	39.0	D	27.7	C	37.9	D
First Street/Silverado Trail (SR 121)	E	80	18.4	B	71.6	E	18.3	B	52.9	D
Third Street/Soscol Avenue	mid E	67	41.3	D	43.3	D	40.8	D	41.0	D
Third Street/Silverado Trail (SR 121)	E	80	**91.9**	**F**	**90.5**	**F**	15.5	C	16.8	C
Coombsville/Silverado Trail (SR 121)	E	80	--	--	--	--	11.8	B	13.2	B
Soscol Avenue/Silverado Trail (SR 121)	E	80	25.0	C	26.9	C	10.3	B	9.5	A
Imola Avenue/SR 29 SB Ramps	C	35	**38.0**	**D**	29.0	C	**36.9**	**D**	28.6	C
Imola Avenue/SR 29 NB Ramps	C	35	22.7	C	11.1	B	22.8	C	10.7	B
Imola Avenue (SR 121)/S Jefferson Street	E	80	45.1	D	67.0	E	43.5	D	61.0	E
Imola Avenue (SR 121)/Soscol Avenue (SR 221)	E	80	**90.9**	**F**	**103.9**	**F**	78.4	E	**81.3**	**F**
Trower Avenue/Solano Avenue	mid D	45	41.2	D	36.7	D	38.6	D	42.8	D
Lincoln Avenue/Silverado Trail (SR 121)	E	80	26.9	C	30.7	C	27.5	C	31.1	C
Salvador Avenue/SR 29	E	80	70.7	E	47.8	D	70.7	E	48.3	D

Intersection	Policy Threshold[a]		No Project (2040)				With Project (2040)			
			AM Peak		PM Peak		AM Peak		PM Peak	
	LOS	Avg. Delay	Delay[b]	LOS	Delay[b]	LOS	Delay[b]	LOS	Delay[b]	LOS
Salvador Avenue/Solano Avenue	mid D	45	30.4	C	25.5	C	30.4	C	25.6	C
First Street/Freeway Drive	mid D	45	62.7	E	**47.6**	**D**	3.5	A	6.5	A

Source: DKS Associates 2021.

[a] Policy thresholds as defined in the General Plan and detailed in *Policy Guidelines: Traffic Level of Service Criteria* (July 23, 2004).

[b] Delay is in seconds per vehicle and is based on average stopped delay for signalized intersections using Highway Capacity Manual methods.

BOLD text indicates intersection performance does not meet policy standard.

As previously discussed, in July 2020, SB 743 directs that LOS impacts may no longer be considered transportation impacts for the purposes of CEQA. In its place, VMT should be used to assess the transportation network. As discussed in Section 3.15.1.1, *Regulatory Setting,* the City would use the City's adopted significance thresholds for VMT. The City has adopted VMT baselines from the existing average levels for Napa County with thresholds of significance 15 percent below the baselines as shown in parentheses below.

- 17.3 VMT per capita (14.7 VMT per capita)
- 26.9 VMT per employee (22.87 VMT per employee)

The City's traffic consultants calculated the VMT efficiency metrics for the No Project and With Project scenarios. The travel demand Solano Napa Activity-Based Model (SNABM) was used to calculate the VMT efficiency metrics. The data are presented in terms of daily VMT per capita for the entire County of Napa and the City of Napa for future (2040) No Project and With Project conditions. As shown in Table 3.15-5, VMT per capita for the City under the No Project conditions is 11.3. Under the With Project conditions VMT per capita decreases to 9.03 in the City (Table 3.15-6). As such, implementation of the General Plan update would decrease VMT per capita from No Project conditions to With Project conditions. In addition, VMT per capita under the With Project conditions would be 15 percent below the baseline. Therefore, impacts would be less than significant.

Table 3.15-5. CEQA VMT Metrics for No Project Conditions

Geographic Area	Total Population	Total Employment	VMT Per Capita[a]	VMT Per Job[b]	HBW VMT Per Capita[c]	HBW VMT Per Job[d]
City of Napa	88,616	72,466	11.30	16.98	6.07	6.19
Napa County	155,661	110,775	15.08	17.89	6.86	7.68

Source: SNABM and DKS Associates 2021.
[a] Home-based VMT measured by location of residence.
[b] Home-based VMT measured by location of job.
[c] Home-based work VMT measured by location of residence.
[d] Home-based work VMT measured by location of job.

Table 3.15-5. CEQA VMT Metrics for With Project Conditions

Geographic Area	Total Population	Total Employment	VMT Per Capita[a]	VMT Per Job[b]	HBW VMT Per Capita[c]	HBW VMT Per Job[d]
City of Napa	103,843	57,989	9.03	36.75	5.25	8.54
Napa County	171,476	94,966	13.44	30.19	6.20	9.62

Source: SNABM and DKS Associates 2021
[a] Home-based work VMT measured by location of residence.
[b] Home-based work VMT measured by location of job.
[c] Home-based work VMT measured by location of residence.
[d] Home-based work VMT measured by location of job.

Impact TRA-2: Conflict with CEQA Guidelines Section 15064.3, subdivision (b) (less than significant)

On December 28, 2018, the California Office of Administrative Law cleared the revised CEQA guidelines for use. Among the changes to the guidelines was removal of vehicle delay and LOS from consideration under CEQA. LOS is a qualitative measure that would assess the level of congestion and delay of a roadway segment. With the adopted guidelines, transportation impacts are to be evaluated based on a project's effect on VMT. VMT is calculated by multiplying the number of vehicle trips by the estimated number of miles driven per trip. Projects that create significant impacts under VMT would be required to mitigate their impacts through transportation demand management measures such as car sharing, improved transit, and enhanced bicycle infrastructure. Lead agencies are allowed to opt in to the revised transportation guidelines, but the new guidelines must be used starting July 1, 2020.

As discussed in TRA-1, in accordance with updated guidelines, the Transportation Element of the General Plan update began a departure from considering LOS as the only measure of a transportation system's effectiveness and utilizes the City's adopted significance thresholds for VMT, consistent with OPR's recommendations. As shown above, VMT per capita for the City under the No Project conditions is 11.3. Under the With Project conditions VMT per capita decreases to 9.03 in the City (Table 3.15-6). As such, implementation of the General Plan update would decrease VMT per capita from No Project conditions to With Project conditions. In addition, VMT per capita under the With Project conditions would be 15 percent below the baseline. Therefore, impacts would be less than significant.

Impact TRA-3: Increase transportation hazards (less than significant)

Implementation of the General Plan update would increase traffic levels in the Planning Area and introduce new intersections and traffic signals to the existing street system. However, these new roadways and traffic signals would be designed to City Design standards and, therefore, should not substantially increase hazards due to a design feature. Therefore, impacts would be less than significant.

Impact TRA-4: Result in inadequate emergency access (less than significant)

Implementation of the General Plan update would increase land uses in the Planning Area. New land uses would require additional emergency access to respond to emergencies. However, these new roadways and intersections would be designed to City design standards that account for emergency access and, therefore, should not result in inadequate emergency access. Construction of these new roadways and intersection would have the potential to result in impacts related to emergency service; nevertheless, these projects would be required to comply with CEQA and avoid or minimize such impacts as needed.

Additionally, the updated Transportation Element has accounted for the potential impacts to emergency routes and has included Goal TE-9 to ensure that there are safe evacuation routes in case of emergencies and natural disasters. Therefore, impacts would be less than significant.

3.15.3 References Cited

California Department of Transportation – District 4. 2021. *Caltrans District 4 Park and Ride Lots*. Available: https://dot.ca.gov/-/media/dot-media/district-4/documents/d4-park-n-ride-lots/prmasterlistwebpgrev62719.pdf. Accessed: April 3, 2021.

City of Napa Public Works Department – Transportation Engineering Division. 2005. *Citywide Guidelines for Traffic Calming and Neighborhood Traffic Management*. Napa, CA. Available: https://www.cityofnapa.org/DocumentCenter/View/969/Napa-Neighborhood-Traffic-Calming-Program-PDF. Accessed: March 22, 2021.

City of Napa. 2021. *Updated Transportation Element of the General Plan.* June.

DKS Associates. 2022. *Napa General Plan Update: Transportation Evaluation of Preferred Plan.* January.

GHD. 2020. *State Route 29 Comprehensive Multimodal Corridor Plan*. May. Caltrans District 4. Available: https://www.nvta.ca.gov/sites/default/files/SR%2029%20Final%20Report.pdf. Accessed: October 2121.

Napa Valley Transportation Authority. 2016. Napa Countywide Pedestrian Plan. Available: https://www.nvta.ca.gov/sites/default/files/NCPMP_Final_web.pdf. Accessed: April 3, 2021.

Napa Valley Transportation Authority. 2019. Napa Countywide Bicycle Plan. Available: https://issuu.com/nvta19/docs/2019-10-10_napa_countywide_bicycle_plan_final?fr=sNGQ1NjE5ODQ3MDg. Accessed: April 3, 2021.

Transportation Research Board. 2010. *HCM2010 Highway Capacity Manual*. Transportation Research Board of the National Academy of Sciences. Available: http://hcm.trb.org/?qr=1.

3.16 Tribal Cultural Resources

3.16.1 Existing Conditions

3.16.1.1 Regulatory Setting

This section describes the federal, state, and local regulations related to tribal cultural resources that would apply to the Project.

Federal

For purposes of this Draft EIR, *tribal cultural resources* are those addressed under CEQA as defined in Assembly Bill (AB) 52 (Chapter 532, Statutes of 2014). There is no precisely analogous federal regulation. Section 3.4, *Cultural Resources*, of this Draft EIR discusses federal regulations relevant to Native American cultural resources.

State

Assembly Bill 52—Native American Consultation Under CEQA

AB 52, as incorporated into the CEQA statute, requires that lead agencies consult with any California Native American tribe that is traditionally and culturally affiliated with the geographic area of a proposed project, if so requested by the tribe. Public Resources Code (PRC) Section 21084.2 specifies that a proposed project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource may have a significant effect on the environment.

PRC 21074(a) defines tribal cultural resources as follows.

- Sites, features, places, cultural landscapes, sacred places and objects with cultural value to a California Native American tribe that are either of the following:
    - Included or determined eligible for listing in the California Register of Historical Resources (CRHR), or
    - Included in a local register of historical resources as defined in subdivision (k) of [PRC] Section 5020.1.
- A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of PRC Section 5024.1. In applying the criteria set forth in subdivision (c) of Section 5024.1 for the purposes of this paragraph, the lead agency shall consider the significance of the resource to a California Native American tribe.

Sacred places can include Native American sanctified cemeteries, places of worship, religious or ceremonial sites, and sacred shrines. Tribal cultural resources also include cultural landscapes that can be geographically defined in terms of size and scope; historical resources; and unique or non-unique archaeological resources (as defined in PRC Section 21083.2) if they conform with the criteria of PRC 21074(a).

When a resource is not already listed in the CRHR or a local register, the lead agency relies upon substantial evidence to make the determination that a resource qualifies as a tribal cultural resource.

AB 52 defines a *California Native American Tribe* as a Native American tribe located in California that is on the contact list maintained by the Native American Heritage Commission (NAHC). Under AB 52, formal consultation with California Native American Tribes is required prior to determining the level of environmental document if a tribe has requested to be informed by the lead agency of proposed projects. AB 52 also requires that consultation address project alternatives and mitigation measures for significant effects, if requested by the California Native American Tribe. AB 52 states that consultation is considered concluded when either (1) the parties agree to measures to mitigate or avoid a significant effect, or (2) the tribe or agency concludes that mutual agreement cannot be reached. Under AB 52, mitigation measures shall be recommended for inclusion in the environmental document and adopted mitigation monitoring program if such measures are determined to avoid or lessen a significant impact on a tribal cultural resource. If the recommended measures are not included in the final environmental document, then the lead agency must consider the four mitigation methods described in PRC 21084.3(e). Any information submitted by a California Native American tribe during the consultation process is considered confidential and is not subject to public review or disclosure. It will be published in a confidential appendix to the environmental document unless the tribe consents to disclosure of all or some of the information to the public. AB 52 applies to projects for which a notice of preparation was issued after July 1, 2015. Accordingly, it applies to this Project as well as future development projects.

Local

Section 3.4, *Cultural Resources*, describes local regulations that apply to tribal cultural resources outside the CEQA and AB 52 contexts.

3.16.1.2 Environmental Setting

The Napa Valley is the ancestral land of several California tribes and was part of the most densely populated regions of North America north of Mexico (Josephy 1994:340). The City lies within the traditional territory of the Wappo, which Kroeber (1925:218) describes as including "the valley of Napa River down to tidewater." Wappo lands bordered that of the Pomo, Patwin, and Coast and Lake Miwok (Knudtson:1977:73).

Abundant wild food resources of the region supported a large and diverse diet for the peoples (Eargle 2000:130; Knudtson 1977: map; 72–73). The culture and lifeways of the California tribes were dramatically disrupted starting in the early 1800s with the arrival of the Spanish to the region, followed by Mexicans and Euro-Americans. Captured and enslaved as agricultural workers in Spanish missions, many Indians died there of maltreatment, starvation, or violence. Epidemics of smallpox in the 1830s and 1840s further devasted the California Indian population, including those of the Napa region. The entry of Euro-American miners and settlers resulted in further expropriation of land, destruction or loss of access to subsistence resources, and labor exploitation (Madley 2016:32–39). Nevertheless, descendants of the tribes persevere into the present.

Because the City is in primarily Wappo territory, the Wappo tribe is described in more detail below. The Yocha Dehe notified the City that the Project is within their aboriginal territory; therefore, they are also described further in this section.

Mishewal-Wappo Tribe of Alexander Valley

The name Wappo is an American variation of the Spanish word *guapo*, meaning handsome or brave. Their name for themselves is Micewal (today spelled Mishewal), meaning "that place" in the Wappo language, which has its roots in the Yuki language (Loeb 1932:106). Other sources identify their name for themselves as "Onasatis," meaning "the outspoken people" (Napa Valley Register Staff 2007; Suscol Intertribal Council n.d.). Wappo occupation of the Napa Valley dates back 10,000 years (City of Napa 1998; 2019:3-1). Speaking five distinct dialects, the Wappo were primarily hunter-gatherers who lived in permanent villages led by male or female chiefs. Villages were generally near the Napa River and other watercourses, or near large oak groves that were a source of acorns, an important food item (Madley 2016:106; City of Napa 2019:3-1). Wappo territory included an area adjoining southern Clear Lake, parts of the Napa and Alexander Valleys, and adjacent regions. Clear Lake was also Pomo territory, and it is presumed the Wappo traded with the Pomo; the two groups shared musical instruments, similar games, and other cultural items and practices (Madley 2016:106). These geographic and cultural associations also led them to share in a bloody months-long conflict that took place in 1849 between a group of Pomo workers who attacked two white ranchers that kept them and others, including Wappo, as virtual slaves on their Big Valley Ranch (Madley 2017:103–107). Local militias and U.S. military became involved in punitive expeditions that did not distinguish members of one tribe from another. In one expedition in December of 1849, soldiers made their way into what was probably the Wappo village of Mayacama in the Napa Valley and opened fire on unsuspecting Wappo villagers, killing 35 of them (Madley 2016:116).

External forces had decimated the Wappo population by the early twentieth century. Pursuant to the Indian Appropriations Act of 1906, the U.S. government purchased two parcels of land in Sonoma County in 1906 and 1913 that became the Mishewal-Wappo Alexander Valley Rancheria. Under the federal Indian Reorganization Act, in 1935, the 14 Wappo tribal members living there voted to organize as a tribal government with a constitution and bylaws. In 1940, of the 49 people living on the rancheria, 44 were members of the Wappo tribe. In 1958, Congress enacted the California Rancheria Act (CRA), which called for the distribution (that is, privatization) of rancheria or reservation land to "interested Indians." The Secretary of Interior approved a distribution plan in September of 1959 and the rancheria's assets were distributed between two families in 1961. The distribution of land terminated the "federal supervision" of the rancheria when the notice was published in the Federal Register on August 1, 1961 (26 *FR* 6875–76). Under the terms of the CRA, the receiving families' status as Indians with a trust relationship with the U.S. government was also terminated. Mishewal Wappo sued the U.S. government in 2009, contending that the "termination of the Alexander Valley Rancheria was procedurally defective and thereby unlawful." The tribe lost the case because the court found that the 6-year statute of limitations for bringing their protest had expired in 1967. One of the tribe's claims was that many tribal members were not present on the Rancheria at the time notice of termination was issued in 1961, and the government did not seek them out to ensure they were informed; therefore, they could not have known of the proposed termination and the statute of limitations clock should not have started in 1961. The decision made a point of noting that termination of a rancheria did not necessarily mean termination of a whole tribe; only the individuals to whom land was distributed lost their trust relationship with the U.S. government and were no longer entitled to government services to Indians (*Mishewal Wappo Tribe of Alexander Valley* v *Jewell*, 84 F. Supp 3d 930 (N.D. Cal 2015) [Casetext 2021]). Today, the Mishewal Wappo Tribe of Alexander Valley is reported to have more than 300 members (Napa County Historical Society 2015; Wappo Tribe 2021) who are still struggling to regain federal recognition and the benefits it confers (*Mishewal Wappo Tribe of Alexander Valley* v *Jewell*).

Yocha Dehe Wintun Nation

Yocha Dehe Wintun Nation is a federally recognized tribe and sovereign tribal government. They currently occupy just a portion of their historic territory in Yolo County (Yocha Dehe n.d.[a]; n.d.[b]), with Tribal headquarters in Brooks. In their native language, Yocha Dehe means "home by the spring water," a description of where their ancestors lived, where their people come from, and who they are as a Tribe. This homeland is the Capay Valley and the watershed of Cache Creek, which, in their own words, "… gave us precious materials, nourishment, and spiritual well-being. The oak tree gave us food, shelter, and strength" (Yocha Dehe 2015:2).

Nineteenth-century Euro-American settlement and U.S. federal policy in 1908 moved the Tribe onto a small reservation in Rumsey, where they struggled to subsist on the poor land and became known as the Rumsey Band of Wintun Indians (Yocha Dehe 2015:4). In 1940, the federal government relocated the Tribe elsewhere in the Capay Valley, where the Tribe was able to farm on 188 acres of trust land. During the 1980s, the Tribe seized opportunities for tribal economic development created by the federal Indian Gaming Regulatory Act and the California Lottery by opening a bingo hall (Yocha Dehe 2015:6).

The bingo hall developed into the Cache Creek Casino Resort, the largest private employer in Yolo County. Other Tribal enterprises include the Yocha Dehe Golf Club and agriculture. The Tribe farms more than a dozen crops on 2,200 acres, of which 250 are certified organic; runs more than 400 head of cattle; and has more than 1,200 acres of Tribal land in conservation easements (Yocha Dehe n.d.[b]; Yocha Dehe 2015:14). The Tribe also markets its own brand of wine, extra virgin olive oil, wildflower honey, and organic produce; the olive oil mill also serves other regional growers. Yocha Dehe businesses support education, cultural and environmental stewardship, philanthropy, and community service (Yocha Dehe 2015:16, 18).

3.16.2 Environmental Impacts

3.16.2.1 Methods for Analysis

Napa does not have on file any formal requests from tribes to be notified of projects and the opportunity to consult under AB 52. Therefore, the City's CEQA consultant requested the NAHC to provide a list of tribes culturally affiliated with the Planning Area and a search of the Sacred Lands File on February 22, 2021. The NAHC provided the list on March 4, 2021, identifying the Cachil Dehe Band of Wintun Indians of the Colusa Indian Community, Cortina Rancheria–Kletsel Dehe Band of Wintun Indians, Guidiville Indian Rancheria (Pomo), Middletown Rancheria of Pomo Indians (and Lake Miwok), Mishewal-Wappo Tribe of Alexander Valley, Pinoleville Pomo Nation, and Yocha Dehe Wintun Nation as tribes with cultural affiliation to the Planning Area. The NAHC also reported a positive result of the Sacred Lands File search and recommended contacting the Mishewal-Wappo Tribe of Alexander Valley.

The City sent letters to the tribes listed on April 15, 2021, notifying them of the General Plan update and inviting them to consult under AB 52 and SB 18. (SB 18 applies specifically to general plans and has different timeframes for required actions by both parties. See Section 3.4, *Cultural Resources*.) The Yocha Dehe Wintun Nation responded on April 29, 2021, stating that the Project is within their aboriginal territories, that they have a cultural interest and authority in the Planning Area, and requested consultation and Project information. In June 2021, the City received a request for consultation from the Yocha Dehe Wintun Nation. City staff met with Mr. Laverne Bill, Director of

Cultural Resources for the Yocha Dehe Wintun Nation. During that meeting, it was requested that the City include additional goals and policies in the General Plan to recognize, work with, and promote educational opportunities with Tribal Nations. These goals and policies have been included in the Historic & Cultural Resources Element of the Draft General Plan. A draft copy of these goals and polices have been forwarded to Yocha Dehe during the staff review of the Administrative Draft EIR. The AB 52 process will be concluded prior to certification of the EIR.

Relevant General Plan Update Goals and Policies

Goal HCR-14: Protect and preserve important archaeological resources.

Policy HCR.14-1: Consider federal and State procedures and requirements relating to the preservation and protection of archeological resources and sites, such as the National Historic Preservation Act's Section 106 process and the National Environmental Policy Act, when evaluating applications for development projects.

Policy HR.14-2: For development and redevelopment proposals in archaeologically or tribal cultural sensitive areas of Napa, require an assessment of the potential presence of archaeological and tribal cultural resources, including a site survey and a records search of the California Historical Resources Information System at the Northwest Information Center. As warranted by the results of the assessment, require additional studies to identify and address project-specific impacts on archaeological and tribal cultural resources.

The City should incorporate the study recommendations as project conditions of approval to ensure that impacts on archaeological and/or tribal cultural resources are mitigated to the extent possible. Studies should be prepared according to National Register Bulletin 24: Guidelines for Local Surveys: A Basis for Preservation Planning and the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation.

Goal HCR-15: Recognize the Tribal Nations who first lived in the Napa area and preserve their identity, culture, and artifacts.

Policy HCR.15-1: Work with local Tribal Nations on development projects to avoid known cultural sites and resources to the extent feasible.

Policy HCR.15-2: Establish City policies and procedures that require development projects to comply with state and federal law that upon discovery of Native American remains or archaeological artifacts during construction, all activity will cease until qualified professional archaeological examination and reburial in an appropriate manner is accomplished.

Policy HCR.15-3: Collaborate with local Tribal Nations on treatment protocols for handling human remains and cultural items affiliated with affected Tribal Nations.

Policy HCR.15-4: Collaborate with local Tribal Nations on cultural events and development of educational signage to promote recognition of their contributions to Napa.

3.16.2.2 Thresholds of Significance

In accordance with Appendix G of the State CEQA Guidelines, the General Plan update would be considered to have a significant effect if it would result in any of the following conditions.

- Potential to cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is listed or eligible for listing in the California Register of Historic Resources or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k).

- Potential to cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is a resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.

3.16.2.3 Impacts and Mitigation Measures

Impact TCR-1: Would the Project have the potential to cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074. (less than significant with mitigation)

As noted above, in June 2021, the City received a request for consultation from the Yocha Dehe Wintun Nation. City staff met with Mr. Laverne Bill, Director of Cultural Resources for the tribe. During that meeting, the tribe requested that the City include additional goals and policies in the General Plan to recognize, work with, and promote educational opportunities with Tribal Nations. These goals and policies have been included in the Historic & Cultural Resources Element of the Draft General Plan. A draft copy of these goals and polices have been forwarded to Yocha Dehe during the staff review of the Administrative Draft EIR.

Consultation will be ongoing during development of the General Plan update. As consultation under the General Plan update EIR proceeds, if any significant tribal cultural resources are identified, the City and the Tribe will negotiate appropriate measures to be incorporated into General Plan policies to prevent a substantial adverse change in the significance of the resource. At a minimum, these measures would include those recommended in PRC Section 21084.3 to avoid damaging effects on tribal cultural resources, incorporated herein as Mitigation Measure TCR-1.

Proposed General Plan policies under proposed Goal HR-14 and HR-15 would identify, preserve, and protect archaeological resources and sites and enforce State mandates upon discovery of Native American remains or archaeological artifacts during construction. Goal TE-25 emphasizes collaboration and consultation with Tribal Nations who first lived in the Napa area to recognize and preserve their identity, culture, and artifacts. Consultation on future individual projects subject to the general plan will provide further protections for any tribal cultural resources identified through the CEQA AB 52 process. Accordingly, the impact of the General Plan update on tribal cultural resources would be less than significant with mitigation incorporated.

Mitigation Measure TCR-1: Implement mitigation measures recommended in Public Resources Code Section 21084.3 to avoid damaging effects on tribal cultural resources

(1) Avoidance and preservation of the resources in place, including planning and construction to avoid the resources and protect the cultural and natural context, or planning greenspace, parks, or other open space, to incorporate the resources with culturally appropriate protection and management criteria.

(2) Treating the resource with culturally appropriate dignity, considering the tribal cultural values and meaning of the resource, including the following.

(A) Protecting the cultural character and integrity of the resource.

(B) Protecting the traditional use of the resource.

(C) Protecting the confidentiality of the resource.

(3) Permanent conservation easements or other interests in real property, with culturally appropriate management criteria for the purposes of preserving or utilizing the resources or places.

(4) Protecting the resource.

Impact TCR-2: Would the Project have the potential to cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074, that is a resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1 (less than significant with mitigation)

The City of Napa received one request for consultation, from the Yocha Dehe Wintun Nation, but no tribal cultural resources had been identified as of June 14, 2021. The City has not otherwise identified or been notified of any tribal cultural resources in the Planning Area.

The records search conducted for Chapter 3.4, *Cultural Resources*, found that 51 archaeological resources have been recorded in the plan area. It is possible that these would be considered to be tribal cultural resources under AB 52, but such determination has not been made. Mitigation measures described in Chapter 3.4 would apply to protect these resources. Furthermore, General Plan update policies under proposed Goal HR-14 and HR-15 would identify, preserve, and protect archaeological resources and sites and enforce State mandates upon discovery of Native American remains or archaeological artifacts during construction. Goal TE-25 emphasizes collaboration and consultation with Tribal Nations who first lived in the Napa area to recognize and preserve their identity, culture, and artifacts. If tribal cultural resources are identified or encountered during future development projects anticipated under the General Plan update, the City would require one or more actions recommended under Mitigation Measure TCR-1, in addition to specific measures agreed upon with the consulting tribe, if any, during AB 52 consultation under CEQA. Accordingly, the impact would be less than significant with mitigation incorporated.

3.16.3 References Cited

Casetext. 2021. *The Mishewal Wappo Tribe of Alexander Valley v. Jewell*. Available: The Mishewal Wappo Tribe of Alexander Valley v. Jewell, 84 F. Supp. 3d 930 | Casetext Search + Citator. Accessed: July 15, 2021.

City of Napa. 1998. *Envision Napa 2020: City of Napa General Plan Policy Document*. Chapter 6, Historic Resources. Adopted December 1, 1998. Available: https://www.cityofnapa.org/259/General-Plan. Accessed: June 6, 2021.

City of Napa. 2019. *Napa 2040 General Plan Existing Conditions Report*. Prepared by Dyett & Bhatia. March.

Eargle, Dolan H., Jr. 2000. *Native California Guide*. San Francisco: Trees Company Press.

Josephy, Alvin M., Jr. 1994. *500 Nations*. New York: Knopf.

Knudtson, P. M. 1977. *The Wintun Indians of California and their Neighbors*. Happy Camp, California: Naturegraph Publishers, Inc.

Kroeber, A. L. 1925. *Handbook of the Indians of California*. Chapter 14, The Wappo. Bulletin 78, Smithsonian Institution Bureau of American Indian Ethnology. Washington, D.C.: Government Printing Office.

Loeb, E.M. 1932. The Western Kuksu Cult. *University of California Publications in American Archaeology and Ethnography*. Volume 33:1, pp. 1-137. Berkeley, California: University of California Press.

Madley, Benjamin. 2016. *An American Genocide: The United States and the California Indian Catastrophe*. New Haven: Yale University Press.

Napa County Historical Society. 2015. *Napa's First People*. https://napahistory.org/napas-first-people/#_edn3. Accessed: February 9, 2021.

Napa Valley Register Staff. 2007. Who Were the Wappo? August 12. *Napa Valley Register*. Available: https://napavalleyregister.com/news/local/who-were-the-wappo/article_f3193792-c3ce-51e7-9618-ec6a5b9f88b4.html. Accessed: April 9, 2021.

Suscol Intertribal Council. No date. *Napa Valley First People's History*. https://www.suscolcouncil.org/about-us/firspeopleshistory/.

Wappo Tribe. 2021. Facebook page. Available: https://www.facebook.com/WappoTribe/. Accessed: April 15, 2021.

Yocha Dehe Wintun Nation. No date a. *Heritage.* Accessed: November 13, 2020. https://www.yochadehe.org/heritage.

Yocha Dehe Wintun Nation. No date b. *Farm & Ranch*. Accessed: November 13, 2020. https://www.yochadehe.org/farm-ranch.

Yocha Dehe Wintun Nation. 2015. *Our Story*. e-brochure. Accessed: November 13, 2020. https://issuu.com/yochadehe/docs/f5_rw-981_tribal_brochure/10.

3.17 Utilities and Service Systems

This section describes the regulatory and environmental setting for utilities and service systems in the Planning Area, analyzes effects on utilities and service systems that would result from implementation of the General Plan update, and provides mitigation measures, if applicable, to reduce the effects of any significant impacts.

3.17.1 Existing Conditions

3.17.1.1 Regulatory Setting

This section describes the key federal, state, and local regulations, laws, and policies related to utilities and service systems in the Planning Area.

Federal

Clean Water Act

The Clean Water Act governs surface water quality protection by employing a variety of regulatory and nonregulatory tools to reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff. Section 402 of the Clean Water Act establishes the National Pollutant Discharge Elimination System (NPDES) program to prohibit discharge without a permit. The U.S. Environmental Protection Agency has established application requirements for stormwater permits that include providing quantitative analytical data identifying the types of pollutants present in a facility's effluent. The Phase II regulations amended in 1999 include small municipal separate storm sewer systems.

America's Water Infrastructure Act of 2018

The Federal Safe Drinking Water Act, enacted in 1974, is a federal law intended to ensure safe drinking water to the public and has been amended several times since it came into law, most recently with America's Water Infrastructure Act of 2018 (AWIA). AWIA amends the federal law that provides for water infrastructure improvements throughout the country. It improves drinking water and water quality, deepens infrastructure investments, enhances public health and quality of life, increases jobs, and bolsters the economy. The AWIA provisions are the most far-reaching changes to the Safe Drinking Water Act since the 1996 Amendments, with over 30 mandated programs (U.S. Environmental Protection Agency 2018).

National Pollutant Discharge Elimination System

The NPDES permit program was established in the Clean Water Act to regulate municipal and industrial discharges to surface waters of the United States. Federal NPDES permit regulations have been established for broad categories of discharges, including point-source municipal waste discharges and nonpoint-source stormwater runoff. NPDES permits generally identify effluent and receiving water limits on allowable connections or mass emissions of pollutants contained in the discharge; prohibitions on discharges not specifically allowed under the permit; and provisions that describe required actions by the discharger, including industrial pretreatment, pollution prevention, self-monitoring, and other activities.

Wastewater discharge is regulated under the NPDES permit program for direct discharges into receiving waters and by the National Pretreatment Program for indirect discharges to a sewage treatment plant.

Napa Sanitation District (NapaSan) is the wastewater collection system provider serving the Planning Area and is regulated by waste discharge requirements (NPDES No. CA0037575) found in Regional Water Quality Control Board (RWQCB) Order No. R2-2016-0035 effective September 1, 2016 to August 31, 2021. The permit is expected to be reissued in December 2021 (San Francisco Bay Regional Water Quality Control Board 2021). NapaSan's NPDES permit consists of waste discharge requirements specifying the amount of wastewater that can be discharged, sampling frequency, and the types of testing and monitoring that must be done by NapaSan; it also sets limits of pollutant concentrations (San Francisco Bay Regional Water Quality Control Board 2016).

Federal Communications Commission

The Federal Communications Commission regulates interstate and international communications by radio, television, wire, satellite, and cable in the United States. The Federal Communications Commission is responsible for implementing and enforcing America's communications law and regulations, including telecommunications facilities in the Project area.

Federal Energy Regulatory Commission

The Federal Energy Regulatory Commission regulates the transmission and wholesale sale of electricity and natural gas in interstate commerce and regulates the transportation of oil by pipeline in interstate commerce. The Federal Energy Regulatory Commission also reviews proposals to build interstate natural gas pipelines, natural gas storage projects, and liquefied natural gas terminals and licenses nonfederal hydropower projects.

State

California Porter-Cologne Water Quality Control Act

Under the California Porter-Cologne Water Quality Control Act, passed in 1969 and amended in 2013, the State Water Resources Control Board (SWRCB) has authority over state water rights and water quality policy. The act divides the state into nine regional basins that are each under the jurisdiction of an RWQCB that oversees water quality on a day-to-day basis at the local and regional level. RWQCBs oversee several water quality functions in their respective regions. RWQCBs regulate all pollutant or nuisance discharges that may affect either surface water or groundwater. The Planning Area falls under the jurisdiction of two RWQCBs: San Francisco Bay (Region 2) and Central Valley (Region 5). Jurisdiction varies based on the exact location of a project or service within the City. Generally, west Napa is within Region 2 and east Napa is within Region 5 (State Water Resources Control Board 2021b).

California Water Plan

The California Water Plan, prepared by the California Department of Water Resources (DWR), was most recently updated in 2018. The plan provides a framework that water managers, legislators, and the public can use when considering options and making decisions regarding California's water future. The plan, which is updated every 5 years, presents basic data and information regarding California's water resources, including water supply evaluations and assessments of agricultural,

urban, and environmental water uses, to quantify the gap between water supplies and uses. The plan also identifies and evaluates existing and proposed statewide demand management and water supply augmentation programs and projects to address the state's water needs. The plan provides resource management strategies and recommendations for strengthening integrated regional water management. A resource management strategy is a project, program, or policy that helps local agencies and governments manage their water and related resources. The resource management strategies help regions meet future demands and sustain the environment, resources, and economy; involve communities in decision making; and meet various goals. These strategies can reduce water demand, improve operational efficiency, increase water supply, improve water quality and flood management, and improve resource stewardship practices.

Urban Water Management Planning Act

Through the Urban Water Management Planning Act of 1983, the California Water Code requires all urban water suppliers within California to prepare and adopt an Urban Water Management Plan (UWMP) and update it every 5 years. This requirement applies to all suppliers providing water to more than 3,000 customers or supplying more than 3,000 AF of water annually. The act is intended to support conservation and efficient use of urban water supplies. The act requires that total project water use be compared to water supply sources over the next 20 years in 5-year increments, that planning occur for single and multiple dry water years, and that plans include a water recycling analysis that incorporates a description of the wastewater collection and treatment system within the agency's service area along with current and potential recycled water uses. In September 2014, the act was amended by Senate Bill (SB) 1420 to require urban water suppliers to provide descriptions of their water demand management measures and similar information. The City most recently updated its UWMP in 2021, as discussed below.

California Senate Bills 610 and 221

California SB 610 and SB 221 amended state law, effective January 1, 2002, to improve the link between information on water supply availability and certain land use decisions made by cities and counties. SB 610 and SB 221 were companion measures that sought to promote more collaborative planning between local water suppliers and cities and counties. Both statutes require that detailed information regarding water availability be provided to the City and County decision makers prior to approval of specified large development projects. The purpose of this coordination is to ensure that prudent water supply planning has been conducted and that planned water supplies are adequate to meet existing demands, anticipated demands from approved projects and tentative maps, and the demands of proposed projects.

SB 610 amended California Water Code Sections 10910 through 10915 (inclusive) to require land use lead agencies to do the following.

- Identify any public water purveyor that may supply water for a proposed development project.
- Request a Water Supply Assessment (WSA) from the identified water purveyor.

The purpose of the WSA is to demonstrate the sufficiency of the purveyor's water supplies to satisfy the water demands of a proposed project, while still meeting the water purveyor's existing and planned future uses. Water Code Sections 10910 through 10915 delineate the specific information that must be included in the WSA.

SB 221 amended state law (California Government Code Section 66473.7) to require that approval by a city or county of certain residential subdivisions requires an affirmative written verification of sufficient water supply. SB 221 was intended as a fail-safe mechanism to ensure that collaboration on finding the needed water supplies to serve a new large residential subdivision occurs before construction begins.

Executive Order B-37-16: Making Conservation a California Way of Life

Signed in 2016, Executive Order B-37-16 establishes mandated actions for California to use water more wisely, eliminate water waste, strengthen local drought resilience, and improve agricultural water use efficiency and drought planning (California Water Resources Control Board 2020).

2015 Model Water Efficient Landscape Ordinance

In 2015, Executive Order B-29-15 tasked DWR with revising the 2010 updated Model Water Efficient Landscape Ordinance (MWELO) to increase water efficiency standards for new and retrofitted landscapes through encouraging the use of more efficient irrigation systems, graywater usage, and onsite stormwater capture and by limiting the portion of landscapes that can be covered in turf. In California, all new development and retrofitted landscapes must conform to the MWELO. All governing agencies must adopt, implement, and enforce the MWELO or a more stringent ordinance (California Department of Water Resources 2021).

California Green Building Standards Code

On July 17, 2008, the California Building Standards Commission adopted the nation's first green building standards. The California Green Building Standards Code (CALGreen) (Part 11, Title 24) was adopted as part of the California Building Standards Code (Title 24, California Code of Regulations) to apply to the planning, design, operation, construction, use, and occupancy of every newly constructed building or structure, unless otherwise indicated in the code, throughout California. CALGreen established planning and design standards for sustainable site development, including water conservation measures and requirements that new buildings reduce water consumption by 20 percent. The mandatory provisions of CALGreen became effective January 1, 2011. The building efficiency standards are enforced through the local building permit process. The purpose of CALGreen is to improve public health, safety, and general welfare by enhancing the design and construction of buildings through the use of building concepts having a reduced negative impact or positive environmental impact and encouraging sustainable construction practices in the following categories: planning and design, energy efficiency, water efficiency and conservation, material conservation and resource efficiency, and environmental quality.

The California Plumbing Code

The California Plumbing Code (Part 5, Title 24, California Code of Regulations) was adopted as part of the California Building Standards Code to prevent disorder in the industry resulting from widely divergent plumbing practices and the use of many different, often conflicting, plumbing codes by local jurisdictions. Among many topics covered in the code are water fixtures, potable and nonpotable water systems, and recycled water systems. Water supply and distribution must comply with all applicable provisions of the current edition of the California Plumbing Code.

California Public Utilities Commission

The California Public Utilities Commission regulates privately owned public utilities in California, including electric power, telecommunications, natural gas, and water companies.

100 Percent Clean Energy Act (Senate Bill 100)

In 2018, the state passed the 100 Percent Clean Energy Act that mandates that by 2045, 100 percent of all retail sales of electricity in California shall be provided by renewable energy and zero-carbon resources. SB 100 accelerates California's Renewables Portfolio Standard established under SB 350 to increase production of energy from renewable resources. In recognition that California retail sellers are well on their way to achieving the target in advance of the existing deadlines, SB 100 requires providers to supply 50 percent of their electricity from eligible renewable energy resources by 2026 and 60 percent by 2030.

California Integrated Waste Management Act

The California Integrated Waste Management Act of 1989 (Assembly Bill [AB] 939) required each city and county in California and all regional solid waste management agencies to enact plans and implement programs to divert 25 percent of their waste stream by 1995 and 50 percent by 2000. Later legislation mandates that the 50 percent diversion requirement be achieved every year.

The law also requires each city to prepare, adopt, and submit Source Reduction and Recycling Elements to the county that include the following: waste characterization, source reduction, recycling, composting, solid waste facility capacity, education and public information, funding, special waste (e.g., asbestos, sewage sludge), and household hazardous waste.

AB 75 and AB 341

AB 75 (Public Resources Code Sections 42920–42927) required all state agencies and large state facilities to divert at least 25 percent of all solid waste from landfills by January 1, 2002, and 50 percent by January 1, 2004. The law also requires each agency to submit an annual report to the California Department of Resources Recycling and Recovery (CalRecycle) that summarizes the agency's yearly progress with respect to implementing waste diversion programs.

AB 341 of 2011 expanded the recycling requirements for commercial businesses and multifamily residences. Any business that generates 4 cubic yards or more of waste per week and multifamily residences with five or more units are now required to have recycling service. AB 341 established a state policy goal requiring that "not less than 75 percent of solid waste generated be source reduced, recycled, or composted by the year 2020, and annually thereafter." Unlike AB 75, which focuses on local diversion, AB 341 requires the state, primarily through CalRecycle, to take a statewide approach to decreasing California's reliance on landfills. CalRecycle is developing strategies to implement this goal, such as diverting organic waste from landfills, continuing to reform the Beverage Container Recycling Program to improve the level of recycling, expanding recycling and manufacturing infrastructure through permitting and compliance assistance and financing, exploring new models for state and local funding of materials management programs, promoting state procurement of postconsumer recycled-content products, and promoting extended producer responsibility (California Department of Resources Recycling and Recovery 2021).

Title 27 of California Code of Regulations, Division 2

In accordance with California Code of Regulations, Title 27, Sections 21600–21900, solid and hazardous waste transfer and disposal facilities serving the City of Napa are regulated jointly by the California RWQCB, Central Valley (Region 5) and CalRecycle. Both the Central Valley RWQCB and CalRecycle regulate facilities individually through permits. As of 2019, businesses that are required to report to CalRecycle must register in the Recycling and Disposal Reporting System.

The primary landfill serving the Planning Area, Potrero Hills Landfill in Suisun City, is permitted by the San Francisco Bay RWQCB (California Regional Water Quality Control Board, San Francisco Bay Region. 2009).

Sanitary District Act of 1923

The Sanitary District Act of 1923 (Health and Safety Code Section 6400 et seq.) authorizes the formation of sanitation districts and enforces the districts to construct, operate, and maintain facilities for the collection, treatment, and disposal of wastewater. The act was amended in 1949 to allow the districts to also provide solid waste management and disposal services, including refuse transfer and resource recovery.

Sanitary Sewer Overflow Program

The Sanitary Sewer Overflow Program addresses any overflow, spill, release, discharge, or diversion of untreated or partially treated wastewater from a sanitary sewer system. The Statewide General Waste Discharge Requirements for Sanitary Sewer Systems (Water Quality Order No. 2006-0003) requires public agencies that own or operate sanitary sewer systems to develop and implement sewer system management plans and report all sanitary sewer overflows to SWRCB's online Sanitary Sewer Overflow database (State Water Resources Control Board 2021a). NapaSan is under jurisdiction of the San Francisco Bay RWQCB.

Local

Napa Sanitation District

NapaSan serves residents and businesses in the City, Silverado Country Club, Napa County Airport, and several adjacent unincorporated areas by providing wastewater collection, treatment and disposal, and pollution prevention programs. NapaSan maintains, cleans, and repairs 270 miles of pipeline and operates three pump stations that pull wastewater through a pipeline under the Napa River (Napa Sanitation District 2021). NapaSan owns and operates a wastewater treatment plant (WWTP) located off Soscol Ferry Road in southern Napa County. Additionally, a 1998 agreement between the City and NapaSan permits NapaSan to provide recycled water via recycled water agreements to some customers in the southern part of the Planning Area who would otherwise be irrigating with City drinking water (City of Napa Public Works Department 2017). The NapaSan Codes are contained in Sections 50022.1 through 50022.8 and 50022.10 of the Napa Municipal Code.

The NapaSan WWTP's permitted capacity is 15.4 million gallons per day (MGD) (Brown and Caldwell and Carollo Engineers 2011). The discharge location is the Napa River.

Napa Sanitation District Wastewater Treatment Plant Master Plan

NapaSan prepared a WWTP Master Plan to "determine the capacity of existing facilities; estimate future loads and regulation impacts; and develop a recommended plan for upgrading existing facilities, optimizing their operation, and expanding their capacity." The planning period is through 2030 (Brown and Caldwell and Carollo Engineers 2011).

Napa Sanitation District Collection System Master Plan

Napa San's Collection System Department works to ensure that NapaSan's network of underground sewer pipes is able to collect and transport wastewater to their treatment plant, the Soscol Water Recycling Facility. To insure that the collection system can perform this essential job, the Collection System Department provides inspection, maintenance, repair, and ongoing replacement of all NapaSan-owned sewer lines in the service area. NapaSan prepared the Collection System Master Plan to guide improvements to the NapaSan collection system to accommodate current and future development and to ensure continued reliable service. The Collection System Master Plan is used by NapaSan to prioritize areas of the collection system for repair and rehabilitation work. The report includes future dry and wet weather flow capacity results based on wastewater flow, groundwater infiltration, and rainfall-derived inflow and infiltration (GHD 2021).

Napa Sanitation District Strategic Plan for Recycled Water Use in the Year 2020

NapaSan completed a strategic plan to determine a recycled water planning approach through the year 2020. Potential for recycled water production was estimated to be 9,800 acre-feet per year (AFY) in 2020 if additional storage were available, and 4,540 AFY using existing storage. Various strategies were proposed for consideration, ranging from minimal to full recycling, with an associated range of benefits. Recommendations for strategies include considering potential revenues from grants and recycled water users for each strategy (Larry Walker Associates 2005).

Napa Sanitation District Strategic Plan 2021 – 2025

NapaSan completed an update to its 2019 strategic plan in May of 2021, describing updated goals, objectives, and priority projects and programs of the Napa Sanitation District (Napa Sanitation District 2021c).

Napa County

Napa County Flood Control and Water Conservation District

Napa County Flood Control and Water Conservation District (the District) administers water supply contracts, watershed management, and stormwater management programs throughout Napa County with the mission to conserve and manage flood waters and stormwaters to protect life and property; maintain the county watershed using the highest level of environmentally sound practices; and provide coordinated planning for water supply needs for the community. The District has easements over portions of creeks and channels within the City (e.g., Tulocay Creek, Salvador Channel) that entitle the District to enter and maintain portions of these drainage channels. The District's Stream and Watershed Maintenance Program enables the District, at its discretion, to attempt to reduce the potential for flood damage and enhance habitat along the riparian corridors on private and public lands throughout Napa County. Also, the District has developed the *Napa County Stream Maintenance Manual* (County of Napa, 2019) to improve the management of streams and drainage channels in the District's countywide jurisdiction through establishing consistent

guidance for stream maintenance activities. The District is the local sponsor of the Napa River Flood Management Plan, which was designed by a countywide coalition of political and community leaders, private industry, natural resource agencies, nonprofit groups, and private citizens (County of Napa 2021).

Napa River/Napa Creek Flood Protection Project

The Napa River-Napa Creek Flood Protection Project (NRNCFPP) includes improvements to 6 miles of the Napa River, from Highway 29 at the Butler Bridge/Southern Crossing to near Trancas Street, and on Napa Creek from its outfall to the Napa River and for about 1 mile upstream. Elements of the NRNCFPP include bank terracing, bridge replacements, bypass channels, culverts, floodwalls, and levees. When the NRNCFPP is completed (estimated by 2027), the existing City and future growth will be protected from flooding from the Napa River (West Yost Associates 2021b).

Napa Countywide Stormwater Pollution Prevention Program

The Napa Countywide Stormwater Pollution Prevention Program (NCSPPP) is a joint effort of the County of Napa; Cities of American Canyon, Napa, St. Helena, and Calistoga; and the Town of Yountville to prevent stormwater pollution, protect and enhance water quality in creeks and wetlands, preserve beneficial uses of local waterways, and comply with state and federal regulations. Though the entities of the NCSPPP carry out their own individual stormwater pollution prevention programs, the NCSPPP provides for the coordination and consistency of approaches between the individual participants and documents their efforts in annual reports (County of Napa 2021).

Napa County Green Business Program

The Napa County Green Business Program certifies businesses that operate in an environmentally responsible manner throughout Napa County. By offering technical assistance, the County helps local businesses save money by helping them to conserve energy and water, minimize waste, prevent pollution, and shrink their carbon footprint. The Napa Green Vineyard certification provides a pathway for growers to improve soil health; become carbon neutral to negative within 6 to 9 years; and increase the resilience of vineyards, businesses, and the community.

City of Napa

2020 Urban Water Management Plan

As required by the California Water Code, described above, urban water suppliers in California must prepare and adopt a UWMP every 5 years to support long-term resource planning and ensure that adequate water supplies are available to meet existing and future water demands. The UWMP is submitted to DWR, which determines whether the plan satisfies the requirements of the Urban Water Management Planning Act of 1983, its amendments, and other applicable regulations. Urban water suppliers are defined as suppliers who service more than 3,000 connections or supply more than 3,000 acre-feet (AF) of water annually. The City meets both these criteria, and its most recent 2020 UWMP was adopted in January 2022. The plan describes and evaluates water supply sources, projected demand, water conservation, and overall water service reliability through 2045 (West Yost Associates 2022).

Water System Optimization and Master Plan (1997) and Capital Improvement Program (2011)

The City adopted a Water System Optimization and Master Plan in 1997, which evaluated the City's potable water demands (through 2020); distribution system; and pumping, storage, and treatment capacities. Key recommendations from the 1997 master plan include increasing in-system storage capacity and treatment capacity at the Jamieson Canyon Water Treatment Plant (WTP), both of which have been completed. Following adoption of the 1997 master plan, the City installed over 14 million gallons of in-system storage tanks and increased the Jamieson Canyon WTP capacity to approximately 20 MGD In 2011, the City developed a 20-year Capital Improvement Program (CIP), which details the water system maintenance, replacement, and upgrade projects to be completed through fiscal year 2030–2031. Because the City is close to buildout, the 20-year CIP focused on protecting and replacing existing infrastructure. While the 20-year CIP plan helps the City to continue providing reliable, safe, and high-quality water in the near-term, a more formal evaluation of buildout conditions will ensure proper planning through at least 2040. To this end, the City plans to update its Water System Optimization and Master Plan based on buildout of the General Plan update (West Yost Associates 2021c).

2006 Final Storm Drainage Master Plan

The City's storm drainage master plan identifies existing flooding problems; evaluates potential solutions; recommends a CIP to make the most critical improvements; and develops hydrologic, hydraulic, and water quality criteria for current and future management of the City's storm drain system (City of Napa 2006).

City of Napa General Plan

The following goals and policies excerpted from Chapter 4: Community Services of the current General Plan relate to utilities and service systems (City of Napa 1998).

Goal CS-1: To ensure the timely development of public facilities and the maintenance of adequate service levels for these facilities to meet the needs of existing and future City residents.

Policy CS-1.1: The City shall plan and build infrastructure improvements that will: (1) accommodate growth demands without lowering levels of service; (2) support central City revitalization efforts; and (3) provide aesthetic enhancements to the City's major gateways and scenic corridors.

Policy CS-1.2: Where new development requires the construction of new public facilities, the new development shall fund its fair share of the construction of those facilities. The City shall require dedication of land within newly developing areas for required public facilities, as allowed by law.

Policy CS-1.3: The City shall ensure through the development review process that adequate public facilities and services are available to serve new development.

Policy CS-1.4: The City shall require, to the extent legally possible, that new development pays the cost of providing new public facilities and services and/or the costs for upgrading of all existing facilities that it uses, based on the demand for these facilities attributable to the new development; exceptions may be made when new development generates significant public benefits (e.g., low-income housing, significant primary wage earner employment) and when alternative sources of funding can be identified to offset foregone revenues.

Policy CS-1.5: The City shall seek broad-based funding sources for public facilities and services that benefit both current and future residents of the City.

Policy CS-1.6: The City shall establish a feasible five-year Capital Improvement Program (CIP) that gives high priority to projects identified as needed in the General Plan. The City shall also give high priority to projects that will reduce or eliminate existing deficiencies in the City's public facilities system.

Policy CS-1.7: The City shall require that all new development meet adopted service levels for public facilities as established in the General Plan.

Goal CS-9: To ensure adequate, reliable, and safe water supplies to the community, even through drought periods of similar intensity as the 1986-1992 drought.

Policy CS-9.1: The City shall continue to implement water conservation programs that show promise of saving significant amounts of water at a reasonable cost.

Policy CS-9.2: The City shall acquire or develop additional water supplies that would be available during drought periods to offset the shortages anticipated from existing supplies. Water Supply options include: a. Acceleration of entitlements from the SWP through contract modification; b. Pursuing transfer agreements with other State Water Contractors pursuant to the provisions of the Monterey Agreement; c. Participation in SWP water banking program; d. Participation in the SWP Drought Year Projects such as the American Basin Conjunctive Use Project and the Supplemental Water Purchase Program.

Policy CS-9.3: The City of Napa shall determine the firm yield available from existing and future SWP water supply sources and shall monitor and, if necessary, limit growth (new water system hook-ups) in order to guarantee drought year water supplies to existing and proposed development. Growth shall be monitored and, if necessary, limited as follows:

1) The City shall not issue any building permits or similar ministerial entitlements for proposed structures that would increase net potable water consumption in the City or its service area in the absence of a letter from the Utilities Department, stating that approval of the permit or other entitlement will not adversely affect the City's ability to adequately serve the public health and safety needs of all of its water customers during drought conditions.

2) In addition, when conducting environmental review for proposed development projects requiring General Plan amendments, specific plans, use permits, tentative subdivision maps, or similar discretionary approvals, the City shall include within the environmental document, information assessing whether the City and its water suppliers are likely to have sufficient water supplies to adequately serve the proposed development and all other City water customers during drought conditions. In approving any such discretionary project, the City shall require, as a mitigation measure and condition of approval, that the applicant(s) may not receive a final subdivision map or, in the absence of the need for such a map, may not receive building permits or similar ministerial entitlements in the absence of a letter from the Utilities Department stating that approval of the map, permit or other ministerial entitlement will not adversely affect the City's ability to adequately serve the health and safety needs of all of its water customers during drought conditions and that there will be sufficient water to serve the basic health, hygiene, and fire suppression needs of the community.

   When contracts are modified or are executed with the SWP to secure additional reliable water supply for drought years, or other dependable and adequate sources are guaranteed, the requirement to limit growth in the manner described above can be suspended.

Policy CS-9.4: The City shall implement the "Water System Optimization and Master Plan" (adopted 11/97) which refines policies and implementation programs for efficient water supply, storage, and delivery for projected demand to the year 2020. These efforts shall be updated to reflect the forthcoming update to this Plan, expected in 2023, which will include be based on projected demands to the year 2050.

Policy CS-9.5: The City shall evaluate the feasibility and pursue the efficient use of reclaimed wastewater in appropriate locations to offset the demand for potable water supplies.

Policy CS-9.6: The City shall promote voluntarily conservation efforts to conserve water to a reasonable extent during multi-year droughts to avoid inordinate expenditures for new water supplies.

Policy CS-9.7: The City shall work cooperatively with other agencies having similar needs to identify water supply options that could have mutual benefit and consider entering into joint powers agreements to develop and manage a candidate project.

Policy CS-9.8: The City shall encourage state and federal agencies to cooperatively establish programs and projects that will enable the State Water Project to meet its contractual obligations to the City predictably and reliably.

Policy CS-9.9: The City shall monitor the State Water Contract and work with other agencies to ensure continued and increased reliable water supply deliveries from the State Water Project.

Policy CS-9.10: The City shall seek to control urban development in the City's Water Service Area beyond the RUL. To this end, the City shall continue applying Policy Resolution #7 (Outside Water Service Policy) as an effective means of limiting and preventing urban development beyond the City's RUL.

Goal CS-10: To ensure adequate wastewater collection and treatment and the safe disposal of wastes.

Policy CS-10.1: The City shall promote reduced wastewater system demand through efficient water use by: a. Requiring water-conserving design and equipment in new construction; b. Encouraging retrofitting with water-conserving devices.

Policy CS-10.2: The City shall support continued efforts by the Napa Sanitation District to promote the use of reclaimed wastewater.

Policy CS-10.3: The City shall coordinate development review with the Napa Sanitation District to ensure that adequate wastewater collection, treatment, and disposal facilities can be provided by the District by requiring that all new applicants for development secure a “will-serve” letter from the NSD if the District notifies the City that a critical capacity situation exists.

Where a critical capacity situation does exist, the City shall not issue, in the absence of a will serve letter from the NSD, any building permits or similar ministerial entitlements for proposed structures that would increase net demand on NSD treatment capacity. In addition, when conducting environmental review for proposed development projects requiring General Plan amendments, specific plans, use permits, tentative subdivision maps, or similar discretionary approvals, the City shall include within the environmental document, information assessing whether NSD is likely to have sufficient capacity to serve the proposed development.

In approving any such discretionary project, the City shall require, as a mitigation measure and condition of approval, that the applicant(s) shall obtain the necessary will-serve letters from NSD prior to receiving approval of a final subdivision map, or in the absence of a need for a final subdivision map, prior to receiving approval of any required building permits or similar ministerial approvals.

Goal CS-11: To develop and maintain a safe, attractive and environmentally sensitive drainage system for handling runoff due to seasonal rainstorms.

Policy CS-11.1: The City shall address needed long-term improvements for the drainage system.

Policy CS-11.2: The City shall continue to collect a Storm Water System Service Fee for needed storm drainage improvements and maintenance.

Policy CS-11.3: The City shall plan and build storm improvements within funding limits.

Policy CS-11.4: The City shall investigate the potential for establishing an impact fee to help accommodate the effects of additional runoff from new development.

Policy CS-11.5: The City shall develop stormwater management programs to reduce water borne pollution discharges to the maximum extent practicable.

Policy CS-11.6: The City shall require new development to obtain all necessary NPDES permits as required by federal law.

Policy CS-11.7: The City shall require all new development to implement feasible best management practices (BMP) in the design of stormwater systems.

Policy CS-11.8: The City shall require all projects in the floodplain to comply with applicable federal, state and local regulations.

Policy CS-11.9: The City shall work with the California Department of Fish and Wildlife and Napa County Resource Conservation District to develop an acceptable and appropriate homeowners' stewardship program aimed at reducing flooding along creek and river side properties.

Goal CS-12: To provide for safe and environmentally sound municipal waste reduction and recycling programs that will allow the City to attain the requirements of AB 939.

Policy CS-12.1: The City shall provide ongoing waste reduction and recycling public awareness and education programs.

Policy CS-12.2: The City shall continue to monitor its Source Reduction and Recycling Element (SRRE) and Household Hazardous Waste Element (HHWE) to ensure that the City is meeting its waste reduction goals.

City of Napa Municipal Code

Municipal Code Chapter 15.04

Under the Buildings and Construction code, several of CALGreen's voluntary provisions are locally mandatory, including lower kitchen faucet flow rates, Energy Star appliance requirements, and lower maximum water pressure for residential projects. For nonresidential projects, the code requires an additional 12 percent reduction in indoor water use; tighter specifications for clothes washers, dishwashers, ice makers, and food steamers; and the same lower maximum water pressure as residential projects (City of Napa 2021d).

Municipal Code Chapter 15.32

The construction and demolition (C&D) debris recycling ordinance aims to redirect C&D materials away from landfills. The ordinance requires that 100 percent of "designated" materials be site-separated onsite and recycled. For projects that exceed $100,000 or 5,000 square feet, a minimum overall salvage or recycle rate of 50 percent of all C&D debris generated must be achieved, and a Waste Reduction and Recycling Plan (WRRP) must be submitted and approved prior to issuance of a building or demolition permit. Noncompliance with a WRRP plan may result in a fine ranging from 1 to 5 percent of project valuation (City of Napa 2021d).

Municipal Code Section 13.09.010

The Water Offset Program allows approved projects to offset the projected water demand of some new projects (e.g., hotels, housing subdivisions) by reducing demand elsewhere in the City. Historically, these offsets were achieved through replacement of older high-water-use toilets in existing buildings. More recently, some offsets have been achieved through recycled water conversions for existing irrigation systems. An offset in-lieu fee option is also available, which funds an array of City programs to help existing customers conserve water (City of Napa 2021e).

City of Napa Departments

Public Works Department

The Public Works Department provides and sustains public works services in the best interests of the community and maintains streets, storm drains, streetlights, traffic signals, sidewalks, and capital improvement projects (City of Napa 2021a).

Utilities Department

The Utilities Department oversees the Water Division and the Recycling and Solid Waste Division (City of Napa 2021b).

Water Division

The Water Division of the Utilities Department is responsible for water operations, treatment, distribution and maintenance, usage, and conservation. Its primary responsibility is to provide water customers within the City's water service boundary with a reliable supply of water that is safe for consumption and other domestic, industrial, and commercial uses (City of Napa 1998, 2021b).

Recycling and Solid Waste Division

The Recycling and Solid Waste Division is responsible for meeting the City's Disposal Reduction Policy and the State of California's mutual goal of diverting at least 75 percent of waste away from landfills by the year 2020. The Recycling and Solid Waste Division administers the City's recycling and solid waste collection contract with Napa Recycling and Waste Services (NRWS) (City of Napa 2021b), which is valid through 2031 (City of Napa 2021f).

3.17.1.2 Environmental Setting

Water Supply

Sources, Treatment, and Distribution

The City of Napa's current water demands are met by three sources: Milliken Reservoir, Lake Hennessey, and water purchased under contract from the State Water Project (SWP) and delivered through the North Bay Aqueduct system. The three sources are used separately or collectively to provide water supply, as needed. In years when reservoirs are nearly full and rainfall is normal, Napa's supplies are currently adequate to meet demands; however, Napa’s supplies are not adequate during periods of multiyear droughts, when customers must be asked to reduce usage. The City needs additional water supplies to accommodate projected growth. Some measures being explored jointly by NapaSan and the Water Division include greater use of reclaimed water and incentive programs for use of water conservation measures within new developments above and beyond the currently mandated programs (City of Napa 1998).

Milliken Reservoir

The City of Napa began offering water service in 1923 following its purchase of the privately-owned Municipal Water Works. This purchase coincided with the construction of Milliken Dam, which allowed storage of water from Milliken Creek, a tributary of the Napa River. The resulting Milliken Reservoir served as the City’s sole water source until Lake Hennessey was created in the 1940s. Located approximately 5 miles northeast of the city, Milliken Reservoir is now a seasonal source of

supply used in the high-demand summer and early fall period when turbidity levels in the reservoir can be effectively treated. The City's water rights to Milliken Reservoir are secured through a license with SWRCB.

The storage capacity of the reservoir is limited to 1,390 AF (1 AF = 325,851 gallons) due to a state seismic evaluation that necessitated the boring of five holes in the dam, lowering storage elevation by 16 feet. Tributary watershed area is about 6,000 acres. Raw water is not taken directly from the reservoir but is instead released into Milliken Creek by a manually operated valve system at the base of the dam. About 2 miles downstream, a diversion dam directs water into a 16-inch diameter aboveground raw water line. That line then runs approximately 1 mile down to the Milliken WTP, which has a treatment capacity of approximately 4 MGD. The Milliken WTP is a direct filtration plant with a contact/reaction tank and four horizontal, dual-media pressure filters operated in parallel. Treated water is stored in a 2-million-gallon clearwell tank located above the treatment plant site. The treated water is delivered to the distribution system via the Milliken Transmission Line. Approximately 3 miles long, the line serves customers in the Silverado Resort/Hillcrest area before it joins the main system at the intersection of Silverado Trail and Monticello Road (City of Napa 2021d).

Lake Hennessey

Located approximately 13 miles north of Napa, Lake Hennessey is the major local water source for the City of Napa system. Lake Hennessey reservoir was formed in 1946 when Conn Dam was constructed to allow storage of water from Conn Creek, an upvalley tributary of the Napa River. The City's water rights to Lake Hennessey are secured through a permit with SWRCB.

Lake Hennessey has an approximate storage capacity of 31,000 AF. Its tributary watershed area is about 35,000 acres. Raw water from Lake Hennessey flows into a cylindrical concrete intake tower and is pumped up to the Hennessey WTP, which has a nominal treatment capacity of approximately 20 MGD. The facility provides complete conventional treatment, including flash mixing, coagulation, flocculation, sedimentation, filtration, and disinfection. Treated drinking water from the plant is conveyed into a buried 5-million-gallon concrete clearwell tank onsite. This treated drinking water is delivered to the distribution system through the 36-inch-diameter Conn Transmission Main. The Conn Line is approximately 20 miles long and runs parallel to Conn Creek, Highway 128, and Highway 29. It travels along easements and rights-of-way before meeting the Jamieson Line in northwest Napa (City of Napa 2021c).

State Water Project

In 1966, the City of Napa contracted for imported surface water from the SWP, which is a system that diverts water from the Sacramento–San Joaquin Delta at the Barker Slough Pumping Plant east of Vacaville and conveys it 21 miles via the North Bay Aqueduct to Cordelia Forebay to serve agencies in Solano and Napa Counties. From there, SWP water is pumped an additional 6 miles to the North Bay Aqueduct Terminal Reservoirs, two 5-million-gallon raw water storage tanks. Most of this water represents SWP entitlements for the Cities of Napa and Calistoga, which are treated at the Jamieson Canyon WTP. The remainder is City of American Canyon SWP entitlement.

The City of Napa has an annual SWP entitlement of up to 21,900 AF of what is known as *Table A* water in the SWP contract. However, actual annual deliveries are determined by DWR based on actual yearly hydrologic conditions. The full 100 percent of Table A entitlement is available only during extreme wet years. In an average year, only about 60 percent of the entitlement is made

available. The DWR allocation drops to as little as 5 percent (1,095 AF) of the entitlement in critically dry years. Fortunately, the City of Napa is able to carry over unused water from previous years' entitlements. This carryover water, along with a special North-of-Delta Allocation and an Advanced Table A Program, provide the City with additional SWP water when needed. In drought years, the City of Napa can also participate in various Dry Year Purchase Programs.

Regardless of category, all SWP raw water delivered to the City of Napa is processed at the Jamieson Canyon WTP, which can provide a rated treatment capacity of approximately 20 MGD. This facility includes pre and intermediate ozonation along with more conventional surface water treatment steps such as rapid mixing, flocculation, sedimentation with tube settlers, gravity filtration, and disinfection. Treated water is stored in a 5-million-gallon clearwell tank onsite. The Jamieson Transmission Line delivers the potable water to Napa. It consists of a 42-inch-diameter line that runs parallel to Jamieson Canyon Road until it reaches Highway 29; it then splits into 36-inch and 24-inch lines near the intersection of Highways 29 and 221 as it joins the rest of the distribution system (City of Napa 2021d).

Groundwater

The City of Napa does not pump groundwater for municipal supply. The City currently relies on local surface water and imported SWP supplies exclusively and has no projects in place involving groundwater or conjunctive use. While options for groundwater use may be considered in the future, groundwater is not considered to be part of the supply portfolio for the Planning Area (City of Napa Public Works Department 2017).

Wastewater and Recycled Water

Recycled water is municipal wastewater that has been treated to a specified quality to enable it to be used again for a beneficial purpose. When highly treated and disinfected to meet stringent water quality guidelines set by the state (Title 22), this safe, nonpotable water supply is typically distributed to large irrigation users such as golf courses, vineyards, parks, and commercial businesses. The City does not itself produce or distribute recycled water; however, in the Planning Area recycled water treatment and distribution is managed by NapaSan. Wastewater from the City and surrounding unincorporated areas is treated by NapaSan and sold as recycled water to customers both inside and outside of the service area.

Service Area Characteristics

The City serves potable water to the Planning Area. The City provides municipal drinking water to approximately 87,000 people in the city and adjacent areas within a service area encompassing much of the lower Napa Valley and extending up the foothills on the east and west sides of the valley. While the vast majority of City water is delivered to customers within the city limits, the City does serve water outside the city limits and even outside the Rural Urban Limit (RUL), including to customers in the Monticello Road/Silverado Resort community and the independent Congress Valley Water District, and to accounts along the Conn Transmission Main. The Congress Valley Water District was originally scheduled to be dissolved and its system infrastructure, wholly maintained by the City, transferred to the City in 2017; however, their current agreement was recently extended to 2022 to establish a water service transition plan. The City also serves the approximately 1,175 residents of Napa State Hospital located outside the city limits and RUL.

The City exports water to the Cities of American Canyon, St. Helena, and Calistoga; the Town of Yountville; and the Veterans Home of California, Yountville. Calistoga and American Canyon have contractual entitlements to SWP water from the North Bay Aqueduct, and the City simply treats their water at its Jamieson Canyon WTP before conveying it to them. Because deliveries to Calistoga and American Canyon do not have a direct impact on City demand, they are excluded from the City's water service reliability forecasts. St. Helena and Yountville are also "wholesale" customers of the City and any City water they purchase is then sold to their own retail customers. St. Helena is contractually obligated to purchase a minimum amount of City water each year. Yountville and Veterans Home of California, Yountville, purchases of City water are rare and minimal due to their own sufficient local supply sources.

Water Demand and Availability

Water demand projections in the City's 2020 UWMP were based on projected service area population from 2025 through 2045, which is primarily based on the City's projection of 7,800 new housing units by 2040 which is expected to lead to 17,900 additional residents. As long-range demographic and economic trends are difficult to predict, the 2020 UWMP accounts for the full addition of 17,900 new residents by 2045. Using conservatively high or worst-case numbers for the outer-year population projections adds confidence to the water service reliability analyses in the 2020 UWMP. This 25-year projection still represents an average annual growth rate under 1 percent, which is a slow growth rate, in accordance with the constraints of the RUL.

To estimate the projected water use in the City's service area in 5-year increments up to the year 2045, reflecting normal year conditions, the City employed a per capita water use methodology and the incremental population increases discussed above. New development projects in the City's General Plan are incorporated, including the Napa Pipe Project, a large mixed-use development along the Napa River with more than 900 residential units.

Table 3.17-1. Population and Water Demand Projections

Year	2025	2030	2035	2040	2045
2020 UWMP Population	90,486	94,066	97,646	101,226	104,806
Projected Demand (AFY)	14,230	14,655	15,005	15,330	15,555

Source: City of Napa Utilities Department 2021. Notes: Projections include system losses.
AFY = acre-feet per year; UWMP = Urban Water Management Plan

Population is a key factor in determining water use; however, reductions in per capita water use over the last decade (partially attributed to voluntary water-saving by the public due to periodic drought conditions) have more than offset gradual population increases. Although the City's service area population has been slowly rising, as of 2020 total water use has declined. Usage totaled 15,370 AF in 2000, compared with 14,092 AF in 2020. The 2020 UWMP, which projects water use in the service area in 5-year increments up to the year 2045, reflecting normal year conditions, conservatively predicts a steady increase in water demand due to anticipated population increases in the City. Total City water demand for the years 2030 and 2035 are projected to increase to 14,655 AF and 15,005 AF, respectively. Demand is expected to reach 15,555 by 2045. The overall projection is that the City will continue to experience declining per capita demand in the coming years, aided by the water-saving benefits associated with local High Performance Building Regulations, the MWELO, the local water offset program for new development, and recycled water policies (City of Napa

Utilities Department 2021). According to the 2020 UWMP, in a normal water year, available supplies from the City's surface and imported water sources greatly exceed demand.

According to the 2020 UWMP, the City's supplies can meet projected demands during normal years through 2045. For 5-year drought years starting from 2035 through 2045, modest deficits from 9 to 12 percent are anticipated (City of Napa 2021c). Implementing Stage 1 or 2 of the City's Water Shortage Contingency Plan would provide sufficient water conservation to eliminate these deficits. During single dry years, the City's supplies are only adequate to meet projected demands through 2035. In 2040 and 2045, a small supply shortfall of 150 and 375 AFY exists, respectively, in single dry years. To match projected dry year supplies in 2040 and 2045, the City would need to reduce demands by less than 3 percent. It is assumed that the City can implement adequate water conservation efforts to achieve these demand reductions.

On May 4, 2021, the Napa City Council declared a Moderate Water Shortage due to climatic drought in the area because the winter rainfall of 2019 and 2020 were well below average and were considered dry and critically dry, respectively. Lack of precipitation in the Feather River watershed (which provides virtually all the water delivered by the SWP) and below average snowpack in the Sierra Nevada have put a strain on the City's imported SWP allocation. Locally, much less rain than normal has fallen in the key watersheds of the county. Lake Hennessey is currently at an historically low level. During the summer of 2021, customers voluntarily reduced daily water usage by changing outside irrigation habits, reducing overall water use compared to summer 2020. Also, all City water customers must adhere to Water Waste Prohibitions in accordance with Napa Municipal Code Section 13.10.050.

Key prohibitions included in the code are as follows.

- Do Not irrigate lawns or landscapes on consecutive calendar days;
- Do Not irrigate between the hours of 10 am and 5 pm;
- Do Not irrigate during rain or within 48 hours after measurable rainfall;
- Do Not overwater lawns and gardens to the point of excessive flowing runoff;
- Do Not use drinking water to wash driveways and sidewalks;
- Do Not wash a motor vehicle by hose unless it is equipped with a shutoff nozzle;
- Do Not operate a fountain or decorative water feature unless the water is recirculated; and
- Do Not drain and refill a swimming pool unless needed for repair purposes. (City of Napa 2021d).

The Napa Valley Drought Contingency Plan is being conducted by a task force of local water managers using a grant secured under the U.S. Bureau of Reclamation's Drought Response Program. The plan process prepares local agencies for drought and associated impacts in advance of a crisis. By prioritizing the development of projects and management response actions, the Napa Valley Drought Contingency Plan assists local water managers and provides the tools for long-term drought resilience for the region's water supply. Participating agencies include the Cities of Napa, American Canyon, St. Helena, and Calistoga; the Town of Yountville; Napa County; and NapaSan (Watershed Information and Conservation Council of Napa County 2021).

The U.S. Drought Monitor (a joint effort of the National Drought Mitigation Center, U.S. Department of Agriculture, and National Oceanic and Atmospheric Association) maps drought conditions every

week across California using a five-category system, from Abnormally Dry (D0) conditions to Exceptional Drought (D4). According to the U.S. Drought Monitor, the Planning Area is currently in Exceptional Drought (D4). This category is characterized by "fields are left fallow; orchards are removed; vegetable yields are low; honey harvest is small; fire season is very costly; number of fires and area burned are extensive; fish rescue and relocation begin; pine beetle infestation occurs; forest mortality is high; wetlands dry up; survival of native plants and animals is low; fewer wildflowers bloom; wildlife death is widespread; and algae blooms appear" (National Integrated Drought Information System 2021).

During multiyear droughts, the City's existing water supply is insufficient to meet the needs of the City if a drought cutback in SWP allocation occurs.

Water Quality Protection

The City of Napa works with various entities to address and maintain water quality and protection in the Planning Area. These entities include the Napa County Resource Conservation District and ReScape California. The Napa County Resource Conservation District facilitates community conservation to protect and restore natural resources in a landscape that supports agriculture, urban areas, and wild lands and provides technical assistance, educational programs, monitoring programs, and funding sources to help land managers meet their conservation goals. ReScape California (formerly Bay-Friendly Landscaping and Gardening Coalition) works with public agencies and municipalities, government entities, and communities to establish landscape policy, standards, and best practices. Each year, the City releases an annual water quality report that includes the City's drinking water test results.

Water Distribution

The City's water system includes a network of treatment plants, pipes, tanks, pump stations, fire hydrants, meters, and other facilities that are designed, operated, maintained, repaired, and replaced to provide residents with uninterrupted access to safe, reliable water (City of Napa 2021c). Much of the system has been in service for 60 years or more. A 20-year CIP prioritizes system improvements that are needed to maintain a high level of service and avoid disruptions and large costs associated with failing infrastructure. Current and upcoming water system CIP projects include several water pump station replacements and improvements and Conn Dam Spillway repairs (City of Napa 2021a). The City has updated its 2020 UWMP (as discussed above) based on buildout of the General Plan update and included the following key tasks: review existing water demands; update water use factors; and develop future water demand projections. Follow-on tasks may include performing a hydraulic analysis of the water system, evaluating supply, storage, and pumping capacities, and developing a CIP to address any deficiencies (West Yost Associates 2021c).

Long-Term Supply and Demand

As discussed above, sufficient water supply is available to meet projected demand of the City's water customers under normal years through 2045. For 5-year droughts starting in 2035 through 2045, modest supply deficits would be addressed with demand reduction triggered by the Water Shortage Contingency Plan. During single dry years, the City's supplies are only adequate to meet projected demands through 2035. In 2040 and 2045, a small supply shortfall of 150 and 375 AFY exists, respectively, in single dry years. To meet projected demand during potential dry years in 2040 and 2045, the City would need to reduce demands by less than 3 percent through implementation of water conservation efforts.

Even during recent statewide drought periods, the City was able to meet its demands with the available supplies (e.g., 2013–2017). During extreme dry years, the City has called for voluntary customer demand reductions ranging from 10 to 50 percent. The 2020 UWMP estimated that a population of about 87,000 people was served by City water in 2020. The population of City water customers is projected to increase to just over 101,000 people by 2040, and is based on the projection within the General Plan. This 20-year projection represents an average annual growth rate of under 1 percent per year.

The City expects to meet average potable water demands beyond 2035. During an extreme single dry year, the City expects to have 16,275 AFY available (56 percent of its average supply at buildout). During a multiple dry year period of 5 years, the City expects to have 19,191 AFY in the first year (66 percent of average supply) and then 14,803 AFY in the next 5 years (51 percent of average supply). Under each of these scenarios, the City expects to manage minor supply deficits via its Water Shortage Contingency Plan.

Wastewater

NapaSan serves the wastewater collection, treatment, recovery, and reuse for approximately 83,300 people in a 21-square-mile area that comprises the City and surrounding unincorporated areas.

NapaSan Wastewater Treatment Plant

In 2011, NapaSan completed a WWTP Master Plan, which covers 2010 through 2030 and determines the capacity of existing facilities, estimates future wastewater loads and regulation impacts, and develops a recommended plan for upgrading existing facilities. Increasing recycled water production was also considered in the planning process and would be enhanced in response to user demands.

The WWTP generally has operated in its current treatment configuration since modifications were completed in 2001. A headworks facility (consisting of screens and aerated grit removal) provides preliminary treatment; primary clarifiers provide primary treatment. Secondary treatment is accomplished through a 342-acre facultative pond system, an activated sludge treatment system with two parallel process trains, or a combination of both systems operating in parallel. The filters, followed by disinfection, convert secondary effluent into tertiary effluent for recycled water that is used on several large parcels in the south and east parts of the City mainly for irrigation. NapaSan can store effluent in the oxidation ponds and discharge it to the Napa River (in winter months only) after suspended solids removal and disinfection.

The dissolved air flotation thickener concentrates waste activated sludge before anaerobic digestion, while primary sludge is sent directly to the digester after thickening within the primary clarifiers. Primary sludge and waste activated sludge are digested in an egg-shaped digester, with recovered biogas sent to cogeneration facilities for energy generation and heat recovery. Following dewatering of belt filter presses biosolids are applied to NapaSan-owned land.

The WWTP has two seasonal operation modes: summer reclamation mode and winter river discharge mode. The original WWTP design accommodated these two operational modes as required by the NPDES discharge permit, which prohibits river discharge from May 1 through October 31, except for emergency discharges. During the dry weather months, a portion of the influent wastewater is treated for reclamation while the remainder is treated and stored without

discharge in the Soscol oxidation ponds. During the winter season, NapaSan discharges to the Napa River in preparation for the next dry season and to accommodate wet weather flows.

The WWTP Master Plan includes a Capacity Analysis for the WWTP to determine the existing WWTP capacity while considering how all the processes interact. Unit process capacities are then compared to future projected flow and loading conditions to determine the overall WWTP capacity and to identify future improvement needs. The plan includes the replacement and rehabilitation of existing capital assets as well as the acquisition or construction of new capital assets (Napa Sanitation District 2021b). As of 2022, the recommended projects in the WWTP Master Plan that were identified as necessary to increase capacity at the WWTP to meet 2030 projections have been completed and sufficient capacity now exists at the treatment plan to meet 2030 demand capacity. A new, updated WWTP Master Plan is currently underway to evaluate capacity needs based on 2040 projections and is expected to be adopted in Summer 2022 (DeMaster 2022).

Stormwater

Stormwater infrastructure in the City is primarily managed by the Public Works Department's approximately 22-square-mile network of open ditches, culverts, and underground pipes of various sizes and capacities. Drainage collection in the City's subbasins operates on a gravity system, facilitating stormwater runoff from low-lying or poorly graded areas into natural drainage channels. Runoff water enters the system through ditches or from street storm drains. The runoff is channeled through ditches, culverts, and buried pipes until it is discharged into a natural channel (i.e., the Napa River or one of its tributaries). The tributary creeks are typically maintained in their natural state as open channels, providing a low level of water filtration and wildlife habitat. Another component in the overall storm drainage system includes the creeks and open channels within the City. The City currently does not have jurisdictional or maintenance responsibilities for most creeks and channels; the District is responsible for maintaining portions of Tulocay Creek and Salvador Channel within the City.

The Napa River

Because of the City's geographic location at the mouth of the Napa Valley watershed and because the Napa River slows, bends, and narrows drastically at the Oxbow near downtown Napa, during extended periods of heavy rainfall in the upvalley reaches of the watershed, the City is subject to flooding in areas on the east and west sides of the Napa River from Trancas Street south to Stanly Ranch. The Napa River Flood Management Plan is an ongoing project on the Napa River that began in 1998 to plan for and implement flood protection, drainage improvements, dam safety, and watershed management projects for each community in Napa County and in the unincorporated areas of the County (County of Napa 2021).

Though the County and each of the five cities and towns carry out their own individual stormwater pollution prevention programs, the NCSPPP, which includes measures to control and reduce the potential for pollutants to enter the storm drain system, provides for the coordination and consistency of approaches between the individual participants and documents their efforts in annual reports to the state. The program also addresses stormwater from new development and redevelopment projects.

Electricity, Natural Gas, and Telecommunications

City residents receive electricity and natural gas services from Pacific Gas and Electric Company (PG&E). PG&E provides natural gas and electric service to approximately 16 million people throughout a 70,000-square-mile service area in northern and central California. The City offers a Community Choice Aggregation program through MCE, a public, not-for-profit electricity provider, that gives PG&E customers the choice of having between 50 and 100 percent of their electricity supplies from renewable resources such as solar, wind, bioenergy, geothermal, and hydroelectric as an alternative to PG&E's energy supply. Napa also receives electricity from Western Area Power Administration, a power marketing administrator within the U.S. Department of Energy that markets and transmits wholesale electricity from multiuse water projects to an area encompassing fifteen states via a 17,000-circuit-mile transmission system. The Western Area Power Administration transmits electricity from 57 hydropower plants to customers, including in Napa (Find Energy 2021; Western Area Power Administration 2021). City residents are served by many telecommunications and high-speed internet service providers, including well-known companies such as AT&T, Spectrum, Verizon, and Cox Communications.

Solid Waste

NRWS provides solid waste and recycling services to the City and southern unincorporated Napa County with a contract valid through 2031. They offer recycling and composting services; use trucks that run on compressed natural gas; provide business waste assessments; produce organic compost from yard trimmings, food scraps, and grape pomace; and are working to reach zero waste in Napa.

Trash from the City residents (as well as from Vallejo, American Canyon, and southern unincorporated Napa County residents) is brought to the Napa County Recycling and Transfer Facility on Devlin Road in American Canyon, where it is loaded onto trucks and sent primarily to Potrero Hills Landfill in Suisun City (Solano County) but also to Clover Flat Resource Recovery Park in Calistoga and several other landfills throughout the area. The NRWS facility also provides a mixed C&D processing area where staff sort mixed loads of C&D and self-haul materials to capture recyclable material, such as wood, carpet, plastics, and metal. NRWS recycles mattresses and box springs, and reusable items are pulled aside and sent to St. Vincent de Paul in Eugene, Oregon. Carpet is sorted and shipped for processing into new carpet, carpet padding, plastic lumber, car parts, and additional recycled plastic items. Food scraps, yard trimmings, and other organic materials are turned into compost at the facility. The Napa-Vallejo Household Hazardous Waste Collection Facility accepts household hazardous waste materials at the facility on Devlin Road in American Canyon. Valley Recycling provides additional recycling services and debris boxes in Napa and the surrounding Northern California region (Napa Recycling and Waste Services 2021).

Potrero Hills Landfill provides waste disposal, diversion, and recycling services and is the main recipient of solid waste from City residents. The facility also harvests gas emissions as a renewable energy source for electricity to power homes and industry in Suisun City. In 2016, about 96 percent of Napa's disposed solid waste went to Potrero Hills Landfill. According to CalRecycle, the Potrero Hills Landfill has a remaining capacity of about 13.9 million cubic yards and is expected to remain in operation until 2048. The Clover Flat Resource Recovery Park has a remaining capacity of about 2.8 million cubic yards and is expected to remain in operation until 2047. As such, sufficient solid waste capacity exists to accommodate the community through 2040 (City of Napa 2021f).

3.17.2 Environmental Impacts

This section describes the environmental impacts associated with utilities and service systems that would result from implementation of the General Plan update. It describes the methods used to determine the effects of the General Plan update and lists the thresholds used to conclude whether an impact would be significant. Measures to mitigate (i.e., avoid, minimize, rectify, reduce, eliminate, or compensate for) significant impacts are provided, if applicable.

3.17.2.1 Methods for Analysis

This qualitative analysis of utilities and service systems relies on the City's current General Plan, City website (https://www.cityofnapa.org), available master plan documents, and technical memorandums prepared for the City by West Yost Associates (West Yost Associates 2021a, 2021b, 2021c) as the primary sources of information regarding existing water, sewer, electricity, natural gas, telecommunications, solid waste, and stormwater service systems. The main sources for projected population numbers were from data provided by the City of Napa, ABAG, and the California Department of Finance, as described in Section 3.12, *Population and Housing*.

The analysis in this Draft EIR takes into consideration the proposed General Plan update goals and policies, listed below, to reduce the impact of potential new development on domestic water, wastewater, stormwater, electric energy, natural gas, telecommunications, and solid waste disposal services.

Relevant General Plan Update Goals and Policies

Natural Resources Conservation Element

Applicable General Plan update goals and policies from the Natural Resources Conservation Element related to water supply and stormwater drainage are as follows.

Water Supply

Goal NRC-9: Protect and enhance the City's potable water, surface water, and groundwater quality.

Policy NRC 9-1: Continue to participate in regional efforts to proactively manage surface and groundwater resources and ensure their long-term health and viability. Implement the May 2019 Lake Hennessey and Milliken Reservoir Watershed Study Hydrology and Water Quality Monitoring Plan to ensure long term protection of water quality in watersheds that contribute to municipal drinking water reservoirs. Implementation of the Napa-Sonoma Valley Groundwater Subbasin Groundwater Sustainability Plan being prepared by the Napa County Sustainability Agency.

Goal NRC-10: Promote utilization of green infrastructure and Low Impact Development (LID) strategies; water conservation, reuse, and collection; and other sustainability measures to limit pollution runoff.

Policy NRC 10-1: Support the continuation and expansion of existing recycled water systems into the City limits. Seek incentive programs to encourage usage of recycled water systems.

Policy NRC 10-2: Explore options for water saving and treatment technology when planning future developments to conserve water and keep the City's water safe and clean.

Policy NRC 10-5: Facilitate groundwater by encouraging development projects to use LID practices such as bioretention, porous paving, and rainwater harvesting systems, and by

encouraging private property owners to design or retrofit landscaped or impervious areas to better capture stormwater runoff.

Stormwater Drainage

Goal NRC-10: Promote utilization of green infrastructure and Low Impact Development (LID) strategies; water conservation, reuse, and collection; and other sustainability measures to limit pollution runoff.

Policy NRC 10-3: Preserve natural drainage courses in their natural state wherever feasible.

Policy NRC 10-4: Whenever feasible, incorporate the use of pervious surfaces in public spaces to permit the percolation of urban runoff while implementing best practices for stormwater pollution prevention.

Policy NRC 10-5: Facilitate groundwater by encouraging development projects to use LID practices such as bioretention, porous paving, and rainwater harvesting systems, and by encouraging private property owners to design or retrofit landscaped or impervious areas to better capture stormwater runoff.

Policy NRC 10-6: Reduce stormwater runoff and pollution by incorporating green infrastructure and sustainability strategies for new development and redevelopment, such as trash capture technology in stormwater systems.

Climate Change and Sustainability Element

Applicable General Plan update goals and policies from the Climate Change and Sustainability Element related to water supply, wastewater, electric power, natural gas, telecommunications, stormwater, and solid waste are as follows.

Water Supply

Goal CCS-3: Promote cost-effective, natural methods to improve the City's infrastructure and resilience to climate change, while furthering Napa's goal of a healthier and more sustainable urban environment.

Policy CCS 3-4: Develop standards for, and encourage, recycled (grey) water use and stormwater capture systems in new and existing developments and in areas that do not impact groundwater quality.

Goal CCS-5: Ensure that Napa residents are prepared for climate change-induced drought conditions by reducing water consumption and promoting resilient water supplies.

Policy CCS 5-1: Continue efforts toward water conservation and recycling to meet the City's SB 606/AB 1668 Urban Water Use Objective (2018 Making Water Conservation a California Way of Life legislation). Although Napa does not rely on groundwater and projects adequate supplies to meet growth needs, ensuring that development does not reach the limits of potential supply would ensure resiliency.

Policy CCS 5-2: Strengthen water conservation measures and water conservation education that result in significant reductions in local water use and the protection of local water resources.

Policy CCS 5-3: Provide education, technology, and financial incentives to promote efficient indoor and outdoor residential water use, and adoption of best management practices for commercial, industrial, and institutional water users.

Policy CCS 5-4: Strengthen water distribution system operations and leak detection to meet the City's SB 555 Water Loss Performance Standard.

Policy CCS 5-5: Support expansion of the Napa Sanitation District's recycled water service within the City's service territory and explore options to use reclaimed and recycled water programs for any necessary irrigation of public parks and greenbelts.

Policy CCS 5-6: Continue to reduce energy use by promoting domestic water conservation and requiring water-efficient landscape improvements associated with new construction.

Policy CCS 5-7: Encourage responsible and sustainable agricultural and landscaping practices.

Policy CCS 5-8: Promote a program to encourage neighborhood tree planting and water-efficient landscaping or xeriscaping strategies.

Policy CCS 7-6: Partner with the County of Napa to implement an AB 811 program that makes funding available to residential and commercial property owners seeking to improve their properties to conserve energy and water, and/or install solar systems to generate solar energy.

Wastewater

Goal CCS-3: Promote cost-effective, natural methods to improve the City's infrastructure and resilience to climate change while furthering Napa's goal of a healthier and sustainable urban environment.

Policy CCS 3-4: Develop standards for, and encourage, recycled (grey) water use and stormwater capture systems in new and existing developments and in areas that do not impact groundwater quality.

Goal CCS-5: Ensure that Napa residents are prepared for climate change-induced drought conditions by reducing water consumption and promoting resilient water supplies.

Policy CCS 5-5: Support expansion of the Napa Sanitation District's (NapaSan) recycled water service within the City's service territory and explore options to use reclaimed and recycled water programs for any necessary irrigation of public parks and greenbelts.

Policy CCS 7-8: Convert street lighting, water pumping, water treatment, and other energy-intensive operations to more efficient technologies.

Electric Power, Natural Gas, and Telecommunications

Goal CCS-1: Further the City's sustainability initiatives to reduce the community's GHG emissions, and foster green development patterns – including buildings, sites, and landscapes.

Policy CCS 1-1: Seek to achieve net zero climate pollutants from public and private operations within the City by 2030 and carbon neutrality by 2040, which is five years sooner than what is established under Executive Order B-55-18.

Policy CCS 1-2: The City should lead by example in managing its local government operations to reduce GHG emissions and promote sustainable environmental practices. City-owned infrastructure currently comprises 35 percent of the City's total GHG emissions. Components of this strategy include:

- Develop plans for the reduction of fossil fuel consumption through all aspects of local government operations, including construction, purchasing, and ongoing operations.
- Set clear goals to increase energy efficiency of City-owned buildings by implementing alternative and renewable energy solutions.
- Require new or substantially renovated municipal facilities to incorporate cost-effective strategies for reducing greenhouse gas emissions, conserving energy and water, and utilizing sustainable construction practices.
- Reduce solid waste from City operations.

Policy CCS 1-3: Partner with local, regional, and County agencies and utility companies to achieve GHG reduction targets. Efforts for this include:

- Support local efforts to market programs, and conduct community outreach through schools, nonprofit groups, community organizations, and the business community to increase participation in GHG reduction efforts.
- Partner with the Napa Valley Unified School District, private schools, community-based nonprofit organizations, and others to undertake public outreach and education efforts that broaden community involvement in reducing GHG emissions.
- Foster and build public/private partnerships that help achieve greater energy efficiency and reduce GHG emissions.

Policy CCS 2-4: Support programs that help businesses and organizations switch from fossil fuel-powered fleet vehicles to vehicles powered by clean, renewable energy sources.

Policy CCS 4-4: Use organic waste (green waste, food waste, agriculture waste, and timber waste) for energy production.

Goal CCS-6: Considering power shutdowns that affect the Napa community, promote sustainable energy generation practices and further develop energy security that is resilient to wildfire and related climate disasters.

Policy CCS 6-2: Promote renewable energy generation and storage to decrease reliance on outside sources, and minimize impacts from public safety power shutdowns.

Policy CCS 6-4: Promote renewable energy generation on City-owned sites and the deployment of micro-grids for energy independence and lifeline operations in the event of power shutdowns.

Policy CCS 6-5: Reduce reliance on fossil fuel-powered backup generators by establishing a citywide program to transition to more climate-friendly options—including battery storage, solar-powered generators, and small-scale wind turbines—in appropriate areas.

Policy CCS 6-5: Adopt energy production standards for the City based on quantifiable measures that increase per capita generation levels.

Goal CCS-7: Implement programs and work with jurisdictional partners to increase sustainable energy production and energy security.

Policy CCS 7-1: Pursue State, regional, and federal funding programs designed to reduce energy demand through conservation and efficiency.

Policy CCS 7-2: Conduct audits, and regularly monitor the effectiveness of City and County energy efficiency implementation measures and adapt them to meet targets.

Policy CCS 7-3: In support of countywide energy generation efforts, increase local renewable energy generation.

Policy CCS 7-6: Partner with the County of Napa to implement an AB 811 program that makes funding available to residential and commercial property owners seeking to improve their properties to conserve energy and water, and/or install solar systems to generate solar energy.

Policy CCS 7-8: Convert street lighting, water pumping, water treatment, and other energy-intensive operations to more efficient technologies.

Policy CCS 7-10: Incentivize the use of onsite renewable energy generation for new and existing buildings.

Stormwater

Goal CCS-3: Promote cost-effective, natural methods to improve the City's infrastructure and resilience to climate change while furthering Napa's goal of a healthier and more sustainable urban environment.

Policy CCS 3-1: Study and incorporate green infrastructure practices to reduce pollution runoff into the Napa River, reduce stress on stormwater systems, recharge underground aquifers, and reduce urban heat island effects, while promoting greenery in the community.

Policy CCS 3-2: Require stormwater management techniques that minimize surface water runoff in public and private developments. Utilize low impact development techniques such as bioswales and other best management practices to manage stormwater. Promote technologically advanced stormwater management systems and practices where land area is limited.

Policy CCS 3-4: Develop standards for, and encourage, recycled (grey) water use and stormwater capture systems in new and existing developments and in areas that do not impact groundwater quality.

Policy CCS 7-8: Convert street lighting, water pumping, water treatment, and other energy-intensive operations to more efficient technologies.

Goal CCS-9: Celebrate Napa as Tree City USA and focus efforts to maintain and expand the urban forest.

Policy CCS 9-1: Support development of a Citywide Urban Forest Master Plan, or similar document, to provide detailed information, recommendations, and timelines to effectively manage and grow the City's tree canopy.

Policy CCS 9-4: Utilize trees and vegetation as part of green infrastructure strategies along major roadways and areas with large impervious pavement surfaces to slow rainwater discharge in the Napa River watershed, provide flood-hazard reduction benefits, and help clean the stormwater.

Policy CCS 9-5: Develop a program to finance, manage, and expand the City's street tree canopy as a valuable ecological and public health resource, especially along key corridors with potentially less coverage. Future study areas for a Citywide Urban Forest Master Plan include: Lincoln Avenue between Jefferson Street and Soscol Avenue, Jefferson Street between Claremont Way and Pueblo Avenue, and Soscol Avenue between Lincoln Avenue and Third Street.

Goal CCS-10: Promote efforts to educate property owners, businesses, and residents about the benefits of trees.

Policy CCS 10-2: Recognize the importance and benefits of maintaining and improving the City's urban forest including community, environmental, and economic benefits that range from increasing property values to providing ecological services such as stormwater mitigation, air pollutant removal, and carbon sequestration.

Policy CCS 10-3: Identify Arbor Day and other community engagement strategies/partnerships to increase citizen awareness and participation in urban forestry management.

Solid Waste

Policy CCS 1-2: The City should lead by example in managing its local government operations to reduce GHG emissions and promote sustainable environmental practices.. Components of this strategy include:

- Reduce solid waste from City operations.

Goal CCS-4: Further the City's Solid Waste & Recycling Division goals to promote recycling, composting, and source reduction services for residential and commercial uses to divert 75 percent

(or more) of waste from landfills by 2035 and maintain diversion at 75 percent or greater through 2040.

Policy CCS 4-1: Create and support other programs, such as the Napa County Green Business Program and the green restaurant program, that help achieve the 75 percent or greater overall waste diversion goal. Recognize and incentivize commercial recycling and waste diversion.

Policy CCS 4-2: Establish a comprehensive, user-friendly recycling program that involves all City operations. Recover 75 percent to 85 percent of all waste generated at City operations.

Policy CCS 4-3: Continue to develop a zero-waste strategy for City operations and for permitted events.

Policy CCS 4-4: Use organic waste (green waste, food waste, agriculture waste, and timber waste) for energy production.

Community Services, Parks and Recreation Element

Applicable General Plan update goals and policies from the Public Safety and Emergency Services, Utilities, and Solid Waste and Recycling sections of the Community Services, Parks and Recreation Element related to water supply, wastewater, electric power, natural gas, telecommunications, stormwater, and solid waste are as follows.

General Utilities

Goal CSPR-5: Support utilities and infrastructure that deliver safe and reliable services for current and future residents and businesses.

Policy CSPR 5-1: Safely manage the water supply and services, wastewater, sewer, recycled water, and storm drain infrastructure in a manner that provides for future growth of the City.

Policy CSPR 5-2: Work with power and dry utility providers, property owners, and developers to underground service lines in existing neighborhoods and require undergrounding service lines for new projects where feasible.

Policy CSPR 5-3: Develop and maintain a safe, attractive, and environmentally sensitive drainage system for handling runoff due to seasonal rainstorms, especially runoff in creeks and the Napa River.

Policy CSPR 5-7: Protect existing water supplies by protecting watersheds in cooperation with Napa County and other stakeholders.

Policy CSPR 5-9: Implement new technologies, such as Advanced Meter Infrastructure, that improve efficiency and contribute to water conservation efforts.

Goal CSPR-6: Improve programs to conserve water, especially during drought.

Policy CSPR 6-1: Promote and continue to implement water conservation programs and sustainability measures for businesses and residents to reduce water consumption. Encourage water recycling, reduced water runoff, and low-impact development strategies, and other programs that show promise of saving significant amounts of water at a reasonable cost.

Policy CSPR 6-2: Promote education for residents and businesses on the benefits of conserving water and explore incentives for lowering water usage, especially during multi-year droughts.

Policy CSPR 6-3: Acquire or develop additional water supplies that would be available during drought periods to offset potential shortages anticipated from existing supplies. Water Supply options include:.

1. Acceleration of entitlements from the State Water Project (SWP) through contract modification

2. Pursuing transfer agreements with other State Water Contractors pursuant to the provisions of the Monterey Agreement.
3. Participation in SWP water banking program d. Participation in the SWP Drought Year Projects such as the American Basin Conjunctive Use Project and the Supplemental Water Purchase Program

Policy CSPR 6-5: Through a partnership with the Napa Sanitation District (NapaSan), promote utilization of recycled water for non-potable water needs.

Policy CSPR 6-6: Reduce demands on the NapaSan wastewater system through efficient water use strategies, including:

- Requiring water-conserving design and equipment in new construction.
- Encouraging retrofitting with water-conserving devices.
- Requiring Low Impact Development principles and guidelines during site design.

Solid Waste & Recycling

Goal CSPR-7: Provide for solid waste and recycling services to meet the needs of current and future residents and businesses.

Policy CSPR 7-1: Safely manage solid waste management services in a manner that provides for future growth of the City.

Policy CSPR 7-2: Promote the safe disposal of household hazardous waste through public education.

Goal CSPR-8: Improve programs to reduce waste accumulation in landfills.

Policy CSPR 8-1: Promote sustainability measures for businesses and residents to reduce waste, such as municipal composting, recycling, and expanded education on the benefits of the green waste recycling program.

Policy CSPR 8-2: Promote education for residents and businesses on the benefits of reducing waste, such as Citywide curbside composting.

Policy CSPR 8-3: Encourage businesses to switch from single-use plastic to compostable or other sustainable packaging alternatives.

Policy CSPR 8-4: Promote safe, attractive, and environmentally-sensitive new technologies that help further sustainable practices.

Policy CSPR 8-5: Implement all aspects of SB 1383 (Mandatory Organics) including collection and capture of compostable and recyclable materials from residential, commercial and industrial generators within the City. SB 1383 is broad-reaching in scope with requirements for auditing, enforcement, edible food recovery and local use of organic products like compost and mulch.

Policy CSPR 8-6: Incorporate BioEnergy and dry Anerobic Digestion technology at City's Materials Diversion Facility. Use of these of technologies would capture and create renewable and sustainable energy from compostable organic materials. It would also provide a significant local contribution towards progress on climate action.

Policy CSPR 8-7: Strive to reach the statewide goal of ensuring that 75 percent of solid waste generated is either reduced at source, recycled, or composted from the year 2020 forward, per per AB 341, SB 1383, and the City's own Disposal Reduction Policy (R2012-100).

Safety and Noise Element

Applicable General Plan update goals and policies from the Safety and Noise Element related to stormwater and drainage are as follows.

Goal SN-3: Reduce risk to life and property due to flooding, including inundation resulting from the failure of water supply reservoir dams.

Policy SN 3-1: Seek opportunities to invest in flood prevention infrastructure, including extension of integrated flooding/open space solutions, to reduce impacts from flooding to Downtown Napa and other areas located along the Napa River as part of the Napa River Flood Management Project, and coordinate funding with applicable agencies.

Policy SN 3-2: Update the Storm Drainage Master Plan focusing the City's effort on condition assessment and needed repairs, storm drain capacity improvements to reduce neighborhood flooding, and ensure it is complementary with the Napa River-Napa Creek Flood Protection Project (including both constructed and planned future improvements).

The master plan should be updated on a regular basis to identify capital improvements and associated costs of annual operations and maintenance activities. The plan should explore City and grant funding sources to implement the recommendations of the master plan.

3.17.2.2 Thresholds of Significance

In accordance with Appendix G of the CEQA Guidelines, the proposed General Plan update would be considered to have a significant effect if it would result in any of the conditions listed below.

- Require or result in the relocation or construction of new or expanded water, wastewater treatment or stormwater drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects.
- Potential to result in insufficient water supplies available to serve the Project and reasonably foreseeable future development during normal, dry, and multiple dry years.
- A determination by the wastewater treatment provider that serves or may serve the Project that it has inadequate capacity to serve the Project's projected demand in addition to the provider's existing commitments.
- Solid waste generation in excess of state or local standards, in excess of the capacity of local infrastructure, or that otherwise impairs the attainment of solid waste reduction goals.
- Failure to comply with federal, state, and local statutes and regulations related to solid waste.

3.17.2.3 Impacts and Mitigation Measures

Impact UT-1: Potential to require or result in the relocation or construction of new or expanded water, wastewater treatment, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects or expansion of existing facilities, the construction of which could cause significant environmental effects (less than significant)

Water

Water in the Planning Area is treated among three WTPs: Milliken WTP, Hennessy WTP, and Jamieson Canyon WTP, depending on the water's original source location. Milliken WTP has a treatment capacity of approximately 4 MGD; Hennessey WTP has a treatment capacity of

approximately 20 MGD; and Jamieson Canyon WTP has a treatment capacity of approximately 20 MGD.

As described in Section 3.12, *Population and Housing*, the population of Napa underwent a low (under 1 percent) increase in average annual growth during the last 20 years, and that growth rate is expected to continue under the General Plan update. The specific distribution and timing of projected development that could be permitted under the General Plan update is not known and is difficult to predict; however, if the water system infrastructure is not updated or expanded, a deficit in potable and fire service water supplies could occur, potentially violating Safe Drinking Water Act and Health and Safety Code requirements. This impact would be significant. However, the City's 2020 UWMP, adopted in 2021, establishes the infrastructure necessary to provide the storage, treatment, and transmission facilities to serve future development, maintain overall service reliability, and honor existing export agreements through 2045. Furthermore, by updating the 2020 UWMP based on the General Plan update projections and constructing facilities recommended in the plan, the City ensures that the potable water distribution system can support all future development.

Also, any future proposed projects in the City would be required to undergo the City's project approval process (including CEQA), would be required to comply with existing regulations (including policies and zoning regulations to promote water conservation and green building best practices), and would have to comply with SB 610 and SB 221 to ensure that adequate water supplies are available before approval of certain development. The General Plan update (Natural Resources Conservation; Climate Change and Sustainability; and Community Services, Parks, and Recreation Elements) includes goals and policies regarding water conservation and efficiency and recycled water use that would reduce the consumption of water both for potable uses and irrigation (Section 3.17.2.1, *Methods of Analysis*). Also, publicly adopted water conservation actions due to the current drought, as well as increased availability of recycled water for irrigation and other nonpotable uses, further reduce potable water consumption, increasing the City's potable water supply portfolio and reducing wastewater generation rates. With adherence to the policies and regulations described above for the General Plan update, the approval of the Project would result in a less-than-significant impact regarding the need for relocation or construction of new or expanded water facilities, and no mitigation is required.

Wastewater

As discussed above, the future population of Napa is expected to grow, causing increased demand on the current infrastructure and system operated by NapaSan, where all wastewater is treated. If demand on the NapaSan system increases such that the facility must be expanded, the expansion could result in significant impacts. However, the specific distribution and timing of projected development that could be permitted under the General Plan update is not known, and, thus, the specific wastewater treatment requirements (e.g., size of plant, technology, treatment capacity) cannot be predicted and have not been evaluated for such planned growth. The General Plan update states that City staff shall coordinate with NapaSan when NapaSan updates its planning documents to ensure that the sewer collection system and existing WWTP can accommodate future growth within the City. As more housing units are added to the City, additional capacity improvements may be needed at the WWTP to balance peak flows. If the current wastewater treatment infrastructure operated by NapaSan is not updated, expanded, or improved, the population increase would raise demand and could cause the City to necessitate the expansion of existing facilities, the construction of which could cause significant environmental effects. This impact would be significant.

However, several measures are in place to address this impact. First, NapaSan, in adherence to its mission statement and vision statement, is already planning for or in the process of updating some of its facilities to improve capacity, based on recommendations from its strategic plan, and will continue updating the WWTP Master Plan based on projected growth. These improvements are already underway (including current construction of major sewer system improvements to address known system deficiencies) and would likely occur regardless of the Project. Second, due to the encouragement of publicly adopted water conservation actions due to the current drought, as well as City water conservation mandates and regulations, per capita consumption may fall, easing some demand on the existing system. Third, the City and NapaSan are currently collaborating on opportunities to increase the use of recycled water for nonpotable irrigation and landscaping in the City, which can help offset some wastewater generation and can decrease the amount of treated wastewater that must be discharged to the Napa River because it would instead be diverted to recycled water use. Finally, the City is required to adhere to current General Plan Policy CS-10.3 (Section 3.17.1.1, *Regulatory Setting*), which prevents issuance of a building permit or similar ministerial entitlement unless NapaSan provides a will-serve letter (which NapaSan will not provide if it cannot meet service needs or alternatively places conditions on the development that would result in NapaSan having the required capacity).

The policies and goals relevant to water conservation and wastewater system maintenance, including some that are specific to NapaSan, in the General Plan update (Natural Resources Conservation; Climate Change and Sustainability; and Community Services, Parks, and Recreation Elements) are listed above in Section 3.17.2.1, *Methods of Analysis.* These goals and policies would help reduce the amount of wastewater generated and requiring treatment and would help mitigate the impacts on existing service. Also, the San Francisco Bay RWQCB would ultimately set the specific waste discharge requirements for any new or expanded wastewater treatment facility as part of its permit for that facility. Future wastewater treatment facilities would be required by law to operate in compliance with any and all requirements of the San Francisco Bay RWQCB and its permits. Also, publicly adopted water conservation actions due to the current drought, as well as increased availability of recycled water, may further reduce water use and wastewater generation rates.

With adherence to the applicable goals, policies, and regulations described above in Section 3.17.2.1, *Methods of Analysis,* the approval of the Project would result in a less-than-significant impact regarding the need for relocation or construction of new or expanded wastewater treatment facilities.

Electric Power, Natural Gas, and Telecommunications

As discussed above, Napa's population is expected to continue growing, which will increase the demand on current infrastructure for electricity, natural gas, and telecommunications. If demand increases to the extent that infrastructure or a facility of a service provider, such as that of PG&E, the Western Area Power Administration, or telecommunications providers, must be relocated or expanded, the expansion could result in significant impacts on the environment. However, the specific distribution and timing of projected development that could be permitted under the General Plan update is not known, and, thus, the specific expansions cannot be predicted. Future expansion or construction projects of electric, natural gas, and telecommunications lines and facilities would be required by law to operate in compliance and under permits of the City, and/or the governing bodies of those utilities, such as the Federal Energy Regulatory Commission, California Public Utilities Commission, and FCC, prior to approvals. Current state and local codes address energy conservation in general and efficiency in new buildings, which further reduces wasteful energy use

and relieves the systems of some demand. Current city, state, and federal rebate and incentive programs on energy efficient products and measures also contribute to efforts to reduce energy consumption and demand.

The Climate Change and Sustainability Element of the General Plan update aims to build on the 2012 City of Napa Sustainability Plan and focuses on sustainability with a goal to reduce Napa's carbon footprint in consideration of the impact that new development and projected population growth could have on the environment by implementing sustainable design measures and policies. The General Plan update also supports policies to help ensure that Napa residents have reliable access to power. The General Plan update states that "Napa can reduce its contribution to global climate change, minimize reliance on fossil-fuel sources, and decrease consumption of natural resources." The General Plan update contains goals and policies related to utilities and energy savings that would reduce the Project's impact on the current electricity, natural gas, and telecommunications providers and are listed in Section 3.17.2.1, *Methods of Analysis* (Climate Change and Sustainability and Community Services, Parks, and Recreation Elements).

Therefore, with adherence to the policies and regulations described above, the approval of the Project would result in a less-than-significant impact regarding the need for relocation or construction of new or expanded electric power, natural gas, or telecommunications facilities, and no mitigation is required.

Impact UT-2: Potential to require or result in the relocation or construction of new or expanded stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects (less than significant)

Similar to the discussions under Impact UT-1, the projected population growth would potentially increase demand on the current infrastructure and stormwater drainage system operated by the City, as well as NapaSan, where all wastewater is treated. If demand on the City's stormwater system and/or NapaSan's system increases such that a facility must be expanded, the expansion could result in significant impacts. However, the specific distribution and timing of projected development that could be permitted under the General Plan update is not known, and, thus, the specific stormwater conveyance (e.g., types, number, locations, physical sizes, and designs of future stormwater drainage facilities or potential expansion of existing facilities) and wastewater treatment requirements of future development cannot be predicted. Therefore, the potential environmental impacts of future development cannot be evaluated at this time. However, the City would require all future developments to comply with the requirements of the NCSPPP. Furthermore, the General Plan update supports and promotes the use of *green infrastructure,* which is the use of open spaces, permeable pavement, street tree rain gardens, bioswales, and other natural approaches to capture, infiltrate, and reuse rainwater, instead of relying only on conventional methods for stormwater capture, such as piped drainage and water treatment systems that are designed to move urban stormwater away from the built environment. Green infrastructure reduces and treats stormwater at its source, thus reducing strain on infrastructure while delivering environmental, social, and economic benefits. The Climate Change and Sustainability Element of the General Plan update states: "There are a variety of green infrastructure strategies that can be woven into a community ranging from small-scale individual buildings to large-scale systems. Such strategies include rainwater harvesting, rain gardens, bioswales, planter boxes, permeable pavers, street trees and vegetation, and green streets, parking lots, and roofs. The General Plan supports usage of green infrastructure strategies to help promote a healthier and sustainable urban environment." Goals and policies in the General Plan update would support the City's ability to maintain an adequate level of service, would

potentially reduce the demand on existing stormwater drainage facilities, and would ensure that future development prioritizes the use of green infrastructure in its stormwater management designs. Goals and policies in the General Plan update (Climate Change and Sustainability; Natural Resources Conservation; Community Services, Parks, and Recreation; and Safety and Noise Elements) relevant to stormwater drainage infrastructure are listed above in Section 3.17.2.1, *Methods of Analysis*.

Flooding impacts related to stormwater are discussed in Section 3.9, *Hydrology and Water Quality*.

Additionally, the City is actively working to improve the City's stormwater infrastructure via its Storm Drainage Master Plan and CIP and continuing coordination efforts with the District. Recommended improvements are already underway and would likely occur regardless of the Project. Construction or renovation of future stormwater drainage facilities would be subject to CEQA analysis. Potential impacts would be disclosed, and site- and project-specific mitigation measures would be developed as new projects are put forward. Conventional stormwater drainage facilities typically consist of detention and retention ponds, sometimes with associated recreational facilities, as well as curbs and gutters, stormwater drains, pipelines, and pumping facilities. Impacts are typically related to excavation for basins and pipeline trenches and the installation of curbs and gutters. These environmental impacts include traffic delays, noise, and dust, all of which can be mitigated through implementation of best management practices, such as traffic management plans and dust control practices pursuant to the Bay Area Air Quality Management District requirements, and through mitigation measures. Green infrastructure, as discussed above, could include impacts related to excavation and land disturbance to create rainwater harvesting systems, rain gardens, and bioswales.

Compliance with existing regulations and implementation of the policies described above, and with the existing local, state, and federal regulations identified above, would reduce increases in stormwater velocity and volume to the maximum extent practicable, and compliance with SWRCB regulations would ensure that any new stormwater facilities that were built would not be environmentally harmful. Therefore, the impact of the General Plan update as related to the construction of new stormwater drainage facilities is less than significant, and no mitigation is required.

Impact UT-3: Potential to result in insufficient available water supplies to serve the Planning Area and reasonably foreseeable future development during normal, dry, and multiple dry years (less than significant)

City residents are supplied water from three sources that are used separately or collectively to meet its supply needs: Milliken Reservoir, Lake Hennessey, and water purchased under contract from the SWP. According to 2020 UWMP, in years when reservoirs are nearly full and rainfall is normal, Napa's supplies are currently adequate to meet demands. However, this is not always the case during periods of multiyear droughts, when customers must be asked to reduce usage. Although the City needs additional water supplies to accommodate projected growth during drought years, the overall demand projection is that the City can meet and maintain its demand for water in the coming years to 2045 under normal, dry, and multiple dry year scenarios, aided by public participation in water-saving measures, the water-saving benefits associated with local high performance building regulations, the MWELO, the local water offset program for new development, recycled water policies, and increased use of recycled water for nonpotable uses. Demand management measures and water shortage contingency plans are included in the 2020 UWMP and would be implemented

by the City. Because the 2020 UWMP is based on the General Plan update, the City ensures that water supply projections can support reasonably foreseeable future development.

Because the specific distribution and timing of projected development that could be permitted under the General Plan update is not known, the specific locations for and quantity of future water supply demand cannot be predicted. Therefore, the potential environmental impacts that future projects may present regarding water demand cannot be adequately estimated or evaluated at this time. However, as noted above, it is expected based on the current 2020 UWMP, that the City will be able to meet projected demand under the General Plan update in normal, dry, and multiple dry years to 2045. Also, prior to project approval, future proposed projects would be required to undergo CEQA review and to comply with all federal, state, and local water supply regulations including SB 610 and SB 221 (which determine if a project would be required to complete a WSA prior to project approval). Also, the City would require all new development to comply with all drought and water conservation requirements set forth under state and local regulations. Further, the General Plan update (Natural Resources Conservation; Climate Change and Sustainability; and Community Services, Parks, and Recreation Elements) includes goals and policies regarding water use conservation and efficiency policies that would help ensure that adequate water supplies are available to serve existing and planned development and are listed in Section 3.17.2.1, *Methods of Analysis*.

Therefore, with adherence to the policies and regulations described above, the Project's potential to result in insufficient water supplies available to serve the Project and reasonably foreseeable future development during normal, dry, and multiple dry years is less than significant, and no mitigation is required.

Impact UT-4: Potential to result in a determination by the wastewater treatment provider that serves or may serve the Project that it has inadequate capacity to serve the Planning Area's projected demand in addition to the provider's existing commitments (less than significant)

NapaSan provides wastewater collection, conveyance, and treatment services to the Planning Area. Due to completed upgrades to the WWTP system in the past 10 years the existing WWTP has capacity to handle projected residential, commercial, and industrial water demands through 2030. A new, updated WWTP Master Plan is underway and will contain recommended capacity upgrades for year 2040 projections, including growth anticipated under the General Plan update. Furthermore, publicly adopted water conservation actions due to the current drought, state and local water conservation mandates, and increased use of recycled water, which would divert some water from the system, is anticipated to continue to reduce demand on the current WWTP system. Also, prior to project approval, future proposed projects would be required to undergo CEQA review and the City would require all new development to comply with all drought and water conservation requirements set forth under state and local regulations, which would further reduce wastewater generation in NapaSan's service area.

The specific distribution and timing of projected development that could be permitted under the General Plan update is not known, and, thus, the specific locations for and quantity of future wastewater treatment cannot be predicted. Therefore, the potential environmental impacts that future projects may present regarding wastewater treatment demands cannot be adequately estimated or evaluated at this time.

The policies and goals relevant to water conservation and wastewater system maintenance in the General Plan update (Natural Resources Conservation; Climate Change and Sustainability; and Community Services, Parks, and Recreation Elements) are listed in Section 3.17.2.1, *Methods of Analysis*. Implementation of these goals and policies would help reduce the amount of wastewater generated and reduce the demand on existing service. Therefore, approval of the Project would result in a less-than-significant impact regarding the potential for the General Plan update to result in a determination by the wastewater treatment provider that serves or may serve the Planning Area that it has inadequate capacity to serve the Planning Area's projected demand in addition to the provider's existing commitments. No mitigation is required.

Impact UT-5: Solid waste generation in excess of state or local standards, in excess of the capacity of local infrastructure, or that otherwise impairs the attainment of solid waste reduction goals (less than significant)

Projected population growth under the General Plan update would lead to additional demands for solid waste disposal services. The specific distribution and timing of projected development that could be permitted under the General Plan update is not known, and, thus, the specific potential increase in solid waste disposal needs, including compliance with state and local standards, local capacity, and solid waste reduction goals cannot be predicted. Therefore, the potential environmental impacts on such facilities and programs as a result of the Project cannot be evaluated at this time. If the increased demand exceeds infrastructure capabilities (i.e., landfill capacity) or standards and goals, the impact could be significant.

However, the Potrero Hills Landfill in Suisun City is expected to have adequate capacity until at least 2044. In addition, implementation of state laws and policies to reduce the waste stream and extend the lifespan of the landfill, such as AB 341 (discussed above), are expected to extend the capacity. The City and NRWS have both instituted several programs and policies that have brought the City much closer to zero waste. Goals and policies in the General Plan update (Climate Change and Sustainability and Community Services, Parks, and Recreation Elements) that support efforts to achieve a high level of waste diversion, minimize the generation of waste, increase recycling, encourage composting, and provide for the collection and disposal of solid waste are shown in Section 3.17.2.1, *Methods of Analysis*.

In the future, as Potrero Hills Landfill reaches capacity, the RWQCB will address expansion or closure options. NRWS would also apply to the City for future necessary expansion of their system to meet the City's projected demands. Also, future development in the City would be required to undergo separate environmental review under CEQA to ensure adequate landfill capacity to serve new development prior to approval. The impact would be less than significant, and no mitigation is required.

Impact UT-6: Failure to comply with federal, state, and local statutes and regulations related to solid waste (less than significant)

The City's Recycling and Solid Waste Division is responsible for implementing all solid waste programs in the City. NRWS and the Potrero Hills Landfill are required by their respective permits to operate in accordance with state laws and regulations. The City's municipal code also addresses solid waste diversion requirements and proposed General Plan update policies in the Climate Change and Sustainability and Community Services, Parks, and Recreation Elements (Section 3.17.2.1, *Methods of Analysis*) specify 75 percent diversion of solid waste by 2022 through increased

solid waste recycling and reuse methods, diversion, and overall reduction in waste generation. Therefore, this impact would be less than significant, and no mitigation is required.

3.17.3 References Cited

Brown and Caldwell and Carollo Engineers. 2011. *Wastewater Treatment Plant Master Plan.* Available: https://www.napasan.com/DocumentCenter/View/272/Wastewater-Treatment-Plant-Master-Plan-entire-document-PDF. Accessed: March 5, 2021.

California Department of Resources Recycling and Recovery. 2021. *California's 75 Percent Initiative Defining the Future*. Last updated: February 17, 2021. Available: https://www.calrecycle.ca.gov/75Percent/. Accessed: March 5, 2021.

California Department of Water Resources. 2021. *Model Water Efficient Landscape Ordinance (MWELO)*. Available: https://water.ca.gov/Programs/Water-Use-And-Efficiency/Urban-Water-Use-Efficiency/Model-Water-Efficient-Landscape-Ordinance. Accessed: July 2, 2021.

California Regional Water Quality Control Board, San Francisco Bay Region. 2009. *Tentative Order: Updated Waste Discharge Requirements, Water Quality Certification, and Rescission of Order No. 93-072: Potrero Hills Landfill, Inc. and Waste Connections, Inc.* Available: https://www.waterboards.ca.gov/rwqcb2/board_decisions/tentative_orders/Potrero_Hills/Potrero_Hills.pdf. Accessed: July 21, 2021.

California Water Resources Control Board. 2020. *Governor's Conservation Executive Orders and Proclamations*. Available: https://www.waterboards.ca.gov/water_issues/programs/conservation_portal/executive_orders.html#:~:text=Executive%20Order%20B-37-16%20%2805%2F09%2F16%29%20Sets%20forth%20actions%20to,for%20the%20Governor%27s%20Office%2C%20Legislature%2C%20and%20the%20public. Accessed: December 2, 2021.

City of Napa. 1998. *Napa 2020: City of Napa General Plan*. Incorporates amendments to March 2015.

City of Napa. 2006. *Final Storm Drainage Master Plan*. Prepared by West Yost Associates. Available: https://www.cityofnapa.org/DocumentCenter/View/846/Storm-Drain-Master-Plan-April-2006-PDF?bidId=. Accessed: June 29, 2021.

City of Napa. 2021a. *Capital Improvement Program*. Available: https://www.cityofnapa.org/575/Capital-Improvement-Program. Accessed: July 5, 2021.

City of Napa. 2021b. *Departments*. Available: https://www.cityofnapa.org/148/departments. Accessed: July 2, 2021.

City of Napa. 2021c. *Water Rates*. Available: https://www.cityofnapa.org/605/Water-Rates. Accessed: July 5, 2021.

City of Napa. 2021d. *Water System*. Available: https://www.cityofnapa.org/924/Milliken-Reservoir. Accessed: July 2, 2021.

City of Napa. 2021e. *Municipal Code*. Available: http://qcode.us/codes/napa/. Accessed: July 2, 2021.

City of Napa. 2021f. *Napa General Plan update*.

City of Napa, Public Works Department. 2017. *Urban Water Management Plan 2015 Update*. Available: https://www.cityofnapa.org/DocumentCenter/View/1376/Urban-Water-Management-Program-2015-Update-PDF?bidId=. Accessed: June 29, 2021.

County of Napa, Flood Control and Water Conservation District. 2019. *Napa County Stream Maintenance Manual*. Available: https://www.countyofnapa.org/DocumentCenter/View/20777/Napa-County-Stream-Maintenance-Program-Manual--2019-PDF?bidId=. Accessed: October 28, 2021.

County of Napa. 2021. *Flood and Water Resources*. Available: https://www.countyofnapa.org/1074/Flood-Water-Resources. Accessed: July 5, 2021.

County of Napa, Public Works Department. 2021. *Stormwater*. Available: https://countyofnapa.org/1351/Stormwater-Program. Accessed: July 2, 2021.

Find Energy. 2021. *Napa Electric Overview*. Available: https://findenergy.com/ca/napa-county/electricity/#cities. Accessed: July 23, 2021.

GHD. 2021. *Collection System Master Plan Napa Sanitation District - Project No. 11196327.* Available: http://www.napasan.com/176/Collection-System. Accessed: March 5, 2021.

Larry Walker Associates. 2005. *Napa Sanitation District Strategic Plan for Recycled Water Use in the Year 2020.* Available: http://napasan.com/202/Management-Planning. Accessed: March 5, 2021.

Napa Recycling and Waste Services. 2021. *About Us*. Available: https://naparecycling.com/residents/about-us/. Accessed: July 21, 2021.

Napa Sanitation District. 2021a. *About Us.* Available: https://www.napasan.com/27/About-Us. Accessed: March 5, 2021.

Napa Sanitation District. 2021b. *Operating and Capital Budget*. Fiscal Year 2021/22.

Napa Sanitation District. 2021c. *Napa Sanitation District Strategic Plan 2021 to 2025*. Available: https://www.napasan.com/DocumentCenter/View/927/NapaSan-Strategic-Plan-2021-PDF. Accessed: July 2, 2021.

National Integrated Drought Information System. 2021. *U.S. Drought Monitor*. Week of June 29, 2021. Available: https://www.drought.gov/states/california. Accessed: July 5, 2021.

San Francisco Bay Regional Water Quality Control Board. 2016. Available: https://www.napasan.com/DocumentCenter/View/470/National-Pollutant-Discharge-Elimination-System-PDF. Accessed: July 20, 2021.

San Francisco Bay Regional Water Quality Control Board. 2021. *San Francisco Bay Regional Water Quality Control Board NPDES Wastewater Permit Reissuance Schedule Updated July* 2021. Available: https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/npdes/permit_schedule_7-21. Accessed: December 2, 2021.

State Water Resources Control Board. 2021a. *Sanitary Sewer Overflow Reduction Program.* Available: https://www.waterboards.ca.gov/water_issues/programs/sso/. Accessed: March 5, 2021.

State Water Resources Control Board. 2021b. *State and Regional Water Boards Map*. Available: https://www.waterboards.ca.gov/waterboards_map.html. Accessed: July 5, 2021.

United States Environmental Protection Agency. 2018. *America's Water Infrastructure Act of 2018*. Available: https://www.epa.gov/ground-water-and-drinking-water/americas-water-infrastructure-act-2018-awia. Accessed: December 2, 2021.

Watershed Information and Conservation Council of Napa County. 2021. Available: https://www.napawatersheds.org/water-conservation. Accessed: July 5, 2021.

West Yost Associates. 2021a. *Technical Memorandum: City of Napa General Plan Update Sewer and Wastewater Treatment EIR Support*.

West Yost Associates. 2021b. *Technical Memorandum: City of Napa General Plan Update Stormwater and Flood Control EIR Support*.

West Yost Associates. 2021c. *Technical Memorandum: City of Napa General Plan Update Potable Water EIR Support*.

West Yost Associates. 2022. *2020 Urban Water Management Plan*. Prepared for City of Napa. January. Available: https://www.cityofnapa.org/DocumentCenter/View/9266/2020-UWMP-PDF?bidId=. Accessed: February 14, 2022.

Western Area Power Administration. 2021. *About Us*. Available: https://www.wapa.gov/About/Pages/about.aspx. Accessed: July 23, 2021.

3.17.3.1 Personal Communications

DeMaster, Douglas. City of Napa Water Department. 2022—personal communication.

3.18 Wildfire

3.18.1 Existing Conditions

3.18.1.1 Regulatory Setting

Federal

No federal regulations pertaining to wildfire are applicable.

State

Emergency Services Act

Under the California Emergency Services Act, the state developed an emergency response plan to coordinate emergency services provided by all governmental agencies. The plan is administered by the California Office of Emergency Services (OES). OES coordinates the responses of other agencies, including EPA, the Federal Emergency Management Agency (FEMA), the California Highway Patrol (CHP), regional water quality control boards, air quality management districts, and county disaster response offices. Local emergency response teams, including fire, police, and sheriff's departments, provide most of the services to protect public health.

The Napa Fire Department (NFD) serves as emergency management coordinator for the City of Napa and is the lead agency fulfilling the City's requirements under the Emergency Services Act (Government Code Section 8550 et. seq.). NFD works with all City departments and other mutual aid partners that have emergency management responsibilities, including the Napa County OES. The Napa County OES provides information about emergency preparedness, response, and recovery, maintains and updates county emergency plans as needed, and trains the community for disasters.

California Public Resources Code—State Responsibility Area

The California Public Resources Code (PRC) requires the designation of State Responsibility Areas (SRAs), which are identified based on cover, beneficial water uses, probable erosion damage, and fire risks and hazards. The financial responsibility of preventing and suppressing fires in an SRA is primarily the responsibility of the state. Fire protection in areas outside SRAs are the responsibilities of local or federal jurisdictions and are referred to as local responsibility areas and federal responsibility areas, respectively.

California Public Resources Code Sections 4201–4204

This section of the PRC was amended in 1982 to require the California Department of Forestry and Fire Protection (CAL FIRE) to classify Fire Hazard Severity Zones within SRAs. Lands within SRAs are classified in accordance with the severity of fire hazard present to identify measures to be used to retard the rate of spreading and reduce the potential intensity of uncontrolled fires that threaten to destroy resources, life, or property.

Very High Fire Hazard Severity Zones

Government Code Section 51178 requires CAL FIRE to identify very high fire hazard severity zones in the state. Very high fire hazard severity zones shall be based on fuel loading, slope, fire weather, and other relevant factors including areas where Santa Ana, Mono, and Diablo winds have been identified by CAL FIRE as a major cause of wildfire spread. Government Code Section 51179 requires a local agency to designate, by ordinance, very high fire hazard severity zones in its jurisdiction. Under the FRAP, CAL FIRE has designated the Planning Area as a non-very high fire hazard severity zone (NON-VHFHSZ).

Local

Napa General Plan

The following goals and policies excerpted from the Community Services, Natural Resources and Health and Safety Elements of the current General Plan pertain to wildfire.

Community Services

Goal CS-2: To ensure community order and public safety in Napa.

Policy CS-2.2. The City shall endeavor to maintain a police and fire force sufficiently staffed and deployed to strive to provide a five-minute maximum response time to any call involving an immediate danger of loss of life or serious injury (response time means from the time the call is received in dispatch to the time the first emergency unit is on the scene).

Goal CS-5: To provide emergency fire suppression services to protect life and property within the City.

Policy CS-5.1. The City shall maintain adequate personnel and equipment necessary to provide fire suppression services for the City of Napa.

Policy CS-5.2. The City shall continue to provide personnel training to maintain optimum preparedness for emergency response.

Policy CS-5.3. The City shall maintain and upgrade equipment as needed to continue efficient mobilization of trained personnel to life safety incidents.

Policy CS-5.4. The City shall provide for adequate emergency vehicle access and public egress in new development.

Policy CS-5.6. The City shall provide for an adequate fire flow system throughout the community, to meet the fire flow requirements of the California Fire Code.

Policy CS-5.7. The City shall continue to require built-in fire protection using automatic fire sprinklers, Class A roofing, fire-resistant building materials, and similar measures.

Policy CS-5.8. The City shall continue to maintain mutual and/or automatic aid agreements with CalFire, the County of Napa, and other local agencies.

Goal CS-6: To prevent fires and maintain safe neighborhood conditions through the use of community-oriented educational and involvement programs.

Policy CS-6.1. The City shall minimize potential property damage, injuries, and loss of life due to fire through fire prevention practices and ongoing educational and public involvement programs.

Policy CS-6.2. The In areas with inadequate fire flows, including those above 300-feet in elevation, the City shall require new development to incorporate design alternatives that will provide the necessary fire flows for both building fire sprinklers and fire hydrants.

Policy CS-6.3. The City shall continue to improve the availability and clarity of fire standards and promote early consultation between the development community and fire prevention staff to ensure that fire protection concerns are considered during project design.

Policy CS-6.7. The City shall continue to participate in and support the Napa Communities Firewise Foundation in their efforts to inform, educate and prepare individuals from the effects of wildfire.

Natural Resources

Policy NR-1.11. The City shall continue to enforce the Fire Prevention Abatement program to protect riparian habitat from destruction by fire.

Health and Safety

Goal HS-5: To reduce the risk to life and property from wildland fires.

Policy HS-5.1. The City shall require that development in wildland urban interface areas provides adequate access roads, onsite fire protection systems, signage, ignition resistant building materials, and defensible space.

Policy HS-5.2. The City shall continue to implement the California Fire Code, Building Code and all other applicable Codes, Standards and local Amendments as the City's minimum regulations for fire prevention and suppression.

Policy HS-5.3. The City shall implement the requirements of Chapter 7A (Materials and Construction Methods for Exterior Wildfire Exposure) if the California Building Code in or adjacent to Wildland/Urban Interface areas.

Environmental Setting

Government Code Sections 51175-89 advises CAL FIRE, to identify areas, or zones, of very high fire hazard severity potential under the Fire and Resources Assessment Program (FRAP). These zones are mapped and identified based on expected burn probabilities, potential fuels over a 30–50-year time period, and their correlated expected fire behavior, to better predict the possible vegetation fire exposure to buildings and developments. Under the FRAP, CAL FIRE has designated the Planning Area as a non-very high fire hazard severity zone (NON-VHFHSZ). This indicates that the Planning Area is not in a very high fire hazard severity zone, and that the probability of a wildfire affecting the incorporated City is very low.

The western and southeastern borders of the Planning Area are adjacent to moderate fire hazard severity zones, while the remaining northern, eastern, and southern portions of the Planning Area are undesignated. All Moderate, High, and VHFHSZ s are under the financial responsibility of the state for fire protection and prevention in areas called State Responsibility Areas (SRAs). Only VHFHSZ s are under the responsibility of the local jurisdiction for fire protection and prevention.

Notwithstanding the Planning Area's designation as a NON-VHFHSZ, in October 2017, several major wildfires occurred in the Napa County region. Three major wildfires occurred within proximity of the Planning Area: the Nun's Fire, the Patrick Fire, and the Atlas Peak Road Fire. The Nun's Fire was suspected of originating less than 0.5 mile north of Highway 12, northwest of the Planning Area. The fire burned 56,216 acres and resulted in three fatalities. The Patrick Fire burned along the west side of the City of Napa on Patrick Road. The fire burned 10,000 acres and destroyed several homes before merging with the Nun's fire. The two merged fires cumulatively affected nine wineries within the area, resulting in the destruction of buildings and infrastructure.

The Atlas Fire originated on Atlas Peak Road, east of the Planning Area. The fire burned 51,624 acres and resulted in six fatalities. The fire also affected 10 wineries, with one winery, VinRoc, completely destroyed.

Although the Planning Area is not designated as being located within a VHFHSZ by CAL FIRE, the City of Napa considers wildfire to be a serious risk to life and property. The City considers the densely developed perimeters of the Planning Area to the east and to the west as particularly susceptible to damage from wildfires.

3.18.2 Environmental Impacts

3.18.2.1 Methods for Analysis

The analysis of wildfire is based on a review of the *Draft Preferred Plan* (2021), review of the *Existing Conditions Report* (Dyett & Bhatia, et al, 2019), and database research prepared in compliance with federal, state, and local ordinances and regulations and professional standards pertaining to wildfire. The California Supreme Court held in a 2015 decision (California Building Industry Association v. Bay Area Air Quality Management District (2015) 62 Cal.4th 369, Case No. S213478) that effects of the existing environment on a project's future users or residents does not constitute an impact under CEQA unless a proposed project risks exacerbating those environmental hazards or conditions that already exist. When a proposed project would exacerbate the environmental hazards or conditions, the potential impacts of such hazards must be evaluated. Accordingly, this impact analysis considers whether the Project would exacerbate hazards.

The environmental baseline for the analysis consists of fringe and infill areas of the City where wildfire has the potential to occur in the Planning Area and that are identified in the General Plan and other sources cited above in *Environmental Setting*.

Relevant General Plan Update Goals and Policies

Applicable General Plan update goals and policies from the Safety and Noise Element are as follows.

Fire

Goal SN-5: Work to prevent urban fires and exposure to wildfires, as well as protect life and property from fire dangers.

Policy SN 5-1: Implement best practices to aggressively address wildfire prevention on open space land within and around the City.

Policy SN 5-2: Facilitate communication and education to the community about fire safety, wildland fire protection measures, and evacuation/emergency response to wildland fires.

Policy SN 5-3: Continue to educate property owners and the public about local fire hazard prevention programs, vegetation management strategies, and other disaster preparation activities in areas threatened by wildfire.

Policy SN 5-4: Ensure that future development plans provide adequate evacuation routes, vegetation management policies, and fire-reduction design measures, as appropriate.

Policy SN 5-5: Regularly assess adequacy of emergency response and evacuation routes and identify any need for road extensions to serve neighborhoods that do not have sufficient evacuation routes or access for emergency services.

Policy SN 5-6: Support extending Linda Vista Avenue to Browns Valley Road to serve areas north of Napa Fire Station 5 to improve the provision of emergency fire service.

3.18.2.2 Thresholds of Significance

In accordance with Appendix G of the State CEQA Guidelines, the Project would be considered to have a significant wildfire effect if it would result in any of the conditions listed below. If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the Project:

- Substantially impair an adopted emergency response plan or emergency evacuation plan.
- Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire.
- Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment.
- Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes.

3.18.2.3 Impacts and Mitigation Measures

Impact WF-1: Substantially impair an adopted emergency response plan or emergency evacuation plan (less than significant)

See Impact HAZ-6 in Section 3.8, *Hazards and Hazardous Materials*. The impact is less than significant.

Impact WF-2: Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose Project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire (less than significant)

As under the existing General Plan, the General Plan update would lead to future residential, commercial, industrial, park, and other uses within the City limits and then beyond when future lands within the Planning Area are annexed into the City. Under the FRAP, CAL FIRE has designated the Planning Area as a non-very high fire hazard severity zone (NON-VHFHSZ). This indicates that the Planning Area is not in a very high fire hazard severity zone, and that the probability of a wildfire affecting the incorporated City is very low. The western and southeastern borders of the Planning Area are adjacent to moderate fire hazard severity zones, while the remaining northern, eastern, and southern portions of the Planning Area are undesignated. Implementation of the General Plan update would not exacerbate wildfire risks. The City's topography is relatively flat with the eastern and western sides increasing in elevation into the foothills. The City's high temperatures and sunlight during summer months combined with low rainfall could create an environment prone to wildfires by drying and pre-heating combustible material. The windiest parts of the year are during the drier parts of the year, which could exacerbate wildfire risks. However, given that the Planning Area is largely urbanized and paved, wildfire threats within City limits are minimal.

Notwithstanding the Planning Area's designation as a NON-VHFHSZ, in October 2017, several major wildfires occurred in the Napa County region. Three major wildfires occurred within proximity of

the Planning Area: the Nun's Fire, the Partrick Fire, and the Atlas Peak Road Fire. Therefore, the City of Napa considers wildfire to be a serious risk to life and property.

Implementation of the General Plan update would not exacerbate wildfire risks due to slope, prevailing winds, and other factors. Several policies in the General Plan update address potential fire hazards. Policy SN 5-1 would implement best practices to aggressively address wildfire prevention on open space land within and around the City. Policy SN 5-2 facilitates communication and education to the community on fire safety, wildland fire protection measures, and evacuation/emergency response to wildland fires. Policy SN 5-3 would continue to educate property owners and the public about local fire hazard prevention programs, vegetation management strategies, and other disaster preparation activities in areas threatened by wildfire. Policy SN 5-4 would ensure that future development plans provide adequate evacuation routes, vegetation management policies, and fire-reduction design measures. Policy SN 5-5 would assess the adequacy of emergency response and evacuation routes. Policy SN 5-6 would explore the feasibility of extending Linda Vista to Browns Valley Road to serve areas north of Napa Fire Station 5 to improve provision of emergency fire service. Implementation of these policies combined with the California Building Code standards and the review of all new structures and land uses in the Planning Area, by the Napa Fire Department would ensure that the exacerbation of wildfire risks, including exposure of project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire, would be less than significant and no mitigation would be required.

Impact WF-3: Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment (less than significant)

As described above, the Planning Area is in a NON-VHFHSZ. Implementation of the General Plan update would allow future development that may require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk. However, future discretionary projects facilitated by the Project would be evaluated for project-specific wildfire impacts at the time they are proposed.

As discussed in Impact WF-2, there are several General Plan update policies that address potential fire hazards. Implementation of these policies combined with the California Building Code standards and the review of all new structures and land uses in the Planning Area by the Napa Fire Department would ensure that any exacerbation of fire risk associated with the installation or maintenance of associated infrastructure would be minimized. This impact would be less than significant, and no mitigation would be required.

Impact WF-4: Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes (less than significant)

The City's topography is relatively flat with the eastern and western sides increasing in elevation into the foothills. Although the Planning Area is not designated as being located within a VHFHSZ by CAL FIRE, the densely developed perimeters of the Planning Area along the Silverado Trail to the east and Redwood Road to the west are particularly susceptible to damage from wildfires. The General Plan update seeks to concentrate new development along key corridors (i.e., Jefferson and Trancas Street and Soscol Avenue), in Downtown, and selected additional opportunity sites while

infusing existing neighborhoods with focused infill development. Future development as a result of the General Plan update would not exacerbate downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or other related risks as development would not be encouraged in areas susceptible to these risks. Future discretionary projects facilitated by the Project would be evaluated for project-specific wildfire impacts at the time they are proposed.

The City is in the process of updating their Hazard Mitigation Plan (HMP) (City of Napa Fire Department 2021). The HMP provides background information on wildfire in the region, local conditions relating to wildfire, fire behavior in the wildland-urban interface (WUI), public safety power shutoffs (PSPS), wildfire protection responsibility in California, applicable codes and regulations, wildfire events in the past, and hazard mitigation to reduce vulnerabilities from wildfire with a prescription of policies and physical projects.

As discussed in Impact WF-2, there are several General Plan update policies that address potential fire hazards. Implementation of these policies combined with the California Building Code standards and the review of all new structures and land uses in the Planning Area, by the Napa Fire Department would ensure that risks from downslope or downstream flooding or landslides, because of runoff, post-fire slope instability, or drainage changes would be less than significant, and no mitigation would be required.

3.18.3 References Cited

City of Napa Fire Department. 2021. *City of Napa Hazard Mitigation Plan Update*. Available: https://documentcloud.adobe.com/link/review?uri=urn:aaid:scds:US:63ce3249-f5a8-4ff2-b4d0-3224848a9a79#pageNum=1. Accessed: December 6, 2021.

Dyett & Bhatia, et al. 2019. *Existing Conditions Report*. Prepared for the City of Napa. March.

Chapter 4
Alternatives Analysis

CEQA requires that an EIR examine a reasonable range of feasible alternatives to a project or project location that could substantially reduce one or more of the project's significant environmental impacts while meeting most or all of its objectives. The EIR is required to analyze the potential environmental impacts of each alternative, though not at the same level of detail as the project. However, there must be sufficient detail to enable comparison of the merits of the respective alternatives.

The key provisions of CEQA Guidelines Section 15126.6 that relate to alternatives analyses are summarized below.

- The discussion of alternatives shall focus on alternatives to the project or project location that are feasible, would meet most or all of the project objectives, and would substantially reduce one or more of its significant impacts.
- The range of alternatives must include the No Project Alternative. The no project analysis will discuss the existing conditions at the time the notice of preparation was published, as well as conditions that would reasonably be expected to occur in the foreseeable future if the project were not approved, based on current plans and consistent with available infrastructure and community services. The No Project Alternative is not required to be feasible, meet any of the project objectives, or reduce the project's expected impacts to any degree.
- The range of alternatives required is governed by a "rule of reason." The EIR must evaluate only those alternatives necessary to permit a reasoned choice. An EIR is not required to analyze every conceivable alternative to a project.
- An EIR does not need to consider an alternative that would not achieve the basic project objectives, for which effects cannot be reasonably ascertained, or for which implementation is remote and speculative.

4.1 Land Use Strategies and Impacts

4.1.1 Land Use Strategies

The City of Napa's (City) purpose in proposing the Project is to comprehensively update the General Plan's goals, policies, and programs to reflect the City's preferences for future development and to conform to current state law. The General Plan has the following fundamental objectives.

1. New development is focused within downtown, aging commercial areas, or where large, vacant surface parking lots exist. An integrated mix of uses, including housing, employment, and commercial uses, are envisioned in these areas. Emphasis would be on creating pedestrian-friendly environments and parking would be incorporated in a safe, aesthetic, and cohesive manner. Housing will cater to people of all incomes and abilities and at various stages of life.

2. Key spines—such as Trancas Street and Soscol Avenue—are envisioned as memorable, tree lined boulevards, providing shaded and comfortable walking environments, and accommodating transit and bicycle paths. Pedestrian paths will connect downtown, neighborhoods, the Napa River, and other destinations.
3. The existing character of historic neighborhoods will be preserved while allowing for more housing options and expanded use of historic properties.
4. The Business Professional designation would focus on medical, technology, health and wellness, and professional services. Businesses with linkages to development and technology production is emphasized.
5. Residential areas will remain in residential use, but with opportunities to build a greater diversity of housing types. Small-scaled, home-based businesses will foster business incubation and work-from-home lifestyle.
6. Vibrant commercial uses, such as car dealerships and retail, will be retained with opportunities to grow and modernize.
7. Jefferson Street is envisioned as a walkable street, with locally-oriented retail and restaurants, and opportunities for housing in a mixed-use setting.
8. Development adjacent to the Napa River is to be oriented towards the river, enhancing public access and enjoyment of the waterfront.
9. The light industrial areas around Lincoln Avenue and Soscol Avenue would offer production and maker uses, while allowing compatible new residential, commercial, office, and industrial uses. Hospitality commercial uses will extend along the Napa River Trail.

4.1.2 Significant Impacts

Alternatives provide a means of avoiding or substantially reducing the level of one or more significant impacts that would otherwise result from implementation of the Project; however, the Project would not result in significant and unavoidable impacts under any resource category as the General Plan policies have been designed to mitigate any potential impacts from implementation of the General Plan.

4.2 Methodology and Screening Criteria

A range of potential alternatives was developed and subjected to specific screening criteria. The Draft EIR preparers considered several representative alternatives. The following criteria were used to screen potential alternatives.

- Does the alternative meet most or all of the Project objectives?
- Is the alternative potentially feasible?
- Would the alternative substantially reduce one or more of the significant environmental impacts associated with the Project?

According to CEQA Guidelines Section 15364, *feasible* is defined as "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic,

environmental, legal, social, and technological factors." CEQA does not require that an EIR determine the ultimate feasibility of a selected alternative, but rather that an alternative be potentially feasible. Accordingly, no economic studies have been prepared regarding the economic feasibility of the selected alternatives.

The significant effects of the Project may include those that are significant and unavoidable as well as those that are less than significant with mitigation. The alternative should provide a means of reducing the level of impact that would otherwise result from the Project. Those alternatives that meet the Project objectives, that are potentially feasible, and that would reduce one or more Project impacts are discussed in greater detail in the following sections.

4.3 Alternatives Considered but Rejected

Alternative Locations. State law requires the City to adopt a long-range, comprehensive general plan. The City is authorized to adopt specific plans that are consistent with the General Plan. The Project consists of an update of the City of Napa General Plan. Consideration of an alternative location for the General Plan is not feasible because the General Plan must address the lands within the City limits and any adjoining land that is of planning interest to the City.

4.4 Alternatives Analyzed in this Draft EIR

4.4.1 Alternative 1—No Project Alternative

Consistent with Section 15126.6(e)(2) of the CEQA Guidelines, the No Project Alternative represents what would be reasonably expected to occur in the foreseeable future if the General Plan update were not adopted and the City's current General Plan were left unchanged and in use. This alternative would retain all current land use designations and definitions from the current General Plan as amended to date, and future development in the Planning Area would continue to be subject to existing policies, regulations, development standards, and land use designations of the existing General Plan.

Like that of the General Plan update, the analysis of the No Project Alternative compares the alternative to existing conditions in the City and to the Project. The impacts of the No Project Alternative are examined qualitatively to allow comparison with the General Plan update.

The No Project Alternative consists of retaining the current General Plan, including the 2015–2023 Housing Element and the various subsidiary plans (e.g., Downtown Specific Plan, Big Ranch Specific Plan) unchanged. Future development would be consistent with the population density and land use intensity set out in the current General Plan and its subsidiary land use plans.

4.4.1.1 Aesthetics

There are important viewsheds within the Planning Area, such as those of historic resources, vineyards, the Napa River, and hillsides, that contribute to the aesthetic quality of Napa. Development under the No Project Alternative would allow development in areas currently used for agriculture, which could affect the rural visual character in the Planning Area. The No Project Alternative would maintain all land use designations from the existing General Plan. The No Project

Alternative could result in the conversion of existing open lands in the Planning Area, primarily at the periphery of the City limits. This conversion of undeveloped lands to urban (i.e., residential, commercial, other) uses, could adversely affect the scenic vistas from those lands and the visual experience of viewers. The existing General Plan includes Policy LU-1.5 to establish gateway and scenic corridor design guidelines for both public and private development to ensure attractive entrances to the City, and Policy LU-1.6 to designate State Route (SR) 29, SR 121, and SR 221 as scenic corridors. Policy PR-7.10 calls for the City to design and construct public improvements that will enhance the aesthetics of pedestrian access to cultural districts. However, future development under the No Project Alternative would be significant and unavoidable.

The No Project Alternative would have more significant impacts than the Project because the General Plan update would ensure that new development would achieve higher standards of visual quality and would meet higher standards for light and glare reduction than under the existing General Plan.

4.4.1.2 Air Quality

The San Francisco Bay Area Air Basin (SFBAAB) is in marginal nonattainment for ozone (8-hour) and moderate nonattainment for particulate matter with a diameter of 2.5 micrometer or less ($PM_{2.5}$) under federal air quality standards. The SFBAAB is in nonattainment for ozone (8-hour), particulate matter with a diameter of 10 micrometers or less (PM_{10}) and $PM_{2.5}$ under State air quality standards. The Bay Area Air Quality Management District (BAAQMD) is responsible for ensuring that the national ambient air quality standards (NAAQS) and California ambient air quality standards (CAAQS) for these pollutants are met. For the purposes of land use planning, the BAAQMD has established advisory emission thresholds to assist CEQA lead agencies in determining the level of significance of a project's emissions with respect to the NAAQS and CAAQS.

The BAAQMD's 2017 Clean Air Plan contains 85 control measures aimed at reducing air pollution in the SFBAAB. The control measures are categorized based on the following sectors: stationary sources, transportation, energy, buildings, agriculture, natural and working lands, waste management, water, and super-GHG pollutants. Under the No Project Alternative, existing General Plan policies would apply, including those that support emissions reductions in criteria pollutants and toxic air contaminants as well as generation of objectionable odors; comply with BAAQMD rules and regulations; encourage alternatives to single-occupancy vehicles; and promote energy conservation (existing General Plan Goal NR-5). These policies, along with other elements of the existing General Plan, would continue to support the 2017 Clean Air Plan.

In addition to compliance with these control measures, BAAQMD CEQA Guidelines require a project to show that the projected increase in VMT or vehicle trips (either one) would be less than the increase in projected population for the planning period. As shown in Table 4.4-1, the No Project Alternative would result in a moderate amount of growth compared to the Project. Specifically, service population (residents and jobs) growth would be 19.1 percent, while total vehicle trips (including both residential and non-residential trips) would increase by 21.4 percent; therefore, the increase in vehicle trips is greater than the projected increase in population. Therefore, the No Project Alternative would have the potential to result in increased criteria pollutant emissions and elevated risk of sensitive receptors exposed to toxic air contaminants and other local hazards that would conflict with the primary goals of the regional air quality control plan. Furthermore, the existing General Plan would not include VMT reduction strategies included in the Project such as

those that reduce single-occupancy vehicle trips. As such, the No Project Alternative would have a significant and unavoidable impact on air quality greater than that of the Project.

Table 4.4-1. Comparison of Vehicle Trips and Population, 2015-2040

		Projected (2040)		
	Existing (2015)[1]	Project	No Project	Higher Infill
Service Population[2]	113,837	147,422	135,592	149,351
Percent Increase		*29.5%*	*19.1%*	*31.2%*
Vehicle Trips[2]	288,160	361,918	349,785	386,394
Percent Increase		*25.6%*	*21.4%*	*34.1%*

1. Data in this table was provided by DKS Associates based on inputs that were used for the regional transportation model, the Solano Napa Activity Based Model, which uses an existing baseline of 2015. These values are used for analysis of air quality impacts to accurately reflect the relationship between population and vehicle trips. Therefore, it is noted that the projected population in this table differs from the Project buildout population (Table 4-2).
2. Includes both residents and employees/non-residential.
Source: DKS Associates, 2021.

4.4.1.3 Biological Resources

The No Project Alternative would result in new development pursuant to the existing General Plan. Existing Natural Resources Element Goal CNR-1 (to manage the natural resources, wetlands and open space areas in and around the City to preserve and enhance plant and wildlife habitats) and its related policies requiring the consideration and conservation of biological resources would regulate the impacts of that development through federal and state laws (e.g., the federal Clean Water Act, the federal and California Endangered Species Acts, Migratory Bird Treaty Act). New development projects under the existing General Plan and General Plan update would be subject to project-specific CEQA review and incorporate mitigation as applicable, and would be required to obtain any necessary federal and state permits prior to proceeding. The impact would be less than significant.

The No Project Alternative could have greater impacts on biological resources from new development in the City than the Project, because the General Plan update would expand existing General Plan policies to provide greater protection for sensitive biological resources, including special-status species habitats, oak woodlands, riparian communities, wetlands, non-wetland waters, wildlife movement corridors, and significant trees (e.g., Policies CSPR 9-7, LUCD 5-3, NRC 1-1, NRC 1-2, NRC 1-5, NRC 1-7, NRC 1-8, NRC 2-1, NRC 2-2, NRC 2-3, and NRC 4-3). Impacts from the introduction or spread of invasive plant species would be similar under both the No Project Alternative and the Project because neither include specific policies addressing invasive plant species.

4.4.1.4 Cultural Resources

The No Project Alternative would result in new development pursuant to the existing General Plan. Although new development would be subject to Policy PR-3.10 (the City shall address conservation of sensitive natural and cultural resources in specific and detailed development) of the Parks and Recreation Element, there are most likely unknown cultural resources within the Planning Area that could be adversely affected by new development. Cultural resources include buildings and structures, historic landscapes, archaeological sites, artifacts, and documents. Future development under the existing General Plan, similar to the General Plan update, would be subject to CEQA and

require mitigation to reduce potential impacts to cultural resources; therefore, the impact would be similar to the Project and less than significant with mitigation.

Although future development under the No Project Alternative would be subject to CEQA and require mitigation to reduce potential impacts to cultural resources, the No Project Alternative could have greater impacts on cultural resources from new development and likely require additional mitigation to reduce those impacts to a less-than-significant level than would the Project. The General Plan update would expand existing General Plan policies to provide greater protection for important cultural resources, including archaeological and architectural built environment resources. Impacts from existing General Plan activities would be similar under both the No Project Alternative and the Project.

4.4.1.5 Energy

New development under the No Project Alternative would result in the increased consumption of electricity, natural gas, and gasoline similar to the Project. Existing General Plan policies under Land Use Element Goal LU-11 (enhance and improve sustainable practices in Napa to minimize long term effects of development) encourage green building, energy conservation, recycling measures and alternate and renewable energy producing systems, and development patterns that provide for resource conservation. Existing General Plan policies H2.15 and H3.9 of the Housing Element encourage mixed-use and higher-density residential construction to facilitate pedestrian, transit and bicycle use, in addition to green building programs and sustainable building design and siting. Existing General Plan policies under Natural Resources Element Goal NR-5 (to maintain acceptable levels of air quality in Napa) encourage the use of mass transit, bicycle facilities, and pedestrian walkways to decrease automobile use, land use patterns that conserve energy resources, and promotion of energy conservation and efficiency programs. The impact under the No Project Alternative would be less than significant, similar to the Project.

4.4.1.6 Geology and Soils

New development under the No Project Alternative would result in soil disturbance and be subject to potential seismic hazards. However, as with the Project and other cumulative projects outside of the City, all development would be undertaken in accordance with Title 24, California Building Code, and the City's Phase II Municipal Separate Storm Sewer System (MS4) Permit, which contain specific requirements that reduce geological risks to an acceptable level, avoid soil problems during construction, and minimize the potential for soil erosion during and following construction. Existing General Plan policies under Health and Safety Element Goal HS-1 (minimize the risk to life and property from seismic activity) and Goal HS-2 (minimize the hazards to people and property caused by soil erosion and landslides) require geotechnical reports with new construction to minimize geologic risks from soil limitations. Therefore, impacts related to geologic and seismic hazards, as well as soil disturbance, would be minimized by the same codes and requirements for the No Project Alternative as for the Project, and impacts would likewise be less than significant.

4.4.1.7 Greenhouse Gas Emissions

The No Project Alternative would contribute to GHG emissions as development occurs under the existing General Plan. The City has an adopted Sustainability Plan but has not yet adopted a Climate Action Plan. The City's Sustainability Plan is not a qualified GHG reduction strategy and cannot be used for tiering and CEQA streamlining. The existing General Plan does not include any goals,

policies, or implementation programs addressing GHG emissions because it predates Assembly Bill 32, which initiated the practice of evaluating a project's GHG emissions impacts. The No Project Alternative also would not reflect updates to the regional transportation plan (Plan Bay Area 2050), the State's Scoping Plan, and more stringent regulations (e.g., Senate Bill 32 and executive orders S-3-05 and B-55-18) that have been adopted to reduce GHG emissions. Therefore, the impact under the No Project Alternative would be significant and would be greater than the Project.

4.4.1.8 Hazards and Hazardous Materials

The City supports a number of industrial operations that handle hazardous materials and, like most cities, a number of sites that are contaminated by hazardous materials. Development under the No Project Alternative has the potential to introduce new sensitive receptors, such as residences, into proximity with existing operations that handle hazardous materials or with sites containing them. However, this would constitute an impact of the environment on the project, and it therefore is not an environmental impact under CEQA (*California Building Industry Assoc. v. Bay Area Air Quality Management District* (2015) 62 Cal.4th 369).

In some cases, new development may exacerbate an existing environmental hazard—for example, where development is being undertaken on a contaminated site with the potential to release contamination into the environment. However, such an occurrence is unlikely given the existing regulatory scheme that requires preconstruction testing and remediation of hazardous conditions. Existing General Plan policies under Health and Safety Element Goal HS-7 (to reduce the risks to health and safety from hazardous wastes) include provisions for the City to support the Countywide Integrated Solid Waste Management Plan, support the County's role as the Certified Unified Program Agency for all County jurisdictions, and to reduce hazardous wastes. Policies under Health and Safety Element Goal HS-6 (to protect development from hazards and associated impacts due to aircraft and prevent incompatible land uses in the vicinity of the airport) includes provisions to reduce aircraft and related hazards. Policies under Health and Safety Element Goals HS-3 and HS-4 include provisions to reduce flooding. The policies and implementation programs in the Health and Safety Element would reduce impacts to a less-than-significant level. Therefore, impact related to hazards and hazardous materials would be similar to the Project.

4.4.1.9 Hydrology and Water Quality

The No Project Alternative would result in new development in the Planning Area consistent with the existing General Plan. Although new development has the potential to adversely affect hydrology and water quality through the introduction of new impermeable surfaces that limit groundwater recharge, increase stormwater flows, and provide a pathway for pollutants to enter surface waters, the existing General Plan policies and water quality regulations would avoid these impacts.

The following applicable existing City planning policies and development standards would avoid these impacts.

- Community Services Element Goal CS-9 (ensure adequate, reliable, and safe water supplies to the community), Goal CS-10 (ensure adequate wastewater collection and treatment), Goal CS-11 (develop and maintain a safe, attractive and environmentally sensitive drainage system for handling runoff) and accompanying policies.

- City's Phase II MS4 Permit, which include low-impact development standards for maximizing onsite retention and recharge of stormwater.
- Title 24 CALGreen requirements for drainage control in residential development.

However, the General Plan Update includes new policies that would further avoid or minimize impacts to hydrology and water quality. These policies are aimed at flooding prevention, disaster preparedness, green infrastructure, drought resiliency, increased groundwater quality and quantity, and stormwater management. Therefore, the No Project Alternative would have a greater impact on hydrology and water quality than the General Plan update. As with the General Plan update, impacts related to hydrology and water quality under the No Project Alternative would be less than significant, given that existing regulations, including the City's Phase II MS4 Permit and Title 24 CALGreen requirements, would apply. The impact would be less than significant.

4.4.1.10 Land Use and Planning

The No Project Alternative would retain the existing General Plan and its goals, policies, and implementation programs. The General Plan is internally consistent, so retaining it would not result in inconsistent land uses. The No Project Alternative would not result in land use conflicts or divide existing communities. Therefore, like the Project, land use impacts from the No Project Alternative would be less than significant.

4.4.1.11 Noise

Development under the No Project Alternative has the potential to introduce new sensitive receptors, such as residences, into proximity with existing noise sources such as industrial operations, freeways and high-volume roadways, trains, and stadiums. However, this would constitute an impact of the environment on the Project, and it therefore is not an environmental impact under CEQA (*California Building Industry Assoc. v. Bay Area Air Quality Management District* (2015) 62 Cal.4th 369).

As noted previously, the No Project Alternative would result in fewer housing units than anticipated under the Project. The fewer housing units would require less construction activities, and thus there may be a corresponding decrease in noise from construction activities, relative to the Project. It is also possible that the same construction equipment assumed to operate simultaneously for the Project analysis could operate simultaneously during construction under this alternative, resulting in comparable construction noise levels. The land use pattern under this alternative is similar to the land use pattern of the Project, and both the Project and the No Project Alternative would result in construction noise near existing residences. The No Project Alternative may expose fewer residents to construction noise, however. Unlike the Project, construction of future development under the No Project Alternative may not implement noise control measures, standards, and monitoring procedures to reduce impacts on nearby uses, because such a requirement is not present in the existing General Plan. As such, the increases in noise from construction activities could be greater than the Project and considered substantial. Therefore, the construction noise impact would be significant.

There would be less development under the No Project Alternative than under the Project, and thus impacts related to traffic noise could be less than under the Project. In general, the fewer housing units would result in less vehicle traffic and less traffic noise. However, in 2040, the difference between the Project traffic noise and the No Project Alternative traffic noise would be 1 decibel or

less at all affected roadways. This different is not considered to be noticeable to the human ear; therefore, there would be no substantial differences in traffic noise levels between the Project and the No Project alternative in 2040.

Residential uses are not typically associated with stationary sources of noise and vibration, so the No Project Alternative would result in similar noise and vibration impacts from stationary sources as the Project, because the non-residential buildout would be similar as the Project. As noted in Chapter 3.11, the impact for stationary sources would be less than significant.

The No Project Alternative could result in the use of impact equipment during construction, but the use of such equipment would be similar in magnitude and frequency as the Project. Unlike the Project, construction of future development under the No Project Alternative may not implement vibration control measures, standards, and monitoring procedures to reduce impacts on nearby uses, because such a requirement is not present in the existing General Plan. As such, vibration from construction activities could be greater than the Project and considered substantial. Therefore, the construction vibration impact would be significant.

4.4.1.12 Population and Housing

Development under the No Project Alternative would result in an increase in the City's population and its housing supply. No existing housing units are expected to be displaced under this alternative. The No Project Alternative would be growth inducing in that the existing General Plan's identification of areas to accommodate future housing and other development removes regulatory obstacles to future growth. The Land Use Element of the existing General Plan includes a Growth Management section with policies and implementation programs to encourage orderly growth throughout the community, provide for efficient development and redevelopment, and to coordinate with surrounding jurisdictions and agencies. Therefore, like the Project, land use impacts from the No Project Alternative would be less than significant.

4.4.1.13 Public Services

The No Project Alternative would retain the existing General Plan and its provisions for meeting future public services demands, as specified in the policies and implementation programs under Goal CS-1 (ensure the timely development of public facilities and the maintenance of adequate service levels); Goal CS-2 (ensure community order and public safety); Goal CS-2 (maintain an adequate police force); Goal CS-5 (provide emergency fire suppression services to protect life and property); Goal CS-7 (provide emergency medical services adequate to meet the call demands); and Goal CS-8 (provide for the educational needs of all Napa residents). Development under the existing General Plan would be required to adhere to the policies under each of these goals; therefore, like the Project, the impact on public services would be less than significant.

4.4.1.14 Recreation

The No Project Alternative would retain the existing General Plan and its provisions for meeting future recreation demand. The City has a Parks and Facilities Master Plan that provides a road map for providing high-quality parks and recreation facilities for residents and visitors to Napa. The plan prioritizes projects into phase one and phase two projects. The existing General Plan includes a Parks and Recreation Element, which describes the City's standards and policies for development and maintenance of parks, recreational facilities, trails, and arts and cultural activities.

Typical impacts of such facilities include short-term noise, air quality, and traffic impacts during construction; and noise, light (if night lighting is installed), and traffic during operations. Because construction of neighborhood park and recreation facilities generally takes place prior to new residents moving into the subdivision, construction impacts would be less than significant. Operational impacts may be significant; however, typical neighborhood park design includes limited use during nighttime hours and provisions to confine lighting onsite through the selection and location of fixtures. Neighborhood parks do not typically generate substantial automobile trips and are served by the City's road network; transportation impacts are typically less than significant. Therefore, like the Project, the impact would be less than significant.

4.4.1.15 Transportation

The No Project Alternative would retain the existing General Plan and its provisions, which includes policies and implementation programs measuring level of service (LOS) not vehicle miles traveled (VMT). As of July 2020, Senate Bill 743 directs that LOS impacts may no longer be considered transportation impacts for the purposes of CEQA. In its place, VMT should be used to assess the transportation network. According to the Transportation Evaluation prepared for the Project (DKS 2021, Appendix C), the No Project Alternative would result in fewer new residents but more new jobs in Napa by 2040 than under the General Plan update, and as such would result in a higher VMT per capita (11.30) compared to VMT per capita under the General Plan update (9.03). Therefore, the No Project Alternative would have a greater impact on VMT than the General Plan update. The No Project Alternative VMT per capita of 11.30 is less than the adopted baseline VMT per capita for the City (14.7); therefore, the No Project Alternative would have a less-than-significant impact on VMT.

Impacts related to conflicts with the Vision 2040 Moving Napa Forward Transportation Plan or the Napa Countywide Bicycle Plan and operation of public transit, bicycle, or pedestrian facilities in Napa would be less than significant under the No Project Alternative; however, given the wider range of multimodal and Complete Streets policies and actions in the General Plan update, the No Project Alternative could have slightly more severe effects than the General Plan update.

As with the General Plan update, impacts related to emergency access and roadway hazards under the No Project Alternative would be less than significant, given that existing City regulations, including the provisions of the Municipal Code and the City's Engineering Standards, would apply. In addition, the General Plan update would include emergency access goals and policies, not provided in the existing General Plan. Similarly, impacts related to air traffic patterns would also be less than significant under the No Project Alternative and would not have the potential to result in a change in air traffic patterns at any nearby public or private airport or airstrip. Overall, the impact would be slightly greater than the Project but less than significant.

4.4.1.16 Utilities and Service Systems

The No Project Alternative would retain the existing General Plan and its provisions for meeting future utilities and service systems demands, as set forth in the existing Community Services Element Goal CS-9 (ensure adequate, reliable, and safe water supplies to the community), Goal CS-10 (ensure adequate wastewater collection and treatment), Goal CS-11 (develop and maintain a safe, attractive and environmentally sensitive drainage system for handling runoff), and Goal CS-12 (provide for safe and environmentally sound municipal waste reduction and recycling programs).

As shown in Table 4.4-2, under the No Project Alternative Napa's projected population increase, number of new housing units, and jobs growth would be less than under the Project. As such, the No Project Alternative would result in less demand for utilities and service systems than the Project. The No Project Alternative would have a lesser impact than the Project on utilities and service systems overall and would be less than significant because there would be less demand for water, water treatment, wastewater generation processing, electric power, natural gas, telecommunications, and solid waste disposal.

4.4.1.17 Wildfire

Wildfire has increasingly become a threat, as seen in 2017 and 2018. The western and southeastern borders of the Planning Area are adjacent to moderate fire hazard severity zones, while the remaining northern, eastern, and southern portions of the Planning Area are undesignated. Although the Planning Area is not designated as being located within a fire hazard zone by the California Department of Forestry and Fire Protection, the City considers wildfire to be a serious risk to life and property. The City considers the densely developed perimeters of the Planning Area along the east and the west as particularly susceptible to damage from wildfires. The existing General Plan includes policies and implementation programs under Goal HS-5 (to reduce the risk to life and property from wildland fires) aimed at reducing risks from wildland fires. Development under the existing General Plan would be greater than under the Project; however, it would still be less than significant since development under the existing General Plan would not take place in a Very High Fire Hazard Severity Zone.

4.4.2 Alternative 2—Higher Infill Alternative

The Higher Infill Alternative was designed to provide more housing than would be achieved by the Project and to target growth in the Focus Areas to support more sustainable, compact development patterns. Compared to the Project, development under the Higher Infill Alternative could result in approximately 8,640 more housing units, leading to a possible population increase of 20,000 more people, and the same number (10,800) of new jobs in Napa by 2040. The Higher Infill Alternative would use the same land use diagram as the Project but increase densities in the Focus Areas: Corridor Mixed Use Low would be 59 percent higher; Corridor Mixed Use High would be 43 percent higher; and Residential Mixed Use would be 25 percent higher, resulting in more housing units within the Focus Areas, including Imola South, Imola North, Trancas, and Jefferson. Downtown is also assumed to have higher development intensities under this alternative. Opportunity sites at the City's edges—including Big Ranch Road, Foster Road Mixed Use, and Napa Valley Commons—are assumed to develop at the same intensities as the Project. The buildout assumption for non-residential development would be consistent with the Project, maintaining the same amount of non-residential square footage and employment.

4.4.2.1 Aesthetics

The Higher Infill Alternative would allow for increased development density in some areas compared to the Project. All other features of the Higher Infill Alternative would be the same or substantially similar to the Project. The goals, policies, and standards of the Higher Infill Alternative would be the same as for the Project.

As with the Project, development under the Higher Infill Alternative would result in new suburban, urban, commercial/retail, and recreational development in undeveloped areas and infill

development with a similar variety of uses. Depending on the particular projects pursued, new development allowed by this alternative could alter topography, remove vegetation, or change land use types in ways that would affect the existing visual character of views, including scenic vistas.

The Higher Infill Alternative would result in more housing units than anticipated under the Project. The additional housing units would create a more concentrated urbanized visual environment compared to the Project. However, the General Plan update policies would ensure that new development would achieve a high standard of visual quality that would be consistent with existing regulations governing scenic quality (Goals LUCD-1, LUCD-2, LUCD-3, and LUCD-14, Policies LUCD 11-2, 14-1 to 14-4, LUCD 24-2, and HCR 9-1).

In addition, as with the Project, the General Plan update policies under this Alternative would ensure that degraded existing visual conditions in the City are improved through renovations, infill, and blight reduction (Goals LUCD-1, LUCD-2, and LUCD-3, Policies LUCD 3-1, 3-2, 3-6, 5-1, 5-2, 5-3). Renovations and infill may have the benefit of making aesthetic identity more cohesive, and new development would be relatively small-scale because the area is already developed. Therefore, the Higher Infill Alternative would not result in large-scale land use changes that would create substantial changes in aesthetics and visual resources (e.g., changing agricultural or open space land to urban uses). In addition, the updated policies would ensure that new development would be designed in a manner that is aesthetically pleasing and sensitive to adjacent land uses, including natural and historical contexts (Goals HCR-9 and NRC-3 and NRC-4, Policies HCR 9-1, 9-2, 9-3, and NRC 3-1, 3-2, 4-1, 4-2, and 4-3). The policies also maintain and improve existing, and provide for new, visual access to important features such as the river, open spaces, and parks (Goals LUCD-1, LUCD-3, and LUCD-25, Policies LUCD 3-2, 3-3, 3-4, 25-3, and 25-7). Therefore, similar to the Project, impacts to aesthetics under the Higher Infill Alternative would be similar to the Project and less than significant.

The additional housing units under the Higher Infill Alternative could increase the number of sources of light and glare by increasing the number of units per acre and the number of cars that would be traveling in the Planning Area, removing more vegetation that provides shade, introducing more reflective surfaces, and increasing interior and exterior nighttime lighting that would affect daytime and nighttime views. However, as with the Project, the areas where development is proposed are already built environments, so increases in light and glare would not create substantial changes. In addition, the same state energy efficiency standards that help limit light pollution and proposed General Plan policies that reduce light and glare would apply under this Alternative (LUCD 20-2, Policy TE 2-4, and Policies SN 6-7 and SN-6-8). Impacts associated with light and glare from future development as a result of the Higher Infill Alternative would be similar to the Project and minimized through implementation of General Plan update policies. The impact would be less than significant.

4.4.2.2 Air Quality

Locally, the Higher Infill Alternative would allow for increased density in the Focus Areas compared to the Project, while the amount of non-residential square footage and employment would remain the same as the Project. Air quality impacts are evaluated on a cumulative basis due to the regional characteristics of air quality and air pollution problems.

Although the Project and the Higher Infill Alternative share policies that would protect or improve air quality, impacts under the Higher Infill Alternative would be greater than those under the Project

due to the higher amount of growth. Specifically, the higher amount of housing and population under the Higher Infill Alternative would correspond to a higher number of vehicle trips, resulting in an increase in overall vehicle trips (34.1 percent), as shown in Table 4.4-1. The service population would also increase by 31.2 percent. Given that the increase in vehicle trips is greater than the increase in projected population, the impact would be significant, per Bay Area Air Quality Management District (BAAQMD) CEQA guidance.

Like the Project, the Higher Infill Alternative would contain policies that would comply with and support all applicable control measures of the 2017 Clean Air Plan, as well as ensure that impacts regarding objectionable odors are less than significant. However, because more growth under the Higher Infill Alternative would result in an increase of vehicle trips (as well as vehicle miles traveled) that is greater than the growth in service population, it would potentially result in a cumulatively considerable increase of criteria pollutants. In parallel, sensitive receptors could be exposed to substantial concentrations of toxic air contaminants generated by the Higher Infill Alternative during construction or as a result of additional traffic volume, both of which would be greater than the Project. In effect, the Higher Infill Alternative would have a significant impact that is greater than the Project.

4.4.2.3 Biological Resources

The Higher Infill Alternative would allow for increased intensity in the Focus Areas compared to the Project, while the amount of non-residential square footage and employment would remain the same as the Project. The Higher Infill Alternative could result in approximately 8,640 new housing units, 840 more units than anticipated under the Project.

As with the Project, development under the Higher Infill Alternative would result in new development in undeveloped areas and infill development, which could result in direct effects, such as the loss or disturbance of suitable or occupied habitat, injury, and mortality of special-status species, or disruption of habitats that could disrupt normal behaviors and reduce reproductive success and overall survivorship; loss of oak woodland and valley foothill riparian habitat; loss of wetlands and nonwetland waters; loss of protected trees; and the introduction or spread on invasive plant species. Indirect effects could occur from increased human occupancy in formerly natural areas, including increases in mortality of special-status wildlife from vehicle collisions or predation by pets, trash and contaminants in waterways, traffic and noise, alteration of hydrology, soil compaction, encroachment into root zones of trees, dust, and degradation of water quality. However, the additional development intensity occurring under the Higher Infill Alternative would be located on infill sites and previously developed areas, reducing the need for development in undeveloped (i.e., greenfield sites) areas where the potential for biological resources impacts are greater. Therefore, while additional units are proposed, they could result in fewer direct and indirect impacts on sensitive biological resources than the Project.

The goals, policies, and standards of the Higher Infill Alternative would be the same as for the Project. The General Plan update includes policies that emphasize the conservation and protection of biological resources, including the following policies in the Land Use Element under Goal LUCD-1 (Policy LUCD.1-1, maintain a compact urban form to promote a distinct community identity, and protect open space, and natural and agricultural resources surrounding the community) and Natural Resources Element under Goal NCR-1 (Policies NRC.1-1, NRC.1-2, NRC.1-3, NRC.1-4, NRC.1-5, NRC-1-6, NRC.1-7, NRC.1-8, NRC.1-9, manage natural resources, including riparian corridors, wetlands, and open space areas in and around the City to preserve and enhance plant and wildlife habitats),

Goal NRC-2 (Policies NRC.2-1, NRC.2-2, NRC.2-3, NRC.2-4, recognize and support the preservation of rare, endangered, and threatened species), and Goal NRC-4 (Policies NRC.4-1, NRC.4-2 and NRC.4-3 support efforts for preserving open spaces and unique and fragile biological environments and biological environments around the City). Similar to the Project, implementation of these proposed policies would reduce the direct and indirect effects on special-status species, oak woodlands, valley foothill riparian communities, wetlands and nonwetland waters, fish and wildlife movement, the use of native wildlife nursery sites, and fish spawing habitat resulting from proposed land use changes. In addition, all future developments would be subject to review under CEQA and to permitting requirements for impacts on special-status species, wetlands, and nonwetland waters. Under the Higher Infill Alternative, therefore, these impacts would be less than significant, and no mitigation is required.

However, no policies specifically address the avoidance and minimization of the spread of invasive species. The potential for the spread of invasive species into sensitive natural communities in or adjacent to development under the Higher Infill Alternative would be slightly greater than under the Project and would be a significant impact; however, implementation of Mitigation Measure BIO-9 would add a policy to the General Plan update to avoid the introduction and spread of invasive plants, and thereby reduce this impact to a less than-significant level.

4.4.2.4 Cultural Resources

The Higher Infill Alternative would allow for increased intensity in the Focus Areas compared to the Project, while the amount of non-residential square footage and employment would remain the same as the Project. The Higher Infill Alternative could result in approximately 8,640 new housing units, 840 more units than anticipated under the Project.

The goals, policies, and standards of the Higher Infill Alternative would remain the same as for the Project. The General Plan update includes goals and policies that would protect and preserve important cultural resources, including Goal HCR-14 to protect important archaeological resources, and Policies TE 11-1, TE 11-2, TE 11-3, and TE 11-5-8, which encourage the preservation and reuse of historic resources. Policies TE 11-4, TE 12-1, TE 12-2, TE 12-3, TE 12-4, and TE 13-1 would protect historic resources by ensuring surveys and records of existing and as-of-yet unknown resources are performed following state, federal, and private guidelines (TE 12-1) by qualified persons (TE 13-1) and are updated regularly (TE 12-3). Historical resources are also protected under the regulations of the NHPA when projects involve federal agencies. In addition, the Higher Infill Alternative would concentrate the additional housing units in previously developed areas, which would reduce the pressure to develop in undisturbed areas (i.e., greenfield sites) and therefore result in lesser potential impacts to cultural resources. The impact of the Higher Infill Alternative to cultural resources would remain less than significant with implementation of existing regulations and the proposed goals and policies and result in a lesser impact than the Project.

4.4.2.5 Energy

The Higher Infill Alternative would allow for increased intensity in Focus Areas compared to the Project, while the amount of non-residential square footage and employment would remain the same as the Project. All other features of the Higher Infill Alternative would be the same or similar to the Project. The goals, policies, and standards of the Higher Infill Alternative would be the same as the Project, and as listed in Chapter 3.5, *Energy*. Goals and policies included in the Climate Change and Sustainability Element would help reduce energy consumption through increasing energy

efficiency and renewable energy, encouraging bicycle and pedestrian transit, and decreasing car use by tourists.

The Higher Infill Alternative could result in approximately 8,640 new housing units, 840 more units than anticipated under the Project. The additional housing units would increase construction activities and associated energy usage relative to the Project. However, as with the Project, development occurring under the Higher Infill Alternative would also adhere to EO N-79-20, which would reduce construction-related emissions from off-road vehicles. While the Higher Infill Alternative would increase the number of residential units compared to the Project, total energy use is anticipated to decrease over time, primarily due to Napa's delivery of energy through MCE, which has much higher goals for renewable energy than PG&E, and the increase in fuel efficiency for vehicles that would result as more vehicles are designed to meet stricter Pavley standards come into use. The alternative would change levels of intensity as compared to the Project, but not any land use designations. Therefore, similar to the Project, the Higher Infill Alternative would not result in a wasteful, inefficient, and unnecessary usage of direct or indirect energy. Therefore, this impact is considered less than significant and would be similar to the Project.

4.4.2.6 Geology and Soils

The Higher Infill Alternative would allow for increased intensity in the Focus Areas compared to the Project, while the amount of non-residential square footage and employment would remain the same as the Project. The Higher Infill Alternative could therefore result in approximately 8,640 new housing units, 840 more units than anticipated under the Project.

Construction built under the Higher Infill Alternative would be in the same areas as the Project and would not increase seismic stresses or exacerbate the risk of surface fault rupture, strong seismic ground shaking, seismic-related ground failure, or seismic-related landslide. Furthermore, structures would be subject to the same General Plan update polices as the Project, requiring setbacks and the preparation of a geotechnical report, and would comply with the California Building Code. Therefore, impacts related to seismic hazards would be less than significant, similar to the Project.

The Higher Infill Alternative would allow for more intensity of development and potentially more ground-disturbing earthwork which may increase the potential for erosion. However, the alternative would increase intensity in mostly previously developed areas. In addition, construction activities resulting from the alternative would be subject to the same municipal code requirements and grading ordinance as the Project and would thus require the preparation of a SWPPP and grading permit, as well as compliance with the CBC. Adherence to these requirements would reduce erosion-related impacts to a less-than-significant level, similar to the Project.

The Higher Infill Alternative would increase intensity in areas identified in the Project for residential development and would have similar impacts regarding the potential to exacerbate risk of nonseismic-related landsliding. The Planning Area is fairly level, Policy S-3.2 would require the preparation of a geotechnical report, and construction would comply with the CBC. Therefore, similar to the Project, impacts related to nonseismic-related landsliding would be less than significant.

Similar to the Project, the Higher Infill Alternative would not include groundwater extraction or substantial dewatering that would result in subsidence; therefore, the impact would be less than significant. Structures constructed as a result of the Higher Infill Alternative could be built on

expansive soils which occur in the Planning Area. However, similar to the Project, future construction as a result of the Higher Infill Alternative would not exacerbate the expansion and contraction cycle. Furthermore, soil sampling and treatment procedures for expansive soils, as well as other soil-related issues, are addressed by the CBC. Compliance with the CBC would create conditions suitable for construction and therefore this impact would be less than significant.

Similar to the Project, future development under the Higher Infill Alternative would be served by NapaSan and would not involve installation of septic systems or other alternative wastewater disposal systems. There would be no impact.

Structures constructed as a result of the Higher Infill Alternative could be built in portions of the Planning Area which are sensitive for paleontological resources. However, similar to the Project, the Higher Infill Alternative would include a new policy added to the Historic Resource Element which would require an assessment of the potential presence of archaeological, tribal cultural and paleontological resources, including a site survey, for development proposals in paleontologically sensitive areas of Napa. With adherence to the new policy, the impact of implementation of the Higher Infill Alternative on paleontological resources would therefore be less than significant.

4.4.2.7 Greenhouse Gas Emissions

The Higher Infill Alternative would have slightly greater GHG emissions than the Project, corresponding to the 840 additional housing units achieved by the higher densities allowed in the Focus Areas. However, given that the Project would result in a significant net reduction of mass emissions (62,026 metric tons of carbon dioxide equivalent [MT CO_2e]), the magnitude of difference is unlikely to result in an overall increase of net GHG emissions. Policies in both the Project and Higher Infill Alternative would leverage the increase in population and the location of housing within Focus Areas where VMT reduction strategies—including improved pedestrian, bicycle, and transit infrastructure and network, as well as access to local amenities and services achieved by higher densities and mixed-use design—would mitigate per capita emissions. Policies would also seek to further reduce GHG emissions through regulation of construction activities and other known sources and adopt a Climate Action Plan as a Qualified GHG Reduction Strategy. Nevertheless, projected emissions under both of these scenarios are estimated to exceed the target levels established by the State and air district (i.e., 40 percent reductions from 1990 levels of GHG emissions by 2030 and 80 percent reductions by 2050 under Assembly Bill 32, in addition to more stringent regulations toward achieving carbon neutrality by 2045 pursuant to Executive Order B-55-18). As a result, the Higher Infill Alternative would have similar mass emissions as the Project that ultimately would not meet regional and State goals for GHG reductions. As such, this impact would be significant and unavoidable.

4.4.2.8 Hazards and Hazardous Materials

As with the Project, the Higher Infill Alternative would be subject to existing federal and State regulations regarding the management of hazardous materials that would apply to all future development and land use activities in the Planning Area. Compliance with these regulations would ensure that this alternative would have a less than significant impact related to the routine transport, use, disposal, and potential upset of hazardous materials. Additionally, as with the Project, the Higher Infill Alternative would also incorporate policies to reduce risks associated with hazardous materials; therefore, this alternative would also have a less than significant impact related to the routine transport, use, disposal, and potential upset of hazardous materials.

Similarly, existing regulations and programs would help to reduce potential impacts of development on Cortese List sites under both the Project and Higher Infill Alternative. Additionally, the Higher Infill Alternative includes the same General Plan update policies requiring soil investigations and hazardous materials management. As with the Project, impacts under this alternative would be less than significant.

Similar to the Project, the Higher Infill alternatives would allow for the development of land uses within a quarter-mile of existing schools that could be reasonably expected to handle hazardous materials or generate hazardous emissions. Neither the Project nor the Higher Infill Alternative would expand the industrial land use designations, and therefore neither would increase school exposure to hazardous materials. As each alternative must follow State law and existing regulations regarding hazardous materials near schools, future schools constructed within the Planning Area could not be located near hazardous material sites. This alternative, similar to the Project, would have less than significant impacts.

The closest public airport is the Napa County Airport located approximately 5 miles south of the City of Napa, outside the perimeter of the Planning Area. Neither the Higher Infill Alternative nor the Project would result in an airport safety hazard for people residing or working within the Planning Area. As no public airports, public use airports, or private airstrips are located within 2 miles of the Planning Area, neither alternative would have an impact.

Neither the Project nor the Higher Infill Alternative would physically interfere with an adopted emergency response or evacuation plan. Both alternatives would include policies promoting emergency preparedness as well as facilitating emergency access throughout the Planning Area. Therefore, both alternatives would have a less than significant impact regarding emergency response or evacuation plans.

As discussed in Section 3.8, CAL FIRE has designated the Planning Area as in a NON-VHFHSZ. The western and southeastern borders of the Planning Area are adjacent to moderate fire hazard severity zones, while the remaining northern, eastern, and southern portions of the Planning Area are undesignated. The Higher Infill Alternative and the Project include the same policies addressing potential fire hazards and requiring all development to adhere to safety standards provided in the City of Napa Municipal Code, the CBC, and California Fire Code. These policies also promote close coordination with emergency services to ensure the safety of new development and to increase fire safety awareness. Therefore, impacts related to the exposure of people or structures to wildland fire under the Higher Infill Alternative would be less than significant, similar to the Project.

4.4.2.9 Hydrology and Water Quality

The Higher Infill Alternative would allow for more intensity of development and potentially more ground-disturbing earthwork which may increase the total impervious surface area, potential for erosion, and flooding risk as compared to the Project. However, this alternative would increase intensity in mostly previously developed areas. In addition, construction activities resulting from the alternative would be subject to the NPDES Construction General Permit and other water quality requirements (i.e., Small MS4 Permit, and the General Dewatering Permit), construction projects would also comply with other federal and State regulations, City standards, and other local ordinances.

Similar to the Project, the Higher Infill Alternative would adhere to General Plan Policy NRC 10-5, which encourages development projects to use LID practices such as bioretention, porous paving,

and rainwater harvesting systems to facilitate groundwater recharge. General Plan Policy CSS 3-1 would require the City to study and incorporate green infrastructure practices to recharge underground aquifers. As described in General Plan Policy CSS 3-2, the City would require stormwater management techniques that minimize surface water runoff in public and private developments. Additionally, General Plan Policy SN 3-5 would require the City to maintain a program to review reservoir dam safety and continue to cooperate with other jurisdictions, such as the Division of Safety of Dams, in addressing needed dam maintenance or structural improvements to mitigate risks caused by dam failure and inundation. General Plan Policy SN 3-6 would require the City to work with the State to minimize risk of damage from inundation due to failure of Rector Reservoir by maintaining the dam in a safe condition. With adherence to the new policies, the impact of implementation of the Higher Infill Alternative on hydrology and water quality would therefore be less than significant, and similar to the Project.

4.4.2.10 Land Use and Planning

The Higher Infill Alternative would allow for increased intensity in Focus Areas compared to the Project, while the amount of non-residential square footage and employment would remain the same as the Project. Similar to the Project, the Higher Infill Alternative would not physically divide an established community; instead, it would enhance and improve connectivity with street improvements, establish a more cohesive and inter-connected system of trails, and discourage the construction of sound walls or barriers along local streets which could divide areas and interfere with mobility. The Higher Infill Alternative includes the same policies as the Project, which are intended to avoid dividing an established community and to ensure interconnection (LUCD 3-6, LUCD 9-1, LUCD 18-2, TE 1-2, TE 2-2, TE 3-2, TE 3-3, and TE 3-5). Therefore, with implementation of these policies, the Higher Infill Alternative would not result in the physical division of existing communities and this impact would be less than significant.

The Higher Infill Alternative would not conflict with other agencies' applicable land use plans, policies, or regulations intended to protect the environment. The City regulates land uses within the City limits and implementation of the Higher Infill Alternative would include the same duties as the Project including preparing zoning and subdivision ordinance amendments, reviewing development applications, conducting investigations, and making reports and recommendations on planning and land use, zoning, subdivisions, development plans, and environmental regulations. The Higher Infill Alternative is consistent with other local and regional plans and would conform to the City of Napa Hillside Overlay District requirements, the Napa County Airport Land Use Compatibility Plan, and the Plan Bay Area 2040 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) compact growth principles. The Higher Infill Alternative includes the same policies as the Project which seek to develop a climate action plan (CAP) along with numerous policies which aim to preserve and enhance wildlife habitats; support the preservation of rare, endangered, and threatened species; develop a balanced open space network; and support efforts for preserving open spaces around the City. With implementation of these policies in future development projects, the Higher Infill Alternative would not conflict with other land use plans, policies, or regulations and impacts would be less than significant.

There are no habitat conservation plans or natural community conservation plans in effect that apply to the Planning Area. Similar to the Project, the Higher Infill Alternative includes policies that aim to preserve and enhance wildlife habitats; support the preservation of rare, endangered, and threatened species; develop a balanced open space network; and support efforts for preserving open spaces and biological environments around the City, which would allow the City to conform to

the requirements of any such applicable conservation plan that may be drafted or adopted in the future. Therefore, the impact would be less than significant, similar to the Project.

4.4.2.11 Noise

As noted previously, the Higher Infill Alternative could result in approximately 8,640 more housing units than anticipated under the Project. The additional housing units would require increased construction activities, and thus there may be a corresponding increase in noise from construction activities, relative to the Project. It is also possible that the same construction equipment assumed to operate simultaneously for the Project analysis could operate simultaneously during construction under this alternative, resulting in comparable construction noise levels. The land use pattern under this alternative is similar to the land use pattern of the Project, and both the Project and the Higher Infill Alternative would result in construction noise near existing residences. The Higher Infill Alternative may expose more residents to construction noise, however. As with the Project, development constructed under the Higher Infill Alternative would be subject to General Plan Policies SN 4-7 and SN 4-8. These policies require future development to implement noise control measures, standards, and monitoring procedures to reduce impacts on nearby uses, and measures to reduce noise impacts for construction activity that is within 1,000 feet of noise-sensitive uses. Adherence to these policies would reduce noise, and the increases in noise from construction activities would not be considered substantial. Therefore, the construction noise impact would be less than significant.

There would be more development under the Higher Infill Alternative than under the Project, and thus impacts related to traffic noise would be greater than under the Project. The additional housing units would result in additional vehicle traffic and thus traffic noise; however, traffic noise would not likely increase proportionally with the number of housing units. Because this alternative would result in a higher intensity of housing units in the Focus Areas, it is likely that residents in these areas would use alternative transportation options (e.g., transit, bicycles, walking) at a higher rate, resulting in a lower rate of personal vehicle usage. Even with a higher rate of alternative transportation use, there would still be more vehicles on the roadway; however, and the presence of the additional vehicles could result in noise that is higher than traffic noise from the Project.

Because the traffic noise increases for the Project would be one decibel or less at all roadways relative to 2040 conditions without the Project, it is not likely that the Higher Infill Alternative would cause noticeable increases in noise. A doubling of sound energy is required to result in a three dB (i.e., barely noticeable) increase in noise; in practice, this means that the volume of traffic on a roadway would typically need to double to result in a noticeable increase in noise. Given the maximum increase of one decibel for the Project, the Higher Infill Alternative would need to result in substantially higher traffic volumes than the Project to result in detectable noise levels relative to the no project conditions in 2040, which would not be likely. The traffic noise impact is less than significant.

Residential uses are not typically associated with stationary sources of noise and vibration, so the Higher Infill Alternative would result in similar noise and vibration impacts from stationary sources, because the non-residential buildout would be the same as the Project. As noted in Chapter 3.11, the impact for stationary sources would be less than significant.

The Higher Infill Alternative could result in the use of impact equipment during construction, but the use of such equipment would be similar in magnitude and frequency as the Project. Like the Project,

development under the Higher Infill Alternative would adhere to General Plan Policy SN 4-7, which includes a requirement for future development to implement vibration control measures, standards, and monitoring procedures to reduce impacts on nearby uses; and to General Plan Policy SN 4-8, which requires measures to prevent exposure of vibration-sensitive receptors to substantial groundborne vibration levels, for receptors within 100 feet of pile-driving locations and 25 feet of non-impact equipment. As such, the increases in vibration from construction activities from the Higher Infill Alternative would not be considered substantial. Therefore, the vibration impact would be less than significant.

4.4.2.12 Population and Housing

As shown above in Table 4.4-2, Comparison of Key Project Characteristics, the Higher Infill Alternative is anticipated to generate 20,000 new residents above the 2020 baseline of 79,300 residents, 2,100 more than anticipated under the Project, for a 2040 population of 99,300. The additional units would be developed by allowing greater density in the same Focus Areas identified in the Project and would be in areas already served by infrastructure which would not require additional road extensions or improvements which would result in unplanned growth. The Higher Infill Alternative would be accompanied by the same increase in employment opportunities (an additional 10,800 jobs) as the Project, and therefore result in a slightly lower existing jobs to employed resident's ratio than the Project, meaning potentially fewer employees commuting from outside the city. As a result, the Higher Infill Alternative would allow for more opportunities for employed residents to located within the City, reducing the pressure for unplanned growth elsewhere in the region. As with the Project, the Higher Infill Alternative includes the same proposed policies as the Project to ensure that infrastructure, facilities, and utilities would be appropriately sized for future growth. Furthermore, environmental impacts that result from new development would be identified as part of individual project review. As such, the Higher Infill Alternative would not induce substantial unplanned population growth, either directly or indirectly, and would reduce pressure for unplanned growth elsewhere in the region: therefore, this impact is considered less than significant, with a lesser impact than the Project.

The Higher Infill Alternative would use the same land use diagram as the Project, and residential uses are not anticipated to undergo significant land use changes. Instead, the Higher Infill Alternative concentrates intensification in Focus Areas located along major corridors. Therefore, similar to the Project, the Higher Infill Alternative focuses on providing infill development housing opportunities while seeking to preserve existing housing and neighborhoods. The Higher Infill Alternative does not propose specific development that would result in the displacement of existing housing units or people, necessitating the construction of replacement housing elsewhere. Additionally, similar to the Project, the Higher Infill Alternative would also include policies to prevent displacement (PHE 4-4 and PHE 6-7). Therefore, any displacement impact on existing housing units or people as a result of the Higher Infill Alternative would be less than significant.

4.4.2.13 Public Services

Fire Protection and Emergency Services

The Higher Infill Alternative would allow for increased intensity in the Focus Areas compared to the Project, while the amount of non-residential square footage and employment would remain the same as the Project. The Higher Infill Alternative could therefore result in approximately 8,640 new housing units, 840 more units than the Project, equating to a population of 20,000 above a 2020

baseline of 79,300 residents. Currently, the Napa Fire Department (NFD) aims to maintain the NFPA 1710 standards for service ratios and response times. Current NFD current staffing are below these standards, and the increase in population under the Higher Infill Alternative would but further strain on services, greater than under the Project. However, the Higher Infill Alternative would include the same General Plan Update goals and policies related to supporting adequate infrastructure, services, and facilities relevant to fire protection, including policies related to developer fees to fund fire protection services and consultation with the fire department during development review process. Accordingly, with adherence to these policies, impacts from the Higher Infill Alternative related to fire protection and emergency services would be less than significant, similar to the Project.

Police Protection

The Higher Infill Alternative would allow for increased intensity in the Focus Areas compared to the Project, while the amount of non-residential square footage and employment would remain the same as the Project. The Higher Infill Alternative could therefore result in approximately 8,640 new housing units, 840 more units than the Project, equating to a population of 20,000 above a 2020 baseline of 79,300 residents. While the Napa Police Department (NPD) does not have an established service ratio, it is currently staffed with 9.5 sworn personnel per 10,000, below the national average of 16.6 sworn personnel per 10,000. The increase in population under the Higher Infill Alternative would put further strain on police services, greater than under the Project. However, the Higher Infill Alternative would include the same General Plan Update goals and policies related to supporting adequate infrastructure, services, and facilities relevant to police services, including policies related to developer fees to fund police services. Accordingly, with adherence to these policies, impacts from the Higher Infill Alternative related to police services would be less than significant, similar to the Project.

Schools

The Higher Infill Alternative would allow for increased intensity in the Focus Areas compared to the Project, while the amount of non-residential square footage and employment would remain the same as the Project. The Higher Infill Alternative could therefore result in approximately 8,640 new housing units, 840 more units than the Project, which could result in more school age children in the Planning Area. While Napa Valley Unified School District (NVUSD) capacity currently exceeds enrollment, the projected 2040 student population would significantly exceed this current capacity, putting pressure on NVUSD to create new or expanded facilities. In addition, many existing NVUSD facilities are over 20 years old and in need of modernization. Therefore, the Higher Infill Alternative would put further strain on the NVUSD, greater than under the Project. However, the Higher Infill Alternative would include the same General Plan Update goals and policies that would support schools and education within the City of Napa. Furthermore, NVUSD collects fees levied on developers (aka Developer Fees) which are deemed to fully mitigate impacts of new development on school districts. Future development under the Higher Infill Alternative would be subject to developer fees, which would reduce impacts on schools to a less-than-significant level.

Parks

The Higher Infill Alternative would allow for increased intensity in the Focus Areas compared to the Project, while the amount of non-residential square footage and employment would remain the same as the Project. The Higher Infill Alternative could therefore result in approximately 8,640 new

housing units, 840 more units than the Project, equating to a population of 20,000 above a 2020 baseline of 79,300 residents. The Higher Infill Alternative could therefore for bring the 2040 population to 99,300, resulting is 2,100 more residents than anticipated under the Project, slightly reducing the parkland acres per 1,000 ratio below that of the Project. However, as with the Project, the Higher Infill Alternative would include policy CSPR 10-1, which would set the General Plan park standard at a lower 10.0 acres of parkland per 1,000 residents. However, the increased population projected by 2040 under the Higher Infill Alternative would meet this standard. Accordingly, this impact is expected to be less than significant.

Other Public Facilities

The Higher Infill Alternative would allow for increased intensity in the Focus Areas compared to the Project, which could result in approximately 8,640 new housing units, 840 more units than the Project, equating to a population of 20,000 above a 2020 baseline of 79,300 residents. The increase in residents would therefore be expected to put a greater strain on the Napa County Library system than the Project, potentially requiring the construction or expansion of library facilities. However, the number, locations, and designs of future libraries and library expansions are unknown. Consequently, the potential environmental impacts of future libraries, if any, cannot be evaluated at this time. Any mitigation measures necessary to reduce the impact of potential future library construction or expansion would be determined on a site-specific basis. These measures would ensure that impacts of construction or expansion of future library facilities would be less than significant.

4.4.2.14 Recreation

The Higher Infill Alternative is expected to result in a buildout population of 99,300, an increase of approximately 2,100 more residents than anticipated under the Project. The additional population would be expected to place added physical demands on existing park facilities by increasing the number of people using the parks, lengthening the periods of time during which the parks would be in active use, and/or increasing the intensity of use over the course of a typical day. However, as described in section 3.14, *Recreation*, the city exceeds its current park service standard of 12 acres per 1,000 residents and would exceed the 10 acres per 1,000 residents standard which would be part of the Higher Infill Alternative. In addition, future planned parkland and trail connections at Napa Pipe and other planned developments would further increase the available parkland for future city residents. The Higher Infill Alternative would also include policies to prioritize improvements and maintenance of existing parks (CSPR 9-3, 11-1, 11-3, 11-4, and 14-5), ensure parks and facilities are reflective of the needs and desires of Napa's diverse community (Goal CSPR-11, CSPR 11-4, 11-4, and 14-2), and maintain close distances to parkland for residents (Policies CSPR 9-2, 9-8, 9-9, and 9-10). Given that the park acreage is sufficient to meet future demand, and that the Higher Infill Alternative directs the City to focus capital projects on sustaining and improving existing parks and includes policies and standards that ensure residents are within close access to parks, the Higher Infill Alternative would not increase the use of existing recreational facilities such that it would result in the substantial deterioration or the acceleration of the deterioration of existing parks and recreational facilities. This impact would be less than significant.

As noted above, the City currently exceeds its park service standard and is expected to meet its future standard under the buildout of the Higher Infill Alternative. Therefore, the Higher Infill Alternative would not need to construct any new parks or recreational facilities. However, should construction or expansion of recreational facilities be introduced in the future, policies included in

the Higher Infill Alternative would protect existing open space and promote coordination with regional partners (NRC 3-1, NRC 4-2), prioritize maintenance and enhancement over development of new parks, protect natural resources in open space areas (CSPR 9-7), and prioritize efficient use of existing amenities and facilities (CSPR 11-4). Given that the Higher Infill Alternative would not result in population growth that exceeds the City's park service standards and the proposed policies detailed list above (along with others) would protect sensitive resources and habitats, the Higher Infill Alternative's impact on construction or expansion of recreational facilities would be less than significant.

4.4.2.15 Transportation

As discussed above, the Higher Infill Alternative would allow for higher densities than those allowed under the Project. Because of the higher densities allowed, total population within the City of Napa would increase under this alternative in comparison to the Project. An increase in total population would result in the Higher Infill Alternative experiencing a higher total volume of VMT in comparison. The alternative would experience a total of 3,146,811 VMT per day and the Project would experience 3,052,088 VMT per day. The alternative would have a three percent increase in VMT over the Project.

However, both the alternative and Project would experience the same total employment volume of 57,989. Because the Higher Infill Alternative will experience the same total employment as the Project, but could result in a higher total population, the VMT per capita calculated for the alternative will be slightly lower than the Project. The alternative could result in a VMT per capita of 8.98, which is below the OPR's standards of 14.7 VMT per capita and below the Project VMT per capita of 9.03. Therefore, impacts would be less than significant, with a lesser impact than the Project.

Additionally, implementation of the alternative would increase traffic levels in the study area and introduce new intersections and traffic signals to the existing street system. However, these new roadways and traffic signals would be designed to City Design standards and therefore should not substantially increase hazards due to a design feature and will not result in inadequate emergency access. Therefore, impacts would be less than significant.

4.4.2.16 Utilities and Service Systems

The Higher Infill Alternative could result in approximately 840 more housing units in Focus Areas than anticipated under the Project (about 11 percent). Population increase could be as high as 2,100 more people (almost 12 percent) under this alternative compared to the Project. This additional population and housing growth would lead to increased demand for utilities and service systems relative to the Project, including higher demands for water, water treatment, wastewater generation processing, electric power, natural gas, telecommunications, and solid waste disposal.

The higher intensity of development under the Higher Infill Alternative would result in a greater demand for water and water treatment compared to the Project. Similar to the Project, the Higher Infill Alternative could thus have a significant impact on water conveyance and treatment services. However, the City's updated UWMP would be based on the approved General Plan update and its projections (whether it be the Project as proposed or an alternative to the Project) and any construction of facilities recommended in the Plan would be undertaken by the City to ensure the potable water distribution system can support all future development. It is expected that the Higher

Infill Alternative would adhere to the same policies and regulations described for the Project and would thus result in the same less-than-significant impact regarding the need for relocation or construction of new or expanded water facilities. No mitigation is required.

The higher intensity of development under the Higher Infill Alternative would result in a greater demand for wastewater treatment compared to the Project. Similar to the Project, the Higher Infill Alternative could have a significant impact if it would cause a need for relocation or construction of new or expanded wastewater treatment facilities. However, it is assumed that, as with the Project, the City would coordinate with NapaSan when NapaSan updates its planning documents to ensure that the sewer collection system and existing wastewater treatment plant can accommodate future growth within the City. With adherence to the same applicable goals, policies, and regulations described for the Project, the Higher Infill Alternative would result in the same less-than-significant impact regarding the need for relocation or construction of new or expanded wastewater treatment facilities, and no mitigation is required.

The Higher Infill Alternative could result in an estimated 2,100 more people and about 840 more housing units in Napa than under the Project, which would result in a greater demand for electric power, natural gas, and telecommunications services compared to the Project. The Higher Infill Alternative, as with the Project, could have a significant impact if it would increase the demand for electric power, natural gas, and telecommunications such that infrastructure or a facility of a service provider would require relocation or expansion that could cause a significant impact to the environment. With adherence to the same policies and regulations described for the Project, the Higher Infill Alternative would result in a similar less-than-significant impact as the Project regarding the need for relocation or construction of new or expanded electric power, natural gas, or telecommunications facilities, and no mitigation is required.

The increased population growth and housing that could result under the Higher Infill Alternative compared to the Project would result in an increased demand on the current infrastructure and stormwater drainage system operated by the City, as well as NapaSan. If demand on the City stormwater system and/or NapaSan's system increases such that a facility must be expanded, the expansion could result in significant impacts. The Higher Infill Alternative would be required to comply with the same regulations and policies as the Project, and adhere to the same existing local, State, and federal regulations identified for the Project to reduce increases in stormwater velocity and volume to the maximum extent practicable in compliance with SWRCB regulations to ensure that any new stormwater facilities that were built would not be environmentally harmful. Therefore, the impact of the Higher Infill Alternative as related to the construction of new stormwater drainage facilities would be greater than the Project, but similarly less than significant and no mitigation is required.

The Higher Infill Alternative could result in an estimated 2,100 more people and about 840 more housing units in Napa than under the Project, which would result in a greater demand for water supply. The Higher Infill Alternative, as with the Project, could have a significant impact if it would result in insufficient water supplies available to serve the Planning Area and reasonably foreseeable future development during normal, dry, and multiple dry years. However, the Higher Infill Alternative would be required to adhere to the same policies and regulations described for the Project and would thus, as with the Project, not result in insufficient water supplies available to serve the Project and reasonably foreseeable future development during normal, dry, and multiple dry years. This impact would be less than significant, and no mitigation is required.

The higher intensity of development under the Higher Infill Alternative would result in a greater demand for wastewater treatment compared to the Project. which could result in a significant impact if it would cause a determination by the wastewater treatment provider that serves or may serve the Project that it has inadequate capacity to serve the Planning Area's projected demand in addition to the provider's existing commitments. The Higher Infill Alternative would be required to adhere to the same applicable goals, policies, and regulations described for the Project and would therefore result in the same less-than-significant impact regarding the need for relocation or construction of new or expanded wastewater treatment facilities as the Project. No mitigation would be necessary.

Higher population growth and more housing under the Higher Infill Alternative would lead to higher demands for solid waste disposal services compared to the Project. If a) the increased demand exceeds infrastructure capabilities or standards and goals or b) a project would fail to comply with federal, state, and local statutes and regulations related to solid waste, significant impacts could result. As with the Project, the Potrero Hills Landfill and Napa Recycling and Waste Services would serve the needs of the Higher Infill Alternative, both of which are expected to have adequate capacity and procedures in place to address expansion or closure options. Also, future development in the City would be required to undergo separate environmental review under CEQA to assure adequate landfill capacity to serve new development prior to approval. The Higher Infill Alternative would comply with all federal, state, and local statutes and regulations related to solid waste that are described for the Project. Therefore, similar to the Project, the Higher Infill Alternative's impact on solid waste generation related to capacity or standards and goals, and compliance with federal, state, and local statutes and regulations related to solid waste would be less than significant.

4.4.2.17 Wildfire

The Higher Infill Alternative would allow for greater residential intensity in certain areas than the Project but would use the same land use diagram and would impact than same area as the Project. Therefore, the Higher Infill Alternative would have similar impacts related to emergency response or evacuation plans, wildfire risk, and post-fire slope instability or drainage changes as the Project. The Higher Infill Alternative would include the same General Plan update policies which address potential fire hazards as the Project and would similarly reduce potential impacts to a less-than-significant level.

4.5 Environmentally Superior Alternative

Table 4.5-1 compares estimates of the numerical increases in population, housing units, and jobs under the Project, the No Project Alternative, and the Higher Infill Alternative to existing baseline conditions.

Table 4.5-1. Comparison of Key Project Characteristics[1,2]

	Existing Baseline (2020)	Project Change from Existing (2020-2040)	Alternative I: No Project Change from Existing (2020-2040)	Alternative II: Higher Infill Change from Existing (2020-2040)
Total Population	79,300	17,900	11,730[3]	20,000
Housing Units	30,700	7,800	1,400[3]	8,640
Jobs	51,200	10,800	8,900[4]	10,800

1. Rounded to the nearest hundred decimal place.

2. Calculations in this table are for the entire Planning Area and include the sphere of influence.

3. Based on the transportation analysis using the Solano Napa Activity Based Model. The growth percentage is applied to the Project's existing Baseline.

4. Based on an annual growth rate of 0.87% taken from Exhibit 2 of the City of Napa Economic Development Action Strategy.

Source: Existing baseline is from the State of California, Department of Finance, E-5 Population and Housing Estimates for Cities, Counties and the State – January 1, 2011-2021. Sacramento, California, October 2021. Jobs from the City of Napa Economic Development action Strategy, 2019. Dyett & Bhatia, 2021.

Table 4.5-2 summarizes the alternatives' overall environmental impacts for each topic presented in Section 4.4, *Alternatives Analyzed in this Draft EIR*. CEQA requires an EIR to examine a range of feasible alternatives to the Project. State CEQA Guidelines Section 15126.6(e)(2) requires that the EIR identify which of those alternatives is the environmentally superior alternative. If the No Project Alternative is the environmentally superior alternative, then CEQA requires an EIR to identify which of the other alternatives is environmentally superior.

In comparison to the Project, the Higher Infill Alternative would have similar impacts for several resource categories but slightly greater impacts on air quality, noise, public services, recreation, and utilities and service systems. This is primarily due to the greater number of residential units, and therefore increased population, under the Higher Infill Alternative compared to the Project. Even though development envisioned under the Higher Infill alternative would allow more people to walk and bicycle to work, shop, recreate, etc., there would still be slightly greater impacts in the resource categories identified above. In comparison to the Project, the Higher Infill Alternative would have lesser impacts overall in relation to the Project for the resource categories of biological resources, cultural resources, population and housing, and transportation. Therefore, based on the assessment included in this chapter, the Project would be considered the environmentally superior alternative because it would result in lesser impacts overall in relation to the Alternatives.

Table 4.5-2. Comparison of Alternatives' Environmental Impacts

Impact Topic	Alternative 1—No Project		Alternative 2—Higher Infill	
Aesthetics	SU	(G)	LTS	(S)
Air Quality	SU	(G)	SU	(G)
Biological Resources	LTS	(G)	LTS	(L)
Cultural Resources	SU	(S)	LTS	(L)
Energy	LTS	(S)	LTS	(S)
Geology and Soils	LTS	(S)	LTS	(S)
Greenhouse Gas Emissions	SU	(G)	SU	(S)
Hazards and Hazardous Materials	LTS	(S)	LTS	(S)
Hydrology and Water Quality	LTS	(G)	LTS	(S)
Land Use and Planning	LTS	(S)	LTS	(S)
Noise	SU	(G)	LTS	(G)
Population and Housing	LTS	(S)	LTS	(L)
Public Services	LTS	(S)	LTS	(G)
Recreation	LTS	(S)	LTS	(G)
Transportation	LTS	(G)	LTS	(L)
Utilities and Service Systems	LTS	(L)	LTS	(G)
Wildfire	LTS	(G)	LTS	(S)

(G) = impact greater than the Project
(L) = impact less than the Project
(S) = impact the same or similar to the Project

4.6 References Cited

Brown and Caldwell. 2011. *Wastewater Treatment Plant Master Plan.* Available: https://www.napasan.com/DocumentCenter/View/272/Wastewater-Treatment-Plant-Master-Plan-entire-document-PDF. Accessed: March 5, 2021.

DKS. 2021. *Napa General Plan Update Transportation Evaluation of Preferred Plan*. Prepared for Dyett Bhatia and City of Napa. October.

City of Napa. 2019. *Napa 2040 General Plan Existing Conditions Report*. Prepared by Dyett & Bhatia in association with DKS Associates, EPS, ICF, Page & Turnbull and West Yost. March.

Chapter 5
Other CEQA Considerations

This chapter presents discussions of additional topics required by CEQA: cumulative impacts, growth-inducing impacts, significant and unavoidable impacts, and significant irreversible environmental changes.

5.1 Cumulative Impacts

CEQA Guidelines Section 15130 requires that an EIR include a discussion of the potential cumulative impacts of a proposed project. Cumulative impacts are defined as two or more individual effects that, when considered together, are significant. The cumulative impact is the change in the environment that results from the incremental impact of the Project being examined in the Draft EIR when added to the incremental impacts of other closely related past, present, and reasonably foreseeable probable future activities.

As defined in CEQA Guidelines Section 15355

> …a cumulative impact consists of an impact which is created as a result of the combination of the project evaluated in the EIR together with other projects causing related impacts. An EIR may determine that a project's contribution to a significant cumulative impact will be rendered less than cumulatively considerable and thus is not significant. A project's contribution is less than cumulatively considerable if the project is required to implement or fund its fair share of a mitigation measure or measures designed to alleviate the cumulative impact.

For purposes of this section, the term *significant cumulative impact* is synonymous with a cumulatively considerable contribution.

An adequate discussion of significant cumulative impacts is based on either of the following approaches.

- A list of past, present, and probable future projects producing related or cumulative impacts, including, if necessary, those projects outside the control of the lead agency.
- A summary of projections contained in an adopted general plan or related planning document, or in a prior environmental document, which has been adopted or certified, that described or evaluated regional or area-wide conditions contributing to the cumulative impact. Any such planning document must be referenced and made available to the public at a location specified by the lead agency.

The cumulative impact analysis in this Draft EIR relies on the projections approach because the Project has a long-term perspective. Unless so stated, the potential for cumulative contributions is projected to the General Plan horizon year of 2040. The geographic context for cumulative impacts is generally the Planning Area and immediately surrounding lands but can be a much larger area for resource categories such as air quality, greenhouse gas emissions, and transportation.

The determination of a project's cumulative effects involves identifying the following criteria.

- Significant impacts that are the result of the cumulative contributions of past, present, and reasonably probable future activities. Cumulative effects that are less than significant or are not required to be analyzed.
- Whether the project would contribute to any of those cumulative impacts. The EIR is not required to analyze a cumulative impact to which the project would not contribute.
- Whether, in the context of the cumulative impact, the project's contribution would be considerable. An impact that is less than significant when viewed as a project impact alone may nonetheless be a considerable contribution to a cumulative impact.

Several analyses presented in Chapter 3: Impact Analysis represent cumulative analyses of issues through the General Plan update horizon year of 2040 because they combine the anticipated effects of the Project with anticipated effects of regional growth and development. By their nature, the air quality, energy, GHG emissions, noise, and transportation analyses presented in Chapter 3 represent a cumulative analysis, because the effects specific to the Project cannot reasonably be differentiated from the broader effects of regional growth and development. Thus, analyses for these topics reflect not just growth in the Planning Area, but growth elsewhere in the region as well. The cumulative conclusions are summarized there, and where applicable. Other cumulative impacts are identified below.

5.1.1 Aesthetics

Reasonably foreseeable growth within the Planning Area could have cumulative effects on the City's aesthetic character. The Planning Area, and much of Napa Valley, are aesthetically characterized by historic downtowns, tree-lined streets, agricultural uses, and prominent natural features, such as the Napa River and surrounding hillsides. The City of Napa's design review process, in combination with implementation of the General Plan update's policies, would maintain the high-quality visual character of existing buildings, improve the high-quality visual character of future buildings, reduce light and glare resulting from future development, would limit impacts on agricultural lands, and would primarily contain growth within infill areas, the downtown, focus areas, and the priority development area, ensuring that aesthetic character is maintained. Because future development would be required to meet higher aesthetic and light and glare standards under the General Plan update, and development in County lands outside the City limits would be subject to the County's aesthetic and light and glare standards, the impact is not considered cumulatively considerable.

5.1.2 Air Quality

Cumulative impacts relating to air quality are analyzed in Section 3.2, *Air Quality*.

5.1.3 Biological Resources

Development associated with the General Plan update through the General Plan horizon year of 2040 would contribute to the ongoing loss of natural lands in the Planning Area, with potential effects on special-status species, sensitive natural communities, federally protected wetlands, wildlife and fish movement corridors, and invasive species.

Although impacts that result in the loss of natural lands would be minimized through policies in the General Plan update, some important habitats for wildlife (e.g., annual grassland, oak woodland, riparian woodland) would be affected by development under the General Plan update. Accordingly, the General Plan update would result both in direct loss and in a cumulative contribution within the Planning Area to the loss of these habitats. Additionally, impacts that result in the mortality of special-status animal species or loss of special-status plant species would contribute to the cumulative loss of populations of these species. The cumulative loss of habitat would contribute to a general decline for the region, resulting in the loss or displacement of wildlife that would have to compete for suitable habitats with existing adjacent populations. While the loss of habitat or special-status species as a result of development under the General Plan update would be less than significant, these losses when combined with other impacts on habitat and special-status species from other past, present, and future projects would contribute to a cumulatively considerable impact.

Development associated with the General Plan update may decrease habitat along the Napa River for special-status fish from impacts on the banks of the Napa River and associated riparian woodland. Water quality could also be affected by the increase of trash and debris that could enter the water due to development close to the river. While the loss of habitat or special-status species as a result of development under the General Plan update would be less than significant, these losses when combined with other impacts on habitat and special-status species from other past, present, and future projects would contribute to a cumulatively considerable impact.

State- and federally protected wetlands and other waters would also be affected by development under the General Plan update. The proposed General Plan update policies would ensure no net loss of these resources, however, such that development would not have a considerable contribution to the significant cumulative impacts on wetlands and other waters.

Proposed development under the General Plan update could interfere with the movement of native wildlife species, through either the reduction or elimination of pathways for movement. Such changes would contribute to cumulative effects on wildlife movement, as the loss or reduction of pathways would constrict or alter movement patterns or result in additional mortality from vehicle strikes. While the impacts on wildlife corridors resulting from development under the General Plan update would be less than significant, these impacts when combined with other impacts on wildlife corridors from other past, present, and future projects in the area would contribute to a cumulatively considerable impact.

Construction activities resulting from the proposed land use changes under the General Plan update could introduce new invasive plants or contribute to their spread in the Planning Area, resulting in adverse impacts on native flora and natural communities. The spread of invasive plants is a cumulative impact of all development activities taking place throughout the region. Proposed mitigation to modify General Plan policies by requiring avoidance and minimization measures regarding the introduction and spread of invasive plants would reduce the Project's impact to a less-than-significant level, but it would nevertheless constitute a cumulatively considerable impact.

Despite the General Plan update's extensive policies that would minimize effects of development on biological resources, the General Plan update would nonetheless contribute to cumulative effects on special-status species, sensitive natural communities, federally protected wetlands, wildlife and fish movement corridors, and invasive species. Therefore, the General Plan update would have a cumulatively considerable impact on biological resources.

5.1.4 Cultural Resources

There are known historical resources within the Planning Area, as well as the potential for unknown archaeological resources that could be affected by development under the General Plan update, and, when considered with other development and regional growth, could have a cumulative impact on these resources. However, all development projects in the region would be required to conform to the Secretary of the Interior's Standards for the Treatment of Historic Properties. Public Resources Code Section 21083.2 and CEQA Guidelines Section 15064.5(f), which would apply to projects throughout the region, recognize that historical or unique archaeological resources may be accidentally discovered during project construction and guidelines recommend that if a potential resource has been discovered, that an immediate evaluation by a qualified archaeologist be included in mitigation measures. Further, the California Health and Safety Code Section 7050.5 includes specific provisions for the protection of human remains in the event of discovery, and Section 7052 makes the willful mutilation, disinterment, or removal of human remains a felony. The California Health and Safety Code is applicable to any project in the region where ground disturbance would occur. Given these protections in place for cultural resources, the General Plan update's impact on this potentially significant cumulative impact is not cumulatively considerable.

5.1.5 Energy

As discussed in Section 3.5, *Energy*, Project-specific energy impacts related to land use patterns, energy efficiency in new construction and building retrofits, energy consumption of nonrenewable resources, and the use of energy resources for transportation systems would be less than significant. Overall, the increased demand for energy as a result of future land uses and development would be consistent with the General Plan update. Development projects under the General Plan update would be required to adhere to the aggressive energy conservation policies outlined in the General Plan update as well as the high-performance building regulations (Napa Municipal Code Chapter 15.04) for new development that address planning and design, energy efficiency, water efficiency and conservation, material conservation and resource efficiency, and environmental quality. In addition, the policies included in the General Plan update would encourage energy conservation programs, result in a reduction in use of nonrenewable fuels, foster the use of renewable resources, and would reduce transportation energy consumption. However, cumulative projects in the surrounding region may increase overall demand and result in a significant cumulative increase in the demand for energy. Thus, although the General Plan update would reduce energy consumption in Napa, the overall increase in regional energy use could result in a significant cumulative impact. However, because the City would implement several policies designed to reduce its energy use, as discussed Section 3.5, *Energy*, Napa's contribution to the cumulative impact would not be cumulatively considerable, and this impact would be less than significant.

5.1.6 Geology and Soils

Potential cumulative impacts related to geology, soils, and seismicity do not extend far beyond a General Plan's boundaries, since geological impacts are confined to discrete spatial locations and do not generally combine to create an extensive cumulative impact condition. The exception to this would occur where a large geologic feature (e.g., fault zone, massive landslide) might affect an extensive area, or where the development effects from a project could affect the geology of an offsite location. These circumstances would not occur as a result of the General Plan update. The cumulative increases in development and population that would result from the full buildout of the

General Plan update would increase the number of residents and employees exposed to the region's known seismic hazards; however, conformance with the California Building Code would preserve building integrity during a seismic event, and other regulatory measures would reduce geohazards impacts to a less-than-significant level. Therefore, there is no cumulative impact related to geology, soils, and seismicity.

5.1.7 Greenhouse Gas Emissions

Cumulative impacts relating to greenhouse gas emissions are analyzed in Section 3.7, *Greenhouse Gas Emissions*.

5.1.8 Hazards and Hazardous Materials

Projected population and employment growth in the Planning Area would increase the number of people potentially exposed to impacts from hazardous material transportation; the increased use of hazardous household, commercial, and industrial materials; as well as a cumulative increase in exposure to risk associated with the accidental release of hazardous materials into the environment. However, compliance with local, state, and federal regulations pertaining to the production, use, and transportation of hazardous materials would apply to development throughout the Planning Area resulting in a less than significant impact; therefore, the General Plan update's contribution to this potential cumulative impact is less than cumulatively considerable.

5.1.9 Hydrology and Water Quality

New development in the region has the potential to generate impacts related to the violation of water quality standards, erosion and sedimentation, flood hazards, and construction-related water quality impacts. The General Plan update, in combination with regional growth and development, could affect local water quality through increased non-point-source pollution resulting from greater use intensity, increased use of routine household cleaners and landscaping chemicals, and more vehicle miles traveled on local roadways. Adherence to state and regional regulations described in Section 3.9, *Hydrology and Water Quality*, would reduce the rate of runoff, and filter out pollutants. Construction activities are required to comply with the State Water Resources Control Board's statewide National Pollutant Discharge Elimination System stormwater permit program, the Porter-Cologne Water Quality Control Act's requirements for site-specific waste discharge, as well as local agency public works construction standards. In addition, policies in the General Plan update and existing City regulations would ensure protection of water quality, improve stormwater management, and reduce stormwater pollution. Increased impervious surface area as a result of the General Plan update would be mitigated by Policies NRC.10-4 and NRC.10-5, which would require new development to incorporate the use of pervious surfaces in public spaces to permit the percolation of urban runoff and facilitate groundwater recharge by encouraging development projects to use low-impact development practices. Therefore, the General Plan update's contribution to this potentially significant cumulative impact is less than cumulatively considerable.

The General Plan update, in combination with other planned and reasonably foreseeable regional population growth, could strain regional surface water systems, especially if water becomes scarcer in California as a result of climate change. As discussed in Section 3.17, *Utilities and Service Systems*, Napa's current water demands are met by three sources: Milliken Reservoir, Lake Hennessey, and water purchased under contract from the State Water Project and delivered through the North Bay

Aqueduct system. In conjunction with future growth in Napa County, which may also rely on the City's water resources, strains on the water supply may become unsustainable. Surface waters may not be abundant enough to meet demand in times of drought, and local aquifers are currently being pumped near safe yield capacity. However, as described in Section 3.17, *Utilities and Service Systems*, sufficient water supply is available to meet projected demand of the City's water customers through the year 2035 under normal, dry, and multiple dry year scenarios. Therefore, the General Plan update's contribution to this potentially significant cumulative impact is less than cumulatively considerable.

5.1.10 Land Use and Population

There is no significant cumulative impact associated with land use. The City of Napa is a cohesive community that has not been physically divided by development projects. Projects that could have the effect of physically dividing an established community—such as a major new road, highway, or similar infrastructure—tend to have a singular rather than cumulative impact. Similarly, impacts from plans and projects in the region that could conflict with existing plans, including habitat conservation plans, are not cumulative in nature. However, potential impacts related to population and housing can be cumulative in nature. Population growth, by itself, is not an environmental impact; however, the direct and indirect effects, such as housing and infrastructure needs that are related to population growth, can lead to physical environmental effects. The Association of Bay Area Governments (ABAG) projects that Napa County will experience total population growth of 23,700 people between 2015 and 2040. The 17,900 new residents anticipated in the Planning Area as a result of buildout under the General Plan update represent about 75 percent of Napa County's projected population growth. Nnapa is the largest city and the county seat of Napa County, and the principal city of the Napa County Metropolitan Statistical Area. As the population growth is within projected growth estimates, and the growth would be occurring primarily through infill development within the City, the General Plan update's contribution to this potentially significant cumulative impact is less than cumulatively considerable.

5.1.11 Noise

Cumulative impacts relating to noise are analyzed in Section 3.11, *Noise*.

5.1.12 Public Services and Recreation

Public services are generally provided by local governments and/or special districts for areas within their jurisdiction and are not provided on a regional basis. Fire and police protection services are provided by local governments or fire protection districts for areas within their jurisdiction, although mutual aid agreements between agencies do help spread resources when needed. Public schools are provided by school districts to areas within their jurisdictions. While districts may have cross-jurisdictional boundaries, school services are still provided at the local, rather than regional, level. Several agencies provide park and recreation services in the region, including counties, cities, and special districts. Each of these areas has their own parkland ratios and standards and is responsible for providing parkland to meet the local demand. An increase in regional population may increase demand for parks and recreation facilities and services; however, these local jurisdictions have authority over land use, set and implement level of service standards, and determine the siting and timing of public service projects. Therefore, there would be no cumulative impact related to public services and recreation.

5.1.13 Transportation

The General Plan update looks at improving transportation options and connectivity within the City as well as including environmental sustainability, connected neighborhoods, increased travel options, balancing tourism, and local needs, and achieving a healthy and safe community for all. The City has set forth an updated Transportation Element that is consistent to updates made to CEQA analysis, the Napa Countywide Bicycle Plan, and the Plan Bay Area 2040 RTP/SCS. For consistency with Senate Bill 743, the Transportation Element of the General Plan includes significance thresholds for VMT, requiring all cumulative development projects within the City to evaluate transportation impacts based on VMT rather than LOS. Implementation of the General Plan update would ensure that projects within the City in conjunction with other projects in the region would result in a less than cumulatively considerable impact.

Implementation of the Project along with other cumulative projects in the region would be required to implement similar project-specific mitigation measures during construction, comply with applicable agency standards and specifications, and to coordinate with public agencies, as applicable. Therefore, the incremental impact of the Project on transportation safety would not be cumulatively considerable. This impact would be less than cumulatively considerable.

Construction activities associated with the implementation of the General Plan update along with other cumulative projects within the region could result in short-term roadway delays and temporary roadway closures which may require detours. However, these impacts would be intermittent and temporary in nature, and are not anticipated to result in inadequate emergency access with mitigation. Goals and policies outlined in the updated Transportation Element would ensure that projects within the City in conjunction with other cumulative projects within the region would allow for easily accessible emergency access. Therefore, the Project would not result in inadequate emergency access and the Project's incremental contribution to cumulative impacts would not be cumulatively considerable.

5.1.14 Tribal Cultural Resources

The potential loss of tribal cultural resources associated with the Project in combination with other projects in the region may contribute to the cumulative loss of such resources that has occurred over time as the tribes' ancestral lands have been developed. The extent to which such resources may exist within the Planning Area is not currently known. However, it is reasonable to assume that future consultations with California Native American tribes could reveal that individual projects consistent with the General Plan update could have a significant effect on tribal cultural resources. Similarly, other projects in the region may result in effects on tribal cultural resources. Together, such projects could have a cumulative impact on tribal cultural resources.

Policy HCR 14-2 would require development and redevelopment proposals in areas of Napa sensitive for tribal cultural resources and would require an assessment of the potential presence of tribal cultural resources, including a site survey and a records search of the California Historical Resources Information System at the Northwest Information Center. As warranted by the results of the assessment, additional studies could be required to identify and address Project-specific impacts on tribal cultural resources. Policy HCR 15-2 would require the City to work with tribal nations on how development projects can plan to avoid known cultural sites and resources. Projects subject to CEQA would be required to comply with AB 52 requirements for consultation and identification of impacts and mitigation measures for tribal cultural resources. These policies, in conjunction with

Project specific CEQA mitigation would reduce the Project's impact to the extent that it would not make a cumulatively considerable contribution to a cumulative impact on tribal cultural resources.

5.1.15 Utilities and Service Systems

The geographic context for the analysis of cumulative impacts on utilities and service systems consists of the service area of the utilities and service systems providers that serve Napa, and thus relies on a projection approach. Refer to Section 3.17, *Utilities and Service Systems*, for a description of the existing utilities and service systems setting of Napa. Napa relies on a variety of providers for water, wastewater processing, stormwater conveyance, solid waste disposal, electricity and natural gas, and telecommunications services.

As discussed under 5.1.10 *Land Use and Population*, implementation of the General Plan update would not spur unplanned growth or unanticipated population increase because the General Plan update is based on projected growth estimates for the City and region. Thus, the Project would not create a new demand for utilities and service systems beyond what is already anticipated based on population growth that would occur regardless of the Project. However, future proposed development in Napa and the region could increase future demand on the providers of utilities and service systems and would be subject to the approval of local jurisdictions that are similarly served by the utilities and service systems providers as Napa. Should such future development occur, the respective decision-making jurisdictions would be required to evaluate the need for any increased utilities and service systems or facilities expansions that may be needed to serve whatever new development is proposed. In addition, such development would be required to undergo CEQA analysis to identify potential impacts to utilities and service systems. Since the General plan update would not directly induce growth, the degree to which subsequent unplanned growth would occur and whether such growth would in turn increase demand for water, wastewater processing, stormwater conveyance, solid waste disposal, electricity and natural gas, and telecommunications services, or similar facilities, is not known at this time. While the potential for the General Plan update, in combination with any future demand in the service areas of the utilities and service systems providers, to result in the need for new or physically altered facilities or infrastructure, such future projects would be required to comply with CEQA. Future CEQA documentation would identify any impacts to utilities and service systems as well as mitigation measures to avoid or minimize such impacts. Future projects within the service areas also would be required to comply with local polices and regulatory requirements with respect to water, wastewater processing, stormwater conveyance, solid waste disposal, electricity and natural gas, and telecommunications services such that no cumulative impact would occur.

5.1.16 Wildfire

Projected population and employment growth in the Planning Area would increase the number of people potentially exposed to impacts from wildfire. Although the Planning Area is not within a very high fire hazard severity zone according to the California Department of Forestry and Fire Protection, areas to the east and west of Napa, and other mountainous areas in the county are in high and very high fire hazard severity zones. Although the policies of the General Plan update as described in Section 3.18, *Wildfire*, would reduce wildfire impacts locally, and compliance with local and state regulations pertaining to wildfire would help reduce impacts regionally, the General Plan update's contribution to this potential cumulative impact is considered cumulatively considerable.

5.2 Growth-Inducing Impacts

CEQA requires a discussion of the ways in which the Project would be growth inducing. CEQA Guidelines Section 15126.2(d) identifies a project as growth inducing if it fosters economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. The General Plan update would not directly authorize new development and therefore would not directly induce growth. However, it would indirectly induce growth by removing barriers to growth, by creating a condition that attracts additional population or new economic activity, or by providing a catalyst for future growth in the area. While these proposals may have a potential to induce growth, they do not automatically result in growth. Growth can happen only through capital investment in new economic opportunities by the public or private sectors.

Typically, the growth-inducing potential of a project is considered significant if it fosters growth or a concentration of population more than the existing setting or baseline. Growth may be induced through the provision of infrastructure or service capacity that would accommodate new development.

By law, the City is required to adopt a comprehensive, long-term general plan for the physical development of the City and of any land outside its boundaries which in the planning agency's judgment bears relation to its planning (California Government Code Section 65300). On a regular basis (every 8 years as required by state law), ABAG prepares the Regional Housing Needs Allocation and adopts the associated Regional Housing Needs Plan (RHNP) that establishes the share of projected future housing growth that each jurisdiction in the San Francisco Bay Area is expected to accommodate in its general plan. ABAG adopted the RHNP for the period of January 31, 2015, through January 31, 2023, on July 18, 2013. The City's regional housing share under the RHNP is 835 dwelling units (very low=185; low=106; moderate=141; and above moderate=403). The City's current (2015) housing element adopted March 3, 2015 is based on the current RHNP allocation.

Based on the definition of growth inducement, a general plan is inherently growth inducing because it must, by law, accommodate at least projected housing demand. The General Plan update would provide the framework by which public officials will be guided in making decisions relative to future development in Napa. This EIR, by evaluating the impacts of the General Plan, also discloses its growth-inducing impacts.

5.3 Significant and Unavoidable Impacts

Section 15126.2(a) (b) of the CEQA Guidelines requires an EIR to identify and focus on the significant environmental effects of the Project, including effects that cannot be avoided if the Project were implemented. All impacts identified in Chapter 3, *Impact Analysis*, of this Draft EIR, are less than significant or less than significant with implementation of mitigation, with the exception of air quality and greenhouse gas emissions, which are significant and unavoidable.

5.4 Significant Irreversible Environmental Changes That Cannot Be Avoided if the Project is Implemented

CEQA Guidelines Section 15126.2 requires that the EIR for a general plan amendment address any significant irreversible environmental change that would result from implementation of that amendment. Specifically, according to the Guidelines (Section 15126.2(c)), such an impact would occur if any of the following conditions would result.

- The project would indirectly involve a large commitment of nonrenewable resources.
- Irreversible damage could result from environmental accidents associated with the project.
- The proposed consumption of resources is not justified.

Approval and implementation of actions related to the Project would be typical of land use planning and regulatory actions associated with development of a general plan amendment or update. Such activities would result in an irretrievable commitment of nonrenewable resources—such as fossil fuel–based energy supplies and construction-related materials—as a result of future development that would occur pursuant to the General Plan update. Energy resources would be used for construction, heating and cooling of buildings, transportation of people and goods, heating and refrigeration, lighting, and other associated energy needs.

Environmental changes would occur as the physical environment is altered through continued commitments of land and construction materials to urban development. There would be an irretrievable commitment of labor, capital, and materials used in construction, and open space and undeveloped lands would be permanently lost over time. Nonrenewable resources would be committed—primarily in the form of fossil fuels (oil, natural gas, and gasoline) used to support the additional development associated with the General Plan update.

The consumption of other nonrenewable or slowly renewable resources would result from the development associated with the General Plan update. These resources would include, but would not be limited to, lumber and other forest products, sand and gravel, asphalt, steel, copper, and water.

Future development in Napa as envisioned in the General Plan update would result in the construction of structures, facilities, or infrastructure on lands that are currently undeveloped or developed at a lesser intensity. Development of lands generally would result in their future and permanent commitment to urban and suburban uses.

5.5 Future Use of this Environmental Impact Report

CEQA has several provisions for streamlining the environmental impact review of later projects that are consistent with the General Plan. The City will use this Draft EIR as the basis for streamlining CEQA reviews of future residential, commercial, and office development that is consistent with the General Plan. As the lead agency for future development projects, the City will be responsible for determining which if any of CEQA's streamlining methods may apply to a given project. In any case, the City will determine whether the impacts of such projects were adequately analyzed in the

General Plan EIR and, if it finds any project was not, will prepare subsequent CEQA documents to disclose the project-specific impacts and identify feasible mitigation.

The City will use an initial study checklist to simplify the process of using the General Plan EIR as the basis for environmental analyses of future projects that are consistent with the General Plan. This will assist the City in identifying future projects that qualify for CEQA streamlining and identifying any new or more severe significant effects that would require the preparation of a subsequent or supplemental CEQA document.

Chapter 6
Report Preparers

6.1 City of Napa

- Michael Walker—City of Napa, Senior Planner
- Daniel Doporto—The Law Office of Daniel P. Doporto, Legal Review

6.2 ICF

- Rich Walter—Project Director
- James Alcorn, AICP—Project Manager, EIR preparation, technical oversight, Introduction, Project Description, Energy, Wildfire, Alternatives, and Other CEQA
- Patrick Maley— Deputy Project Manager, Executive Summary, Public Services
- Jennifer Ban—Aesthetics
- Cory Matsui—Noise
- Diana Roberts—Geology and Soils
- Monica Corpuz—Geology and Soils
- Dave Buehler—Noise Review
- Laura Yoon—Air Quality and Greenhouse Gas Review
- Lisa Webber—Biological Resources
- Marieka Schrader—Biological Resources
- Donna Maniscalco—Biological Resources
- Steve Pappas—Cultural Resources
- David Lemon—Cultural Resources Review
- Katrina Sukola—Hydrology and Water Quality
- Meagan Flacy—Hydrology and Water Quality
- Barbara Wolf—Tribal Cultural Resources
- Joza Burnam —Transportation
- Lisetta Quick - Utilities
- Tait Elder—Cultural Resources Review
- Alex Angier—Geographical Information Systems
- Stephanie Monzon—Editing
- Kristen Lundstrom—Editing
- Anthony Ha—Formatting

6.3 Dyett & Bhatia

- Rajeev Bhatia—Principal, Project Manager
- Brendan Hurley—Junior Project Manager, Land Use, Alternatives
- Mayu Tanaka— Air Quality, Greenhouse Gas
- Hazel O'Neil— Air Quality, Greenhouse Gas, Recreation
- Clare Kucera—Land Use, Population

6.4 DKS Associates

- John Long—Principal, Transportation Impact Analysis
- Erin Vaca—Transportation Impact Analysis

6.5 West Yost Associates

- Neal Colwell—Hydrology and Water Quality

Appendix A

Notice of Preparation and Comments on Notice of Preparation

NOTICE OF PREPARATION
of a Draft Environmental Impact Report for the City of Napa General Plan Update

Date:	January 22, 2021
To:	Reviewing Agencies, Interested Parties, and Organizations
Project Title:	City of Napa General Plan Update 2040
Comment Period:	January 22, 2021 to February 22, 2021 by 5:00 PM PST
Scoping Meeting:	Wednesday, January 27, 2021 at 5:30 PM PST Zoom Registration Link: https://us02web.zoom.us/webinar/register/WN_D8Ihmu2ERtiDC5CyOhEOIA
Lead Agency:	City of Napa
Contact:	Michael Walker, AICP Senior Planner Planning Division City of Napa 1600 First Street, Napa, CA 94559 mwalker@cityofnapa.org

The City of Napa (City) is preparing an update of its General Plan, which will establish the City's overall approach to development, transportation, environmental quality, and other topics through 2040. The City has determined that the General Plan Update, or proposed Plan, will require the preparation of a Program Environmental Impact Report (Program EIR) in compliance with the California Environmental Quality Act (CEQA; California Public Resources Code, Section 21000 et seq.), and Title 14 of the California Code of Regulations (CCR; hereafter CEQA Guidelines, 14 CCR 15000 et seq.). The City has prepared this Notice of Preparation (NOP) in accordance with CEQA Guidelines Sections 15082(a) and 15375.

The NOP solicits guidance from responsible, trustee, and federal agencies about the scope and content of environmental information to be included in the EIR related to the agencies' statutory responsibilities. The agencies will use the City's EIR when considering their permits or other approvals related to the project. The NOP also provides an opportunity for other interested parties to provide the City comments on environmental issues they see as being germane to the Program EIR.

The project description, location, and the potential environmental effects are contained in the attached materials. Since the City has determined that a Program EIR is required for the propose Plan, pursuant to Section 15060(d) of the CEQA Guidelines (14 CCR 15000 et seq.), preparation of an Initial Study is not required and, therefore, one has not been prepared. Due to time limits mandated by state law, your response to this NOP must be submitted at the earliest possible date but no later than the close of the NOP review period, which runs as follows: January 21, 2021 to February 19, 2021. Written comments should be addressed to Michael Walker at the City of Napa at the address listed previously and be received by 5:00 pm on February 19.

PROJECT SETTING

The City of Napa is located in southern Napa County. A global destination, the city is located about 10 miles north of San Pablo Bay, 50 miles from San Francisco, and 40 miles from Oakland. State Route (SR) 29, SR 121, and SR 221 run through Napa, connecting the city to other communities throughout the region. In addition, Napa is accessible via public transportation, including the Vine bus and shuttle.

The General Plan Planning Area (Planning Area) is defined as the land area addressed by the General Plan update. The Planning Area includes all land within the City of Napa, its Sphere of Influence (SOI), and within the City's Rural Urban Limit. The Planning Area encompasses about 10,700 acres, of which 93 percent is in City limits and the remaining 7 percent is in the SOI. The Planning Area is surrounded by unincorporated Napa County and generally bounded by Oak Knoll Avenue to the north, First Avenue on the east, Napa Valley Corporate Park on the south, and the Mayacamas Mountains on the west. The SOI includes a portion of unincorporated Napa County, located in various sections of the Planning Area. The Napa River runs through the Planning Area.

The attached Figure 1 shows the city's regional location and Figure 2 the General Plan Planning Area.

PROJECT DESCRIPTION

The Project involves a comprehensive update to all elements of the General Plan with the exception of the Housing Element, which is not being presently updated. Preparation of the General Plan is underway, and a Draft Land Use Diagram and key policies are currently under review by the General Plan Advisory Committee (GPAC), appointed by the City Council. Significant community input has been gathered through community meetings and workshops, and online surveys. Information on work completed to date, community input gathered, along with the Draft Land Use Plan and policy proposals that are currently being worked on are available at the project website https://napa2040.com.

The Napa General Plan Update will have all elements required by State law plus additional elements to incorporate strategies for achieving the plan vision, complying with new State law enacted since the Napa General Plan was last comprehensively updated, and addressing emerging trends and new technologies. The General Plan is anticipated to have the following elements: Land Use and

Community Design; Transportation; Community Services, Parks, and Recreation; Historic Resources; Climate Change and Sustainability; Natural Resources Conservation; Safety and Noise; Public Health and Equity; and Economic Development.

In March 2020, the City Council approved the key elements of a vision for the future of the community to guide the General Plan that include:

- Fostering Napa as a community of connected neighborhoods, with vibrant, walkable districts, and revitalized corridors.
- Increasing travel options through enhanced walking, bicycling, and public transportation systems, and promote mobility through increased connectivity and intelligent transportation management.
- Balancing local and tourist needs.
- Promoting housing and support a diverse array of housing types to meet the needs of all segments of the population.
- Fostering connections to nature and open space.
- Emphasizing environmental sustainability.
- Achieving a healthy and safe community for all.
- Promoting continued Downtown revitalization.
- Celebrating Culture, Arts, and History.
- Achieving an economically diverse and resilient community.

PROBABLE ENVIRONMENTAL EFFECTS

A Program EIR will be prepared for the Napa General Plan Update and will describe existing environmental resources and current conditions in the Planning Area, evaluate the environmental impacts of implementing the project, and identify feasible mitigation measures that may lessen or avoid adverse environmental impacts. The analysis will focus on the reasonably foreseeable direct and indirect physical environmental effects that could result from implementation of the project.

The following CEQA environmental issue areas will be addressed in the EIR:

- Aesthetics
- Agriculture and Forestry Resources
- Air Quality
- Biological Resources
- Cultural Resources
- Energy Resources
- Geology and Soils
- Greenhouse Gas Emissions
- Hazards and Hazardous Materials

- Hydrology and Water Quality
- Land Use and Planning
- Noise and Vibration
- Population and Housing
- Public Services, Recreation
- Tribal Cultural Resources
- Utilities and Service Systems
- Transportation and Traffic
- Wildfire Hazards

There is reasonable potential that the project would result in less-than-significant environmental effects related to Agriculture and Forestry Resources; thus, it is anticipated that this topic will be discussed in the Less than Significant Impacts chapter in the EIR. There are no known Mineral Resources in the Planning Area; thus, this topic will be excluded from the EIR.

SCOPING MEETING

Pursuant to Section 21083.9(a)(2) of CEQA (California Public Resources Code, Section 21000 et seq.), scoping meetings are required for projects that may have statewide, regional, or area-wide environmental impacts. The City has determined that this project meets this threshold. A public scoping meeting has been scheduled and will be held on Wednesday, January 27, 2021 starting at 5:30 PM, via Zoom. The Zoom registration link is included at the beginning of this document and the link will be provided for public view on the project's website at https://napa2040.com/participate. Verbal comments regarding the scope of the proposed Program EIR will be accepted at the meeting. Written comments can also be mailed to the above-mentioned address, addressed to Michael Walker, before the close of the NOP public comment period.

Please contact Michael Walker at 707-257-9530 or mwalker@cityofnapa.org with any questions regarding this notice or the scoping meeting.

Michael Walker, AICP
Senior Planner

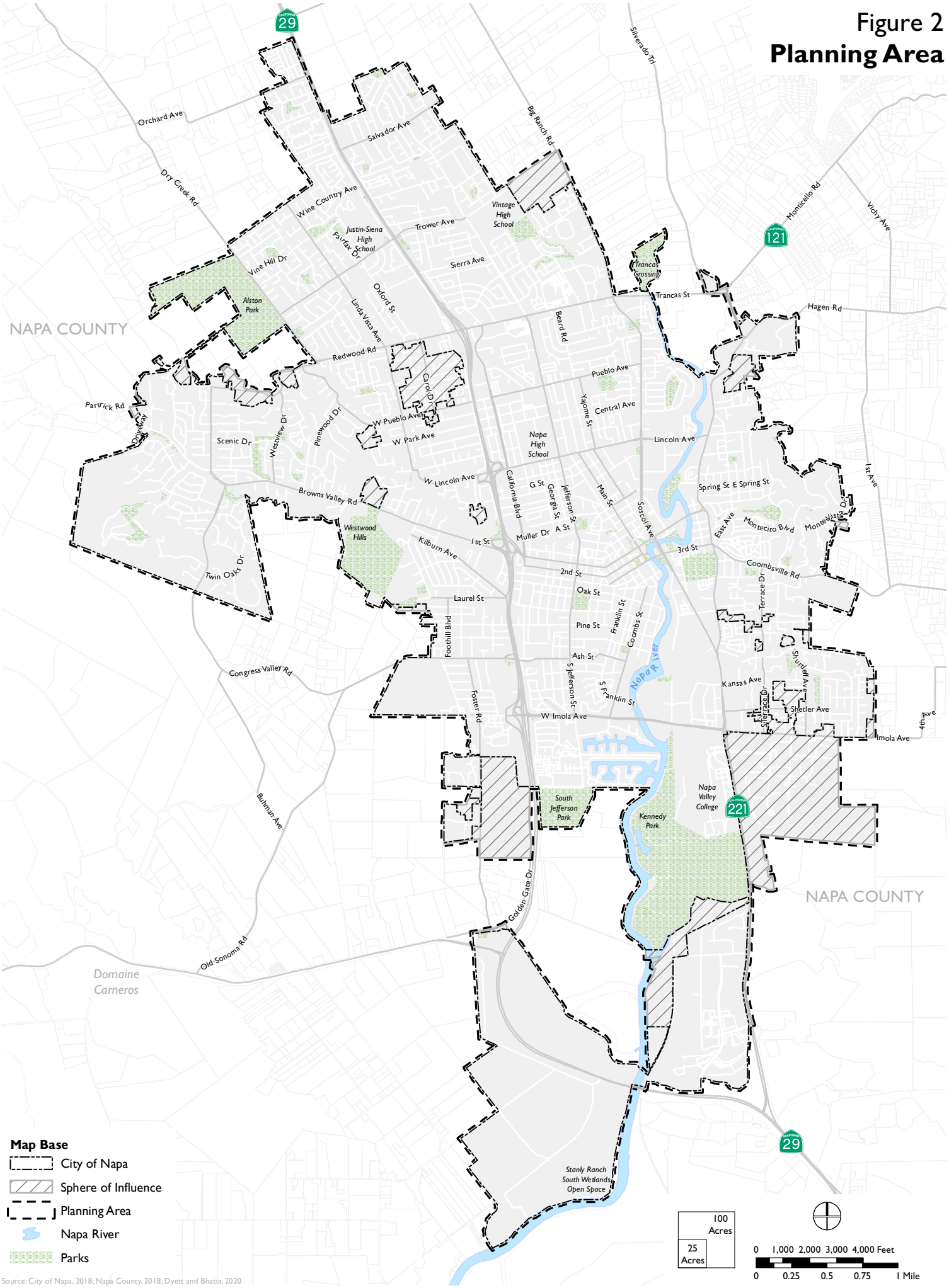
Date

Figure 1

Regional Setting



Figure 2
Planning Area



Source: City of Napa, 2018; Napa County, 2018; Dyett and Bhatia, 2020

STATE OF CALIFORNIA Gavin Newsom, Governor

NATIVE AMERICAN HERITAGE COMMISSION

CHAIRPERSON
Laura Miranda
Luiseño

VICE CHAIRPERSON
Reginald Pagaling
Chumash

SECRETARY
Merri Lopez-Keifer
Luiseño

PARLIAMENTARIAN
Russell Attebery
Karuk

COMMISSIONER
William Mungary
Paiute/White Mountain Apache

COMMISSIONER
Julie Tumamait-Stenslie
Chumash

COMMISSIONER
[Vacant]

COMMISSIONER
[Vacant]

COMMISSIONER
[Vacant]

EXECUTIVE SECRETARY
Christina Snider
Pomo

NAHC HEADQUARTERS
1550 Harbor Boulevard
Suite 100
West Sacramento,
California 95691
(916) 373-3710
nahc@nahc.ca.gov
NAHC.ca.gov

January 25, 2021

RECEIVED
FEB 01 2021
COMMUNITY DEVELOPMENT DEPARTMENT

Michael Walker
City of Napa
1600 First Street
Napa, CA 94559

Re: 2021010255, City of Napa General Plan Update Project, Napa County

Dear Mr. Walker:

The Native American Heritage Commission (NAHC) has received the Notice of Preparation (NOP), Draft Environmental Impact Report (DEIR) or Early Consultation for the project referenced above. The California Environmental Quality Act (CEQA) (Pub. Resources Code §21000 et seq.), specifically Public Resources Code §21084.1, states that a project that may cause a substantial adverse change in the significance of a historical resource, is a project that may have a significant effect on the environment. (Pub. Resources Code § 21084.1; Cal. Code Regs., tit.14, §15064.5 (b) (CEQA Guidelines §15064.5 (b)). If there is substantial evidence, in light of the whole record before a lead agency, that a project may have a significant effect on the environment, an Environmental Impact Report (EIR) shall be prepared. (Pub. Resources Code §21080 (d); Cal. Code Regs., tit. 14, § 5064 subd.(a)(1) (CEQA Guidelines §15064 (a)(1)). In order to determine whether a project will cause a substantial adverse change in the significance of a historical resource, a lead agency will need to determine whether there are historical resources within the area of potential effect (APE).

CEQA was amended significantly in 2014. Assembly Bill 52 (Gatto, Chapter 532, Statutes of 2014) (AB 52) amended CEQA to create a separate category of cultural resources, "tribal cultural resources" (Pub. Resources Code §21074) and provides that a project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment. (Pub. Resources Code §21084.2). Public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource. (Pub. Resources Code §21084.3 (a)). **AB 52 applies to any project for which a notice of preparation, a notice of negative declaration, or a mitigated negative declaration is filed on or after July 1, 2015.** If your project involves the adoption of or amendment to a general plan or a specific plan, or the designation or proposed designation of open space, on or after March 1, 2005, it may also be subject to Senate Bill 18 (Burton, Chapter 905, Statutes of 2004) (SB 18). **Both SB 18 and AB 52 have tribal consultation requirements.** If your project is also subject to the federal National Environmental Policy Act (42 U.S.C. § 4321 et seq.) (NEPA), the tribal consultation requirements of Section 106 of the National Historic Preservation Act of 1966 (154 U.S.C. 300101, 36 C.F.R. §800 et seq.) may also apply.

The NAHC recommends consultation with California Native American tribes that are traditionally and culturally affiliated with the geographic area of your proposed project as early as possible in order to avoid inadvertent discoveries of Native American human remains and best protect tribal cultural resources. Below is a brief summary of portions of AB 52 and SB 18 as well as the NAHC's recommendations for conducting cultural resources assessments.

Consult your legal counsel about compliance with AB 52 and SB 18 as well as compliance with any other applicable laws.

AB 52

AB 52 has added to CEQA the additional requirements listed below, along with many other requirements:

1. Fourteen Day Period to Provide Notice of Completion of an Application/Decision to Undertake a Project: Within fourteen (14) days of determining that an application for a project is complete or of a decision by a public agency to undertake a project, a lead agency shall provide formal notification to a designated contact of, or tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice, to be accomplished by at least one written notice that includes:

- **a.** A brief description of the project.
- **b.** The lead agency contact information.
- **c.** Notification that the California Native American tribe has 30 days to request consultation. (Pub. Resources Code §21080.3.1 (d)).
- **d.** A "California Native American tribe" is defined as a Native American tribe located in California that is on the contact list maintained by the NAHC for the purposes of Chapter 905 of Statutes of 2004 (SB 18). (Pub. Resources Code §21073).

2. Begin Consultation Within 30 Days of Receiving a Tribe's Request for Consultation and Before Releasing a Negative Declaration, Mitigated Negative Declaration, or Environmental Impact Report: A lead agency shall begin the consultation process within 30 days of receiving a request for consultation from a California Native American tribe that is traditionally and culturally affiliated with the geographic area of the proposed project. (Pub. Resources Code §21080.3.1, subds. (d) and (e)) and prior to the release of a negative declaration, mitigated negative declaration or Environmental Impact Report. (Pub. Resources Code §21080.3.1(b)).

- **a.** For purposes of AB 52, "consultation shall have the same meaning as provided in Gov. Code §65352.4 (SB 18). (Pub. Resources Code §21080.3.1 (b)).

3. Mandatory Topics of Consultation If Requested by a Tribe: The following topics of consultation, if a tribe requests to discuss them, are mandatory topics of consultation:

- **a.** Alternatives to the project.
- **b.** Recommended mitigation measures.
- **c.** Significant effects. (Pub. Resources Code §21080.3.2 (a)).

4. Discretionary Topics of Consultation: The following topics are discretionary topics of consultation:

- **a.** Type of environmental review necessary.
- **b.** Significance of the tribal cultural resources.
- **c.** Significance of the project's impacts on tribal cultural resources.
- **d.** If necessary, project alternatives or appropriate measures for preservation or mitigation that the tribe may recommend to the lead agency. (Pub. Resources Code §21080.3.2 (a)).

5. Confidentiality of Information Submitted by a Tribe During the Environmental Review Process: With some exceptions, any information, including but not limited to, the location, description, and use of tribal cultural resources submitted by a California Native American tribe during the environmental review process shall not be included in the environmental document or otherwise disclosed by the lead agency or any other public agency to the public, consistent with Government Code §6254 (r) and §6254.10. Any information submitted by a California Native American tribe during the consultation or environmental review process shall be published in a confidential appendix to the environmental document unless the tribe that provided the information consents, in writing, to the disclosure of some or all of the information to the public. (Pub. Resources Code §21082.3 (c)(1)).

6. Discussion of Impacts to Tribal Cultural Resources in the Environmental Document: If a project may have a significant impact on a tribal cultural resource, the lead agency's environmental document shall discuss both of the following:

- **a.** Whether the proposed project has a significant impact on an identified tribal cultural resource.
- **b.** Whether feasible alternatives or mitigation measures, including those measures that may be agreed to pursuant to Public Resources Code §21082.3, subdivision (a), avoid or substantially lessen the impact on the identified tribal cultural resource. (Pub. Resources Code §21082.3 (b)).

7. Conclusion of Consultation: Consultation with a tribe shall be considered concluded when either of the following occurs:

a. The parties agree to measures to mitigate or avoid a significant effect, if a significant effect exists, on a tribal cultural resource; or

b. A party, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached. (Pub. Resources Code §21080.3.2 (b)).

8. Recommending Mitigation Measures Agreed Upon in Consultation in the Environmental Document: Any mitigation measures agreed upon in the consultation conducted pursuant to Public Resources Code §21080.3.2 shall be recommended for inclusion in the environmental document and in an adopted mitigation monitoring and reporting program, if determined to avoid or lessen the impact pursuant to Public Resources Code §21082.3, subdivision (b), paragraph 2, and shall be fully enforceable. (Pub. Resources Code §21082.3 (a)).

9. Required Consideration of Feasible Mitigation: If mitigation measures recommended by the staff of the lead agency as a result of the consultation process are not included in the environmental document or if there are no agreed upon mitigation measures at the conclusion of consultation, or if consultation does not occur, and if substantial evidence demonstrates that a project will cause a significant effect to a tribal cultural resource, the lead agency shall consider feasible mitigation pursuant to Public Resources Code §21084.3 (b). (Pub. Resources Code §21082.3 (e)).

10. Examples of Mitigation Measures That, If Feasible, May Be Considered to Avoid or Minimize Significant Adverse Impacts to Tribal Cultural Resources:

a. Avoidance and preservation of the resources in place, including, but not limited to:

i. Planning and construction to avoid the resources and protect the cultural and natural context.

ii. Planning greenspace, parks, or other open space, to incorporate the resources with culturally appropriate protection and management criteria.

b. Treating the resource with culturally appropriate dignity, taking into account the tribal cultural values and meaning of the resource, including, but not limited to, the following:

i. Protecting the cultural character and integrity of the resource.

ii. Protecting the traditional use of the resource.

iii. Protecting the confidentiality of the resource.

c. Permanent conservation easements or other interests in real property, with culturally appropriate management criteria for the purposes of preserving or utilizing the resources or places.

d. Protecting the resource. (Pub. Resource Code §21084.3 (b)).

e. Please note that a federally recognized California Native American tribe or a non-federally recognized California Native American tribe that is on the contact list maintained by the NAHC to protect a California prehistoric, archaeological, cultural, spiritual, or ceremonial place may acquire and hold conservation easements if the conservation easement is voluntarily conveyed. (Civ. Code §815.3 (c)).

f. Please note that it is the policy of the state that Native American remains and associated grave artifacts shall be repatriated. (Pub. Resources Code §5097.991).

11. Prerequisites for Certifying an Environmental Impact Report or Adopting a Mitigated Negative Declaration or Negative Declaration with a Significant Impact on an Identified Tribal Cultural Resource: An Environmental Impact Report may not be certified, nor may a mitigated negative declaration or a negative declaration be adopted unless one of the following occurs:

a. The consultation process between the tribes and the lead agency has occurred as provided in Public Resources Code §21080.3.1 and §21080.3.2 and concluded pursuant to Public Resources Code §21080.3.2.

b. The tribe that requested consultation failed to provide comments to the lead agency or otherwise failed to engage in the consultation process.

c. The lead agency provided notice of the project to the tribe in compliance with Public Resources Code §21080.3.1 (d) and the tribe failed to request consultation within 30 days. (Pub. Resources Code §21082.3 (d)).

The NAHC's PowerPoint presentation titled, "Tribal Consultation Under AB 52: Requirements and Best Practices" may be found online at: http://nahc.ca.gov/wp-content/uploads/2015/10/AB52TribalConsultation_CalEPAPDF.pdf

SB 18

SB 18 applies to local governments and requires local governments to contact, provide notice to, refer plans to, and consult with tribes prior to the adoption or amendment of a general plan or a specific plan, or the designation of open space. (Gov. Code §65352.3). Local governments should consult the Governor's Office of Planning and Research's "Tribal Consultation Guidelines," which can be found online at: https://www.opr.ca.gov/docs/09_14_05_Updated_Guidelines_922.pdf.

Some of SB 18's provisions include:

1. Tribal Consultation: If a local government considers a proposal to adopt or amend a general plan or a specific plan, or to designate open space it is required to contact the appropriate tribes identified by the NAHC by requesting a "Tribal Consultation List." If a tribe, once contacted, requests consultation the local government must consult with the tribe on the plan proposal. **A tribe has 90 days from the date of receipt of notification to request consultation unless a shorter timeframe has been agreed to by the tribe.** (Gov. Code §65352.3 (a)(2)).

2. No Statutory Time Limit on SB 18 Tribal Consultation. There is no statutory time limit on SB 18 tribal consultation.

3. Confidentiality: Consistent with the guidelines developed and adopted by the Office of Planning and Research pursuant to Gov. Code §65040.2, the city or county shall protect the confidentiality of the information concerning the specific identity, location, character, and use of places, features and objects described in Public Resources Code §5097.9 and §5097.993 that are within the city's or county's jurisdiction. (Gov. Code §65352.3 (b)).

4. Conclusion of SB 18 Tribal Consultation: Consultation should be concluded at the point in which:

a. The parties to the consultation come to a mutual agreement concerning the appropriate measures for preservation or mitigation; or

b. Either the local government or the tribe, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached concerning the appropriate measures of preservation or mitigation. (Tribal Consultation Guidelines, Governor's Office of Planning and Research (2005) at p. 18).

Agencies should be aware that neither AB 52 nor SB 18 precludes agencies from initiating tribal consultation with tribes that are traditionally and culturally affiliated with their jurisdictions before the timeframes provided in AB 52 and SB 18. For that reason, we urge you to continue to request Native American Tribal Contact Lists and "Sacred Lands File" searches from the NAHC. The request forms can be found online at: http://nahc.ca.gov/resources/forms/.

NAHC Recommendations for Cultural Resources Assessments

To adequately assess the existence and significance of tribal cultural resources and plan for avoidance, preservation in place, or barring both, mitigation of project-related impacts to tribal cultural resources, the NAHC recommends the following actions:

1. Contact the appropriate regional California Historical Research Information System (CHRIS) Center (http://ohp.parks.ca.gov/?page_id=1068) for an archaeological records search. The records search will determine:

a. If part or all of the APE has been previously surveyed for cultural resources.

b. If any known cultural resources have already been recorded on or adjacent to the APE.

c. If the probability is low, moderate, or high that cultural resources are located in the APE.

d. If a survey is required to determine whether previously unrecorded cultural resources are present.

2. If an archaeological inventory survey is required, the final stage is the preparation of a professional report detailing the findings and recommendations of the records search and field survey.

a. The final report containing site forms, site significance, and mitigation measures should be submitted immediately to the planning department. All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum and not be made available for public disclosure.

b. The final written report should be submitted within 3 months after work has been completed to the appropriate regional CHRIS center.

3. Contact the NAHC for:
   a. A Sacred Lands File search. Remember that tribes do not always record their sacred sites in the Sacred Lands File, nor are they required to do so. A Sacred Lands File search is not a substitute for consultation with tribes that are traditionally and culturally affiliated with the geographic area of the project's APE.
   b. A Native American Tribal Consultation List of appropriate tribes for consultation concerning the project site and to assist in planning for avoidance, preservation in place, or, failing both, mitigation measures.

4. Remember that the lack of surface evidence of archaeological resources (including tribal cultural resources) does not preclude their subsurface existence.
   a. Lead agencies should include in their mitigation and monitoring reporting program plan provisions for the identification and evaluation of inadvertently discovered archaeological resources per Cal. Code Regs., tit. 14, §15064.5(f) (CEQA Guidelines §15064.5(f)). In areas of identified archaeological sensitivity, a certified archaeologist and a culturally affiliated Native American with knowledge of cultural resources should monitor all ground-disturbing activities.
   b. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the disposition of recovered cultural items that are not burial associated in consultation with culturally affiliated Native Americans.
   c. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the treatment and disposition of inadvertently discovered Native American human remains. Health and Safety Code §7050.5, Public Resources Code §5097.98, and Cal. Code Regs., tit. 14, §15064.5, subdivisions (d) and (e) (CEQA Guidelines §15064.5, subds. (d) and (e)) address the processes to be followed in the event of an inadvertent discovery of any Native American human remains and associated grave goods in a location other than a dedicated cemetery.

If you have any questions or need additional information, please contact me at my email address: Nancy.Gonzalez-Lopez@nahc.ca.gov.

Sincerely,



Nancy Gonzalez-Lopez
Cultural Resources Analyst

cc: State Clearinghouse

Appendix B

Air Quality and Greenhouse Gas Emissions

CalEEMod Defaults

Land Use Sub Type	Size	Size Metric	Trip Rate (/size/day)			Trip Length (mi)						Trip Type (%)			Trip Type by Use(%)					
			WkDy	Sat	Sun	Res H-W	Res H-S	Res H-O	Non Res C-C	Non Res C-W	Non Res C-NW	Primary	Diverted	Pass-By	Res H-W	Res H-S	Res H-O	Non Res C-C	Non Res C-W	Non Res C-NW
Apartments Low Rise	6,830	DU	7.32	8.14	6.28	10.8	4.8	5.7	0	0	0	86	11	3	31	15	54	0	0	0
Apartments Mid Rise	1,354	DU	5.44	4.91	4.09	10.8	4.8	5.7	0	0	0	86	11	3	31	15	54	0	0	0
Automobile Care Center	127.808	1000sqft	23.72	23.72	11.88	0	0	0	7.3	9.5	7.3	21	51	28	0	0	0	48	33	19
City Park	0.31	Acres	0.78	1.96	2.19	0	0	0	7.3	9.5	7.3	66	28	6	0	0	0	48	33	19
General Light Industry	49.999	1000sqft	4.96	1.99	5	0	0	0	7.3	9.5	7.3	92	5	3	0	0	0	28	59	13
General Office Building	2419.291	1000sqft	9.74	2.21	0.7	0	0	0	7.3	9.5	7.3	77	19	4	0	0	0	48	33	19
Government Office Building	78.548	1000sqft	22.59	0	0	0	0	0	7.3	9.5	7.3	50	34	16	0	0	0	62	33	5
High School	68.761	1000sqft	14.07	3.98	1.71	0	0	0	7.3	9.5	7.3	75	19	6	0	0	0	17.2	77.8	5
Hotel	1,016	Rooms	8.36	8.19	5.95	0	0	0	7.3	9.5	7.3	37	20	43	0	0	0	72.5	8.5	19
Industrial Park	7928.975	1000sqft	3.37	2.54	1.24	0	0	0	7.3	9.5	7.3	79	19	2	0	0	0	28	59	13
Mobile Home Park	1,365	DU	5	4.61	4.24	10.8	4.8	5.7	0	0	0	86	11	3	31	15	54	0	0	0
Office Park	43.865	1000sqft	11.07	1.64	0.76	0	0	0	7.3	9.5	7.3	82	15	3	0	0	0	48	33	19
Single Family Housing	21,212	DU	9.44	9.54	8.55	10.8	4.8	5.7	0	0	0	86	11	3	31	15	54	0	0	0
Strip Mall	3109.478	1000sqft	44.32	42.04	20.43	0	0	0	7.3	9.5	7.3	34	30	36	0	0	0	74.5	6.5	19

Notes:

CalEEMod User's Guide Appendix D, 2021: http://www.aqmd.gov/docs/default-source/caleemod/user-guide-2021/appendix-d2020-4-0-full-merge.pdf?sfvrsn=12

Existing land use (commercial square footage) from Bay Area Council Economic Institute Economic Report, 2019.

Existing land use proportions based on County Assessor's parcel database, 2019 (used in buildout)

Existing Conditions (2021)

Land Use Sub Type	Size	Size Metric	Trip Rate (/size/day)			Trip Length (mi)						Trip Type (%)			Trip Type by Use(%)					
			WkDy	Sat	Sun	Res H-W	Res H-S	Res H-O	Non Res C-C	Non Res C-W	Non Res C-NW	Primary	Diverted	Pass-By	Res H-W	Res H-S	Res H-O	Non Res C-C	Non Res C-W	Non Res C-NW
Apartments Low Rise	6,830	DU	2.64	2.93	2.26	9.00	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Apartments Mid Rise	1,354	DU	1.96	1.77	1.47	9.00	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Automobile Care Center	127.808	1000sqft	8.55	8.55	4.28	0	0	0	9.00	0	0	100	0	0	0	0	0	100	0	0
City Park	0.31	Acres	0.28	0.71	0.79	0	0	0	9.00	0	0	100	0	0	0	0	0	100	0	0
General Light Industry	49.999	1000sqft	1.79	0.72	1.80	0	0	0	9.00	0	0	100	0	0	0	0	0	100	0	0
General Office Building	2,419.291	1000sqft	3.51	0.80	0.25	0	0	0	9.00	0	0	100	0	0	0	0	0	100	0	0
Government Office Building	78.548	1000sqft	8.14	-	-	0	0	0	9.00	0	0	100	0	0	0	0	0	100	0	0
High School	68.761	1000sqft	5.07	1.43	0.62	0	0	0	9.00	0	0	100	0	0	0	0	0	100	0	0
Hotel	1,016	Rooms	3.01	2.95	2.14	0	0	0	9.00	0	0	100	0	0	0	0	0	100	0	0
Industrial Park	7,928.975	1000sqft	1.21	0.92	0.45	0	0	0	9.00	0	0	100	0	0	0	0	0	100	0	0
Mobile Home Park	1,365	DU	1.80	1.66	1.53	9.00	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Office Park	43.865	1000sqft	3.99	0.59	0.27	0	0	0	9.00	0	0	100	0	0	0	0	0	100	0	0
Single Family Housing	21,212	DU	3.40	3.44	3.08	9.00	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Strip Mall	3,109.478	1000sqft	15.97	15.15	7.36	0	0	0	9.00	0	0	100	0	0	0	0	0	100	0	0

Existing Conditions

Remark 1	2021 PG&E pounds of CO2/MWh. (From CalEEMod Appendix D, May 2021: 204. Used in-lieu of PG&E Corporate Sustainability Report, 2021 due to change in calculation methodology for reporting as of 2020.)
Remark 4-10	No construction.
Remark 12	Scaled trip rate to match existing (2015) VMT from traffic data.
Remark 15	No woodstoves. (BAAQMD rules)

Project (GP 2040) Conditions

Land Use Sub Type	Size	Size Metric	Trip Rate (/size/day)			Trip Length (mi)						Trip Type (%)			Trip Type by Use(%)					
			WkDy	Sat	Sun	Res H-W	Res H-S	Res H-O	Non Res C-C	Non Res C-W	Non Res C-NW	Primary	Diverted	Pass-By	Res H-W	Res H-S	Res H-O	Non Res C-C	Non Res C-W	Non Res C-NW
Apartments Low Rise	7,820	DU	2.57	1.03	0.79	11.40	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Apartments Mid Rise	6,755	DU	1.91	0.62	0.52	11.40	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Automobile Care Center	127.808	1000sqft	8.32	3.00	1.50	0	0	0	11.40	0	0	100	0	0	0	0	0	100	0	0
City Park	0.31	Acres	0.27	0.25	0.28	0	0	0	11.40	0	0	100	0	0	0	0	0	100	0	0
General Light Industry	49.999	1000sqft	1.74	0.25	0.63	0	0	0	11.40	0	0	100	0	0	0	0	0	100	0	0
General Office Building	2,827.429	1000sqft	3.41	0.28	0.09	0	0	0	11.40	0	0	100	0	0	0	0	0	100	0	0
Government Office Building	78.548	1000sqft	7.92	-	-	0	0	0	11.40	0	0	100	0	0	0	0	0	100	0	0
High School	68.761	1000sqft	4.93	0.50	0.22	0	0	0	11.40	0	0	100	0	0	0	0	0	100	0	0
Hotel	2,476	Rooms	2.93	1.03	0.75	0	0	0	11.40	0	0	100	0	0	0	0	0	100	0	0
Industrial Park	9,727.739	1000sqft	1.18	0.32	0.16	0	0	0	11.40	0	0	100	0	0	0	0	0	100	0	0
Mobile Home Park	1,365	DU	1.75	0.58	0.54	11.40	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Office Park	452.002	1000sqft	3.88	0.21	0.10	0	0	0	11.40	0	0	100	0	0	0	0	0	100	0	0
Single Family Housing	22,621	DU	3.31	1.20	1.08	11.40	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Strip Mall	3,741.255	1000sqft	15.54	5.31	2.58	0	0	0	11.40	0	0	100	0	0	0	0	0	100	0	0

2040 Conditions (Remarks 27-33 for Project with policies)

Remark 1	Intensity factor includes Renewable Portfolio Standard (RPS) benefit up to 2030.
Remark 4-10	No construction.
Remark 12	Scaled trip rate to match VMT resulting from implementation of the Proposed Plan.
Remark 15	No woodstoves. (BAAQMD rules)
Remark 27	CAPCOA low-end estimate for limited parking supply (proposed Goal LUCD-4 and policies LUCD 3-6, LUCD 4-1, LUCD 11-3, LUCD 12-5, and LUCD 17-2).
Remark 28	Trip reduction for City employees (5%) at minimum, per proposed Goals CCS-1 and CCS-2 - includes programs such as vanpooling, on-demand transit service, active modes of transportation.
Remark 32	Existing City's SB 606/AB 1668 Urban Water Use Objective and Urban Water Management Plan (2015) implementation measures, in combination with Proposed Goal CCS-5, calculated at 10% less per capita water us
Remark 33	Proposed Policy CSPR 8-7 to divert 75% waste per AB 341, SB 1383, and City Disposal Reduction Policy.

Note from DKS, 12/7/2021

1) The GIS layer does not seem to be up to date with the highway network. In particular, there is a new zone 993 that was broken out of TAZ 107 (TANNERY BEND). This zone has 0 population and **2935** jobs in the 2040 as-given scenario. Since we were working solely on the basis of the zones shown in the GIS layer to spatially overlap with the study area, then this zone was left out of the land use edits and remained as given through all scenarios. So the employment would be higher than intended by this amount in both the Plan and Alternative scenarios.

Annual

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	439.79	4.97	384.59	0.26	-	22.59	22.59	-	22.59	22.59	1,895.64	1,214.20	3,109.85	0.38	0.18	3,173.74
Energy	5.08	44.22	24.45	0.28	-	3.51	3.51	-	3.51	3.51	-	91,004.49	91,004.49	7.49	1.71	91,702.04
Mobile	105.24	207.80	1,060.87	2.10	195.28	2.92	198.20	52.37	2.76	55.13	-	194,844.42	194,844.42	12.57	10.99	198,434.01
Waste	-	-	-	-	-	-	-	-	-	-	9,495.93	-	9,495.93	561.19	-	23,525.76
Water	-	-	-	-	-	-	-	-	-	-	1,454.54	2,874.16	4,328.70	149.86	3.58	9,142.93
Total	**550.11**	**256.99**	**1,469.92**	**2.64**	**195.28**	**29.02**	**224.29**	**52.37**	**28.85**	**81.23**	**12,846.11**	**289,937.27**	**302,783.38**	**731.48**	**16.47**	**325,978.49**

Summer

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	26,960.06	446.60	30,471.85	45.10	-	3,842.27	3,842.27	-	3,842.27	3,842.27	375,150.52	170,975.73	546,126.26	7.63	36.15	557,090.28
Energy	27.83	242.33	133.96	1.52	-	19.23	19.23	-	19.23	19.23	-	303,652.99	303,652.99	5.82	5.57	305,457.45
Mobile	675.25	1,139.91	6,357.56	13.00	1,198.18	17.26	1,215.44	320.32	16.30	336.62	-	1,327,212.42	1,327,212.42	77.04	68.10	1,349,430.85
Total	**27,663.15**	**1,828.84**	**36,963.37**	**59.62**	**1,198.18**	**3,878.77**	**5,076.95**	**320.32**	**3,877.81**	**4,198.12**	**375,150.52**	**1,801,841.14**	**2,176,991.66**	**90.49**	**109.81**	**2,211,978.58**

Winter

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	26,960.06	446.60	30,471.85	45.10	-	3,842.27	3,842.27	-	3,842.27	3,842.27	375,150.52	170,975.73	546,126.26	7.63	36.15	557,090.28
Energy	27.83	242.33	133.96	1.52	-	19.23	19.23	-	19.23	19.23	-	303,652.99	303,652.99	5.82	5.57	305,457.45
Mobile	627.47	1,292.77	6,711.44	12.36	1,198.18	17.28	1,215.46	320.32	16.32	336.64	-	1,261,694.20	1,261,694.20	87.68	74.66	1,286,134.97
Total	**27,615.37**	**1,981.70**	**37,317.25**	**58.98**	**1,198.18**	**3,878.78**	**5,076.96**	**320.32**	**3,877.82**	**4,198.14**	**375,150.52**	**1,736,322.92**	**2,111,473.44**	**101.13**	**116.38**	**2,148,682.70**

Natural Gas

Land Use	Natural Gas Use	Total CO2	CH4	N2O	CO2e
	kBTU/yr				
Apartments Low Rise	6.74E+07	3,596.56	0.07	0.07	3,617.93
Apartments Mid Rise	1.13E+07	605.61	0.01	0.01	609.21
Automobile Care Center	3.35E+06	178.56	0.00	0.00	179.62
City Park	-	-	-	-	-
General Light Industry	1.31E+06	69.85	0.00	0.00	70.27
General Office Building	3.92E+07	2,091.46	0.04	0.04	2,103.89
Government Office Building	1.27E+06	67.90	0.00	0.00	68.31
High School	1.26E+06	67.04	0.00	0.00	67.44
High Turnover (Sit Down Restaurant)	9.40E+07	5,017.90	0.10	0.09	5,047.72
Industrial Park	1.28E+08	6,854.55	0.13	0.13	6,895.28
Mobile Home Park	2.14E+07	1,143.10	0.02	0.02	1,149.90
Office Park	9.17E+05	48.95	0.00	0.00	49.24
Single Family Housing	5.65E+08	30,143.39	0.58	0.55	30,322.52
Supermarket	7.28E+06	388.28	0.01	0.01	390.59
Total	**9.42E+08**	**50,273.16**	**0.96**	**0.92**	**50,571.91**

Electricity

	Electricity Use	Total CO2	CH4	N2O	CO2e
	kWh/yr	MT/yr			
Apartments Low Rise	2.77E+07	2,591.72	0.42	0.05	2,617.09
Apartments Mid Rise	5.24E+06	489.17	0.08	0.01	493.96
Automobile Care Center	1.04E+06	96.73	0.02	0.00	97.68
City Park	-	-	-	-	-
General Light Industry	4.05E+05	37.84	0.01	0.00	38.21
General Office Building	4.15E+07	3,881.43	0.62	0.08	3,919.43
Government Office Building	1.35E+06	126.02	0.02	0.00	127.25
High School	3.59E+05	33.54	0.01	0.00	33.87
High Turnover (Sit Down Restaurant)	1.58E+07	1,480.73	0.24	0.03	1,495.23
Industrial Park	1.36E+08	12,720.97	2.04	0.25	12,845.53
Mobile Home Park	6.97E+06	651.55	0.10	0.01	657.93
Office Park	8.24E+05	76.97	0.01	0.00	77.73
Single Family Housing	1.66E+08	15,525.83	2.49	0.30	15,677.85
Supermarket	3.23E+07	3,018.81	0.48	0.06	3,048.37
Total	**4.36E+08**	**40,731.33**	**6.52**	**0.79**	**41,130.14**

Annual - Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	494.61	5.62	440.79	0.27	-	22.91	22.91	-	22.91	22.91	1,895.64	1,308.88	3,204.53	0.46	0.18	3,270.52
Energy	6.17	53.86	30.78	0.34	-	4.26	4.26	-	4.26	4.26	-	100,960.12	100,960.12	9.17	2.09	101,812.20
Mobile	60.14	89.83	697.86	1.69	244.85	0.92	245.77	65.47	0.86	66.33	-	156,528.60	156,528.60	7.78	7.50	158,958.46
Waste	-	-	-	-	-	-	-	-	-	-	9,495.93	-	9,495.93	561.19	-	23,525.76
Water	-	-	-	-	-	-	-	-	-	-	1,454.54	2,295.14	3,749.68	149.86	3.58	8,563.91
Total	**560.92**	**149.31**	**1,169.43**	**2.30**	**244.85**	**28.09**	**272.94**	**65.47**	**28.04**	**93.51**	**12,846.11**	**261,092.75**	**273,938.86**	**728.46**	**13.36**	**296,130.85**

Summer - Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	27,269.41	453.81	31,096.28	45.14	-	3,845.90	3,845.90	-	3,845.90	3,845.90	375,150.52	172,135.37	547,285.89	8.65	36.15	558,275.58
Energy	33.81	295.13	168.63	1.84	-	23.36	23.36	-	23.36	23.36	-	368,811.79	368,811.79	7.07	6.76	371,003.45
Mobile	447.07	573.49	4,849.65	12.25	1,755.33	6.33	1,761.66	467.90	5.94	473.84	-	1,248,230.66	1,248,230.66	56.73	54.51	1,265,894.11
Total	**27,750.28**	**1,322.43**	**36,114.57**	**59.23**	**1,755.33**	**3,875.59**	**5,630.91**	**467.90**	**3,875.20**	**4,343.09**	**375,150.52**	**1,789,177.82**	**2,164,328.34**	**72.45**	**97.43**	**2,195,173.14**

Winter - Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	27,269.41	453.81	31,096.28	45.14	-	3,845.90	3,845.90	-	3,845.90	3,845.90	375,150.52	172,135.37	547,285.89	8.65	36.15	558,275.58
Energy	33.81	295.13	168.63	1.84	-	23.36	23.36	-	23.36	23.36	-	368,811.79	368,811.79	7.07	6.76	371,003.45
Mobile	416.01	654.32	5,164.03	11.61	1,755.33	6.34	1,761.66	467.90	5.95	473.84	-	1,183,505.84	1,183,505.84	62.26	59.29	1,202,731.74
Total	**27,719.22**	**1,403.26**	**36,428.94**	**58.59**	**1,755.33**	**3,875.59**	**5,630.92**	**467.90**	**3,875.20**	**4,343.10**	**375,150.52**	**1,724,453.00**	**2,099,603.52**	**77.98**	**102.21**	**2,132,010.78**

Natural Gas

	Natural Gas Use	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr				
Apartments Low Rise	7.72E+07	0.42	3.56	1.51	0.02
Apartments Mid Rise	5.66E+07	0.31	2.61	1.11	0.02
Automobile Care Center	3.35E+06	0.02	0.16	0.14	0.00
City Park	-	-	-	-	-
General Light Industry	1.31E+06	0.01	0.06	0.05	0.00
General Office Building	4.58E+07	0.25	2.25	1.89	0.01
Government Office Building	1.27E+06	0.01	0.06	0.05	0.00
High School	1.26E+06	0.01	0.06	0.05	0.00
High Turnover (Sit Down Restaurant)	1.58E+08	0.85	7.74	6.50	0.05
Industrial Park	1.58E+08	0.85	7.73	6.49	0.05
Mobile Home Park	2.14E+07	0.12	0.99	0.42	0.01
Office Park	9.45E+06	0.05	0.46	0.39	0.00
Single Family Housing	6.02E+08	3.25	27.76	11.81	0.18
Supermarket	8.75E+06	0.05	0.43	0.36	0.00
Total	**1.14E+09**	**6.17**	**53.86**	**30.78**	**0.34**

Electricity

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments Low Rise	3.18E+07	2,369.59	0.48	0.06	2,398.64
Apartments Mid Rise	2.61E+07	1,948.80	0.39	0.05	1,972.69
Automobile Care Center	1.04E+06	77.25	0.02	0.00	78.19
City Park	-	-	-	-	-
General Light Industry	4.05E+05	30.22	0.01	0.00	30.59
General Office Building	4.85E+07	3,622.38	0.73	0.09	3,666.79
Government Office Building	1.35E+06	100.63	0.02	0.00	101.87
High School	3.59E+05	26.78	0.01	0.00	27.11
High Turnover (Sit Down Restaurant)	2.66E+07	1,985.09	0.40	0.05	2,009.43
Industrial Park	1.67E+08	12,462.75	2.50	0.30	12,615.56
Mobile Home Park	6.97E+06	520.29	0.10	0.01	526.67
Office Park	8.49E+06	633.38	0.13	0.02	641.15
Single Family Housing	1.77E+08	13,221.59	2.65	0.32	13,383.71
Supermarket	3.89E+07	2,900.44	0.58	0.07	2,936.01
Total	**5.35E+08**	**39,899.20**	**8.00**	**0.97**	**40,388.42**

Including Proposed Policies (Mitigated). See Remarks Below

Annual - Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	494.61	5.62	440.79	0.27	-	22.91	22.91	-	22.91	22.91	1,895.64	1,308.88	3,204.53	0.46	0.18	3,270.52
Energy	6.17	53.86	30.78	0.34	-	4.26	4.26	-	4.26	4.26	-	100,960.12	100,960.12	9.17	2.09	101,812.20
Mobile	56.58	83.30	647.06	1.55	223.33	0.84	224.17	59.72	0.79	60.51	-	143,029.19	143,029.19	7.24	6.95	145,280.53
Waste	-	-	-	-	-	-	-	-	-	-	2,373.98	-	2,373.98	140.30	-	5,881.44
Water	-	-	-	-	-	-	-	-	-	-	1,309.09	2,065.63	3,374.72	134.87	3.23	7,707.52
Total	**557.36**	**142.78**	**1,118.63**	**2.15**	**223.33**	**28.02**	**251.35**	**59.72**	**27.96**	**87.68**	**5,578.71**	**247,363.83**	**252,942.54**	**292.05**	**12.44**	**263,952.20**

Percent Reduction	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Annual	0.63	4.37	4.34	6.36	8.79	0.27	7.91	8.79	0.25	6.23	56.57	5.26	7.66	59.91	6.83	10.87
Summer	0.09	3.15	1.02	1.79	8.79	0.01	2.75	8.79	0.01	0.96	-	6.02	4.98	5.59	4.16	4.97
Winter	0.09	3.37	1.01	1.71	8.79	0.01	2.75	8.79	0.01	0.96	-	5.92	4.86	5.38	4.26	4.85

Summer - Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	27,269.41	453.81	31,096.28	45.14	-	3,845.90	3,845.90	-	3,845.90	3,845.90	375,150.52	172,135.37	547,285.89	8.65	36.15	558,275.58
Energy	33.81	295.13	168.63	1.84	-	23.36	23.36	-	23.36	23.36	-	368,811.79	368,811.79	7.07	6.76	371,003.45
Mobile	423.14	531.85	4,481.46	11.20	1,601.05	5.81	1,606.86	426.77	5.45	432.22	-	1,140,455.99	1,140,455.99	52.68	50.46	1,156,810.57
Total	**27,726.35**	**1,280.79**	**35,746.38**	**58.18**	**1,601.05**	**3,875.06**	**5,476.11**	**426.77**	**3,874.71**	**4,301.48**	**375,150.52**	**1,681,403.15**	**2,056,553.67**	**68.40**	**93.38**	**2,086,089.60**

Winter - Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	27,269.41	453.81	31,096.28	45.14	-	3,845.90	3,845.90	-	3,845.90	3,845.90	375,150.52	172,135.37	547,285.89	8.65	36.15	558,275.58
Energy	33.81	295.13	168.63	1.84	-	23.36	23.36	-	23.36	23.36	-	368,811.79	368,811.79	7.07	6.76	371,003.45
Mobile	390.52	606.97	4,797.37	10.61	1,601.05	5.81	1,606.86	426.77	5.45	432.23	-	1,081,483.36	1,081,483.36	58.07	54.94	1,099,306.62
Total	**27,693.73**	**1,355.91**	**36,062.29**	**57.59**	**1,601.05**	**3,875.07**	**5,476.12**	**426.77**	**3,874.71**	**4,301.48**	**375,150.52**	**1,622,430.52**	**1,997,581.04**	**73.79**	**97.85**	**2,028,585.65**

Remark 27 CAPCOA low-end estimate for limited parking supply (proposed Goal LUCD-4 and policies LUCD 3-6, LUCD 4-1, LUCD 11-3, LUCD 12-5, and LUCD 17-2).

Remark 28 Trip reduction for City employees (5%) at minimum, per proposed Goals CCS-1 and CCS-2 - includes programs such as vanpooling, on-demand transit service, active modes of transportation.

Remark 32 Existing City's SB 606/AB 1668 Urban Water Use Objective and Urban Water Management Plan (2015) implementation measures, in combination with Proposed Goal CCS-5, calculated at 10% less per capita water use than existing.

Remark 33 Proposed Policy CSPR 8-7 to divert 75% waste per AB 341, SB 1383, and City Disposal Reduction Policy.

NapaGPU_ProjectConditions_2040 - Napa County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

NapaGPU_ProjectConditions_2040_withPolicies

Napa County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Office Building	2,827.43	1000sqft	64.91	2,827,429.00	0
Government Office Building	78.55	1000sqft	1.80	78,548.00	0
Office Park	452.00	1000sqft	10.38	452,002.00	0
High School	68.76	1000sqft	1.58	68,760.00	0
General Light Industry	50.00	1000sqft	1.15	49,999.00	0
Industrial Park	9,727.74	1000sqft	223.32	9,727,739.00	0
City Park	0.31	Acre	0.31	13,503.60	0
Hotel	2,476.00	Room	82.53	3,595,152.00	0
Apartments Low Rise	7,820.00	Dwelling Unit	488.75	7,820,000.00	22365
Apartments Mid Rise	6,755.00	Dwelling Unit	177.76	6,755,000.00	19319
Mobile Home Park	1,365.00	Dwelling Unit	171.96	1,638,000.00	3904
Single Family Housing	22,621.00	Dwelling Unit	7,344.48	40,717,800.00	64696
Automobile Care Center	127.81	1000sqft	2.93	127,808.00	0
Strip Mall	3,741.26	1000sqft	85.89	3,741,255.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	3.6	**Precipitation Freq (Days)**	64
Climate Zone	4			**Operational Year**	2040
Utility Company	Pacific Gas and Electric Company				
CO2 Intensity (lb/MWhr)	164.5	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Intensity factor includes Renewable Portfolio Standard (RPS) benefit up to 2030.
Land Use -
Construction Phase - No construction.
Off-road Equipment - No construction.
Off-road Equipment - No construction.
Off-road Equipment - No construction.
Off-road Equipment - No construction.
Off-road Equipment - No construction.
Off-road Equipment - No construction.
Trips and VMT - No construction.

On-road Fugitive Dust -
Demolition - No construction.
Grading - No construction.
Architectural Coating - No construction.
Vehicle Trips - Scaled trip rate to match VMT resulting from implementation of the Proposed Plan.
Vehicle Emission Factors -
Vehicle Emission Factors -
Vehicle Emission Factors -
Road Dust -
Woodstoves - No woodstoves.
Land Use Change -
Mobile Land Use Mitigation - CAPCOA low-end estimate for limited parking supply (proposed Goal LUCD-4and policies LUCD 3-6, LUCD 4-1, LUCD 11-3, LUCD 12-5, and LUCD 17-2).
Mobile Commute Mitigation - Trip reduction for City employees (5%) at minimum, per proposed Goals CCS-1 and CCS-2 - includes programs such as vanpooling, on-demand transit
Area Mitigation -
Water Mitigation - Existing City's SB 606/AB 1668 Urban Water Use Objective and Urban Water Management Plan (2015) implementation measures, in combination with Proposed
Waste Mitigation - Proposed Policy CSPR 8-7 to divert 75% waste per AB 341, SB 1383, and City Disposal Reduction Policy.
Fleet Mix -

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	ConstArea_Nonresidential_Exterior	10,341,200.00	0.00
tblArchitecturalCoating	ConstArea_Nonresidential_Interior	31,023,600.00	0.00
tblArchitecturalCoating	ConstArea_Residential_Exterior	38,428,290.00	0.00
tblArchitecturalCoating	ConstArea_Residential_Interior	115,284,870.00	0.00
tblAreaCoating	Area_Nonresidential_Exterior	10341203	7990954
tblAreaCoating	Area_Nonresidential_Interior	31023608	23972862
tblAreaCoating	Area_Residential_Exterior	38428290	32402430
tblAreaCoating	Area_Residential_Interior	115284870	97207290
tblConstDustMitigation	WaterUnpavedRoadMoistureContent	0	0.5
tblConstructionPhase	NumDays	10,000.00	0.00
tblConstructionPhase	NumDays	6,000.00	0.00
tblConstructionPhase	NumDays	15,500.00	0.00
tblConstructionPhase	NumDays	155,000.00	0.00
tblConstructionPhase	NumDays	11,000.00	0.00
tblConstructionPhase	NumDays	11,000.00	0.00
tblConstructionPhase	NumDaysWeek	5.00	0.00
tblConstructionPhase	NumDaysWeek	5.00	0.00
tblConstructionPhase	NumDaysWeek	5.00	0.00
tblConstructionPhase	NumDaysWeek	5.00	0.00
tblConstructionPhase	NumDaysWeek	5.00	0.00
tblConstructionPhase	NumDaysWeek	5.00	0.00
tblFireplaces	NumberGas	1,173.00	1,024.50
tblFireplaces	NumberGas	1,013.25	203.10
tblFireplaces	NumberGas	5,655.25	5,303.00
tblFireplaces	NumberNoFireplace	312.80	273.20
tblFireplaces	NumberNoFireplace	270.20	54.16

tblFireplaces	NumberNoFireplace	1,809.68	1,696.96
tblFireplaces	NumberWood	1,329.40	1,161.10
tblFireplaces	NumberWood	1,148.35	230.18
tblFireplaces	NumberWood	9,727.03	9,121.16
tblLandUse	LandUseSquareFeet	2,827,430.00	2,827,429.00
tblLandUse	LandUseSquareFeet	78,550.00	78,548.00
tblLandUse	LandUseSquareFeet	452,000.00	452,002.00
tblLandUse	LandUseSquareFeet	50,000.00	49,999.00
tblLandUse	LandUseSquareFeet	9,727,740.00	9,727,739.00
tblLandUse	LandUseSquareFeet	127,810.00	127,808.00
tblLandUse	LandUseSquareFeet	3,741,260.00	3,741,255.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	UsageHours	6.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	7.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00

tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	7.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	203.98	164.5
tblSolidWaste	SolidWasteGenerationRate	3,597.20	3,141.80
tblSolidWaste	SolidWasteGenerationRate	3,107.30	622.84
tblSolidWaste	SolidWasteGenerationRate	2,629.51	2,249.94
tblSolidWaste	SolidWasteGenerationRate	1,355.61	807.47
tblSolidWaste	SolidWasteGenerationRate	12,062.40	9,831.94
tblSolidWaste	SolidWasteGenerationRate	420.36	40.80
tblSolidWaste	SolidWasteGenerationRate	27,172.32	25,479.72
tblSolidWaste	SolidWasteGenerationRate	3,928.32	3,264.95
tblTripsAndVMT	VendorTripNumber	7,512.00	0.00
tblTripsAndVMT	WorkerTripNumber	27,584.00	0.00
tblTripsAndVMT	WorkerTripNumber	5,517.00	0.00
tblVehicleTrips	CC_TL	7.30	11.40
tblVehicleTrips	CC_TL	7.30	11.40
tblVehicleTrips	CC_TL	7.30	11.40
tblVehicleTrips	CC_TL	7.30	11.40
tblVehicleTrips	CC_TL	7.30	11.40
tblVehicleTrips	CC_TL	7.30	11.40
tblVehicleTrips	CC_TL	7.30	11.40
tblVehicleTrips	CC_TL	7.30	11.40
tblVehicleTrips	CC_TL	7.30	11.40
tblVehicleTrips	CC_TL	7.30	11.40
tblVehicleTrips	CC_TTP	48.00	100.00
tblVehicleTrips	CC_TTP	48.00	100.00
tblVehicleTrips	CC_TTP	28.00	100.00
tblVehicleTrips	CC_TTP	48.00	100.00
tblVehicleTrips	CC_TTP	62.00	100.00
tblVehicleTrips	CC_TTP	17.20	100.00
tblVehicleTrips	CC_TTP	61.60	100.00
tblVehicleTrips	CC_TTP	28.00	100.00
tblVehicleTrips	CC_TTP	48.00	100.00
tblVehicleTrips	CC_TTP	64.40	100.00
tblVehicleTrips	CNW_TL	7.30	0.00
tblVehicleTrips	CNW_TL	7.30	0.00
tblVehicleTrips	CNW_TL	7.30	0.00
tblVehicleTrips	CNW_TL	7.30	0.00
tblVehicleTrips	CNW_TL	7.30	0.00

tblVehicleTrips	CNW_TL	7.30	0.00
tblVehicleTrips	CNW_TL	7.30	0.00
tblVehicleTrips	CNW_TL	7.30	0.00
tblVehicleTrips	CNW_TL	7.30	0.00
tblVehicleTrips	CNW_TL	7.30	0.00
tblVehicleTrips	CNW_TTP	19.00	0.00
tblVehicleTrips	CNW_TTP	19.00	0.00
tblVehicleTrips	CNW_TTP	13.00	0.00
tblVehicleTrips	CNW_TTP	19.00	0.00
tblVehicleTrips	CNW_TTP	5.00	0.00
tblVehicleTrips	CNW_TTP	5.00	0.00
tblVehicleTrips	CNW_TTP	19.00	0.00
tblVehicleTrips	CNW_TTP	13.00	0.00
tblVehicleTrips	CNW_TTP	19.00	0.00
tblVehicleTrips	CNW_TTP	19.00	0.00
tblVehicleTrips	CW_TL	9.50	0.00
tblVehicleTrips	CW_TL	9.50	0.00
tblVehicleTrips	CW_TL	9.50	0.00
tblVehicleTrips	CW_TL	9.50	0.00
tblVehicleTrips	CW_TL	9.50	0.00
tblVehicleTrips	CW_TL	9.50	0.00
tblVehicleTrips	CW_TL	9.50	0.00
tblVehicleTrips	CW_TL	9.50	0.00
tblVehicleTrips	CW_TL	9.50	0.00
tblVehicleTrips	CW_TL	9.50	0.00
tblVehicleTrips	CW_TTP	33.00	0.00
tblVehicleTrips	CW_TTP	33.00	0.00
tblVehicleTrips	CW_TTP	59.00	0.00
tblVehicleTrips	CW_TTP	33.00	0.00
tblVehicleTrips	CW_TTP	33.00	0.00
tblVehicleTrips	CW_TTP	77.80	0.00
tblVehicleTrips	CW_TTP	19.40	0.00
tblVehicleTrips	CW_TTP	59.00	0.00
tblVehicleTrips	CW_TTP	33.00	0.00
tblVehicleTrips	CW_TTP	16.60	0.00
tblVehicleTrips	DV_TP	11.00	0.00
tblVehicleTrips	DV_TP	11.00	0.00
tblVehicleTrips	DV_TP	51.00	0.00
tblVehicleTrips	DV_TP	28.00	0.00
tblVehicleTrips	DV_TP	5.00	0.00
tblVehicleTrips	DV_TP	19.00	0.00
tblVehicleTrips	DV_TP	34.00	0.00
tblVehicleTrips	DV_TP	19.00	0.00

tblVehicleTrips	DV_TP	38.00	0.00
tblVehicleTrips	DV_TP	19.00	0.00
tblVehicleTrips	DV_TP	11.00	0.00
tblVehicleTrips	DV_TP	15.00	0.00
tblVehicleTrips	DV_TP	11.00	0.00
tblVehicleTrips	DV_TP	40.00	0.00
tblVehicleTrips	HO_TL	5.70	0.00
tblVehicleTrips	HO_TL	5.70	0.00
tblVehicleTrips	HO_TL	5.70	0.00
tblVehicleTrips	HO_TL	5.70	0.00
tblVehicleTrips	HO_TTP	54.00	0.00
tblVehicleTrips	HO_TTP	54.00	0.00
tblVehicleTrips	HO_TTP	54.00	0.00
tblVehicleTrips	HO_TTP	54.00	0.00
tblVehicleTrips	HS_TL	4.80	0.00
tblVehicleTrips	HS_TL	4.80	0.00
tblVehicleTrips	HS_TL	4.80	0.00
tblVehicleTrips	HS_TL	4.80	0.00
tblVehicleTrips	HS_TTP	15.00	0.00
tblVehicleTrips	HS_TTP	15.00	0.00
tblVehicleTrips	HS_TTP	15.00	0.00
tblVehicleTrips	HS_TTP	15.00	0.00
tblVehicleTrips	HW_TL	10.80	11.40
tblVehicleTrips	HW_TL	10.80	11.40
tblVehicleTrips	HW_TL	10.80	11.40
tblVehicleTrips	HW_TL	10.80	11.40
tblVehicleTrips	HW_TTP	31.00	100.00
tblVehicleTrips	HW_TTP	31.00	100.00
tblVehicleTrips	HW_TTP	31.00	100.00
tblVehicleTrips	HW_TTP	31.00	100.00
tblVehicleTrips	PB_TP	3.00	0.00
tblVehicleTrips	PB_TP	3.00	0.00
tblVehicleTrips	PB_TP	28.00	0.00
tblVehicleTrips	PB_TP	6.00	0.00
tblVehicleTrips	PB_TP	3.00	0.00
tblVehicleTrips	PB_TP	4.00	0.00
tblVehicleTrips	PB_TP	16.00	0.00
tblVehicleTrips	PB_TP	6.00	0.00
tblVehicleTrips	PB_TP	4.00	0.00
tblVehicleTrips	PB_TP	2.00	0.00
tblVehicleTrips	PB_TP	3.00	0.00
tblVehicleTrips	PB_TP	3.00	0.00
tblVehicleTrips	PB_TP	3.00	0.00

tblVehicleTrips	PB_TP	15.00	0.00
tblVehicleTrips	PR_TP	86.00	100.00
tblVehicleTrips	PR_TP	86.00	100.00
tblVehicleTrips	PR_TP	21.00	100.00
tblVehicleTrips	PR_TP	66.00	100.00
tblVehicleTrips	PR_TP	92.00	100.00
tblVehicleTrips	PR_TP	77.00	100.00
tblVehicleTrips	PR_TP	50.00	100.00
tblVehicleTrips	PR_TP	75.00	100.00
tblVehicleTrips	PR_TP	58.00	100.00
tblVehicleTrips	PR_TP	79.00	100.00
tblVehicleTrips	PR_TP	86.00	100.00
tblVehicleTrips	PR_TP	82.00	100.00
tblVehicleTrips	PR_TP	86.00	100.00
tblVehicleTrips	PR_TP	45.00	100.00
tblVehicleTrips	ST_TR	8.14	1.03
tblVehicleTrips	ST_TR	4.91	0.62
tblVehicleTrips	ST_TR	23.72	3.00
tblVehicleTrips	ST_TR	1.96	0.25
tblVehicleTrips	ST_TR	1.99	0.25
tblVehicleTrips	ST_TR	2.21	0.28
tblVehicleTrips	ST_TR	3.98	0.50
tblVehicleTrips	ST_TR	8.19	1.03
tblVehicleTrips	ST_TR	2.54	0.32
tblVehicleTrips	ST_TR	4.61	0.58
tblVehicleTrips	ST_TR	1.64	0.21
tblVehicleTrips	ST_TR	9.54	1.20
tblVehicleTrips	ST_TR	42.04	5.31
tblVehicleTrips	SU_TR	6.28	0.79
tblVehicleTrips	SU_TR	4.09	0.52
tblVehicleTrips	SU_TR	11.88	1.50
tblVehicleTrips	SU_TR	2.19	0.28
tblVehicleTrips	SU_TR	5.00	0.63
tblVehicleTrips	SU_TR	0.70	0.09
tblVehicleTrips	SU_TR	1.71	0.22
tblVehicleTrips	SU_TR	5.95	0.75
tblVehicleTrips	SU_TR	1.24	0.16
tblVehicleTrips	SU_TR	4.24	0.54
tblVehicleTrips	SU_TR	0.76	0.10
tblVehicleTrips	SU_TR	8.55	1.08
tblVehicleTrips	SU_TR	20.43	2.58
tblVehicleTrips	WD_TR	7.32	2.57
tblVehicleTrips	WD_TR	5.44	1.91

tblVehicleTrips	WD_TR	23.72	8.32
tblVehicleTrips	WD_TR	0.78	0.27
tblVehicleTrips	WD_TR	4.96	1.74
tblVehicleTrips	WD_TR	9.74	3.41
tblVehicleTrips	WD_TR	22.59	7.92
tblVehicleTrips	WD_TR	14.07	4.93
tblVehicleTrips	WD_TR	8.36	2.93
tblVehicleTrips	WD_TR	3.37	1.18
tblVehicleTrips	WD_TR	5.00	1.75
tblVehicleTrips	WD_TR	11.07	3.88
tblVehicleTrips	WD_TR	9.44	3.31
tblVehicleTrips	WD_TR	44.32	15.54
tblWater	IndoorWaterUseRate	509,504,480.36	445,001,994.99
tblWater	IndoorWaterUseRate	440,115,443.07	88,218,550.69
tblWater	IndoorWaterUseRate	502,529,731.09	429,989,479.18
tblWater	IndoorWaterUseRate	62,808,122.52	37,411,927.07
tblWater	IndoorWaterUseRate	2,249,539,875.00	1,833,576,625.00
tblWater	IndoorWaterUseRate	80,335,654.09	7,797,179.52
tblWater	IndoorWaterUseRate	1,473,849,213.58	1,382,047,191.48
tblWater	IndoorWaterUseRate	277,124,561.73	230,327,024.10
tblWater	OutdoorWaterUseRate	321,209,346.31	280,544,735.97
tblWater	OutdoorWaterUseRate	277,464,083.68	55,616,042.83
tblWater	OutdoorWaterUseRate	308,002,093.25	263,541,938.85
tblWater	OutdoorWaterUseRate	6,978,680.28	4,156,880.79
tblWater	OutdoorWaterUseRate	49,237,981.54	4,778,916.48
tblWater	OutdoorWaterUseRate	929,165,808.56	871,290,620.72
tblWater	OutdoorWaterUseRate	169,850,537.83	141,168,176.06
tblWoodstoves	NumberCatalytic	156.40	0.00
tblWoodstoves	NumberCatalytic	135.10	0.00
tblWoodstoves	NumberCatalytic	27.30	0.00
tblWoodstoves	NumberCatalytic	904.84	0.00
tblWoodstoves	NumberNoncatalytic	156.40	0.00
tblWoodstoves	NumberNoncatalytic	135.10	0.00
tblWoodstoves	NumberNoncatalytic	27.30	0.00
tblWoodstoves	NumberNoncatalytic	904.84	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2040	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2078	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2101	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2754	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2797	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2040	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2078	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2101	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2754	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2797	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
		Highest		

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	494.6108	5.6159	440.7936	0.2656		22.9118	22.9118		22.9118	22.9118	1,895.6427	1,308.8841	3,204.5268	0.4622	0.1827	3,270.5196
Energy	6.1699	53.8619	30.7755	0.3365		4.2629	4.2629		4.2629	4.2629	0.0000	100,960.1245	100,960.1245	9.1744	2.0896	101,812.1990
Mobile	60.1376	89.8291	697.8603	1.6935	244.8528	0.9172	245.7701	65.4703	0.8606	66.3309	0.0000	156,528.5971	156,528.5971	7.7788	7.5013	158,958.4578
Waste						0.0000	0.0000		0.0000	0.0000	9,495.9294	0.0000	9,495.9294	561.1934	0.0000	23,525.7632
Water						0.0000	0.0000		0.0000	0.0000	1,454.5392	2,295.1442	3,749.6834	149.8556	3.5834	8,563.9109
Total	**560.9183**	**149.3070**	**1,169.4294**	**2.2956**	**244.8528**	**28.0919**	**272.9447**	**65.4703**	**28.0352**	**93.5055**	**12,846.1114**	**261,092.7499**	**273,938.8612**	**728.4643**	**13.3570**	**296,130.8504**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	494.6108	5.6159	440.7936	0.2656		22.9118	22.9118		22.9118	22.9118	1,895.6427	1,308.8841	3,204.5268	0.4622	0.1827	3,270.5196
Energy	6.1699	53.8619	30.7755	0.3365		4.2629	4.2629		4.2629	4.2629	0.0000	100,960.1245	100,960.1245	9.1744	2.0896	101,812.1990
Mobile	56.5771	83.3049	647.0563	1.5474	223.3326	0.8415	224.1740	59.7161	0.7894	60.5055	0.0000	143,029.1923	143,029.1923	7.2412	6.9473	145,280.5253
Waste						0.0000	0.0000		0.0000	0.0000	2,373.9824	0.0000	2,373.9824	140.2983	0.0000	5,881.4408
Water						0.0000	0.0000		0.0000	0.0000	1,309.0853	2,065.6298	3,374.7151	134.8700	3.2250	7,707.5198
Total	**557.3578**	**142.7827**	**1,118.6254**	**2.1495**	**223.3326**	**28.0161**	**251.3487**	**59.7161**	**27.9640**	**87.6801**	**5,578.7104**	**247,363.8306**	**252,942.5409**	**292.0462**	**12.4447**	**263,952.2045**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.63**	**4.37**	**4.34**	**6.36**	**8.79**	**0.27**	**7.91**	**8.79**	**0.25**	**6.23**	**56.57**	**5.26**	**7.66**	**59.91**	**6.83**	**10.87**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/22/2040	1/20/2040	0	0	
2	Site Preparation	Site Preparation	5/21/2078	5/20/2078	0	0	
3	Grading	Grading	5/21/2101	5/20/2101	0	0	
4	Building Construction	Building Construction	10/18/2160	10/17/2160	0	0	
5	Paving	Paving	12/4/2754	12/3/2754	0	0	
6	Architectural Coating	Architectural Coating	2/1/2797	1/31/2797	0	0	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	0	0.00	81	0.73
Demolition	Excavators	0	0.00	158	0.38
Demolition	Rubber Tired Dozers	0	0.00	247	0.40
Site Preparation	Rubber Tired Dozers	0	0.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	0	0.00	97	0.37
Grading	Excavators	0	0.00	158	0.38
Grading	Graders	0	0.00	187	0.41
Grading	Rubber Tired Dozers	0	0.00	247	0.40
Grading	Scrapers	0	0.00	367	0.48
Grading	Tractors/Loaders/Backhoes	0	0.00	97	0.37
Building Construction	Cranes	0	0.00	231	0.29
Building Construction	Forklifts	0	0.00	89	0.20
Building Construction	Generator Sets	0	0.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	0	0.00	97	0.37
Building Construction	Welders	0	0.00	46	0.45
Paving	Pavers	0	0.00	130	0.42
Paving	Paving Equipment	0	0.00	132	0.36
Paving	Rollers	0	0.00	80	0.38
Architectural Coating	Air Compressors	0	0.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	0	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	0	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	0	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	0	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	0	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	0	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2040

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.3 Site Preparation - 2078

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.4 Grading - 2101

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.5 Building Construction - 2160

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.6 Paving - 2754

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Paving	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Paving	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.7 Architectural Coating - 2797

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Limit Parking Supply
Implement Trip Reduction Program
Market Commute Trip Reduction Option
Employee Vanpool/Shuttle

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	56.5771	83.3049	647.0563	1.5474	223.3326	0.8415	224.1740	59.7161	0.7894	60.5055	0.0000	143,029.1923	143,029.1923	7.2412	6.9473	145,280.5253
Unmitigated	60.1376	89.8291	697.8603	1.6935	244.8528	0.9172	245.7701	65.4703	0.8606	66.3309	0.0000	156,528.5971	156,528.5971	7.7788	7.5013	158,958.4578

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments Low Rise	20,097.40	8,054.60	6177.80	68,005,660	62,028,600
Apartments Mid Rise	12,902.05	4,188.10	3512.60	42,806,651	39,044,348
Automobile Care Center	1,063.38	383.43	191.72	3,492,802	3,185,817
City Park	0.08	0.08	0.09	345	315
General Light Industry	87.00	12.50	31.50	283,951	258,995
General Office Building	9,641.54	791.68	254.47	29,197,671	26,631,469
Government Office Building	622.12	0.00	0.00	1,843,952	1,681,886
High School	338.99	34.38	15.13	1,034,105	943,217
Hotel	7,254.68	2,550.28	1857.00	24,115,507	21,995,980
Industrial Park	11,478.73	3,112.88	1556.44	36,790,935	33,557,357
Mobile Home Park	2,388.75	791.70	737.10	7,986,528	7,284,587
Office Park	1,753.76	94.92	45.20	5,281,208	4,817,039
Single Family Housing	74,875.51	27,145.20	24430.68	252,505,193	230,312,355
Strip Mall	58,139.18	19,866.09	9652.45	189,823,122	173,139,450
Total	200,643.17	67,025.84	48,462.17	663,167,631	604,881,414

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Apartments Low Rise	11.40	0.00	0.00	100.00	0.00	0.00	100	0	0
Apartments Mid Rise	11.40	0.00	0.00	100.00	0.00	0.00	100	0	0
Automobile Care Center	0.00	11.40	0.00	0.00	100.00	0.00	100	0	0
City Park	0.00	11.40	0.00	0.00	100.00	0.00	100	0	0
General Light Industry	0.00	11.40	0.00	0.00	100.00	0.00	100	0	0
General Office Building	0.00	11.40	0.00	0.00	100.00	0.00	100	0	0
Government Office Building	0.00	11.40	0.00	0.00	100.00	0.00	100	0	0
High School	0.00	11.40	0.00	0.00	100.00	0.00	100	0	0
Hotel	0.00	11.40	0.00	0.00	100.00	0.00	100	0	0
Industrial Park	0.00	11.40	0.00	0.00	100.00	0.00	100	0	0
Mobile Home Park	11.40	0.00	0.00	100.00	0.00	0.00	100	0	0
Office Park	0.00	11.40	0.00	0.00	100.00	0.00	100	0	0
Single Family Housing	11.40	0.00	0.00	100.00	0.00	0.00	100	0	0
Strip Mall	0.00	11.40	0.00	0.00	100.00	0.00	100	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Apartments Low Rise	0.598202	0.052430	0.161159	0.109323	0.021150	0.005988	0.011023	0.010820	0.001500	0.000536	0.024052	0.001262	0.002556
Apartments Mid Rise	0.598202	0.052430	0.161159	0.109323	0.021150	0.005988	0.011023	0.010820	0.001500	0.000536	0.024052	0.001262	0.002556
Automobile Care Center	0.598202	0.052430	0.161159	0.109323	0.021150	0.005988	0.011023	0.010820	0.001500	0.000536	0.024052	0.001262	0.002556
City Park	0.598202	0.052430	0.161159	0.109323	0.021150	0.005988	0.011023	0.010820	0.001500	0.000536	0.024052	0.001262	0.002556
General Light Industry	0.598202	0.052430	0.161159	0.109323	0.021150	0.005988	0.011023	0.010820	0.001500	0.000536	0.024052	0.001262	0.002556
General Office Building	0.598202	0.052430	0.161159	0.109323	0.021150	0.005988	0.011023	0.010820	0.001500	0.000536	0.024052	0.001262	0.002556
Government Office Building	0.598202	0.052430	0.161159	0.109323	0.021150	0.005988	0.011023	0.010820	0.001500	0.000536	0.024052	0.001262	0.002556
High School	0.598202	0.052430	0.161159	0.109323	0.021150	0.005988	0.011023	0.010820	0.001500	0.000536	0.024052	0.001262	0.002556
Hotel	0.598202	0.052430	0.161159	0.109323	0.021150	0.005988	0.011023	0.010820	0.001500	0.000536	0.024052	0.001262	0.002556
Industrial Park	0.598202	0.052430	0.161159	0.109323	0.021150	0.005988	0.011023	0.010820	0.001500	0.000536	0.024052	0.001262	0.002556
Mobile Home Park	0.598202	0.052430	0.161159	0.109323	0.021150	0.005988	0.011023	0.010820	0.001500	0.000536	0.024052	0.001262	0.002556
Office Park	0.598202	0.052430	0.161159	0.109323	0.021150	0.005988	0.011023	0.010820	0.001500	0.000536	0.024052	0.001262	0.002556
Single Family Housing	0.598202	0.052430	0.161159	0.109323	0.021150	0.005988	0.011023	0.010820	0.001500	0.000536	0.024052	0.001262	0.002556
Strip Mall	0.598202	0.052430	0.161159	0.109323	0.021150	0.005988	0.011023	0.010820	0.001500	0.000536	0.024052	0.001262	0.002556

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	39,899.1965	39,899.1965	8.0041	0.9702	40,388.4164
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	39,899.1965	39,899.1965	8.0041	0.9702	40,388.4164
NaturalGas Mitigated	6.1699	53.8619	30.7755	0.3365		4.2629	4.2629		4.2629	4.2629	0.0000	61,060.9280	61,060.9280	1.1703	1.1195	61,423.7825
NaturalGas Unmitigated	6.1699	53.8619	30.7755	0.3365		4.2629	4.2629		4.2629	4.2629	0.0000	61,060.9280	61,060.9280	1.1703	1.1195	61,423.7825

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Apartments Low Rise	7.71661e+007	0.4161	3.5557	1.5131	0.0227		0.2875	0.2875		0.2875	0.2875	0.0000	4,117.8779	4,117.8779	0.0789	0.0755	4,142.3484
Apartments Mid Rise	5.66182e+007	0.3053	2.6089	1.1102	0.0167		0.2109	0.2109		0.2109	0.2109	0.0000	3,021.3654	3,021.3654	0.0579	0.0554	3,039.3198
Automobile Care Center	3.34601e+006	0.0180	0.1640	0.1378	9.8000e-004		0.0125	0.0125		0.0125	0.0125	0.0000	178.5560	178.5560	3.4200e-003	3.2700e-003	179.6171
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
General Light Industry	1.30897e+006	7.0600e-003	0.0642	0.0539	3.8000e-004		4.8800e-003	4.8800e-003		4.8800e-003	4.8800e-003	0.0000	69.8518	69.8518	1.3400e-003	1.2800e-003	70.2669
General Office Building	4.58043e+007	0.2470	2.2453	1.8861	0.0135		0.1706	0.1706		0.1706	0.1706	0.0000	2,444.2945	2,444.2945	0.0469	0.0448	2,458.8198
Government Office Building	1.27248e+006	6.8600e-003	0.0624	0.0524	3.7000e-004		4.7400e-003	4.7400e-003		4.7400e-003	4.7400e-003	0.0000	67.9043	67.9043	1.3000e-003	1.2400e-003	68.3078
High School	1.25625e+006	6.7700e-003	0.0616	0.0517	3.7000e-004		4.6800e-003	4.6800e-003		4.6800e-003	4.6800e-003	0.0000	67.0380	67.0380	1.2800e-003	1.2300e-003	67.4364
Hotel	1.57863e+008	0.8512	7.7384	6.5003	0.0464		0.5881	0.5881		0.5881	0.5881	0.0000	8,424.1775	8,424.1775	0.1615	0.1544	8,474.2382
Industrial Park	1.57589e+008	0.8498	7.7250	6.4890	0.0464		0.5871	0.5871		0.5871	0.5871	0.0000	8,409.5690	8,409.5690	0.1612	0.1542	8,459.5429
Mobile Home Park	2.14209e+007	0.1155	0.9870	0.4200	6.3000e-003		0.0798	0.0798		0.0798	0.0798	0.0000	1,143.1025	1,143.1025	0.0219	0.0210	1,149.8954
Office Park	9.45136e+006	0.0510	0.4633	0.3892	2.7800e-003		0.0352	0.0352		0.0352	0.0352	0.0000	504.3607	504.3607	9.6700e-003	9.2500e-003	507.3578
Single Family Housing	6.02387e+008	3.2482	27.7570	11.8115	0.1772		2.2442	2.2442		2.2442	2.2442	0.0000	32,145.6550	32,145.6550	0.6161	0.5893	32,336.6805
Strip Mall	8.75454e+006	0.0472	0.4291	0.3605	2.5700e-003		0.0326	0.0326		0.0326	0.0326	0.0000	467.1754	467.1754	8.9500e-003	8.5600e-003	469.9516
Total		**6.1699**	**53.8619**	**30.7755**	**0.3365**		**4.2629**	**4.2629**		**4.2629**	**4.2629**	**0.0000**	**61,060.9280**	**61,060.9280**	**1.1703**	**1.1194**	**61,423.7825**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr															
Apartments Low Rise	7.71661e+007	0.4161	3.5557	1.5131	0.0227		0.2875	0.2875		0.2875	0.2875	0.0000	4,117.8779	4,117.8779	0.0789	0.0755	4,142.3484
Apartments Mid Rise	5.66182e+007	0.3053	2.6089	1.1102	0.0167		0.2109	0.2109		0.2109	0.2109	0.0000	3,021.3654	3,021.3654	0.0579	0.0554	3,039.3198
Automobile Care Center	3.34601e+006	0.0180	0.1640	0.1378	9.8000e-004		0.0125	0.0125		0.0125	0.0125	0.0000	178.5560	178.5560	3.4200e-003	3.2700e-003	179.6171
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
General Light Industry	1.30897e+006	7.0600e-003	0.0642	0.0539	3.8000e-004		4.8800e-003	4.8800e-003		4.8800e-003	4.8800e-003	0.0000	69.8518	69.8518	1.3400e-003	1.2800e-003	70.2669
General Office Building	4.58043e+007	0.2470	2.2453	1.8861	0.0135		0.1706	0.1706		0.1706	0.1706	0.0000	2,444.2945	2,444.2945	0.0469	0.0448	2,458.8198
Government Office Building	1.27248e+006	6.8600e-003	0.0624	0.0524	3.7000e-004		4.7400e-003	4.7400e-003		4.7400e-003	4.7400e-003	0.0000	67.9043	67.9043	1.3000e-003	1.2400e-003	68.3078
High School	1.25625e+006	6.7700e-003	0.0616	0.0517	3.7000e-004		4.6800e-003	4.6800e-003		4.6800e-003	4.6800e-003	0.0000	67.0380	67.0380	1.2800e-003	1.2300e-003	67.4364
Hotel	1.57863e+008	0.8512	7.7384	6.5003	0.0464		0.5881	0.5881		0.5881	0.5881	0.0000	8,424.1775	8,424.1775	0.1615	0.1544	8,474.2382
Industrial Park	1.57589e+008	0.8498	7.7250	6.4890	0.0464		0.5871	0.5871		0.5871	0.5871	0.0000	8,409.5690	8,409.5690	0.1612	0.1542	8,459.5429
Mobile Home Park	2.14209e+007	0.1155	0.9870	0.4200	6.3000e-003		0.0798	0.0798		0.0798	0.0798	0.0000	1,143.1025	1,143.1025	0.0219	0.0210	1,149.8954
Office Park	9.45136e+006	0.0510	0.4633	0.3892	2.7800e-003		0.0352	0.0352		0.0352	0.0352	0.0000	504.3607	504.3607	9.6700e-003	9.2500e-003	507.3578
Single Family Housing	6.02387e+008	3.2482	27.7570	11.8115	0.1772		2.2442	2.2442		2.2442	2.2442	0.0000	32,145.6550	32,145.6550	0.6161	0.5893	32,336.6805
Strip Mall	8.75454e+006	0.0472	0.4291	0.3605	2.5700e-003		0.0326	0.0326		0.0326	0.0326	0.0000	467.1754	467.1754	8.9500e-003	8.5600e-003	469.9516
Total		**6.1699**	**53.8619**	**30.7755**	**0.3365**		**4.2629**	**4.2629**		**4.2629**	**4.2629**	**0.0000**	**61,060.9280**	**61,060.9280**	**1.1703**	**1.1194**	**61,423.7825**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr		MT/yr		
Apartments Low Rise	3.17571e+007	2,369.5859	0.4754	0.0576	2,398.6403
Apartments Mid Rise	2.61177e+007	1,948.7995	0.3909	0.0474	1,972.6945
Automobile Care Center	1.03524e+006	77.2458	0.0155	1.8800e-003	78.1929
City Park	0	0.0000	0.0000	0.0000	0.0000
General Light Industry	404992	30.2189	6.0600e-003	7.3000e-004	30.5894
General Office Building	4.8547e+007	3,622.3770	0.7267	0.0881	3,666.7924
Government Office Building	1.34867e+006	100.6322	0.0202	2.4500e-003	101.8661
High School	358927	26.7817	5.3700e-003	6.5000e-004	27.1101
Hotel	2.66041e+007	1,985.0919	0.3982	0.0483	2,009.4319
Industrial Park	1.67025e+008	12,462.7490	2.5001	0.3031	12,615.5597
Mobile Home Park	6.97295e+006	520.2934	0.1044	0.0127	526.6730
Office Park	8.4886e+006	633.3847	0.1271	0.0154	641.1509
Single Family Housing	1.77195e+008	13,221.5925	2.6524	0.3215	13,383.7077
Strip Mall	3.88716e+007	2,900.4441	0.5819	0.0705	2,936.0076
Total		**39,899.1965**	**8.0041**	**0.9702**	**40,388.4164**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments Low Rise	3.17571e+007	2,369.5859	0.4754	0.0576	2,398.6403
Apartments Mid Rise	2.61177e+007	1,948.7995	0.3909	0.0474	1,972.6945
Automobile Care Center	1.03524e+006	77.2458	0.0155	1.8800e-003	78.1929
City Park	0	0.0000	0.0000	0.0000	0.0000
General Light Industry	404992	30.2189	6.0600e-003	7.3000e-004	30.5894
General Office Building	4.8547e+007	3,622.3770	0.7267	0.0881	3,666.7924
Government Office Building	1.34867e+006	100.6322	0.0202	2.4500e-003	101.8661
High School	358927	26.7817	5.3700e-003	6.5000e-004	27.1101
Hotel	2.66041e+007	1,985.0919	0.3982	0.0483	2,009.4319
Industrial Park	1.67025e+008	12,462.7490	2.5001	0.3031	12,615.5597
Mobile Home Park	6.97295e+006	520.2934	0.1044	0.0127	526.6730
Office Park	8.4886e+006	633.3847	0.1271	0.0154	641.1509
Single Family Housing	1.77195e+008	13,221.5925	2.6524	0.3215	13,383.7077
Strip Mall	3.88716e+007	2,900.4441	0.5819	0.0705	2,936.0076
Total		**39,899.1965**	**8.0041**	**0.9702**	**40,388.4164**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	494.6108	5.6159	440.7936	0.2656		22.9118	22.9118		22.9118	22.9118	1,895.6427	1,308.8841	3,204.5268	0.4622	0.1827	3,270.5196
Unmitigated	494.6108	5.6159	440.7936	0.2656		22.9118	22.9118		22.9118	22.9118	1,895.6427	1,308.8841	3,204.5268	0.4622	0.1827	3,270.5196

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	42.1253					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	303.1184					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	140.8249	2.3240	155.5531	0.2505		21.3233	21.3233		21.3233	21.3233	1,895.6427	840.8363	2,736.4791	0.0161	0.1827	2,791.3200
Landscaping	8.5423	3.2920	285.2405	0.0151		1.5884	1.5884		1.5884	1.5884	0.0000	468.0478	468.0478	0.4461	0.0000	479.1996
Total	**494.6108**	**5.6159**	**440.7936**	**0.2656**		**22.9118**	**22.9118**		**22.9118**	**22.9118**	**1,895.6427**	**1,308.8841**	**3,204.5268**	**0.4622**	**0.1827**	**3,270.5196**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	42.1253					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	303.1184					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	140.8249	2.3240	155.5531	0.2505		21.3233	21.3233		21.3233	21.3233	1,895.6427	840.8363	2,736.4791	0.0161	0.1827	2,791.3200
Landscaping	8.5423	3.2920	285.2405	0.0151		1.5884	1.5884		1.5884	1.5884	0.0000	468.0478	468.0478	0.4461	0.0000	479.1996
Total	**494.6108**	**5.6159**	**440.7936**	**0.2656**		**22.9118**	**22.9118**		**22.9118**	**22.9118**	**1,895.6427**	**1,308.8841**	**3,204.5268**	**0.4622**	**0.1827**	**3,270.5196**

7.0 Water Detail

7.1 Mitigation Measures Water

Apply Water Conservation Strategy

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	3,374.7151	134.8700	3.2250	7,707.5198
Unmitigated	3,749.6834	149.8556	3.5834	8,563.9109

7.2 Water by Land Use

Unmitigated

	Indoor/ Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Apartments Low Rise	445.002 / 280.545	394.1127	14.5511	0.3485	861.7549
Apartments Mid Rise	88.2186 / 55.616	78.1301	2.8847	0.0691	170.8369
Automobile Care Center	12.0245 / 7.36986	10.5944	0.3932	9.4200e-003	23.2300
City Park	0 / 0.369359	0.0965	2.0000e-005	0.0000	0.0976
General Light Industry	11.5625 / 0	8.3366	0.3777	9.0100e-003	20.4640
General Office Building	429.989 / 263.542	378.8482	14.0599	0.3367	830.6900
Government Office Building	15.6047 / 9.56418	13.7488	0.5102	0.0122	30.1465
High School	2.28315 / 5.87096	3.1794	0.0749	1.8200e-003	5.5929
Hotel	37.4119 / 4.15688	28.0596	1.2223	0.0292	67.3127
Industrial Park	1833.58 / 0	1,322.0101	59.8956	1.4288	3,245.1714
Mobile Home Park	88.9352 / 56.0679	78.7648	2.9081	0.0697	172.2248
Office Park	7.79718 / 4.77892	6.8698	0.2550	6.1100e-003	15.0633

Single Family Housing	1382.05 / 871.291	1,223.9997	45.1916	1.0825	2,676.3608
Strip Mall	230.327 / 141.168	202.9328	7.5313	0.1804	444.9652
Total		**3,749.6834**	**149.8556**	**3.5834**	**8,563.9109**

Mitigated

	Indoor/ Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Apartments Low Rise	400.502 / 252.49	354.7014	13.0960	0.3137	775.5794
Apartments Mid Rise	79.3967 / 50.0544	70.3171	2.5962	0.0622	153.7532
Automobile Care Center	10.8221 / 6.63287	9.5349	0.3539	8.4700e-003	20.9070
City Park	0 / 0.332423	0.0868	2.0000e-005	0.0000	0.0879
General Light Industry	10.4063 / 0	7.5029	0.3399	8.1100e-003	18.4176
General Office Building	386.991 / 237.188	340.9634	12.6539	0.3031	747.6210
Government Office Building	14.0442 / 8.60776	12.3739	0.4592	0.0110	27.1319
High School	2.05484 / 5.28386	2.8615	0.0674	1.6300e-003	5.0336
Hotel	33.6707 / 3.74119	25.2537	1.1001	0.0263	60.5815
Industrial Park	1650.22 / 0	1,189.8091	53.9061	1.2859	2,920.6543
Mobile Home Park	80.0417 / 50.4611	70.8884	2.6173	0.0627	155.0023
Office Park	7.01746 / 4.30102	6.1828	0.2295	5.5000e-003	13.5569
Single Family Housing	1243.84 / 784.162	1,101.5997	40.6725	0.9742	2,408.7247
Strip Mall	207.294 / 127.051	182.6396	6.7781	0.1623	400.4687
Total		**3,374.7151**	**134.8700**	**3.2250**	**7,707.5198**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Institute Recycling and Composting Services

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	2,373.9824	140.2983	0.0000	5,881.4408
Unmitigated	9,495.9294	561.1934	0.0000	23,525.7632

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons/yr	MT/yr			
Apartments Low Rise	3141.8	637.7570	37.6904	0.0000	1,580.0160
Apartments Mid Rise	622.84	126.4309	7.4719	0.0000	313.2272
Automobile Care Center	488.23	99.1063	5.8570	0.0000	245.5316
City Park	0.03	6.0900e-003	3.6000e-004	0.0000	0.0151
General Light Industry	62	12.5854	0.7438	0.0000	31.1799
General Office Building	2249.94	456.7175	26.9912	0.0000	1,131.4982
Government Office Building	73.05	14.8285	0.8763	0.0000	36.7370
High School	89.39	18.1454	1.0724	0.0000	44.9544
Hotel	807.47	163.9091	9.6868	0.0000	406.0779
Industrial Park	9831.94	1,995.7950	117.9481	0.0000	4,944.4976
Mobile Home Park	627.9	127.4580	7.5326	0.0000	315.7719

Office Park	40.8	8.2820	0.4895	0.0000	20.5184
Single Family Housing	25479.7	5,172.1529	305.6655	0.0000	12,813.7899
Strip Mall	3264.95	662.7553	39.1677	0.0000	1,641.9483
Total		**9,495.9294**	**561.1933**	**0.0000**	**23,525.7632**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Apartments Low Rise	785.45	159.4393	9.4226	0.0000	395.0040
Apartments Mid Rise	155.71	31.6077	1.8680	0.0000	78.3068
Automobile Care Center	122.058	24.7766	1.4643	0.0000	61.3829
City Park	0.0075	1.5200e-003	9.0000e-005	0.0000	3.7700e-003
General Light Industry	15.5	3.1464	0.1859	0.0000	7.7950
General Office Building	562.485	114.1794	6.7478	0.0000	282.8746
Government Office Building	18.2625	3.7071	0.2191	0.0000	9.1842
High School	22.3475	4.5363	0.2681	0.0000	11.2386
Hotel	201.868	40.9773	2.4217	0.0000	101.5195
Industrial Park	2457.99	498.9487	29.4870	0.0000	1,236.1244
Mobile Home Park	156.975	31.8645	1.8831	0.0000	78.9430
Office Park	10.2	2.0705	0.1224	0.0000	5.1296
Single Family Housing	6369.93	1,293.0382	76.4164	0.0000	3,203.4475
Strip Mall	816.237	165.6888	9.7919	0.0000	410.4871
Total		**2,373.9824**	**140.2983**	**0.0000**	**5,881.4408**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

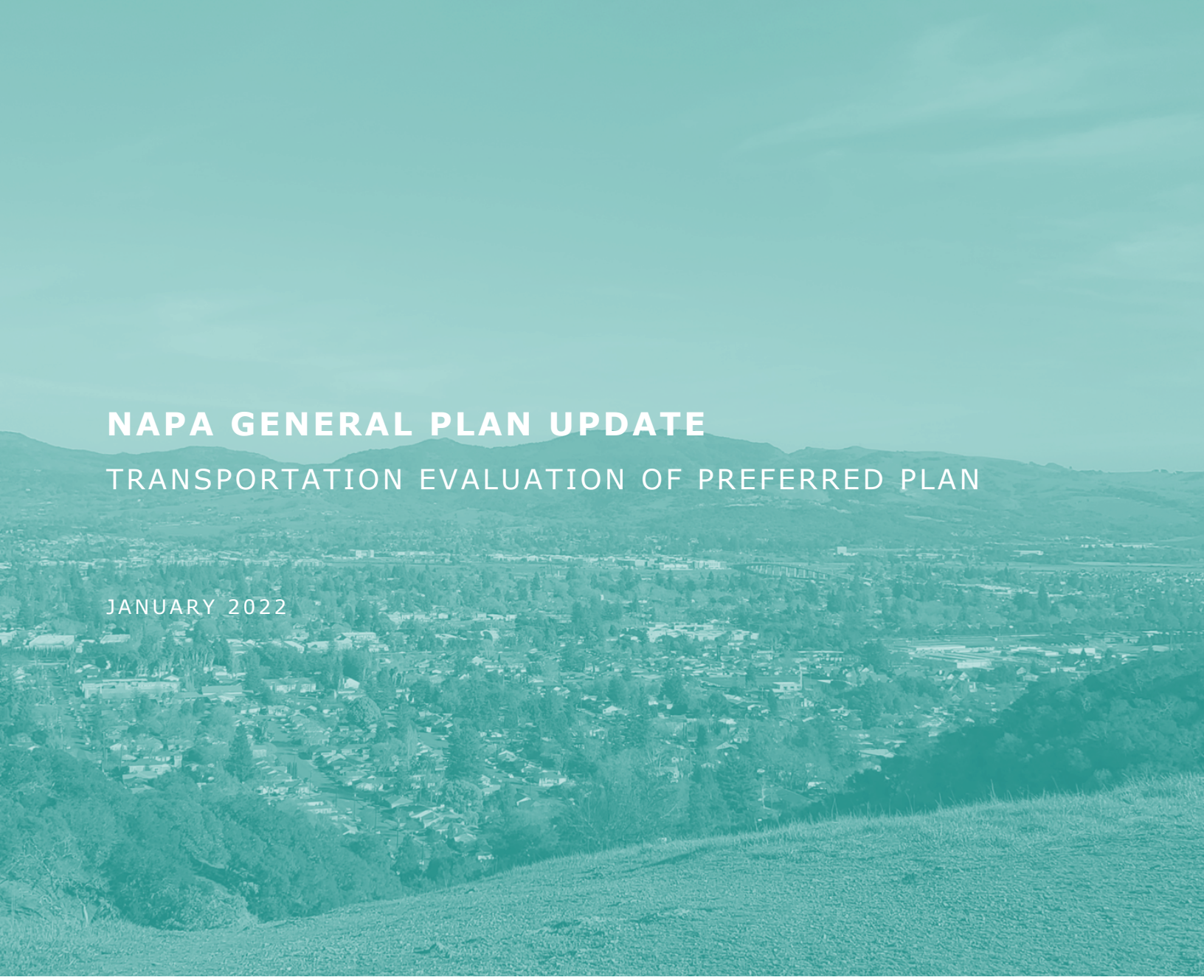
User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Appendix C

Transportation Evaluation



NAPA GENERAL PLAN UPDATE

TRANSPORTATION EVALUATION OF PREFERRED PLAN

JANUARY 2022

PREPARED FOR:

DYETT BHATIA
CITY OF NAPA

DKS

1970 BROADWAY, SUITE 740, OAKLAND, CA 94612 • 510.763.2061 • DKSASSOCIATES.COM

PREPARED FOR CITY OF NAPA

PREPARED BY DKS ASSOCIATES



TABLE OF CONTENTS

INTRODUCTION AND REPORT CONTENTS 6

TRAVEL DEMAND MODELING TOOLS 6

CITY OF NAPA TRAVEL DEMAND MODEL 6
SOLANO NAPA ACTIVITY BASED MODEL 8

FUTURE LAND USE SCENARIOS 10

DEVELOPMENT CITY OF NAPA TRAVEL DEMAND MODEL LAND USE INPUTS 10
SOLANO NAPA MODEL INPUTS 11

LOCAL TRANSPORTATION IMPACTS 12

VEHICLE MILES TRAVELED IMPACTS 19

CALCULATION METHODOLOGY 19
RESULTS 19

VMT FOR AIR QUALITY ANALYSIS 21

INPUTS 21
CALCULATION METHODOLOGY 21

APPENDIX

SECTION 1. OPERATIONAL MODEL REPORTS 28

LIST OF FIGURES

FIGURE 1. CITY OF NAPA TRAVEL DEMAND MODEL STUDY AREA 7

FIGURE 2. SOLANO NAPA ACTIVITY MODEL ZONES IN NAPA PLANNING AREA 9

FIGURE 3. PLANNED ROADWAY IMPROVEMENTS 15

LIST OF TABLES

TABLE 1. CITY OF NAPA TRAVEL MODEL LAND USE INPUTS BY SCENARIO 10

TABLE 2. SNABM LAND USE INPUTS 11

TABLE 3. PLANNED ROADWAY IMPROVEMENTS 13

TABLE 4. PEAK HOUR STUDY INTERSECTION LEVEL OF SERVICE 17

TABLE 5: CEQA VMT METRICS BY SCENARIO 20

TABLE 6. VMT BY VEHICLE CLASS (2040) TABLE 6A: PROJECT SCENARIO 22

TABLE 7. SUMMARY OF ORIGIN-DESTINATION VMT BY SCENARIO 25

INTRODUCTION AND REPORT CONTENTS

This report summarizes technical transportation analyses undertaken to support development of the Napa 2040 General Plan update. These include:

- Assessment of the future operational performance of the local roadway network with and without the proposed package of transportation improvements; and
- Analysis of the Vehicle Miles Traveled (VMT) effects associated with the Plan to support environmental documentation.

Section 1 describes the travel demand modeling tools that were utilized in this study. Section 2 includes the development of future land use scenarios and the assessment of local transportation operations. Section 3 describes the methodology used to calculate VMT efficiency metrics for No Project, Project, and Alternative land use scenarios. Section 4 describes the inputs and methodology used to calculate roadway link based VMT for air quality analyses for the three land use alternatives.

TRAVEL DEMAND MODELING TOOLS

Two travel demand models were used for this study. The City of Napa Travel Demand Model provided the finer network details for operational analysis and for obtaining citywide daily volumes for noise impact analysis. The Solano Napa Activity Based Model, which is a regional model, captured regional commute patterns and provided a better estimate of total VMT to or from the City of Napa.

CITY OF NAPA TRAVEL DEMAND MODEL

The City of Napa maintains a four-step, trip-based travel demand model that covers the city limits and adjacent areas in unincorporated Napa County. **Figure 1** shows the City of Napa Travel Demand Model Transportation Analysis Zones (TAZs) and roadway network.

The City of Napa model has sufficient network detail to capture effects of minor network extensions and capacity enhancements. However, as the model study area only extends slightly beyond the city's boundaries, it is not well suited to quantify the VMT of trips originating from or destined to locations outside the City of Napa.

This model was used to test various combinations of transportation network improvements and confirm the adequacy of future transportation network. It was also used to provide detailed forecasts of Average Daily Traffic (ADT) on the roadway network for noise impact analysis.

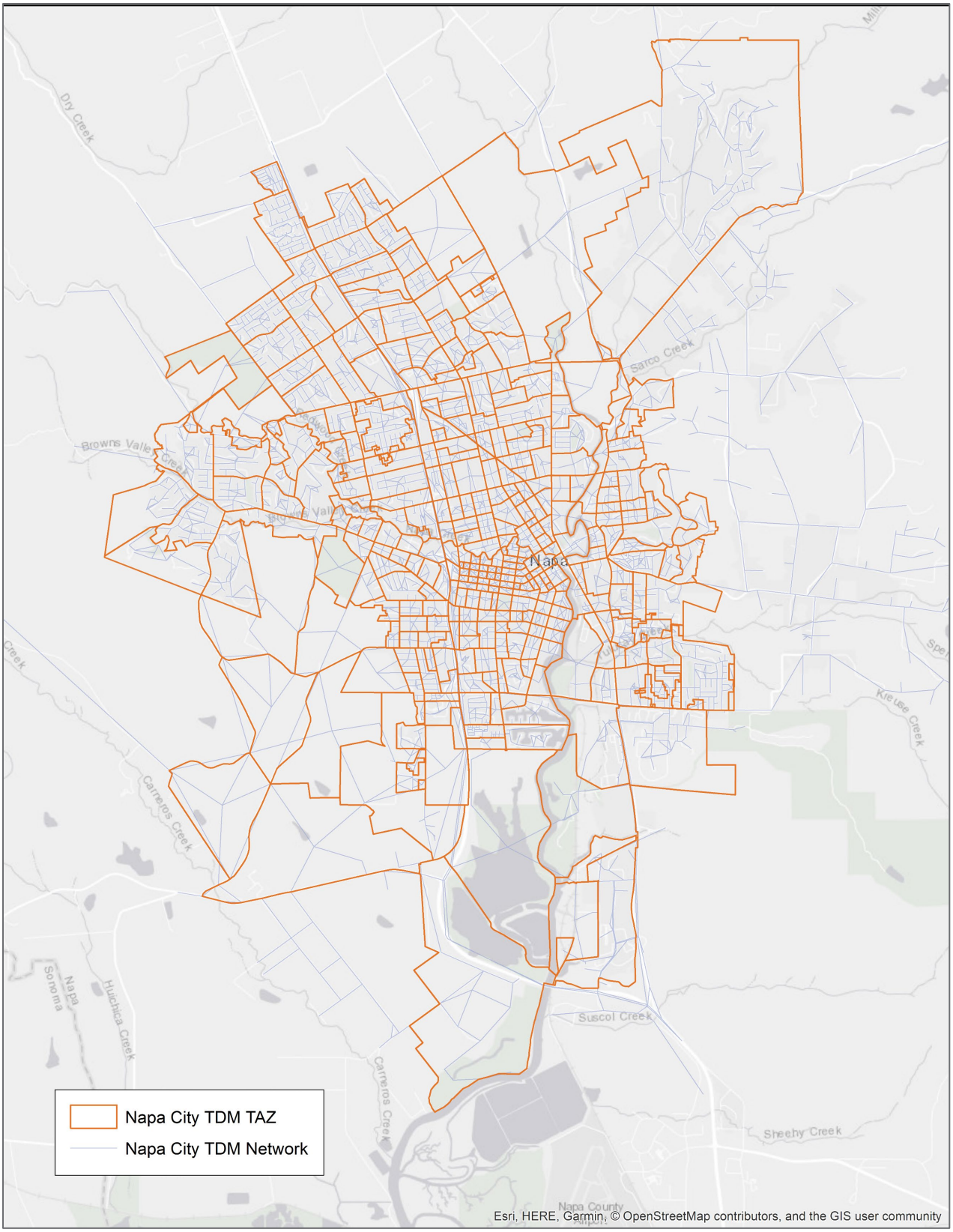


FIGURE 1. CITY OF NAPA TRAVEL DEMAND MODEL STUDY AREA

SOLANO NAPA ACTIVITY BASED MODEL

The Solano Napa Activity Based Model (SNAMB) is a regional travel demand model maintained jointly by the Napa Valley Transportation Authority and the Solano Transportation Authority. The model covers the nine county Bay Area and is a variation of the Metropolitan Transportation Commission's Travel Model 1.5 with additional detail in Napa and Sonoma counties. **Figure 2** shows the SNABM TAZs in the City of Napa vicinity.

As a regional model, the SNABM can capture the effects of regional commuting and the true trip lengths of most trips into or out of the City of Napa. In addition, the City of Napa recently adopted VMT baselines and thresholds of significance derived from this model. For these reasons, the SNABM was thought to be the appropriate tool for quantifying VMT for CEQA purposes.

The SNABM year 2040 model network was edited to reflect the Napa 2040 proposed transportation improvement projects for roadway facilities within the City of Napa. Three land use scenarios were developed to reflect No Project, Project, and Alternative conditions.

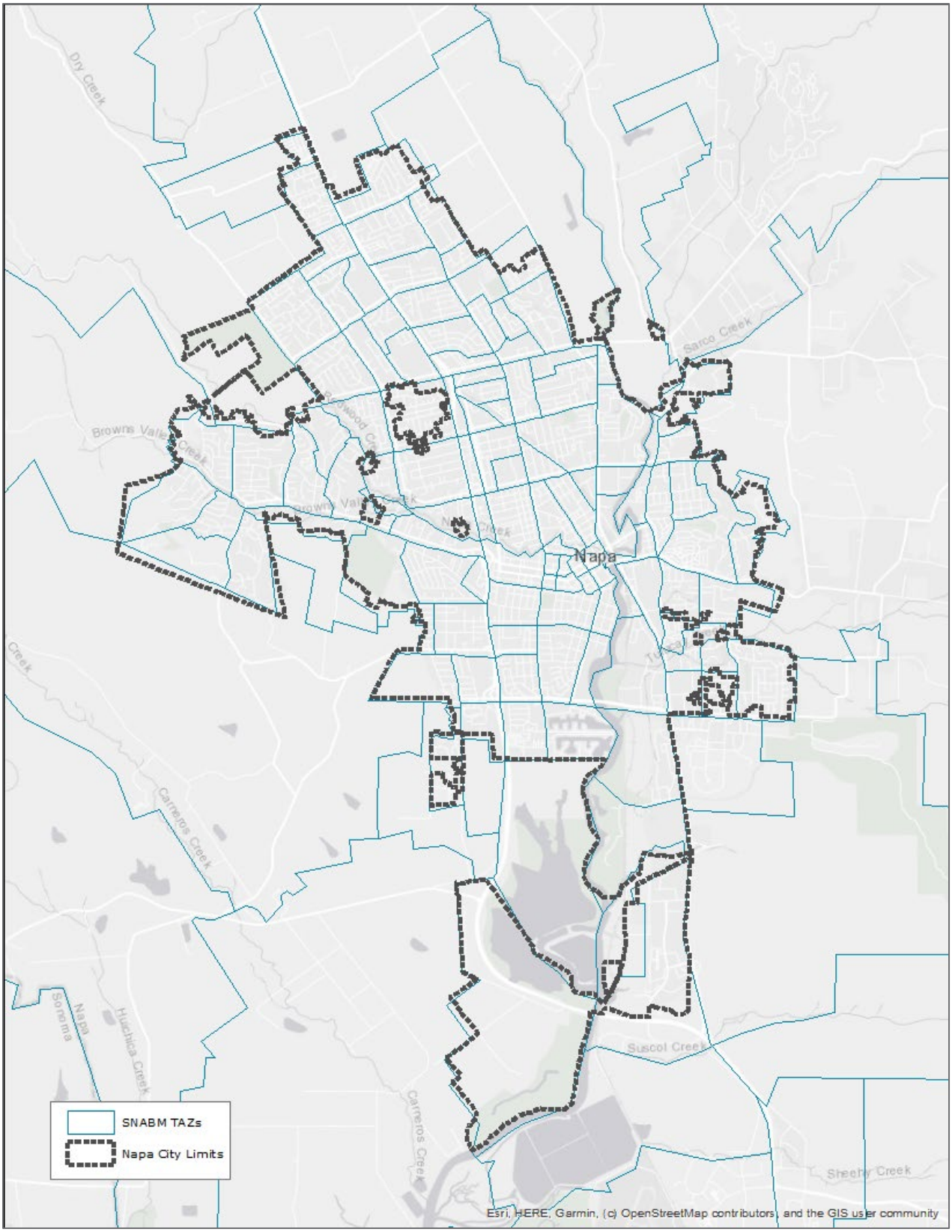


FIGURE 2. SOLANO NAPA ACTIVITY MODEL ZONES IN NAPA PLANNING AREA

FUTURE LAND USE SCENARIOS

Three land use scenarios have been considered for this study:

- **No Project**: reflects the previous City of Napa General plan and regional land use projections
- **Project**: reflects Napa 2040 land use pattern as outlined in the General Plan
- **Alternative**: Alternative land use scenario reflecting increased population relative to the Project scenario

The future population and employment by category associated with the proposed Plan and an alternative scenario were obtained from the general plan team at the City of Napa and SNABM TAZ levels. This information was used to develop inputs used by the two travel demand models.

DEVELOPMENT CITY OF NAPA TRAVEL DEMAND MODEL LAND USE INPUTS

The City of Napa travel demand model takes a scenario land use file at the TAZ level as one of the inputs. Land use associated with the Project scenario was refined by comparing original "No Project" land use with the updated land use. The population per TAZ was estimated according to the increase in dwelling units. The "No Project" split of office and medical employment was applied to the Plan land use that presented these employment numbers as a combined value. Similarly, the split of households by vehicle occupancy was applied to the total households in the new land use files. This process was carried out for both "Project" and "Alternative" land use files. **Table 1** compares key land use inputs by scenario for variables used in the City of Napa travel demand model.

TABLE 1. CITY OF NAPA TRAVEL MODEL LAND USE INPUTS BY SCENARIO

	NO PROJECT	PROJECT	DIFFERENCE (PROJECT-NP)
TOTAL POPULATION	96,432	111,184	14,751
SINGLE FAMILY RESIDENTIAL	23,732	26,327	2,595
MULTIFAMILY RESIDENTIAL	10,849	14,131	3,282
MOBILE HOUSING	1,291	1,257	(34)
SENIOR HOUSING	2,329	2,329	0
TOTAL EMPLOYMENT	45,783	56,635	10,852

Note: Totals reflect City of Napa Travel Model planning area and include TAZs outside city limits.
Source: Napa City Travel Demand Model and DKS Associates.

SOLANO NAPA MODEL INPUTS

The SNABM model takes as one input a socioeconomic/land use file at the TAZ level. Note that the TAZ land use inputs are not used directly in trip generation but instead serve as control totals for a synthesized population whose travel patterns are then simulated. Land use inputs for year 2040 were obtained from NVTA's modeling support contractor and served as the "No Project" scenario as these should be consistent with the previous Napa General Plan and regional forecasts. The No Project inputs also served as the basis for land use outside the City of Napa planning area for the Project and Alternative scenarios.

Land use variables in the TAZs covering the study area were edited to match as closely as possible to those used in the City of Napa travel demand model analyses for the Project and Alternative scenarios. Land use variables of TAZs falling within the Napa sphere of influence were also edited (e.g., TAZs 122, 148).

Table 2 summarizes the key input variables for the scenarios.

TABLE 2. SNABM LAND USE INPUTS

	NO PROJECT	PROJECT	ALTERNATIVE	DIFFERENCE (PROJECT-NP)	DIFFERENCE (ALT-PROJECT)
POPULATION	89,346	96,335	98,261	6,989	(2,059)
HOUSEHOLDS	31,456	36,527	37,358	5,071	--
EMPLOYMENT	43,311	48,152	48,152	4,841	(1,571)

Notes: Totals cover General Plan planning area. Some SNABM TAZs straddle the City – County boundary.

LOCAL TRANSPORTATION IMPACTS

Twenty-six study intersections were analyzed for the General Plan update, as listed in T**able 3.** Turning movement volumes during the morning (7:00 to 9:00 AM) and afternoon (4:00 to 6:00 PM) peak periods were collected at the study intersections in October 2018 to serve as the basis for existing conditions analysis. Intersection operations were analyzed for a.m. and p.m. peak hour conditions using Synchro (version 10) traffic analysis software, in concert with outputs from the travel demand model.

The City's proposed General Plan policy is that average vehicle delay at signalized intersections on arterial and collector streets should not exceed a midrange LOS D, with some exceptions. A midrange LOS E is permitted in the downtown area bounded by Soscol Avenue, First Street, California Boulevard, and Third Street; on Jefferson Street between Third Street and Old Sonoma Road; and on Silverado Trail between Soscol Avenue and First Street. For signalized intersections on State highway facilities within Napa, LOS E is also permitted.

Various operational scenarios were tested to arrive at the proposed set of transportation improvement projects for the Napa 2040 General Plan. The proposed improvements modeled for the Project scenario are summarized in **Table 3** and shown in **Figure 3** The table indicates whether or not the improvement was coded in the travel demand model or analyzed solely with Synchro operational models. This was done as the travel demand model is not sensitive to capture certain intersection and complete streets improvements.

TABLE 3. PLANNED ROADWAY IMPROVEMENTS

ID	ROADWAY SEGMENT/INTERSECTION	IMPROVEMENT	MODELED IN TDM?
1	Trower Avenue	Extend Trower Avenue east to connect with Big Ranch Road	Yes
2	Linda Vista Avenue	Extend southwest of Lone Oak Avenue and connect with Robinson Lane	Yes
3	Terrace Drive	Complete missing segment over Cayetano Creek	Yes
4	Wine Country Avenue	Complete missing segment west of Linda Vista Avenue	Yes
5	Sierra Avenue	Extend east to connect with Villa Lane; terminate before reaching Salvador Channel	Yes
6	Silverado Trail	Widen Silverado Trail to provide turn lane improvements from Soscol Avenue to Third Street	Yes
7	Silverado Trail/Soscol Avenue	Intersection modification to southbound Silverado Trail to provide one right-turn lane and two left-turn lanes	No; Turn lanes analyzed in operational model.
8	Soscol Avenue/Imola Avenue	Intersection modification including addition of a second left-turn lane to eastbound Imola Avenue and a separated right-turn lane to westbound Imola Avenue.	No; Turn lanes analyzed in operational model.
9	Jefferson Street/Laurel Street	Signalization	No; Signalization analyzed in operational model.
10	Jefferson Street/Old Sonoma Road	Signalization	No; Signalization analyzed in operational model.
11	Jefferson Street/Imola Avenue	Intersection modifications including additional right-turn lanes	No; Turn lanes analyzed in operational model.

TABLE 3. PLANNED ROADWAY IMPROVEMENTS (CONTINUED)

ID	ROADWAY SEGMENT/INTERSECTION	IMPROVEMENT	MODELED IN TDM?
12	Jefferson Street/Sierra Avenue	Signalization	No; Signalization analyzed in operational model.
13	Solano Avenue/ Redwood Road	Intersection modifications including widening and restriping	No; Intersection analyzed in operational model.
14	Lincoln Avenue/Jefferson Street	Intersection modifications including additional right-turn lanes	No; Intersection analyzed in operational model.
15	Lincoln Avenue/Soscol Avenue	Intersection modifications including additional right-turn lanes	No; Intersection analyzed in operational model.
16	Silverado Trail/Third Street/Coombsville Road/East Avenue	Construct roundabout	No; Roundabout analyzed in operational model.
17	First Street	Construct two roundabouts: one at the intersection of First Street/ Freeway Drive and one at the intersection of First Street/ SR29 Southbound ramps	No; Roundabouts analyzed in operational model.
18	First Street	Complete streets infrastructure improvements along First Street and Browns Valley Road extending from the intersection of First Street/SR29 southbound ramps to the intersection of Browns Valley Road/Partrick Road	No
19	Salvador Avenue	Complete streets infrastructure improvements extending from Solano Avenue to Jefferson Street including roadway widening to accommodate bicycle and pedestrian facilities	No

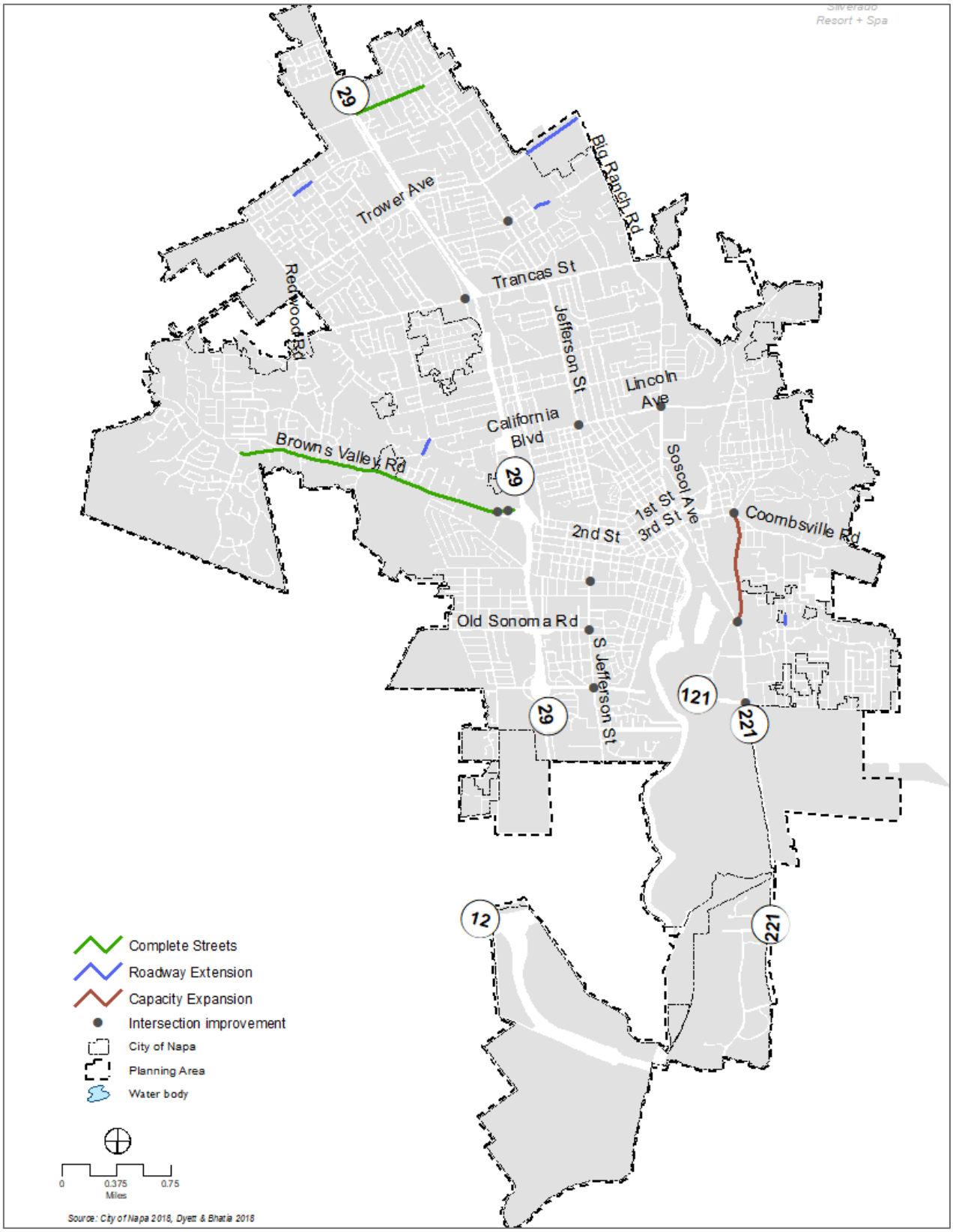


FIGURE 3. PLANNED ROADWAY IMPROVEMENTS

Future intersection operations with the proposed package of transportation improvements and Plan land use scenario are summarized in **Table 4**. The No Project operational analysis considers the previous City of Napa General plan's regional land use projections. The future project intersection operational analysis assumes that population and employment growth has occurred as anticipated through 2040 (i.e., full land use buildout). The projected future operations also assume that the transportation network improvements listed in **Table 3** have been build and are operational. As shown in **Table 4**, the proposed transportation improvements will allow the City to grow while maintaining or improving upon current levels of service. Detailed Synchro and SIDRA reports can be found in Section 2 of the Appendix.

Note that the City of Napa travel demand model was also used to develop Average Daily Traffic (ADT) inputs along roadways of all study intersections for noise impact analysis.

TABLE 4. PEAK HOUR STUDY INTERSECTION LEVEL OF SERVICE

INTERSECTION LOCATIONS	OBSERVED CONDITIONS (2018)				NO PROJECT (YEAR 2040)				WITH PROJECT (YEAR 2040)			
	AM		PM		AM		PM		AM		PM	
	DELAY	LOS	DELAY	LOS	DELAY	LOS	DELAY	LOS	DELAY	LOS	DELAY	LOS
Trower Ave/SR-29*	**129.2**	**F**	69.9	E	**129.4**	**F**	**83.8**	**F**	**123.3**	**F**	**81.8**	**F**
Redwood Rd/Solano Ave**	33.6	C	42	D	29.7	C	31.0	C	28.8	C	31.1	C
Trancas St/SR-29 SB Ramps	21.6	C	21.7	C	43.4	D	40.3	D	21.8	C	21.2	C
Trancas St/SR-29 NB Ramps	24.3	C	25.1	C	28.7	C	28.2	C	27.9	C	27.4	C
Trancas St/California Blvd	30.1	C	37.4	D	29.1	C	**47.7**	**D**	29.3	C	**47.0**	**D**
Trancas St/Jefferson St	40.3	D	44.4	D	40.4	D	**72.0**	**E**	40.2	D	**68.1**	**E**
Trancas St/Soscol Ave	**47.4**	**D**	**48.6**	**D**	**45.7**	D	**48.3**	**D**	44.7	D	**47.7**	**D**
Lincoln Ave/California Blvd	34.7	C	**61.4**	**E**	30.0	C	**48.5**	**D**	30.9	C	**48.2**	**D**
Lincoln Ave/Jefferson St**	35.6	D	**50.2**	**D**	33.2	C	**51.9**	**D**	31.9	C	**48.6**	**D**
Lincoln Ave/Soscol Ave**	**73.9**	**E**	**54.2**	**D**	**78.5**	**E**	**62.5**	**E**	**81.0**	**F**	**56.2**	**E**
First St/Jefferson St	35.7	D	**73.4**	**E**	23.4	C	27.7	C	23.7	C	27.5	C
Soscol Ave/Pearl St	-	-	-	-	19.0	B	30.6	C	18.2	B	28.9	C
First St/Soscol Ave	22.4	C	32.3	C	21.9	C	39.0	D	27.7	C	37.9	D
First St/Silverado Trail (SR-121)	15	B	33.6	C	18.4	B	71.6	E	18.3	B	52.9	D
Third St/Soscol Ave	37.8	D	43.5	D	41.3	D	43.3	D	40.8	D	41.0	D
Third St/East Ave/Silverado Trail (SR-121) **	**84.5**	**F**	79.4	E	**91.9**	**F**	**90.5**	**F**	15.5	C	16.8	C
Coombsville/Silverado Trail (SR-121)	-	-	-	-	-	-	-	-	11.8	B	13.2	B

Notes:

Delay is in seconds per vehicle and is based on average stopped delay for signalized intersections using Highway Capacity Manual methods.

* Signal coordination implemented to decrease delay along corridor after October 2018 when counts used for this report were collected

**Planned improvement location

BOLD text indicates intersection performance does not meet policy standard.

TABLE 4. PEAK HOUR STUDY INTERSECTION LEVEL OF SERVICE (CONTINUED)

INTERSECTION LOCATIONS	OBSERVED CONDITIONS (2018)				NO PROJECT (YEAR 2040)				WITH PROJECT (YEAR 2040)			
	AM		PM		AM		PM		AM		PM	
	DELAY	LOS	DELAY	LOS	DELAY	LOS	DELAY	LOS	DELAY	LOS	DELAY	LOS
Soscol Ave/Silverado Trail (SR-121)**	20.8	C	14.5	B	25.0	C	26.9	C	10.3	B	9.5	A
Imola Ave/SR-29 SB Ramps	32.9	C	18.3	B	**38.0**	D	29.0	C	**36.9**	**D**	28.6	C
Imola Ave/SR-29 NB Ramps	19.9	B	8.2	A	22.7	C	11.1	B	22.8	C	10.7	B
Imola Ave (SR-121)/S Jefferson St**	41	D	52.3	D	45.1	D	67.0	E	43.5	D	61.0	E
Imola Ave (SR-121)/Soscol Ave (SR-221)**	56.4	E	65.2	E	**90.9**	**F**	**103.9**	**F**	78.4	E	**81.3**	**F**
Trower Ave/Solano Ave*	**46.6**	**D**	33.6	C	41.2	D	36.7	D	38.6	D	42.8	D
Lincoln Ave/Silverado Trail (SR-121)	27.7	C	33.8	C	26.9	C	30.7	C	27.5	C	31.1	C
Salvador Ave/SR-29*	76.4	E	46.4	D	70.7	E	47.8	D	70.7	E	48.3	D
Salvador Ave/Solano Ave*	26.8	C	23.8	C	30.4	C	25.5	C	30.4	C	25.6	C
First St/Freeway Dr**	**64.0**	**E**	**46.2**	**D**	**62.7**	**E**	**47.6**	**D**	6.5	A	6.5	A

Notes:

Delay is in seconds per vehicle and is based on average stopped delay for signalized intersections using Highway Capacity Manual methods.

* Signal coordination implemented to decrease delay along corridor after October 2018 when counts used for this report were collected

**Planned improvement location

BOLD text indicates intersection performance does not meet policy standard.

VEHICLE MILES TRAVELED IMPACTS

This section describes the methodology used to calculate VMT efficiency metrics for the No Project, Project, and Alternative scenarios using the Solano Napa Activity Based travel demand Model (SNABM).

CALCULATION METHODOLOGY

Calculation of VMT metrics for each future scenario involved the following steps:

1) Conduct full model run
2) Apply VMT processing scripts to calculate VMT by trip purpose at the residence and workplace location for each TAZ using trip lists by mode and time-of-day distance skims.
3) Summarize results and calculate VMT efficiency metrics using the TAZ land use inputs.

RESULTS

Results for each scenario are reported in **Table 5**. The City of Napa has adopted VMT baselines from the existing average levels for Napa County with thresholds of significance 15 percent below the baselines as shown in parentheses below:

- 17.3 VMT per capita (14.7 VMT per capita)
- 26.9 VMT per employee (22.87 VMT per employee)

TABLE 5: CEQA VMT METRICS BY SCENARIO

SCENARIO	GEOGRAPHIC AREA	TOTAL POP	TOTAL EMP	VMT PER CAPITA [a]	VMT PER JOB [b]	HBW VMT PER CAPITA [c]	HBW VMT PER JOB [d]
2040 PROJECT	City of Napa	96,335	51,087	10.02	26.83	5.38	9.53
	Napa County	164,181	87,247	13.89	24.13	6.36	10.14
2040 NO PROJECT	City of Napa	89,346	46,246	11.2	26.61	6.02	9.71
	Napa County	158,038	83,361	14.86	23.77	6.86	10.20
2040 ALTERNATIVE	City of Napa	98,260	51,091	11.23	26.59	6.08	8.87
	Napa County	165,880	87,253	14.50	23.95	6.88	9.81
EXISTING	City of Napa			17.3	26.9		
THRESHOLD OF SIGNIFICANCE				14.7	22.87		

a) Home based VMT measured by location of residence

b) Home based VMT measured by location of job

c) Home based work VMT measured by location of residence

d) Home based work VMT measured by location of job

Note: CEQA VMT metrics measure VMT of trips by Bay Area residents; does not include commercial vehicle VMT or trips made by residents outside the Bay Area.

Source: SNABM and DKS Associates.

VMT FOR AIR QUALITY ANALYSIS

This section describes the inputs and methodology used to calculate link based VMT for air quality analyses for the No Project, Project, and Alternative scenarios using the Solano Napa Activity Based travel demand Model (SNABM).

INPUTS

The input roadway network used for all three scenarios was edited to more closely match the improvements coded in the City of Napa travel demand model.

CALCULATION METHODOLOGY

VMT by time period was calculated by multiplying the resident, non-resident, internal-external, commercial vehicle, and airport passenger vehicle trip tables for each time period by the appropriate distance skim. Daily origin-destination vehicle trip tables and VMT were then calculated by summing the trips and VMT for each time period. The resulting matrices were then renumbered to identify trips starting or ending within the Napa planning area. VMT from trips beginning and ending within the planning area was tabulated at 100 percent while VMT from trips with one end external to the planning area was discounted at 50 percent.

Table 6 and **Table 7** summarize the origin-destination VMT results by vehicle classification.

TABLE 6. VMT BY VEHICLE CLASS (2040)
TABLE 6A: PROJECT SCENARIO

VEHICLE CLASS	NAPA VEHICLE TRIPS [a]	DISCOUNTED NAPA VMT [b]	TOTAL NAPA VMT	AVERAGE TRIP LENGTH
DA	248,390	1,542,756	2,770,638	11.2
SR2	49,384	429,623	795,801	16.1
SR3	15,743	90,911	161,184	10.2
STRK	37,907	158,107	269,291	7.1
LTRK	454	9,486	18,961	41.7
DATOLL	597	27,410	54,821	91.9
SR2TOLL	34	54	61	1.8
SR3TOLL	19	29	33	1.7
STRKTOLL	1	18	35	69.5
LTRKTOLL	-	-	-	-
DATNC	-	-	-	-
SR2TNC	5,170	15,073	20,461	4.0
SR3TNC	4,218	13,327	18,945	4.5
TOTAL	**361,918**	**2,286,793**	**4,110,231**	**11.4**

a) All vehicle trips with an origin or destination in the City of Napa.

b) VMT for trips with an origin or destination outside the City of Napa is discounted by 50%.

Source: DKS Associates and Solano Activity Based Model 2040 Scenarios

TABLE 6. VMT BY VEHICLE CLASS (2040)
TABLE 6B: NO PROJECT SCENARIO

VEHICLE CLASS	NAPA VEHICLE TRIPS [a]	DISCOUNTED NAPA VMT [b]	TOTAL NAPA VMT	AVERAGE TRIP LENGTH
DA	253,688	1,391,346	2,447,212	9.6
SR2	41,993	192,247	324,265	7.7
SR3	16,420	89,568	156,984	9.6
STRK	34,302	148,178	254,498	7.4
LTRK	414	8,541	17,073	41.3
DATOLL	83	4,847	9,695	117.4
SR2TOLL	37	57	65	1.8
SR3TOLL	20	31	36	1.8
STRKTOLL	1	17	35	69.4
LTRKTOLL	-	-	-	-
DATNC	-	-	-	-
SR2TNC	1,712	4,574	6,078	3.6
SR3TNC	1,115	3,521	5,159	4.6
TOTAL	**349,785**	**1,842,927**	**3,221,098**	**9.2**

a) All vehicle trips with an origin or destination in the City of Napa.

b) VMT for trips with an origin or destination outside the City of Napa is discounted by 50%.

Source: DKS Associates and Solano Activity Based Model 2040 Scenarios

TABLE 6. VMT BY VEHICLE CLASS (2040)
TABLE 6C: ALTERNATIVE SCENARIO

VEHICLE CLASS	NAPA VEHICLE TRIPS [a]	DISCOUNTED NAPA VMT [b]	TOTAL NAPA VMT	AVERAGE TRIP LENGTH
DA	269,424	1,622,139	2,874,600	10.7
SR2	51,429	435,088	800,816	15.6
SR3	15,932	89,548	157,719	9.9
STRK	37,962	157,447	267,941	7.1
LTRK	456	9,526	19,041	41.8
DATOLL	571	26,588	53,176	93.1
SR2TOLL	38	64	74	2.0
SR3TOLL	21	35	41	2.0
STRKTOLL	1	20	39	70.0
LTRKTOLL	-	-	-	-
DATNC	-	-	-	-
SR2TNC	5,671	16,971	23,001	4.1
SR3TNC	4,889	15,827	22,548	4.6
TOTAL	**386,394**	**2,373,253**	**4,218,995**	**10.9**

a) All vehicle trips with an origin or destination in the City of Napa.

b) VMT for trips with an origin or destination outside the City of Napa is discounted by 50%.

Source: DKS Associates and Solano Activity Based Model 2040 Scenarios

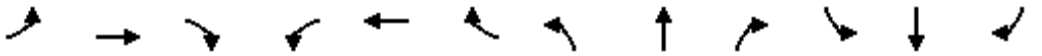
TABLE 7. SUMMARY OF ORIGIN-DESTINATION VMT BY SCENARIO

SCENARIO	NAPA TRIPS	DISCOUNTED NAPA VMT	UNDISCOUNTED NAPA VMT	AVG TRIP LENGTH (MILES)
EXISTING (2015)	288,160	1,516,021	2,638,139	9
PROJECT (2040)	361,918	2,286,793	4,110,231	11.4
NO PROJECT (2040)	349,785	1,842,927	3,221,098	9.2
ALTERNATIVE (2040)	386,394	2,373,253	4,218,995	10.9

APPENDIX

CONTENTS

SECTION 1. OPERATIONAL MODEL REPORTS



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	95	325	340	350	285	40	150	1390	215	40	950	35
Future Volume (vph)	95	325	340	350	285	40	150	1390	215	40	950	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.1	5.1	5.1	5.1		4.7	6.4	6.4	4.7	6.4	6.4
Lane Util. Factor		0.91	0.91	0.91	0.91		0.97	0.95	1.00	1.00	0.95	1.00
Frt		0.97	0.85	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00	0.95	0.98		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		3268	1441	1610	3293		3433	3539	1583	1770	3539	1583
Flt Permitted		0.54	1.00	0.43	0.65		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1772	1441	735	2163		3433	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	103	353	370	380	310	43	163	1511	234	43	1033	38
RTOR Reduction (vph)	0	11	170	0	4	0	0	0	108	0	0	26
Lane Group Flow (vph)	0	545	100	198	531	0	163	1511	126	43	1033	12
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		3			8		5	2		1	6	
Permitted Phases	3		3	8					2			6
Actuated Green, G (s)		30.7	30.7	42.9	42.9		11.2	51.3	51.3	8.8	48.9	48.9
Effective Green, g (s)		30.7	30.7	42.9	42.9		11.2	51.3	51.3	8.8	48.9	48.9
Actuated g/C Ratio		0.20	0.20	0.28	0.28		0.07	0.33	0.33	0.06	0.32	0.32
Clearance Time (s)		5.1	5.1	5.1	5.1		4.7	6.4	6.4	4.7	6.4	6.4
Vehicle Extension (s)		4.0	4.0	2.0	2.0		2.0	3.0	3.0	2.0	3.0	3.0
Lane Grp Cap (vph)		350	285	203	598		248	1171	523	100	1116	499
v/s Ratio Prot							0.05	c0.43		0.02	c0.29	
v/s Ratio Perm		c0.31	0.07	c0.27	0.25				0.08			0.01
v/c Ratio		1.84dl	0.35	0.98	0.89		0.66	1.29	0.24	0.43	0.93	0.02
Uniform Delay, d1		62.1	53.6	55.5	53.7		70.0	51.9	37.7	70.7	51.3	36.6
Progression Factor		0.25	0.12	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		260.0	0.7	55.4	14.5		4.7	137.2	1.1	1.1	14.1	0.1
Delay (s)		275.7	7.3	110.9	68.2		74.8	189.0	38.8	71.8	65.4	36.7
Level of Service		F	A	F	E		E	F	D	E	E	D
Approach Delay (s)		188.0			79.7			160.8			64.7	
Approach LOS		F			E			F			E	

Intersection Summary			
HCM 2000 Control Delay	129.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.23		
Actuated Cycle Length (s)	155.0	Sum of lost time (s)	21.3
Intersection Capacity Utilization	93.6%	ICU Level of Service	F
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	1000	15	105	720	155	50	70	225	195	110	40
Future Volume (veh/h)	40	1000	15	105	720	155	50	70	225	195	110	40
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1900	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	43	1087	16	114	783	168	54	76	245	212	120	43
Adj No. of Lanes	1	2	0	1	2	0	0	1	1	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	55	1620	24	142	1458	313	189	248	464	264	384	138
Arrive On Green	0.03	0.45	0.45	0.08	0.50	0.50	0.29	0.29	0.29	0.29	0.29	0.29
Sat Flow, veh/h	1774	3571	53	1774	2900	622	480	846	1583	1054	1310	470
Grp Volume(v), veh/h	43	539	564	114	478	473	130	0	245	212	0	163
Grp Sat Flow(s),veh/h/ln	1774	1770	1853	1774	1770	1753	1326	0	1583	1054	0	1780
Q Serve(g_s), s	2.5	25.1	25.1	6.6	19.3	19.3	3.8	0.0	13.6	19.5	0.0	7.5
Cycle Q Clear(g_c), s	2.5	25.1	25.1	6.6	19.3	19.3	11.3	0.0	13.6	30.8	0.0	7.5
Prop In Lane	1.00		0.03	1.00		0.35	0.42		1.00	1.00		0.26
Lane Grp Cap(c), veh/h	55	803	841	142	890	881	438	0	464	264	0	522
V/C Ratio(X)	0.78	0.67	0.67	0.80	0.54	0.54	0.30	0.00	0.53	0.80	0.00	0.31
Avail Cap(c_a), veh/h	101	803	841	220	890	881	438	0	464	264	0	522
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.94	0.94	0.94	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	50.5	22.5	22.5	47.5	17.8	17.8	30.2	0.0	31.0	43.5	0.0	28.9
Incr Delay (d2), s/veh	28.5	4.4	4.2	10.6	2.2	2.2	0.4	0.0	1.1	16.2	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	13.3	13.8	3.7	10.0	9.9	3.1	0.0	6.1	7.3	0.0	3.7
LnGrp Delay(d),s/veh	79.0	27.0	26.8	58.0	19.9	20.0	30.6	0.0	32.1	59.7	0.0	29.2
LnGrp LOS	E	C	C	E	B	B	C		C	E		C
Approach Vol, veh/h		1146			1065			375			375	
Approach Delay, s/veh		28.8			24.0			31.6			46.5	
Approach LOS		C			C			C			D	

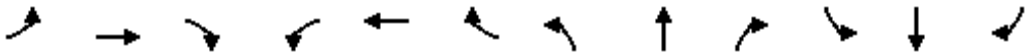
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	8.2	57.8		36.2	13.4	52.6		36.2
Change Period (Y+Rc), s	5.0	5.0		5.4	5.0	5.0		5.4
Max Green Setting (Gmax), s	6.0	52.8		30.8	13.0	45.8		30.8
Max Q Clear Time (g_c+I1), s	4.5	21.3		15.6	8.6	27.1		32.8
Green Ext Time (p_c), s	0.0	7.3		1.4	0.1	7.3		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	29.7
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	995	450	575	935	0	0	0	0	155	0	65
Future Volume (vph)	0	995	450	575	935	0	0	0	0	155	0	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6		4.0	4.6					4.0	4.0	
Lane Util. Factor		0.95		0.97	0.95					0.95	0.95	
Frt		0.95		1.00	1.00					1.00	0.91	
Flt Protected		1.00		0.95	1.00					0.95	0.98	
Satd. Flow (prot)		3374		3433	3539					1681	1576	
Flt Permitted		1.00		0.95	1.00					0.95	0.98	
Satd. Flow (perm)		3374		3433	3539					1681	1576	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1082	489	625	1016	0	0	0	0	168	0	71
RTOR Reduction (vph)	0	33	0	0	0	0	0	0	0	0	61	0
Lane Group Flow (vph)	0	1538	0	625	1016	0	0	0	0	124	54	0
Turn Type		NA		Prot	NA					Perm	NA	
Protected Phases		2		1	6						4	
Permitted Phases										4		
Actuated Green, G (s)		59.5		14.0	77.5					13.9	13.9	
Effective Green, g (s)		59.5		14.0	77.5					13.9	13.9	
Actuated g/C Ratio		0.60		0.14	0.78					0.14	0.14	
Clearance Time (s)		4.6		4.0	4.6					4.0	4.0	
Vehicle Extension (s)		2.0		2.0	2.0					3.0	3.0	
Lane Grp Cap (vph)		2007		480	2742					233	219	
v/s Ratio Prot		c0.46		c0.18	0.29							
v/s Ratio Perm										c0.07	0.03	
v/c Ratio		0.77		1.30	0.37					0.53	0.25	
Uniform Delay, d1		15.1		43.0	3.6					40.0	38.4	
Progression Factor		1.00		0.68	0.42					1.00	1.00	
Incremental Delay, d2		2.9		146.8	0.3					2.3	0.6	
Delay (s)		17.9		176.1	1.8					42.4	39.0	
Level of Service		B		F	A					D	D	
Approach Delay (s)		17.9			68.2			0.0			40.7	
Approach LOS		B			E			A			D	

Intersection Summary			
HCM 2000 Control Delay	43.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.6
Intersection Capacity Utilization	78.8%	ICU Level of Service	D
Analysis Period (min)	15		

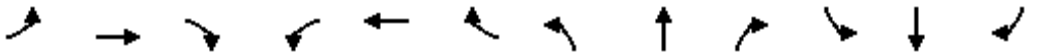
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	110	1040	0	0	1185	145	355	0	795	0	0	0
Future Volume (vph)	110	1040	0	0	1185	145	355	0	795	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.6			4.6			4.0	4.0			
Lane Util. Factor	1.00	0.95			0.86			0.95	0.95			
Frt	1.00	1.00			0.98			0.94	0.85			
Flt Protected	0.95	1.00			1.00			0.97	1.00			
Satd. Flow (prot)	1770	3539			6303			1615	1504			
Flt Permitted	0.95	1.00			1.00			0.97	1.00			
Satd. Flow (perm)	1770	3539			6303			1615	1504			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	120	1130	0	0	1288	158	386	0	864	0	0	0
RTOR Reduction (vph)	0	0	0	0	20	0	0	35	35	0	0	0
Lane Group Flow (vph)	120	1130	0	0	1426	0	0	610	570	0	0	0
Turn Type	Prot	NA			NA		Perm	NA	Perm			
Protected Phases	5	2			6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	9.6	49.1			35.5			42.3	42.3			
Effective Green, g (s)	9.6	49.1			35.5			42.3	42.3			
Actuated g/C Ratio	0.10	0.49			0.36			0.42	0.42			
Clearance Time (s)	4.0	4.6			4.6			4.0	4.0			
Vehicle Extension (s)	2.0	2.0			2.0			2.0	2.0			
Lane Grp Cap (vph)	169	1737			2237			683	636			
v/s Ratio Prot	0.07	c0.32			0.23							
v/s Ratio Perm								0.38	c0.38			
v/c Ratio	0.71	0.65			0.64			0.89	0.90			
Uniform Delay, d1	43.8	19.0			26.9			26.7	26.8			
Progression Factor	0.93	0.63			1.00			1.00	1.00			
Incremental Delay, d2	8.0	1.4			1.4			13.7	14.8			
Delay (s)	48.9	13.4			28.3			40.5	41.6			
Level of Service	D	B			C			D	D			
Approach Delay (s)		16.8			28.3			41.0			0.0	
Approach LOS		B			C			D			A	

Intersection Summary			
HCM 2000 Control Delay	28.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.6
Intersection Capacity Utilization	78.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	170	1210	155	115	920	50	250	65	145	50	90	190
Future Volume (vph)	170	1210	155	115	920	50	250	65	145	50	90	190
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.3	4.3		4.3	4.3		4.7	4.7	4.7	4.7	4.7	4.7
Lane Util. Factor	0.97	0.95		0.97	0.95		0.97	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.98		1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3479		3433	3512		3433	1863	1583	1681	1765	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3479		3433	3512		3433	1863	1583	1681	1765	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	185	1315	168	125	1000	54	272	71	158	54	98	207
RTOR Reduction (vph)	0	7	0	0	3	0	0	0	143	0	0	166
Lane Group Flow (vph)	185	1476	0	125	1051	0	272	71	15	49	103	41
Turn Type	Prot	NA		Prot	NA		Split	NA	Perm	Split	NA	Perm
Protected Phases	1	6		5	2		4	4		3	3	
Permitted Phases									4			3
Actuated Green, G (s)	10.1	59.2		5.3	54.4		10.2	10.2	10.2	12.3	12.3	12.3
Effective Green, g (s)	10.1	59.2		5.3	54.4		10.2	10.2	10.2	12.3	12.3	12.3
Actuated g/C Ratio	0.10	0.56		0.05	0.52		0.10	0.10	0.10	0.12	0.12	0.12
Clearance Time (s)	4.3	4.3		4.3	4.3		4.7	4.7	4.7	4.7	4.7	4.7
Vehicle Extension (s)	2.0	4.0		2.0	4.0		2.0	2.0	2.0	3.0	3.0	3.0
Lane Grp Cap (vph)	330	1961		173	1819		333	180	153	196	206	185
v/s Ratio Prot	0.05	c0.42		0.04	c0.30		c0.08	0.04		0.03	c0.06	
v/s Ratio Perm									0.01			0.03
v/c Ratio	0.56	0.75		0.72	0.58		0.82	0.39	0.10	0.25	0.50	0.22
Uniform Delay, d1	45.3	17.4		49.1	17.4		46.5	44.5	43.2	42.2	43.5	42.0
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.3	2.7		11.9	1.3		13.6	0.5	0.1	0.7	1.9	0.6
Delay (s)	46.6	20.1		61.0	18.7		60.1	45.0	43.3	42.8	45.4	42.6
Level of Service	D	C		E	B		E	D	D	D	D	D
Approach Delay (s)		23.0			23.2			52.7			43.4	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	29.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	67.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	145	900	90	120	775	300	110	245	180	320	360	155
Future Volume (veh/h)	145	900	90	120	775	300	110	245	180	320	360	155
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	158	978	0	130	842	0	120	266	0	348	391	0
Adj No. of Lanes	2	2	1	2	2	1	2	2	1	2	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	310	1112	497	189	987	442	179	1182	529	412	1422	0
Arrive On Green	0.09	0.31	0.00	0.05	0.28	0.00	0.05	0.33	0.00	0.12	0.40	0.00
Sat Flow, veh/h	3442	3539	1583	3442	3539	1583	3442	3539	1583	3442	3632	0
Grp Volume(v), veh/h	158	978	0	130	842	0	120	266	0	348	391	0
Grp Sat Flow(s),veh/h/ln	1721	1770	1583	1721	1770	1583	1721	1770	1583	1721	1770	0
Q Serve(g_s), s	4.6	27.5	0.0	3.9	23.6	0.0	3.6	5.7	0.0	10.4	7.8	0.0
Cycle Q Clear(g_c), s	4.6	27.5	0.0	3.9	23.6	0.0	3.6	5.7	0.0	10.4	7.8	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	310	1112	497	189	987	442	179	1182	529	412	1422	0
V/C Ratio(X)	0.51	0.88	0.00	0.69	0.85	0.00	0.67	0.23	0.00	0.84	0.27	0.00
Avail Cap(c_a), veh/h	310	1213	543	197	1146	513	252	1182	529	482	1422	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	45.6	34.1	0.0	48.7	35.8	0.0	48.9	25.2	0.0	45.2	21.1	0.0
Incr Delay (d2), s/veh	1.4	7.3	0.0	7.5	5.7	0.0	1.6	0.4	0.0	10.1	0.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	14.6	0.0	2.1	12.4	0.0	1.8	2.8	0.0	5.5	3.9	0.0
LnGrp Delay(d),s/veh	46.9	41.4	0.0	56.2	41.5	0.0	50.5	25.6	0.0	55.3	21.6	0.0
LnGrp LOS	D	D		E	D		D	C		E	C	
Approach Vol, veh/h		1136			972			386			739	
Approach Delay, s/veh		42.2			43.5			33.4			37.5	
Approach LOS		D			D			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.5	34.3	16.9	39.4	10.8	38.0	9.8	46.5
Change Period (Y+Rc), s	5.0	5.0	* 4.3	* 4.3	5.0	5.0	* 4.3	* 4.3
Max Green Setting (Gmax), s	8.0	34.0	* 15	* 30	6.0	36.0	* 7.7	* 37
Max Q Clear Time (g_c+I1), s	6.6	25.6	12.4	7.7	5.9	29.5	5.6	9.8
Green Ext Time (p_c), s	0.1	3.6	0.2	1.6	0.0	3.5	0.0	2.7

Intersection Summary	
HCM 2010 Ctrl Delay	40.4
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	85	510	250	80	575	170	370	310	55	185	310	135
Future Volume (veh/h)	85	510	250	80	575	170	370	310	55	185	310	135
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	92	554	0	87	625	185	402	337	0	201	337	147
Adj No. of Lanes	1	2	1	2	2	0	2	1	1	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	116	1146	513	160	821	243	472	376	319	232	471	202
Arrive On Green	0.07	0.32	0.00	0.05	0.30	0.30	0.14	0.20	0.00	0.13	0.20	0.20
Sat Flow, veh/h	1774	3539	1583	3442	2695	797	3442	1863	1583	1774	2415	1034
Grp Volume(v), veh/h	92	554	0	87	410	400	402	337	0	201	245	239
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1721	1770	1722	1721	1863	1583	1774	1770	1680
Q Serve(g_s), s	5.4	13.2	0.0	2.6	22.0	22.1	12.0	18.5	0.0	11.7	13.6	14.0
Cycle Q Clear(g_c), s	5.4	13.2	0.0	2.6	22.0	22.1	12.0	18.5	0.0	11.7	13.6	14.0
Prop In Lane	1.00		1.00	1.00		0.46	1.00		1.00	1.00		0.62
Lane Grp Cap(c), veh/h	116	1146	513	160	539	525	472	376	319	232	345	328
V/C Ratio(X)	0.79	0.48	0.00	0.55	0.76	0.76	0.85	0.90	0.00	0.87	0.71	0.73
Avail Cap(c_a), veh/h	135	1146	513	197	539	525	629	465	395	291	408	387
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	48.4	28.5	0.0	49.0	33.0	33.1	44.2	40.9	0.0	44.7	39.5	39.6
Incr Delay (d2), s/veh	20.1	1.5	0.0	1.1	9.7	10.0	6.7	15.5	0.0	17.0	4.6	5.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.3	6.6	0.0	1.3	12.2	11.9	6.1	11.2	0.0	6.8	7.1	7.0
LnGrp Delay(d),s/veh	68.5	29.9	0.0	50.1	42.7	43.1	50.9	56.4	0.0	61.8	44.1	45.3
LnGrp LOS	E	C		D	D	D	D	E		E	D	D
Approach Vol, veh/h		646			897			739			685	
Approach Delay, s/veh		35.4			43.6			53.4			49.7	
Approach LOS		D			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.9	37.0	19.5	27.0	9.9	39.0	20.2	26.3
Change Period (Y+Rc), s	5.0	5.0	5.8	5.8	5.0	5.0	5.8	5.8
Max Green Setting (Gmax), s	8.0	32.0	17.2	26.2	6.0	34.0	19.2	24.2
Max Q Clear Time (g_c+I1), s	7.4	24.1	13.7	20.5	4.6	15.2	14.0	16.0
Green Ext Time (p_c), s	0.0	3.2	0.1	0.7	0.0	3.6	0.4	1.9

Intersection Summary	
HCM 2010 Ctrl Delay	45.7
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	275	705	180	180	535	60	130	335	195	65	265	255
Future Volume (veh/h)	275	705	180	180	535	60	130	335	195	65	265	255
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	299	766	196	196	582	65	141	364	212	71	288	277
Adj No. of Lanes	1	2	1	1	2	0	2	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	352	1075	481	242	777	87	222	567	325	92	441	394
Arrive On Green	0.20	0.30	0.30	0.14	0.24	0.24	0.06	0.26	0.26	0.05	0.25	0.25
Sat Flow, veh/h	1774	3539	1583	1774	3211	358	3442	2170	1243	1774	1770	1583
Grp Volume(v), veh/h	299	766	196	196	320	327	141	296	280	71	288	277
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1800	1721	1770	1643	1774	1770	1583
Q Serve(g_s), s	12.8	15.1	7.7	8.4	13.2	13.3	3.1	11.7	12.0	3.1	11.5	12.5
Cycle Q Clear(g_c), s	12.8	15.1	7.7	8.4	13.2	13.3	3.1	11.7	12.0	3.1	11.5	12.5
Prop In Lane	1.00		1.00	1.00		0.20	1.00		0.76	1.00		1.00
Lane Grp Cap(c), veh/h	352	1075	481	242	428	435	222	463	430	92	441	394
V/C Ratio(X)	0.85	0.71	0.41	0.81	0.75	0.75	0.64	0.64	0.65	0.77	0.65	0.70
Avail Cap(c_a), veh/h	811	1977	884	563	741	754	450	771	716	277	815	730
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.4	24.4	21.8	33.0	27.6	27.7	35.9	25.8	25.9	36.9	26.5	26.9
Incr Delay (d2), s/veh	5.7	0.9	0.6	6.4	2.6	2.6	3.0	2.1	2.4	12.7	2.3	3.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.8	7.5	3.4	4.6	6.7	6.9	1.6	5.9	5.7	1.8	5.9	5.8
LnGrp Delay(d),s/veh	36.2	25.2	22.3	39.4	30.3	30.3	39.0	27.9	28.3	49.6	28.9	30.2
LnGrp LOS	D	C	C	D	C	C	D	C	C	D	C	C
Approach Vol, veh/h		1261			843			717			636	
Approach Delay, s/veh		27.4			32.4			30.2			31.8	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.8	25.3	15.7	28.9	9.8	24.3	20.6	24.1
Change Period (Y+Rc), s	* 4.7	* 4.7	5.0	5.0	* 4.7	* 4.7	5.0	5.0
Max Green Setting (Gmax), s	* 12	* 34	25.0	44.0	* 10	* 36	36.0	33.0
Max Q Clear Time (g_c+I1), s	5.1	14.0	10.4	17.1	5.1	14.5	14.8	15.3
Green Ext Time (p_c), s	0.1	5.0	0.5	6.7	0.2	5.1	0.9	3.8

Intersection Summary	
HCM 2010 Ctrl Delay	30.0
HCM 2010 LOS	C

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	160	555	100	110	495	195	115	410	60	150	560	180
Future Volume (veh/h)	160	555	100	110	495	195	115	410	60	150	560	180
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	174	603	109	120	538	212	125	446	65	163	609	196
Adj No. of Lanes	1	2	0	1	2	1	1	2	0	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	206	1321	238	150	1449	648	154	545	79	215	744	333
Arrive On Green	0.12	0.44	0.44	0.08	0.41	0.41	0.09	0.18	0.18	0.12	0.21	0.21
Sat Flow, veh/h	1774	2996	540	1774	3539	1583	1774	3103	450	1774	3539	1583
Grp Volume(v), veh/h	174	356	356	120	538	212	125	253	258	163	609	196
Grp Sat Flow(s),veh/h/ln	1774	1770	1767	1774	1770	1583	1774	1770	1783	1774	1770	1583
Q Serve(g_s), s	9.4	13.8	13.8	6.5	10.4	5.8	6.8	13.5	13.6	8.7	16.1	8.1
Cycle Q Clear(g_c), s	9.4	13.8	13.8	6.5	10.4	5.8	6.8	13.5	13.6	8.7	16.1	8.1
Prop In Lane	1.00		0.31	1.00		1.00	1.00		0.25	1.00		1.00
Lane Grp Cap(c), veh/h	206	780	779	150	1449	648	154	311	313	215	744	333
V/C Ratio(X)	0.85	0.46	0.46	0.80	0.37	0.33	0.81	0.81	0.82	0.76	0.82	0.59
Avail Cap(c_a), veh/h	241	780	779	234	1449	648	181	479	482	226	1047	469
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.5	19.2	19.2	44.0	20.2	8.2	43.9	38.9	38.9	41.6	36.9	19.1
Incr Delay (d2), s/veh	18.5	1.9	1.9	10.3	0.7	1.3	20.6	3.3	3.7	11.4	2.4	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.7	7.1	7.2	3.6	5.2	3.5	4.2	6.9	7.0	4.9	8.1	4.2
LnGrp Delay(d),s/veh	61.0	21.1	21.1	54.3	20.9	9.5	64.6	42.1	42.6	53.1	39.4	19.8
LnGrp LOS	E	C	C	D	C	A	E	D	D	D	D	B
Approach Vol, veh/h		886			870			636			968	
Approach Delay, s/veh		28.9			22.7			46.7			37.7	
Approach LOS		C			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	16.1	21.4	12.8	47.7	12.7	24.8	15.9	44.6
Change Period (Y+Rc), s	* 4.2	* 4.2	4.5	4.5	* 4.2	* 4.2	4.5	4.5
Max Green Setting (Gmax), s	* 13	* 27	12.9	28.7	* 10	* 29	13.3	28.3
Max Q Clear Time (g_c+I1), s	10.7	15.6	8.5	15.8	8.8	18.1	11.4	12.4
Green Ext Time (p_c), s	0.0	1.6	0.1	2.5	0.0	2.5	0.0	2.6

Intersection Summary	
HCM 2010 Ctrl Delay	33.2
HCM 2010 LOS	C

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	130	285	175	120	280	220	135	760	45	265	870	120
Future Volume (veh/h)	130	285	175	120	280	220	135	760	45	265	870	120
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	141	310	190	130	304	239	147	826	49	288	946	130
Adj No. of Lanes	1	2	1	1	2	0	1	2	0	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	127	772	346	91	378	290	145	919	54	199	1066	477
Arrive On Green	0.07	0.22	0.22	0.05	0.20	0.20	0.08	0.27	0.27	0.11	0.30	0.30
Sat Flow, veh/h	1774	3539	1583	1774	1910	1464	1774	3395	201	1774	3539	1583
Grp Volume(v), veh/h	141	310	190	130	281	262	147	430	445	288	946	130
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1604	1774	1770	1827	1774	1770	1583
Q Serve(g_s), s	7.0	7.4	10.4	5.0	14.8	15.3	8.0	23.0	23.0	11.0	25.0	6.1
Cycle Q Clear(g_c), s	7.0	7.4	10.4	5.0	14.8	15.3	8.0	23.0	23.0	11.0	25.0	6.1
Prop In Lane	1.00		1.00	1.00		0.91	1.00		0.11	1.00		1.00
Lane Grp Cap(c), veh/h	127	772	346	91	350	317	145	479	494	199	1066	477
V/C Ratio(X)	1.11	0.40	0.55	1.44	0.80	0.83	1.02	0.90	0.90	1.45	0.89	0.27
Avail Cap(c_a), veh/h	127	1264	565	91	596	540	145	524	541	199	1156	517
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	45.5	32.8	34.0	46.5	37.5	37.7	45.0	34.5	34.5	43.5	32.7	26.1
Incr Delay (d2), s/veh	113.4	0.1	0.5	248.1	17.5	21.1	78.8	16.5	16.1	226.8	7.7	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.4	3.6	4.6	8.7	9.0	8.6	7.1	13.4	13.8	17.9	13.4	2.7
LnGrp Delay(d),s/veh	158.9	32.9	34.5	294.6	55.0	58.8	123.9	51.0	50.6	270.3	40.4	26.2
LnGrp LOS	F	C	C	F	D	E	F	D	D	F	D	C
Approach Vol, veh/h		641			673			1022			1364	
Approach Delay, s/veh		61.1			102.7			61.3			87.6	
Approach LOS		E			F			E			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	16.0	31.5	9.0	25.4	13.0	34.5	11.0	23.4
Change Period (Y+Rc), s	5.0	5.0	4.0	4.0	5.0	5.0	4.0	4.0
Max Green Setting (Gmax), s	11.0	29.0	5.0	35.0	8.0	32.0	7.0	33.0
Max Q Clear Time (g_c+I1), s	13.0	25.0	7.0	12.4	10.0	27.0	9.0	17.3
Green Ext Time (p_c), s	0.0	1.5	0.0	1.6	0.0	2.3	0.0	2.1

Intersection Summary	
HCM 2010 Ctrl Delay	78.5
HCM 2010 LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	110	40	60	10	310	110	85	615	20
Future Volume (veh/h)	0	0	0	110	40	60	10	310	110	85	615	20
Number				7	4	14	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1900	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h				120	43	65	11	337	120	92	668	22
Adj No. of Lanes				0	2	0	1	2	0	1	2	0
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				0	2	0	2	2	2	2	2	2
Cap, veh/h				194	74	112	76	794	278	182	1289	42
Arrive On Green				0.11	0.11	0.11	0.04	0.31	0.31	0.10	0.37	0.37
Sat Flow, veh/h				1765	674	1019	1774	2572	901	1774	3497	115
Grp Volume(v), veh/h				121	0	107	11	230	227	92	338	352
Grp Sat Flow(s),veh/h/ln				1775	0	1683	1774	1770	1704	1774	1770	1842
Q Serve(g_s), s				4.5	0.0	4.2	0.4	7.2	7.4	3.4	10.4	10.4
Cycle Q Clear(g_c), s				4.5	0.0	4.2	0.4	7.2	7.4	3.4	10.4	10.4
Prop In Lane				0.99		0.61	1.00		0.53	1.00		0.06
Lane Grp Cap(c), veh/h				195	0	185	76	546	526	182	652	679
V/C Ratio(X)				0.62	0.00	0.58	0.14	0.42	0.43	0.50	0.52	0.52
Avail Cap(c_a), veh/h				684	0	649	79	546	526	185	652	679
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh				29.8	0.0	29.6	32.3	19.2	19.3	29.7	17.2	17.3
Incr Delay (d2), s/veh				3.2	0.0	2.9	0.9	2.4	2.6	2.1	2.9	2.8
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				2.4	0.0	2.1	0.2	3.9	3.8	1.8	5.6	5.8
LnGrp Delay(d),s/veh				32.9	0.0	32.5	33.1	21.6	21.9	31.9	20.2	20.1
LnGrp LOS				C		C	C	C	C	C	C	C
Approach Vol, veh/h					228			468			782	
Approach Delay, s/veh					32.7			22.0			21.5	
Approach LOS					C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		
Phs Duration (G+Y+Rc), s	11.9	26.3		12.4	7.7	30.5		
Change Period (Y+Rc), s	* 4.7	* 4.7		* 4.7	* 4.7	* 4.7		
Max Green Setting (Gmax), s	* 7.3	* 22		* 27	* 3.1	* 26		
Max Q Clear Time (g_c+I1), s	5.4	9.4		6.5	2.4	12.4		
Green Ext Time (p_c), s	0.0	2.2		1.2	0.0	3.6		

Intersection Summary	
HCM 2010 Ctrl Delay	23.4
HCM 2010 LOS	C

Notes



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	90	220	75	1370	1045	100
Future Volume (veh/h)	90	220	75	1370	1045	100
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	98	239	82	1489	1136	109
Adj No. of Lanes	1	1	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	310	277	408	2600	1618	724
Arrive On Green	0.17	0.17	0.23	0.73	0.46	0.46
Sat Flow, veh/h	1774	1583	1774	3632	3632	1583
Grp Volume(v), veh/h	98	239	82	1489	1136	109
Grp Sat Flow(s),veh/h/ln	1774	1583	1774	1770	1770	1583
Q Serve(g_s), s	5.1	15.4	3.9	20.2	26.9	4.2
Cycle Q Clear(g_c), s	5.1	15.4	3.9	20.2	26.9	4.2
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	310	277	408	2600	1618	724
V/C Ratio(X)	0.32	0.86	0.20	0.57	0.70	0.15
Avail Cap(c_a), veh/h	549	490	408	2600	1618	724
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.8	42.1	32.6	6.4	22.8	16.6
Incr Delay (d2), s/veh	0.6	7.9	0.2	0.9	2.6	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.5	13.3	1.9	10.1	13.7	1.9
LnGrp Delay(d),s/veh	38.4	50.0	32.9	7.3	25.4	17.1
LnGrp LOS	D	D	C	A	C	B
Approach Vol, veh/h	337			1571	1245	
Approach Delay, s/veh	46.6			8.6	24.6	
Approach LOS	D			A	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		82.1		22.9	29.1	53.0		
Change Period (Y+Rc), s		5.0		4.5	5.0	* 5		
Max Green Setting (Gmax), s		63.0		32.5	10.5	* 48		
Max Q Clear Time (g_c+I1), s		22.2		17.4	5.9	28.9		
Green Ext Time (p_c), s		16.7		1.0	0.1	8.7		

Intersection Summary	
HCM 2010 Ctrl Delay	19.0
HCM 2010 LOS	B

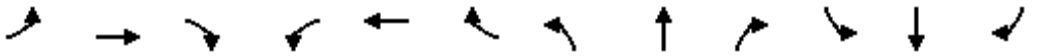
Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	180	45	60	275	85	80	1255	70	105	1025	105
Future Volume (veh/h)	50	180	45	60	275	85	80	1255	70	105	1025	105
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	54	196	49	65	299	92	87	1364	76	114	1114	114
Adj No. of Lanes	1	1	0	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	147	404	101	258	384	118	262	1608	719	228	1540	689
Arrive On Green	0.28	0.28	0.28	0.28	0.28	0.28	0.30	0.91	0.91	0.13	0.44	0.44
Sat Flow, veh/h	989	1439	360	1130	1368	421	1774	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	54	0	245	65	0	391	87	1364	76	114	1114	114
Grp Sat Flow(s),veh/h/ln	989	0	1799	1130	0	1788	1774	1770	1583	1774	1770	1583
Q Serve(g_s), s	5.6	0.0	11.9	5.3	0.0	21.1	4.0	16.1	0.5	6.3	27.2	4.6
Cycle Q Clear(g_c), s	26.7	0.0	11.9	17.2	0.0	21.1	4.0	16.1	0.5	6.3	27.2	4.6
Prop In Lane	1.00		0.20	1.00		0.24	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	147	0	505	258	0	502	262	1608	719	228	1540	689
V/C Ratio(X)	0.37	0.00	0.49	0.25	0.00	0.78	0.33	0.85	0.11	0.50	0.72	0.17
Avail Cap(c_a), veh/h	192	0	586	306	0	579	262	1608	719	228	1540	689
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.60	0.60	0.60	1.00	1.00	1.00
Uniform Delay (d), s/veh	47.1	0.0	31.4	38.6	0.0	34.8	32.9	3.4	2.6	42.6	24.4	18.0
Incr Delay (d2), s/veh	1.5	0.0	0.7	0.5	0.0	5.8	0.4	3.6	0.2	1.7	3.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	0.0	6.0	1.7	0.0	11.2	2.0	7.4	0.2	3.2	13.9	2.1
LnGrp Delay(d),s/veh	48.6	0.0	32.2	39.1	0.0	40.6	33.4	6.9	2.8	44.3	27.4	18.6
LnGrp LOS	D		C	D		D	C	A	A	D	C	B
Approach Vol, veh/h		299			456			1527			1342	
Approach Delay, s/veh		35.1			40.4			8.2			28.1	
Approach LOS		D			D			A			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	18.5	52.7		33.8	20.5	50.7		33.8
Change Period (Y+Rc), s	5.0	5.0		* 4.3	5.0	5.0		* 4.3
Max Green Setting (Gmax), s	9.0	47.7		* 34	11.0	45.7		* 34
Max Q Clear Time (g_c+I1), s	8.3	18.1		28.7	6.0	29.2		23.1
Green Ext Time (p_c), s	0.0	17.5		0.8	0.1	9.9		2.0

Intersection Summary			
HCM 2010 Ctrl Delay		21.9	
HCM 2010 LOS		C	

Notes



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	115	30	50	25	105	10	55	515	0	5	460	200
Future Volume (vph)	115	30	50	25	105	10	55	515	0	5	460	200
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.7	4.7		4.7	4.7	4.7	5.1		4.7	5.1	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	0.95	
Flt Protected		0.96	1.00		0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1792	1583		1845	1583	1770	1863		1770	1778	
Flt Permitted		0.68	1.00		0.91	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1265	1583		1701	1583	1770	1863		1770	1778	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	125	33	54	27	114	11	60	560	0	5	500	217
RTOR Reduction (vph)	0	0	44	0	0	9	0	0	0	0	19	0
Lane Group Flow (vph)	0	158	10	0	141	2	60	560	0	5	698	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)		12.0	12.0		12.0	12.0	5.3	37.1		1.4	33.2	
Effective Green, g (s)		12.0	12.0		12.0	12.0	5.3	37.1		1.4	33.2	
Actuated g/C Ratio		0.18	0.18		0.18	0.18	0.08	0.57		0.02	0.51	
Clearance Time (s)		4.7	4.7		4.7	4.7	4.7	5.1		4.7	5.1	
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		233	292		314	292	144	1063		38	908	
v/s Ratio Prot							0.03	c0.30		0.00	c0.39	
v/s Ratio Perm		c0.12	0.01		0.08	0.00						
v/c Ratio		0.68	0.03		0.45	0.01	0.42	0.53		0.13	0.77	
Uniform Delay, d1		24.7	21.7		23.6	21.6	28.4	8.6		31.2	12.8	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		7.6	0.0		1.0	0.0	1.9	1.9		1.6	6.2	
Delay (s)		32.3	21.8		24.6	21.6	30.3	10.4		32.8	19.0	
Level of Service		C	C		C	C	C	B		C	B	
Approach Delay (s)		29.6			24.4			12.4			19.1	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	18.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	68.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	90	225	165	25	280	85	330	1225	20	90	950	95
Future Volume (veh/h)	90	225	165	25	280	85	330	1225	20	90	950	95
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	98	245	179	27	304	92	359	1332	22	98	1033	103
Adj No. of Lanes	1	1	1	1	2	0	2	2	0	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	117	337	287	55	394	117	393	1463	24	348	1743	780
Arrive On Green	0.07	0.18	0.18	0.03	0.15	0.15	0.11	0.41	0.41	0.20	0.49	0.49
Sat Flow, veh/h	1774	1863	1583	1774	2691	800	3442	3563	59	1774	3539	1583
Grp Volume(v), veh/h	98	245	179	27	198	198	359	661	693	98	1033	103
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	1770	1722	1721	1770	1852	1774	1770	1583
Q Serve(g_s), s	5.7	13.0	11.0	1.6	11.3	11.6	10.8	36.9	37.0	4.9	22.0	3.7
Cycle Q Clear(g_c), s	5.7	13.0	11.0	1.6	11.3	11.6	10.8	36.9	37.0	4.9	22.0	3.7
Prop In Lane	1.00		1.00	1.00		0.46	1.00		0.03	1.00		1.00
Lane Grp Cap(c), veh/h	117	337	287	55	259	252	393	726	760	348	1743	780
V/C Ratio(X)	0.84	0.73	0.62	0.49	0.76	0.78	0.91	0.91	0.91	0.28	0.59	0.13
Avail Cap(c_a), veh/h	117	548	466	101	506	492	393	726	760	348	1743	780
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.79	0.79	0.79
Uniform Delay (d), s/veh	48.5	40.5	39.7	50.0	43.1	43.2	46.0	29.1	29.1	35.9	19.1	14.5
Incr Delay (d2), s/veh	38.7	2.2	1.7	4.9	3.5	4.0	25.2	17.5	17.0	0.3	1.2	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.1	6.9	4.9	0.8	5.8	5.8	6.5	21.5	22.5	2.5	10.9	1.7
LnGrp Delay(d),s/veh	87.2	42.8	41.3	54.9	46.5	47.2	71.2	46.7	46.2	36.2	20.3	14.7
LnGrp LOS	F	D	D	D	D	D	E	D	D	D	C	B
Approach Vol, veh/h		522			423			1713			1234	
Approach Delay, s/veh		50.6			47.4			51.6			21.1	
Approach LOS		D			D			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	25.6	48.1	7.6	23.7	17.0	56.7	11.2	20.1
Change Period (Y+Rc), s	5.0	5.0	* 4.3	* 4.7	5.0	5.0	* 4.3	* 4.7
Max Green Setting (Gmax), s	6.0	43.1	* 6	* 31	12.0	37.1	* 6.9	* 30
Max Q Clear Time (g_c+I1), s	6.9	39.0	3.6	15.0	12.8	24.0	7.7	13.6
Green Ext Time (p_c), s	0.0	3.3	0.0	1.4	0.0	7.9	0.0	1.7

Intersection Summary	
HCM 2010 Ctrl Delay	41.3
HCM 2010 LOS	D

Notes

Movement	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	NBR2
Lane Configurations												
Traffic Volume (vph)	24	67	176	19	4	165	188	31	25	392	73	4
Future Volume (vph)	24	67	176	19	4	165	188	31	25	392	73	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5			5.0			3.5	5.0		5.0
Lane Util. Factor		1.00	1.00			1.00			1.00	1.00		1.00
Frt		1.00	0.99			0.92			1.00	0.98		0.85
Flt Protected		0.95	1.00			1.00			0.95	1.00		1.00
Satd. Flow (prot)		1770	1835			1720			1770	1819		1583
Flt Permitted		0.95	1.00			1.00			0.95	1.00		1.00
Satd. Flow (perm)		1770	1835			1716			1770	1819		1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	73	191	21	4	179	204	34	27	426	79	4
RTOR Reduction (vph)	0	0	2	0	0	1	0	0	0	0	0	3
Lane Group Flow (vph)	0	99	210	0	0	420	0	0	27	505	0	1
Turn Type	Prot	Prot	NA		Perm	NA			Prot	NA		Perm
Protected Phases	4	4				7			1	6		
Permitted Phases			4		7							6
Actuated Green, G (s)		22.7	22.7			47.3			5.6	57.9		57.9
Effective Green, g (s)		22.7	22.7			47.3			5.6	57.9		57.9
Actuated g/C Ratio		0.12	0.12			0.25			0.03	0.31		0.31
Clearance Time (s)		4.5	4.5			5.0			3.5	5.0		5.0
Vehicle Extension (s)		3.5	3.5			4.0			3.5	6.0		6.0
Lane Grp Cap (vph)		213	221			430			52	559		486
v/s Ratio Prot		0.06							0.02	c0.28		
v/s Ratio Perm			c0.11			c0.24						0.00
v/c Ratio		0.46	0.95			0.98			0.52	0.90		0.00
Uniform Delay, d1		77.2	82.3			70.0			90.1	62.6		45.2
Progression Factor		1.00	1.00			1.00			1.00	1.00		1.00
Incremental Delay, d2		1.9	47.0			36.8			9.8	19.5		0.0
Delay (s)		79.1	129.3			106.8			99.9	82.1		45.2
Level of Service		E	F			F			F	F		D
Approach Delay (s)			113.3			106.8				82.7		
Approach LOS			F			F				F		

Intersection Summary			
HCM 2000 Control Delay	91.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	188.4	Sum of lost time (s)	23.5
Intersection Capacity Utilization	96.6%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group



Movement	SBL2	SBL	SBT	SBR	SWL2	SWL	SWR	SWR2
Lane Configurations								
Traffic Volume (vph)	20	139	386	27	45	79	49	9
Future Volume (vph)	20	139	386	27	45	79	49	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	5.0			5.0		
Lane Util. Factor		1.00	1.00			1.00		
Frt		1.00	0.99			0.96		
Flt Protected		0.95	1.00			0.97		
Satd. Flow (prot)		1770	1845			1724		
Flt Permitted		0.95	1.00			0.97		
Satd. Flow (perm)		1770	1845			1724		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	151	420	29	49	86	53	10
RTOR Reduction (vph)	0	0	1	0	0	99	0	0
Lane Group Flow (vph)	0	173	448	0	0	99	0	0
Turn Type	Prot	Prot	NA		Prot	Prot		
Protected Phases	5	5	2		3	3		
Permitted Phases								
Actuated Green, G (s)		19.0	71.8			18.0		
Effective Green, g (s)		19.0	71.8			18.0		
Actuated g/C Ratio		0.10	0.38			0.10		
Clearance Time (s)		4.0	5.0			5.0		
Vehicle Extension (s)		3.0	6.0			3.5		
Lane Grp Cap (vph)		178	703			164		
v/s Ratio Prot		c0.10	0.24			c0.06		
v/s Ratio Perm								
v/c Ratio		0.97	0.64			0.61		
Uniform Delay, d1		84.4	47.6			81.8		
Progression Factor		1.00	1.00			1.00		
Incremental Delay, d2		58.9	4.4			15.5		
Delay (s)		143.3	52.0			97.3		
Level of Service		F	D			F		
Approach Delay (s)			77.4			97.3		
Approach LOS			E			F		

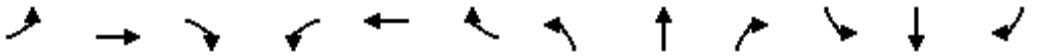
Intersection Summary



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	580	5	1375	575	0	1025
Future Volume (vph)	580	5	1375	575	0	1025
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.1	5.1	5.1	5.1		5.1
Lane Util. Factor	1.00	1.00	0.95	1.00		0.95
Frt	1.00	0.85	1.00	0.85		1.00
Flt Protected	0.95	1.00	1.00	1.00		1.00
Satd. Flow (prot)	1770	1583	3539	1583		3539
Flt Permitted	0.95	1.00	1.00	1.00		1.00
Satd. Flow (perm)	1770	1583	3539	1583		3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	630	5	1495	625	0	1114
RTOR Reduction (vph)	0	1	0	0	0	0
Lane Group Flow (vph)	630	4	1495	625	0	1114
Turn Type	Prot	Prot	NA	pt+ov		NA
Protected Phases	4	4	6	4 6		2
Permitted Phases					2	
Actuated Green, G (s)	21.0	21.0	33.8	65.0		33.8
Effective Green, g (s)	21.0	21.0	33.8	65.0		33.8
Actuated g/C Ratio	0.32	0.32	0.52	1.00		0.52
Clearance Time (s)	5.1	5.1	5.1			5.1
Vehicle Extension (s)	2.5	2.5	4.0			4.0
Lane Grp Cap (vph)	571	511	1840	1583		1840
v/s Ratio Prot	c0.36	0.00	c0.42	0.39		0.31
v/s Ratio Perm						
v/c Ratio	1.10	0.01	0.81	0.39		0.61
Uniform Delay, d1	22.0	14.9	13.0	0.0		10.9
Progression Factor	1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2	69.1	0.0	4.0	0.1		1.5
Delay (s)	91.1	14.9	17.0	0.1		12.4
Level of Service	F	B	B	A		B
Approach Delay (s)	90.5		12.0			12.4
Approach LOS	F		B			B

Intersection Summary			
HCM 2000 Control Delay	25.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	14.2
Intersection Capacity Utilization	78.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	775	110	0	640	230	0	0	0	635	0	435
Future Volume (vph)	0	775	110	0	640	230	0	0	0	635	0	435
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.1			5.1	5.1				4.7	4.7	
Lane Util. Factor		1.00			1.00	1.00				0.95	0.95	
Frt		0.98			1.00	0.85				1.00	0.87	
Flt Protected		1.00			1.00	1.00				0.95	0.99	
Satd. Flow (prot)		1831			1863	1583				1681	1532	
Flt Permitted		1.00			1.00	1.00				0.95	0.99	
Satd. Flow (perm)		1831			1863	1583				1681	1532	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	842	120	0	696	250	0	0	0	690	0	473
RTOR Reduction (vph)	0	4	0	0	0	113	0	0	0	0	127	0
Lane Group Flow (vph)	0	958	0	0	696	137	0	0	0	607	429	0
Turn Type		NA			NA	Perm				Split	NA	
Protected Phases		2			6					4	4	
Permitted Phases						6						
Actuated Green, G (s)		65.6			65.6	65.6				44.6	44.6	
Effective Green, g (s)		65.6			65.6	65.6				44.6	44.6	
Actuated g/C Ratio		0.55			0.55	0.55				0.37	0.37	
Clearance Time (s)		5.1			5.1	5.1				4.7	4.7	
Vehicle Extension (s)		2.0			2.0	2.0				2.0	2.0	
Lane Grp Cap (vph)		1000			1018	865				624	569	
v/s Ratio Prot		c0.52			0.37					c0.36	0.28	
v/s Ratio Perm						0.09						
v/c Ratio		0.96			0.68	0.16				0.97	0.75	
Uniform Delay, d1		25.9			19.7	13.5				37.1	32.9	
Progression Factor		1.00			0.53	0.53				1.00	1.00	
Incremental Delay, d2		20.0			3.2	0.3				29.0	5.0	
Delay (s)		45.8			13.6	7.5				66.1	37.9	
Level of Service		D			B	A				E	D	
Approach Delay (s)		45.8			12.0			0.0			52.6	
Approach LOS		D			B			A			D	

Intersection Summary			
HCM 2000 Control Delay	38.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.8
Intersection Capacity Utilization	86.5%	ICU Level of Service	E
Analysis Period (min)	15		

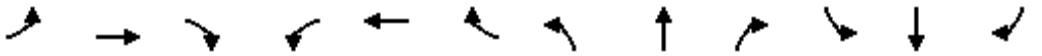
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	420	995	0	0	805	640	120	0	310	0	0	0
Future Volume (veh/h)	420	995	0	0	805	640	120	0	310	0	0	0
Number	5	2	12	1	6	16	3	8	18			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1863	1863	0	0	1863	1863	1900	1863	1863			
Adj Flow Rate, veh/h	457	1082	0	0	875	0	130	0	0			
Adj No. of Lanes	1	2	0	0	2	1	0	1	1			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	874	2923	0	0	1029	460	160	0	142			
Arrive On Green	0.99	1.00	0.00	0.00	0.10	0.00	0.09	0.00	0.00			
Sat Flow, veh/h	1774	3632	0	0	3632	1583	1774	0	1583			
Grp Volume(v), veh/h	457	1082	0	0	875	0	130	0	0			
Grp Sat Flow(s),veh/h/ln	1774	1770	0	0	1770	1583	1774	0	1583			
Q Serve(g_s), s	0.9	0.0	0.0	0.0	29.2	0.0	8.6	0.0	0.0			
Cycle Q Clear(g_c), s	0.9	0.0	0.0	0.0	29.2	0.0	8.6	0.0	0.0			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	874	2923	0	0	1029	460	160	0	142			
V/C Ratio(X)	0.52	0.37	0.00	0.00	0.85	0.00	0.81	0.00	0.00			
Avail Cap(c_a), veh/h	874	2923	0	0	1324	592	325	0	290			
HCM Platoon Ratio	2.00	2.00	1.00	1.00	0.33	0.33	1.00	1.00	1.00			
Upstream Filter(I)	0.18	0.18	0.00	0.00	0.60	0.00	1.00	0.00	0.00			
Uniform Delay (d), s/veh	0.5	0.0	0.0	0.0	51.7	0.0	53.6	0.0	0.0			
Incr Delay (d2), s/veh	0.0	0.1	0.0	0.0	5.5	0.0	3.8	0.0	0.0			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.3	0.0	0.0	0.0	15.1	0.0	4.4	0.0	0.0			
LnGrp Delay(d),s/veh	0.5	0.1	0.0	0.0	57.1	0.0	57.4	0.0	0.0			
LnGrp LOS	A	A			E		E					
Approach Vol, veh/h		1539			875			130				
Approach Delay, s/veh		0.2			57.1			57.4				
Approach LOS		A			E			E				

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		104.2			64.2	40.0		15.8
Change Period (Y+Rc), s		5.1			5.1	* 5.1		5.0
Max Green Setting (Gmax), s		87.9			38.3	* 45		22.0
Max Q Clear Time (g_c+I1), s		2.0			2.9	31.2		10.6
Green Ext Time (p_c), s		6.5			0.7	3.7		0.3

Intersection Summary	
HCM 2010 Ctrl Delay	22.7
HCM 2010 LOS	C

Notes



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	1025	190	35	780	160	320	115	40	270	80	210
Future Volume (vph)	65	1025	190	35	780	160	320	115	40	270	80	210
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	5.1		4.7	5.1		4.7	4.7	4.7	4.7	4.7	
Lane Util. Factor	1.00	0.95		1.00	0.95		0.95	0.95	1.00	1.00	1.00	
Frt	1.00	0.98		1.00	0.97		1.00	1.00	0.85	1.00	0.89	
Flt Protected	0.95	1.00		0.95	1.00		0.95	0.98	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3456		1770	3449		1681	1728	1583	1770	1661	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	0.98	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3456		1770	3449		1681	1728	1583	1770	1661	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	71	1114	207	38	848	174	348	125	43	293	87	228
RTOR Reduction (vph)	0	11	0	0	13	0	0	0	36	0	85	0
Lane Group Flow (vph)	71	1310	0	38	1009	0	233	240	7	293	230	0
Turn Type	Prot	NA		Prot	NA		Split	NA	Perm	Split	NA	
Protected Phases	5	2		1	6		3	3		4	4	
Permitted Phases									3			
Actuated Green, G (s)	8.8	51.3		6.6	49.1		18.8	18.8	18.8	24.1	24.1	
Effective Green, g (s)	8.8	51.3		6.6	49.1		18.8	18.8	18.8	24.1	24.1	
Actuated g/C Ratio	0.07	0.43		0.05	0.41		0.16	0.16	0.16	0.20	0.20	
Clearance Time (s)	4.7	5.1		4.7	5.1		4.7	4.7	4.7	4.7	4.7	
Vehicle Extension (s)	2.0	4.0		2.0	4.0		2.5	2.5	2.5	2.0	2.0	
Lane Grp Cap (vph)	129	1477		97	1411		263	270	248	355	333	
v/s Ratio Prot	0.04	c0.38		0.02	c0.29		0.14	c0.14		c0.17	0.14	
v/s Ratio Perm									0.00			
v/c Ratio	0.55	0.89		0.39	0.72		0.89	0.89	0.03	0.83	0.69	
Uniform Delay, d1	53.7	31.7		54.8	29.6		49.6	49.6	42.9	45.9	44.5	
Progression Factor	0.88	0.98		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.5	7.4		1.0	3.1		27.7	27.6	0.0	13.8	4.9	
Delay (s)	49.7	38.3		55.7	32.7		77.3	77.2	42.9	59.7	49.4	
Level of Service	D	D		E	C		E	E	D	E	D	
Approach Delay (s)		38.9			33.6			74.4			54.4	
Approach LOS		D			C			E			D	

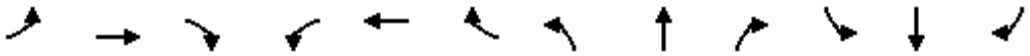
Intersection Summary			
HCM 2000 Control Delay	45.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	19.2
Intersection Capacity Utilization	88.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	90	440	695	210	270	45	415	1370	185	95	1365	175
Future Volume (veh/h)	90	440	695	210	270	45	415	1370	185	95	1365	175
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	98	478	0	228	293	49	451	1489	0	103	1484	0
Adj No. of Lanes	1	1	1	1	1	0	2	2	0	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	234	417	354	203	321	54	387	1506	0	136	1380	618
Arrive On Green	0.13	0.22	0.00	0.11	0.21	0.21	0.11	0.43	0.00	0.08	0.39	0.00
Sat Flow, veh/h	1774	1863	1583	1774	1557	260	3442	3632	0	1774	3539	1583
Grp Volume(v), veh/h	98	478	0	228	0	342	451	1489	0	103	1484	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	0	1817	1721	1770	0	1774	1770	1583
Q Serve(g_s), s	6.6	29.1	0.0	14.9	0.0	23.9	14.6	54.3	0.0	7.4	50.7	0.0
Cycle Q Clear(g_c), s	6.6	29.1	0.0	14.9	0.0	23.9	14.6	54.3	0.0	7.4	50.7	0.0
Prop In Lane	1.00		1.00	1.00		0.14	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	234	417	354	203	0	375	387	1506	0	136	1380	618
V/C Ratio(X)	0.42	1.15	0.00	1.12	0.00	0.91	1.17	0.99	0.00	0.75	1.08	0.00
Avail Cap(c_a), veh/h	234	417	354	203	0	489	387	1506	0	136	1380	618
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	51.8	50.4	0.0	57.5	0.0	50.4	57.7	37.0	0.0	58.8	39.6	0.0
Incr Delay (d2), s/veh	0.9	90.5	0.0	99.5	0.0	15.8	99.6	20.7	0.0	19.0	47.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.3	25.4	0.0	12.9	0.0	13.6	12.3	30.8	0.0	4.4	33.8	0.0
LnGrp Delay(d),s/veh	52.7	140.9	0.0	157.0	0.0	66.2	157.3	57.8	0.0	77.8	86.8	0.0
LnGrp LOS	D	F		F		E	F	E		E	F	
Approach Vol, veh/h		576			570			1940			1587	
Approach Delay, s/veh		125.9			102.6			80.9			86.2	
Approach LOS		F			F			F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	20.0	55.8	22.3	31.9	15.1	60.7	20.0	34.2
Change Period (Y+Rc), s	5.4	5.1	5.1	5.1	5.1	5.4	5.1	5.1
Max Green Setting (Gmax), s	14.6	50.7	9.0	35.0	10.0	55.3	14.9	29.1
Max Q Clear Time (g_c+I1), s	16.6	52.7	8.6	25.9	9.4	56.3	16.9	31.1
Green Ext Time (p_c), s	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0

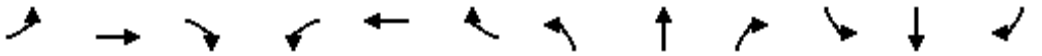
Intersection Summary	
HCM 2010 Ctrl Delay	90.9
HCM 2010 LOS	F



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	615	35	65	375	40	30	110	120	30	85	70
Future Volume (vph)	25	615	35	65	375	40	30	110	120	30	85	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.1			4.7			6.4	6.4		6.4	
Lane Util. Factor		0.91			0.95			1.00	1.00		1.00	
Frt		0.99			0.99			1.00	0.85		0.95	
Flt Protected		1.00			0.99			0.99	1.00		0.99	
Satd. Flow (prot)		5036			3472			1843	1583		1753	
Flt Permitted		0.89			0.99			0.90	1.00		0.93	
Satd. Flow (perm)		4515			3472			1675	1583		1639	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	668	38	71	408	43	33	120	130	33	92	76
RTOR Reduction (vph)	0	4	0	0	5	0	0	0	89	0	14	0
Lane Group Flow (vph)	0	729	0	0	517	0	0	153	41	0	187	0
Turn Type	Perm	NA		Split	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		3		5 8	5 8			6			6	
Permitted Phases	3						6		6	6		
Actuated Green, G (s)		30.7			59.2			48.9	48.9		48.9	
Effective Green, g (s)		30.7			54.1			48.9	48.9		48.9	
Actuated g/C Ratio		0.20			0.35			0.32	0.32		0.32	
Clearance Time (s)		5.1						6.4	6.4		6.4	
Vehicle Extension (s)		4.0						3.0	3.0		3.0	
Lane Grp Cap (vph)		894			1211			528	499		517	
v/s Ratio Prot					c0.15							
v/s Ratio Perm		c0.16						0.09	0.03		c0.11	
v/c Ratio		0.82			0.43			0.29	0.08		0.36	
Uniform Delay, d1		59.4			38.6			40.0	37.3		41.0	
Progression Factor		1.00			0.18			1.00	1.00		1.00	
Incremental Delay, d2		6.1			0.1			1.4	0.3		2.0	
Delay (s)		65.5			7.2			41.4	37.6		42.9	
Level of Service		E			A			D	D		D	
Approach Delay (s)		65.5			7.2			39.6			42.9	
Approach LOS		E			A			D			D	

Intersection Summary			
HCM 2000 Control Delay	41.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	155.0	Sum of lost time (s)	21.3
Intersection Capacity Utilization	57.3%	ICU Level of Service	B
Analysis Period (min)	15		

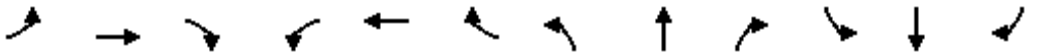
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	150	95	235	15	130	5	250	375	20	10	385	255
Future Volume (vph)	150	95	235	15	130	5	250	375	20	10	385	255
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.1	5.1	5.1		5.1		4.7	5.4		4.7	5.4	5.4
Lane Util. Factor	1.00	1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85		1.00		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00		1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583		1846		1770	1848		1770	1863	1583
Flt Permitted	0.57	1.00	1.00		0.97		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1063	1863	1583		1798		1770	1848		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	163	103	255	16	141	5	272	408	22	11	418	277
RTOR Reduction (vph)	0	0	194	0	1	0	0	1	0	0	0	53
Lane Group Flow (vph)	163	103	61	0	161	0	272	429	0	11	418	224
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		8			8		1	6		5	2	
Permitted Phases	8		8	8								2
Actuated Green, G (s)	23.6	23.6	23.6		23.6		22.4	59.0		1.1	37.7	37.7
Effective Green, g (s)	23.6	23.6	23.6		23.6		22.4	59.0		1.1	37.7	37.7
Actuated g/C Ratio	0.24	0.24	0.24		0.24		0.23	0.60		0.01	0.38	0.38
Clearance Time (s)	5.1	5.1	5.1		5.1		4.7	5.4		4.7	5.4	5.4
Vehicle Extension (s)	3.0	3.0	3.0		3.0		3.0	5.0		3.0	5.0	5.0
Lane Grp Cap (vph)	253	444	377		429		400	1102		19	710	603
v/s Ratio Prot		0.06					c0.15	0.23		0.01	c0.22	
v/s Ratio Perm	c0.15		0.04		0.09							0.14
v/c Ratio	0.64	0.23	0.16		0.38		0.68	0.39		0.58	0.59	0.37
Uniform Delay, d1	33.9	30.3	29.8		31.5		35.0	10.5		48.7	24.4	22.1
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	5.5	0.3	0.2		0.6		4.7	0.5		36.3	1.9	0.8
Delay (s)	39.4	30.6	30.0		32.0		39.7	11.0		85.0	26.4	22.9
Level of Service	D	C	C		C		D	B		F	C	C
Approach Delay (s)		33.1			32.0			22.1			25.9	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	26.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	98.9	Sum of lost time (s)	15.2
Intersection Capacity Utilization	67.3%	ICU Level of Service	C
Analysis Period (min)	15		

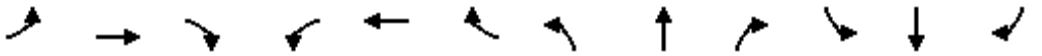
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	95	65	115	70	135	30	1400	115	35	795	10
Future Volume (vph)	25	95	65	115	70	135	30	1400	115	35	795	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.1	7.1	5.1	5.1		4.7	6.4	6.4	4.7	6.4	6.4
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt		1.00	0.85	1.00	0.90		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1844	1583	1770	1679		1770	3539	1583	1770	3539	1583
Flt Permitted		0.22	1.00	0.67	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		414	1583	1255	1679		1770	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	103	71	125	76	147	33	1522	125	38	864	11
RTOR Reduction (vph)	0	0	54	0	49	0	0	0	56	0	0	7
Lane Group Flow (vph)	0	130	17	125	174	0	33	1522	69	38	864	4
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		3			8		5	2		1	6	
Permitted Phases	3		3	8					2			6
Actuated Green, G (s)		40.0	40.0	20.4	20.4		11.0	64.5	64.5	8.8	62.3	62.3
Effective Green, g (s)		38.0	38.0	20.4	20.4		11.0	64.5	64.5	8.8	62.3	62.3
Actuated g/C Ratio		0.25	0.25	0.13	0.13		0.07	0.42	0.42	0.06	0.40	0.40
Clearance Time (s)		5.1	5.1	5.1	5.1		4.7	6.4	6.4	4.7	6.4	6.4
Vehicle Extension (s)		4.0	4.0	2.0	2.0		2.0	4.0	4.0	2.0	4.0	4.0
Lane Grp Cap (vph)		101	388	165	220		125	1472	658	100	1422	636
v/s Ratio Prot					c0.10		0.02	c0.43		0.02	c0.24	
v/s Ratio Perm		c0.31	0.01	0.10					0.04			0.00
v/c Ratio		1.29	0.04	0.76	0.79		0.26	1.03	0.10	0.38	0.61	0.01
Uniform Delay, d1		58.5	44.6	64.9	65.2		68.2	45.2	27.6	70.5	36.7	27.8
Progression Factor		0.81	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		183.9	0.1	16.0	15.7		0.4	32.7	0.3	0.9	1.9	0.0
Delay (s)		231.4	44.7	81.0	80.9		68.6	77.9	27.9	71.3	38.6	27.8
Level of Service		F	D	F	F		E	E	C	E	D	C
Approach Delay (s)		165.4			80.9			74.0			39.8	
Approach LOS		F			F			E			D	

Intersection Summary			
HCM 2000 Control Delay	70.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	155.0	Sum of lost time (s)	23.3
Intersection Capacity Utilization	76.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	70	15	35	25	50	5	150	20	130	120	10
Future Volume (vph)	5	70	15	35	25	50	5	150	20	130	120	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.1			4.7			6.4		6.4	6.4	
Lane Util. Factor		1.00			1.00			1.00		1.00	1.00	
Frt		0.98			0.94			0.98		1.00	0.99	
Flt Protected		1.00			0.98			1.00		0.95	1.00	
Satd. Flow (prot)		1817			1721			1831		1770	1841	
Flt Permitted		0.99			0.98			0.99		0.59	1.00	
Satd. Flow (perm)		1800			1721			1823		1101	1841	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	76	16	38	27	54	5	163	22	141	130	11
RTOR Reduction (vph)	0	4	0	0	22	0	0	3	0	0	2	0
Lane Group Flow (vph)	0	93	0	0	97	0	0	187	0	141	139	0
Turn Type	Perm	NA		Split	NA		Perm	NA		Perm	NA	
Protected Phases		3		5 8	5 8			6			6	
Permitted Phases	3						6			6		
Actuated Green, G (s)		40.0			36.5			62.3		62.3	62.3	
Effective Green, g (s)		40.0			31.4			62.3		62.3	62.3	
Actuated g/C Ratio		0.26			0.20			0.40		0.40	0.40	
Clearance Time (s)		5.1						6.4		6.4	6.4	
Vehicle Extension (s)		4.0						4.0		4.0	4.0	
Lane Grp Cap (vph)		464			348			732		442	739	
v/s Ratio Prot					c0.06						0.08	
v/s Ratio Perm		c0.05						0.10		c0.13		
v/c Ratio		0.20			0.28			0.26		0.32	0.19	
Uniform Delay, d1		45.0			52.2			30.9		31.8	30.0	
Progression Factor		1.00			0.22			1.00		1.00	1.00	
Incremental Delay, d2		0.3			0.1			0.8		1.9	0.6	
Delay (s)		45.3			11.9			31.7		33.7	30.6	
Level of Service		D			B			C		C	C	
Approach Delay (s)		45.3			11.9			31.7			32.1	
Approach LOS		D			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	30.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	155.0	Sum of lost time (s)	21.3
Intersection Capacity Utilization	52.6%	ICU Level of Service	A
Analysis Period (min)	15		

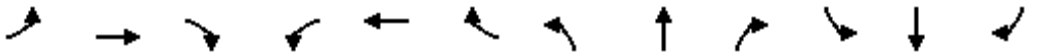
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	880	65	385	585	15	100	5	560	15	5	5
Future Volume (veh/h)	10	880	65	385	585	15	100	5	560	15	5	5
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1900	1863	1863	1900	1863	1863
Adj Flow Rate, veh/h	11	957	71	418	636	16	109	5	609	16	5	5
Adj No. of Lanes	1	2	1	2	2	0	0	1	1	0	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	52	1159	518	628	1711	43	77	2	510	70	13	510
Arrive On Green	0.03	0.33	0.33	0.18	0.48	0.48	0.32	0.32	0.32	0.32	0.32	0.32
Sat Flow, veh/h	1774	3539	1583	3442	3528	89	0	6	1583	0	40	1583
Grp Volume(v), veh/h	11	957	71	418	319	333	114	0	609	21	0	5
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1721	1770	1847	6	0	1583	40	0	1583
Q Serve(g_s), s	0.6	22.7	2.9	10.3	10.3	10.3	0.0	0.0	29.3	0.0	0.0	0.2
Cycle Q Clear(g_c), s	0.6	22.7	2.9	10.3	10.3	10.3	29.3	0.0	29.3	29.3	0.0	0.2
Prop In Lane	1.00		1.00	1.00		0.05	0.96		1.00	0.76		1.00
Lane Grp Cap(c), veh/h	52	1159	518	628	858	896	79	0	510	82	0	510
V/C Ratio(X)	0.21	0.83	0.14	0.67	0.37	0.37	1.44	0.00	1.19	0.25	0.00	0.01
Avail Cap(c_a), veh/h	214	1280	572	628	858	896	79	0	510	82	0	510
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	43.1	28.2	21.6	34.6	14.7	14.7	44.8	0.0	30.9	27.8	0.0	21.0
Incr Delay (d2), s/veh	0.7	6.8	0.6	2.2	1.2	1.2	254.9	0.0	105.5	0.6	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	12.1	1.3	5.1	5.3	5.5	7.6	0.0	27.6	0.4	0.0	0.1
LnGrp Delay(d),s/veh	43.9	35.0	22.1	36.8	16.0	15.9	299.7	0.0	136.4	28.4	0.0	21.0
LnGrp LOS	D	D	C	D	B	B	F		F	C		C
Approach Vol, veh/h		1039			1070			723			26	
Approach Delay, s/veh		34.2			24.1			162.1			27.0	
Approach LOS		C			C			F			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	21.7	34.9		34.4	7.4	49.2		34.4
Change Period (Y+Rc), s	5.1	* 5.1		* 5.1	* 4.7	5.1		5.1
Max Green Setting (Gmax), s	14.3	* 33		* 29	* 11	36.2		28.9
Max Q Clear Time (g_c+I1), s	12.3	24.7		31.3	2.6	12.3		31.3
Green Ext Time (p_c), s	0.2	5.1		0.0	0.0	5.9		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	62.7
HCM 2010 LOS	E

Notes



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	95	345	285	365	255	55	130	1425	230	55	1015	35
Future Volume (vph)	95	345	285	365	255	55	130	1425	230	55	1015	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.1	5.1	5.1	5.1		4.7	6.4	6.4	4.7	6.4	6.4
Lane Util. Factor		0.91	0.91	0.91	0.91		0.97	0.95	1.00	1.00	0.95	1.00
Frt		0.98	0.85	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00	0.95	0.98		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		3305	1441	1610	3273		3433	3539	1583	1770	3539	1583
Flt Permitted		0.54	1.00	0.44	0.64		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1805	1441	751	2140		3433	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	103	375	310	397	277	60	141	1549	250	60	1103	38
RTOR Reduction (vph)	0	6	162	0	6	0	0	0	111	0	0	25
Lane Group Flow (vph)	0	528	92	198	530	0	141	1549	139	60	1103	13
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		3			8		5	2		1	6	
Permitted Phases	3		3	8					2			6
Actuated Green, G (s)		29.5	29.5	42.0	42.0		11.0	53.4	53.4	8.8	51.2	51.2
Effective Green, g (s)		29.5	29.5	42.0	42.0		11.0	53.4	53.4	8.8	51.2	51.2
Actuated g/C Ratio		0.19	0.19	0.27	0.27		0.07	0.34	0.34	0.06	0.33	0.33
Clearance Time (s)		5.1	5.1	5.1	5.1		4.7	6.4	6.4	4.7	6.4	6.4
Vehicle Extension (s)		4.0	4.0	2.0	2.0		2.0	3.0	3.0	2.0	3.0	3.0
Lane Grp Cap (vph)		343	274	203	579		243	1219	545	100	1169	522
v/s Ratio Prot							0.04	c0.44		0.03	c0.31	
v/s Ratio Perm		c0.29	0.06	c0.26	0.25				0.09			0.01
v/c Ratio		2.02dl	0.34	0.98	0.92		0.58	1.27	0.25	0.60	0.94	0.02
Uniform Delay, d1		62.8	54.3	56.0	54.8		69.8	50.8	36.5	71.4	50.5	35.0
Progression Factor		0.32	0.06	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		254.8	0.8	55.4	18.9		2.3	128.4	1.1	6.3	15.8	0.1
Delay (s)		274.6	4.3	111.4	73.7		72.0	179.2	37.6	77.7	66.3	35.1
Level of Service		F	A	F	E		E	F	D	E	E	D
Approach Delay (s)		187.5			83.8			153.2			65.9	
Approach LOS		F			F			F			E	

Intersection Summary			
HCM 2000 Control Delay	125.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.22		
Actuated Cycle Length (s)	155.0	Sum of lost time (s)	21.3
Intersection Capacity Utilization	94.6%	ICU Level of Service	F
Analysis Period (min)	15		

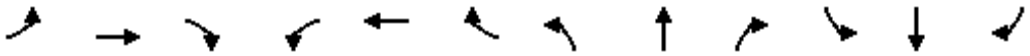
dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	980	15	105	710	155	50	70	220	195	110	40
Future Volume (veh/h)	40	980	15	105	710	155	50	70	220	195	110	40
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	43	1065	16	114	772	168	54	76	239	212	120	43
Adj No. of Lanes	1	2	1	1	2	0	1	1	1	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	55	1579	706	142	1432	312	287	473	402	304	333	119
Arrive On Green	0.03	0.45	0.45	0.08	0.50	0.50	0.25	0.25	0.25	0.25	0.25	0.25
Sat Flow, veh/h	1774	3539	1583	1774	2892	629	1218	1863	1583	1060	1310	470
Grp Volume(v), veh/h	43	1065	16	114	472	468	54	76	239	212	0	163
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1752	1218	1863	1583	1060	0	1780
Q Serve(g_s), s	2.5	25.0	0.6	6.6	19.3	19.3	4.0	3.3	13.9	20.4	0.0	7.9
Cycle Q Clear(g_c), s	2.5	25.0	0.6	6.6	19.3	19.3	11.9	3.3	13.9	23.7	0.0	7.9
Prop In Lane	1.00		1.00	1.00		0.36	1.00		1.00	1.00		0.26
Lane Grp Cap(c), veh/h	55	1579	706	142	876	868	287	473	402	304	0	452
V/C Ratio(X)	0.78	0.67	0.02	0.80	0.54	0.54	0.19	0.16	0.59	0.70	0.00	0.36
Avail Cap(c_a), veh/h	101	1579	706	220	876	868	344	561	477	354	0	536
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.94	0.94	0.94	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	50.5	23.0	16.3	47.5	18.2	18.2	37.0	30.4	34.4	39.7	0.0	32.1
Incr Delay (d2), s/veh	28.5	2.3	0.1	10.6	2.2	2.3	0.3	0.2	1.4	4.9	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	12.6	0.3	3.7	9.9	9.8	1.4	1.7	6.2	6.4	0.0	4.0
LnGrp Delay(d),s/veh	79.0	25.4	16.3	58.1	20.5	20.5	37.3	30.6	35.8	44.5	0.0	32.6
LnGrp LOS	E	C	B	E	C	C	D	C	D	D		C
Approach Vol, veh/h		1124			1054			369			375	
Approach Delay, s/veh		27.3			24.6			35.0			39.4	
Approach LOS		C			C			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	8.2	57.0		32.1	13.4	51.8		32.1
Change Period (Y+Rc), s	5.0	5.0		5.4	5.0	5.0		5.4
Max Green Setting (Gmax), s	6.0	52.0		31.6	13.0	45.0		31.6
Max Q Clear Time (g_c+I1), s	4.5	21.3		15.9	8.6	27.0		25.7
Green Ext Time (p_c), s	0.0	7.2		1.3	0.1	7.5		1.0

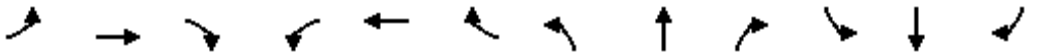
Intersection Summary	
HCM 2010 Ctrl Delay	28.8
HCM 2010 LOS	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	985	445	570	925	0	0	0	0	155	0	70
Future Volume (vph)	0	985	445	570	925	0	0	0	0	155	0	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6	4.6	4.0	4.6					4.0	4.0	
Lane Util. Factor		0.91	0.91	0.97	0.95					0.95	0.95	
Frt		0.99	0.85	1.00	1.00					1.00	0.90	
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.98	
Satd. Flow (prot)		3368	1441	3433	3539					1681	1571	
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.98	
Satd. Flow (perm)		3368	1441	3433	3539					1681	1571	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1071	484	620	1005	0	0	0	0	168	0	76
RTOR Reduction (vph)	0	2	194	0	0	0	0	0	0	0	65	0
Lane Group Flow (vph)	0	1117	242	620	1005	0	0	0	0	126	53	0
Turn Type		NA	Perm	Prot	NA					Perm	NA	
Protected Phases		2		1	6						4	
Permitted Phases			2							4		
Actuated Green, G (s)		55.4	55.4	18.0	77.4					14.0	14.0	
Effective Green, g (s)		55.4	55.4	18.0	77.4					14.0	14.0	
Actuated g/C Ratio		0.55	0.55	0.18	0.77					0.14	0.14	
Clearance Time (s)		4.6	4.6	4.0	4.6					4.0	4.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0					3.0	3.0	
Lane Grp Cap (vph)		1865	798	617	2739					235	219	
v/s Ratio Prot		c0.33		c0.18	0.28							
v/s Ratio Perm			0.17							c0.07	0.03	
v/c Ratio		0.60	0.30	1.00	0.37					0.54	0.24	
Uniform Delay, d1		14.9	11.9	41.0	3.6					40.0	38.3	
Progression Factor		1.00	1.00	0.69	0.41					1.00	1.00	
Incremental Delay, d2		1.4	1.0	32.3	0.3					2.3	0.6	
Delay (s)		16.3	12.9	60.6	1.7					42.3	38.8	
Level of Service		B	B	E	A					D	D	
Approach Delay (s)		15.4			24.2			0.0			40.6	
Approach LOS		B			C			A			D	

Intersection Summary					
HCM 2000 Control Delay	21.3	HCM 2000 Level of Service	C		
HCM 2000 Volume to Capacity ratio	0.67				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.6		
Intersection Capacity Utilization	71.3%	ICU Level of Service	C		
Analysis Period (min)	15				

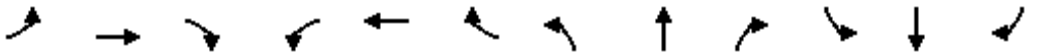
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	110	1025	0	0	1175	145	350	0	775	0	0	0
Future Volume (vph)	110	1025	0	0	1175	145	350	0	775	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.6			4.6			4.0	4.0			
Lane Util. Factor	1.00	0.95			0.86			0.95	0.95			
Frt	1.00	1.00			0.98			0.94	0.85			
Flt Protected	0.95	1.00			1.00			0.97	1.00			
Satd. Flow (prot)	1770	3539			6302			1615	1504			
Flt Permitted	0.95	1.00			1.00			0.97	1.00			
Satd. Flow (perm)	1770	3539			6302			1615	1504			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	120	1114	0	0	1277	158	380	0	842	0	0	0
RTOR Reduction (vph)	0	0	0	0	20	0	0	36	36	0	0	0
Lane Group Flow (vph)	120	1114	0	0	1415	0	0	597	553	0	0	0
Turn Type	Prot	NA			NA		Perm	NA	Perm			
Protected Phases	5	2			6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	9.8	49.6			35.8			41.8	41.8			
Effective Green, g (s)	9.8	49.6			35.8			41.8	41.8			
Actuated g/C Ratio	0.10	0.50			0.36			0.42	0.42			
Clearance Time (s)	4.0	4.6			4.6			4.0	4.0			
Vehicle Extension (s)	2.0	2.0			2.0			2.0	2.0			
Lane Grp Cap (vph)	173	1755			2256			675	628			
v/s Ratio Prot	0.07	c0.31			0.22							
v/s Ratio Perm								0.37	0.37			
v/c Ratio	0.69	0.63			0.63			0.89	0.88			
Uniform Delay, d1	43.6	18.5			26.6			26.9	26.8			
Progression Factor	0.81	0.60			1.00			1.00	1.00			
Incremental Delay, d2	8.0	1.5			1.3			12.9	13.4			
Delay (s)	43.3	12.7			27.9			39.8	40.2			
Level of Service	D	B			C			D	D			
Approach Delay (s)		15.7			27.9			40.0			0.0	
Approach LOS		B			C			D			A	

Intersection Summary			
HCM 2000 Control Delay	27.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.6
Intersection Capacity Utilization	71.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	165	1195	155	115	900	50	250	65	145	50	90	190
Future Volume (vph)	165	1195	155	115	900	50	250	65	145	50	90	190
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.3	4.3		4.3	4.3		4.7	4.7	4.7	4.7	4.7	4.7
Lane Util. Factor	0.97	0.95		0.97	0.95		0.97	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.98		1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3478		3433	3511		3433	1863	1583	1681	1765	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3478		3433	3511		3433	1863	1583	1681	1765	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	179	1299	168	125	978	54	272	71	158	54	98	207
RTOR Reduction (vph)	0	7	0	0	3	0	0	0	143	0	0	168
Lane Group Flow (vph)	179	1460	0	125	1029	0	272	71	15	49	103	39
Turn Type	Prot	NA		Prot	NA		Split	NA	Perm	Split	NA	Perm
Protected Phases	1	6		5	2		4	4		3	3	
Permitted Phases									4			3
Actuated Green, G (s)	9.9	59.2		5.3	54.6		10.2	10.2	10.2	12.3	12.3	12.3
Effective Green, g (s)	9.9	59.2		5.3	54.6		10.2	10.2	10.2	12.3	12.3	12.3
Actuated g/C Ratio	0.09	0.56		0.05	0.52		0.10	0.10	0.10	0.12	0.12	0.12
Clearance Time (s)	4.3	4.3		4.3	4.3		4.7	4.7	4.7	4.7	4.7	4.7
Vehicle Extension (s)	2.0	4.0		2.0	4.0		2.0	2.0	2.0	3.0	3.0	3.0
Lane Grp Cap (vph)	323	1960		173	1825		333	180	153	196	206	185
v/s Ratio Prot	0.05	c0.42		0.04	c0.29		c0.08	0.04		0.03	c0.06	
v/s Ratio Perm									0.01			0.02
v/c Ratio	0.55	0.74		0.72	0.56		0.82	0.39	0.10	0.25	0.50	0.21
Uniform Delay, d1	45.4	17.2		49.1	17.1		46.5	44.5	43.2	42.2	43.5	42.0
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.2	2.6		11.9	1.3		13.6	0.5	0.1	0.7	1.9	0.6
Delay (s)	46.6	19.8		61.0	18.4		60.1	45.0	43.3	42.8	45.4	42.5
Level of Service	D	B		E	B		E	D	D	D	D	D
Approach Delay (s)		22.8			23.0			52.7			43.4	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	28.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	67.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	140	875	90	115	750	285	110	240	175	315	360	155
Future Volume (veh/h)	140	875	90	115	750	285	110	240	175	315	360	155
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	152	951	0	125	815	0	120	261	0	342	391	0
Adj No. of Lanes	2	2	1	2	2	1	2	2	1	2	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	314	1081	484	184	947	424	179	1224	548	407	1458	0
Arrive On Green	0.09	0.31	0.00	0.05	0.27	0.00	0.05	0.35	0.00	0.12	0.41	0.00
Sat Flow, veh/h	3442	3539	1583	3442	3539	1583	3442	3539	1583	3442	3632	0
Grp Volume(v), veh/h	152	951	0	125	815	0	120	261	0	342	391	0
Grp Sat Flow(s),veh/h/ln	1721	1770	1583	1721	1770	1583	1721	1770	1583	1721	1770	0
Q Serve(g_s), s	4.4	26.8	0.0	3.7	23.0	0.0	3.6	5.5	0.0	10.2	7.7	0.0
Cycle Q Clear(g_c), s	4.4	26.8	0.0	3.7	23.0	0.0	3.6	5.5	0.0	10.2	7.7	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	314	1081	484	184	947	424	179	1224	548	407	1458	0
V/C Ratio(X)	0.48	0.88	0.00	0.68	0.86	0.00	0.67	0.21	0.00	0.84	0.27	0.00
Avail Cap(c_a), veh/h	314	1180	528	197	1079	483	252	1224	548	482	1458	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	45.4	34.6	0.0	48.8	36.6	0.0	48.9	24.3	0.0	45.3	20.4	0.0
Incr Delay (d2), s/veh	1.2	7.5	0.0	6.6	6.5	0.0	1.6	0.4	0.0	9.6	0.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	14.2	0.0	2.0	12.1	0.0	1.8	2.8	0.0	5.4	3.8	0.0
LnGrp Delay(d),s/veh	46.5	42.1	0.0	55.4	43.1	0.0	50.5	24.7	0.0	54.9	20.9	0.0
LnGrp LOS	D	D		E	D		D	C		D	C	
Approach Vol, veh/h		1103			940			381			733	
Approach Delay, s/veh		42.7			44.8			32.8			36.7	
Approach LOS		D			D			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.6	33.1	16.7	40.6	10.6	37.1	9.8	47.6
Change Period (Y+Rc), s	5.0	5.0	* 4.3	* 4.3	5.0	5.0	* 4.3	* 4.3
Max Green Setting (Gmax), s	9.0	32.0	* 15	* 31	6.0	35.0	* 7.7	* 38
Max Q Clear Time (g_c+I1), s	6.4	25.0	12.2	7.5	5.7	28.8	5.6	9.7
Green Ext Time (p_c), s	0.1	3.1	0.2	1.6	0.0	3.3	0.0	2.7

Intersection Summary	
HCM 2010 Ctrl Delay	40.7
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	80	500	255	85	570	160	370	295	60	170	290	115
Future Volume (veh/h)	80	500	255	85	570	160	370	295	60	170	290	115
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	87	543	0	92	620	174	402	321	0	185	315	125
Adj No. of Lanes	1	2	1	2	2	0	2	1	1	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	110	1146	513	146	830	233	472	360	306	216	443	173
Arrive On Green	0.06	0.32	0.00	0.04	0.30	0.30	0.14	0.19	0.00	0.12	0.18	0.18
Sat Flow, veh/h	1774	3539	1583	3442	2732	765	3442	1863	1583	1774	2492	969
Grp Volume(v), veh/h	87	543	0	92	401	393	402	321	0	185	222	218
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1721	1770	1728	1721	1863	1583	1774	1770	1692
Q Serve(g_s), s	5.1	12.9	0.0	2.8	21.4	21.5	12.0	17.6	0.0	10.7	12.4	12.8
Cycle Q Clear(g_c), s	5.1	12.9	0.0	2.8	21.4	21.5	12.0	17.6	0.0	10.7	12.4	12.8
Prop In Lane	1.00		1.00	1.00		0.44	1.00		1.00	1.00		0.57
Lane Grp Cap(c), veh/h	110	1146	513	146	538	525	472	360	306	216	315	301
V/C Ratio(X)	0.79	0.47	0.00	0.63	0.75	0.75	0.85	0.89	0.00	0.86	0.70	0.72
Avail Cap(c_a), veh/h	152	1146	513	197	538	525	629	465	395	291	408	390
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	48.6	28.4	0.0	49.5	32.9	32.9	44.2	41.3	0.0	45.2	40.6	40.7
Incr Delay (d2), s/veh	11.5	1.4	0.0	1.7	9.1	9.4	6.7	13.7	0.0	13.6	3.8	4.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.8	6.5	0.0	1.4	11.8	11.6	6.1	10.5	0.0	6.1	6.4	6.4
LnGrp Delay(d),s/veh	60.1	29.8	0.0	51.1	42.0	42.3	50.9	55.0	0.0	58.8	44.3	45.4
LnGrp LOS	E	C		D	D	D	D	E		E	D	D
Approach Vol, veh/h		630			886			723			625	
Approach Delay, s/veh		33.9			43.1			52.7			49.0	
Approach LOS		C			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.5	36.9	18.6	26.1	9.4	39.0	20.2	24.5
Change Period (Y+Rc), s	5.0	5.0	5.8	5.8	5.0	5.0	5.8	5.8
Max Green Setting (Gmax), s	9.0	31.0	17.2	26.2	6.0	34.0	19.2	24.2
Max Q Clear Time (g_c+I1), s	7.1	23.5	12.7	19.6	4.8	14.9	14.0	14.8
Green Ext Time (p_c), s	0.0	3.0	0.1	0.7	0.0	3.5	0.4	1.8

Intersection Summary	
HCM 2010 Ctrl Delay	44.8
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	280	700	145	170	535	60	130	340	190	65	245	260
Future Volume (veh/h)	280	700	145	170	535	60	130	340	190	65	245	260
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	304	761	158	185	582	65	141	370	207	71	266	283
Adj No. of Lanes	1	2	1	1	2	0	2	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	357	1109	496	230	777	87	221	577	318	92	441	395
Arrive On Green	0.20	0.31	0.31	0.13	0.24	0.24	0.06	0.26	0.26	0.05	0.25	0.25
Sat Flow, veh/h	1774	3539	1583	1774	3211	358	3442	2204	1214	1774	1770	1583
Grp Volume(v), veh/h	304	761	158	185	320	327	141	296	281	71	266	283
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1800	1721	1770	1648	1774	1770	1583
Q Serve(g_s), s	13.2	15.0	6.1	8.1	13.3	13.4	3.2	11.8	12.1	3.1	10.6	13.0
Cycle Q Clear(g_c), s	13.2	15.0	6.1	8.1	13.3	13.4	3.2	11.8	12.1	3.1	10.6	13.0
Prop In Lane	1.00		1.00	1.00		0.20	1.00		0.74	1.00		1.00
Lane Grp Cap(c), veh/h	357	1109	496	230	428	435	221	463	432	92	441	395
V/C Ratio(X)	0.85	0.69	0.32	0.81	0.75	0.75	0.64	0.64	0.65	0.77	0.60	0.72
Avail Cap(c_a), veh/h	784	2008	898	534	755	768	445	758	706	274	802	718
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.7	23.9	20.9	33.7	28.0	28.0	36.4	26.1	26.2	37.3	26.4	27.3
Incr Delay (d2), s/veh	5.8	0.8	0.4	6.5	2.6	2.6	3.0	2.1	2.4	12.7	1.9	3.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.0	7.4	2.7	4.4	6.8	6.9	1.6	6.0	5.7	1.9	5.4	6.0
LnGrp Delay(d),s/veh	36.5	24.7	21.2	40.2	30.6	30.6	39.4	28.2	28.5	50.0	28.3	30.8
LnGrp LOS	D	C	C	D	C	C	D	C	C	D	C	C
Approach Vol, veh/h		1223			832			718			620	
Approach Delay, s/veh		27.2			32.7			30.5			31.9	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.8	25.6	15.3	30.0	9.8	24.6	21.0	24.3
Change Period (Y+Rc), s	* 4.7	* 4.7	5.0	5.0	* 4.7	* 4.7	5.0	5.0
Max Green Setting (Gmax), s	* 12	* 34	24.0	45.2	* 10	* 36	35.2	34.0
Max Q Clear Time (g_c+I1), s	5.1	14.1	10.1	17.0	5.2	15.0	15.2	15.4
Green Ext Time (p_c), s	0.1	5.0	0.4	6.5	0.2	4.9	0.9	3.9

Intersection Summary	
HCM 2010 Ctrl Delay	30.1
HCM 2010 LOS	C

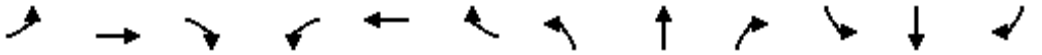
Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	155	555	90	105	490	195	115	410	60	155	550	180
Future Volume (veh/h)	155	555	90	105	490	195	115	410	60	155	550	180
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	168	603	98	114	533	212	125	446	65	168	598	196
Adj No. of Lanes	1	2	1	1	2	1	1	2	1	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	199	1584	709	143	1472	658	155	565	253	239	733	328
Arrive On Green	0.11	0.45	0.45	0.08	0.42	0.42	0.09	0.16	0.16	0.13	0.21	0.21
Sat Flow, veh/h	1774	3539	1583	1774	3539	1583	1774	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	168	603	98	114	533	212	125	446	65	168	598	196
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1583	1774	1770	1583	1774	1770	1583
Q Serve(g_s), s	9.1	11.1	2.4	6.2	10.2	5.5	6.8	11.9	2.8	8.9	15.8	8.2
Cycle Q Clear(g_c), s	9.1	11.1	2.4	6.2	10.2	5.5	6.8	11.9	2.8	8.9	15.8	8.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	199	1584	709	143	1472	658	155	565	253	239	733	328
V/C Ratio(X)	0.84	0.38	0.14	0.80	0.36	0.32	0.81	0.79	0.26	0.70	0.82	0.60
Avail Cap(c_a), veh/h	226	1584	709	232	1472	658	196	968	433	239	1047	469
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.6	18.0	7.4	44.3	19.7	7.4	43.9	39.6	23.0	40.5	37.1	19.6
Incr Delay (d2), s/veh	19.8	0.7	0.4	9.6	0.7	1.3	17.7	1.0	0.2	7.7	2.2	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.5	5.6	1.5	3.4	5.1	3.5	4.1	5.9	1.5	4.8	8.0	4.2
LnGrp Delay(d),s/veh	62.5	18.7	7.8	53.8	20.4	8.7	61.6	40.6	23.2	48.2	39.3	20.2
LnGrp LOS	E	B	A	D	C	A	E	D	C	D	D	C
Approach Vol, veh/h		869			859			636			962	
Approach Delay, s/veh		26.0			21.9			42.9			37.0	
Approach LOS		C			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	17.4	19.8	12.4	48.4	12.7	24.5	15.5	45.2
Change Period (Y+Rc), s	* 4.2	* 4.2	4.5	4.5	* 4.2	* 4.2	4.5	4.5
Max Green Setting (Gmax), s	* 13	* 27	12.8	28.0	* 11	* 29	12.5	28.3
Max Q Clear Time (g_c+I1), s	10.9	13.9	8.2	13.1	8.8	17.8	11.1	12.2
Green Ext Time (p_c), s	0.0	1.8	0.1	2.6	0.1	2.5	0.0	2.6

Intersection Summary	
HCM 2010 Ctrl Delay	31.3
HCM 2010 LOS	C

Notes



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	135	290	175	115	270	235	135	735	45	270	855	120
Future Volume (veh/h)	135	290	175	115	270	235	135	735	45	270	855	120
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	147	315	190	125	293	255	147	799	49	293	929	130
Adj No. of Lanes	1	2	1	1	2	1	1	2	1	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	127	540	242	91	468	209	145	913	408	211	1046	468
Arrive On Green	0.07	0.15	0.15	0.05	0.13	0.13	0.08	0.26	0.26	0.12	0.30	0.30
Sat Flow, veh/h	1774	3539	1583	1774	3539	1583	1774	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	147	315	190	125	293	255	147	799	49	293	929	130
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1583	1774	1770	1583	1774	1770	1583
Q Serve(g_s), s	7.0	8.1	11.3	5.0	7.7	6.3	8.0	21.2	1.1	11.7	24.6	6.2
Cycle Q Clear(g_c), s	7.0	8.1	11.3	5.0	7.7	6.3	8.0	21.2	1.1	11.7	24.6	6.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	127	540	242	91	468	209	145	913	408	211	1046	468
V/C Ratio(X)	1.16	0.58	0.79	1.38	0.63	1.22	1.02	0.88	0.12	1.39	0.89	0.28
Avail Cap(c_a), veh/h	127	1264	565	91	1192	533	145	1047	469	211	1156	517
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	45.5	38.6	40.0	46.5	40.2	10.0	45.0	34.9	6.7	43.2	33.0	26.5
Incr Delay (d2), s/veh	129.4	0.4	2.1	226.1	6.2	133.2	78.8	6.9	0.0	200.0	7.6	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.0	4.0	5.1	8.1	4.1	12.6	7.1	11.2	1.0	17.4	13.1	2.7
LnGrp Delay(d),s/veh	174.9	39.0	42.1	272.6	46.4	143.2	123.9	41.8	6.7	243.2	40.6	26.6
LnGrp LOS	F	D	D	F	D	F	F	D	A	F	D	C
Approach Vol, veh/h		652			673			995			1352	
Approach Delay, s/veh		70.5			125.1			52.2			83.1	
Approach LOS		E			F			D			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	16.7	30.3	9.0	19.0	13.0	34.0	11.0	17.0
Change Period (Y+Rc), s	5.0	5.0	4.0	4.0	5.0	5.0	4.0	4.0
Max Green Setting (Gmax), s	11.0	29.0	5.0	35.0	8.0	32.0	7.0	33.0
Max Q Clear Time (g_c+I1), s	13.7	23.2	7.0	13.3	10.0	26.6	9.0	9.7
Green Ext Time (p_c), s	0.0	2.1	0.0	1.6	0.0	2.4	0.0	1.7

Intersection Summary	
HCM 2010 Ctrl Delay	80.2
HCM 2010 LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	120	40	60	10	325	120	85	635	15
Future Volume (veh/h)	0	0	0	120	40	60	10	325	120	85	635	15
Number				7	4	14	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1900	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h				130	43	65	11	353	130	92	690	16
Adj No. of Lanes				0	2	0	1	2	0	1	2	0
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				0	2	0	2	2	2	2	2	2
Cap, veh/h				206	78	117	76	786	285	182	1303	30
Arrive On Green				0.12	0.12	0.12	0.04	0.31	0.31	0.10	0.37	0.37
Sat Flow, veh/h				1774	670	1013	1774	2546	923	1774	3536	82
Grp Volume(v), veh/h				130	0	108	11	244	239	92	345	361
Grp Sat Flow(s),veh/h/ln				1774	0	1684	1774	1770	1700	1774	1770	1848
Q Serve(g_s), s				4.9	0.0	4.2	0.4	7.7	7.9	3.4	10.7	10.7
Cycle Q Clear(g_c), s				4.9	0.0	4.2	0.4	7.7	7.9	3.4	10.7	10.7
Prop In Lane				1.00		0.60	1.00		0.54	1.00		0.04
Lane Grp Cap(c), veh/h				206	0	195	76	546	525	182	652	681
V/C Ratio(X)				0.63	0.00	0.55	0.14	0.45	0.46	0.50	0.53	0.53
Avail Cap(c_a), veh/h				684	0	650	79	546	525	185	652	681
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh				29.5	0.0	29.2	32.3	19.4	19.5	29.7	17.3	17.3
Incr Delay (d2), s/veh				3.2	0.0	2.4	0.9	2.6	2.8	2.1	3.1	2.9
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				2.6	0.0	2.1	0.2	4.1	4.1	1.8	5.7	6.0
LnGrp Delay(d),s/veh				32.7	0.0	31.7	33.1	22.0	22.3	31.9	20.4	20.3
LnGrp LOS				C		C	C	C	C	C	C	C
Approach Vol, veh/h					238			494			798	
Approach Delay, s/veh					32.2			22.4			21.7	
Approach LOS					C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		
Phs Duration (G+Y+Rc), s	11.9	26.3		12.8	7.7	30.5		
Change Period (Y+Rc), s	* 4.7	* 4.7		* 4.7	* 4.7	* 4.7		
Max Green Setting (Gmax), s	* 7.3	* 22		* 27	* 3.1	* 26		
Max Q Clear Time (g_c+I1), s	5.4	9.9		6.9	2.4	12.7		
Green Ext Time (p_c), s	0.0	2.3		1.3	0.0	3.6		

Intersection Summary	
HCM 2010 Ctrl Delay	23.6
HCM 2010 LOS	C

Notes



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	90	210	75	1345	1035	100
Future Volume (veh/h)	90	210	75	1345	1035	100
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	98	228	82	1462	1125	109
Adj No. of Lanes	1	1	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	298	266	420	2625	1618	724
Arrive On Green	0.17	0.17	0.24	0.74	0.46	0.46
Sat Flow, veh/h	1774	1583	1774	3632	3632	1583
Grp Volume(v), veh/h	98	228	82	1462	1125	109
Grp Sat Flow(s),veh/h/ln	1774	1583	1774	1770	1770	1583
Q Serve(g_s), s	5.1	14.7	3.9	19.1	26.6	4.2
Cycle Q Clear(g_c), s	5.1	14.7	3.9	19.1	26.6	4.2
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	298	266	420	2625	1618	724
V/C Ratio(X)	0.33	0.86	0.20	0.56	0.70	0.15
Avail Cap(c_a), veh/h	549	490	420	2625	1618	724
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	38.5	42.5	32.1	6.0	22.7	16.6
Incr Delay (d2), s/veh	0.6	7.9	0.2	0.9	2.5	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	12.7	1.9	9.5	13.5	1.9
LnGrp Delay(d),s/veh	39.1	50.3	32.3	6.8	25.2	17.1
LnGrp LOS	D	D	C	A	C	B
Approach Vol, veh/h	326			1544	1234	
Approach Delay, s/veh	47.0			8.2	24.5	
Approach LOS	D			A	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		82.9		22.1	29.9	53.0		
Change Period (Y+Rc), s		5.0		4.5	5.0	* 5		
Max Green Setting (Gmax), s		63.0		32.5	10.5	* 48		
Max Q Clear Time (g_c+I1), s		21.1		16.7	5.9	28.6		
Green Ext Time (p_c), s		16.4		0.9	0.1	8.7		

Intersection Summary	
HCM 2010 Ctrl Delay	18.7
HCM 2010 LOS	B

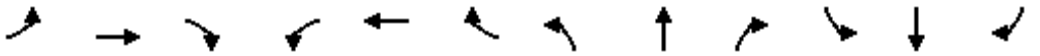
Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	175	45	65	280	90	85	1230	65	100	1015	100
Future Volume (veh/h)	50	175	45	65	280	90	85	1230	65	100	1015	100
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	54	190	49	71	304	98	92	1337	71	109	1103	109
Adj No. of Lanes	1	1	0	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	146	409	106	270	387	125	269	1574	704	235	1507	674
Arrive On Green	0.29	0.29	0.29	0.29	0.29	0.29	0.20	0.59	0.59	0.13	0.43	0.43
Sat Flow, veh/h	979	1429	369	1136	1351	435	1774	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	54	0	239	71	0	402	92	1337	71	109	1103	109
Grp Sat Flow(s),veh/h/ln	979	0	1798	1136	0	1786	1774	1770	1583	1774	1770	1583
Q Serve(g_s), s	5.6	0.0	11.5	5.8	0.0	21.8	4.7	32.6	2.0	6.0	27.3	4.5
Cycle Q Clear(g_c), s	27.4	0.0	11.5	17.2	0.0	21.8	4.7	32.6	2.0	6.0	27.3	4.5
Prop In Lane	1.00		0.21	1.00		0.24	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	146	0	515	270	0	512	269	1574	704	235	1507	674
V/C Ratio(X)	0.37	0.00	0.46	0.26	0.00	0.79	0.34	0.85	0.10	0.46	0.73	0.16
Avail Cap(c_a), veh/h	185	0	586	312	0	578	269	1574	704	235	1507	674
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.60	0.60	0.60	1.00	1.00	1.00
Uniform Delay (d), s/veh	47.1	0.0	30.8	37.9	0.0	34.5	37.4	18.6	12.3	42.1	25.2	18.6
Incr Delay (d2), s/veh	1.6	0.0	0.7	0.5	0.0	6.3	0.5	3.7	0.2	1.4	3.2	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	0.0	5.8	1.9	0.0	11.6	2.3	16.4	0.9	3.0	14.0	2.0
LnGrp Delay(d),s/veh	48.7	0.0	31.5	38.4	0.0	40.8	37.9	22.2	12.5	43.5	28.3	19.1
LnGrp LOS	D		C	D		D	D	C	B	D	C	B
Approach Vol, veh/h		293			473			1500			1321	
Approach Delay, s/veh		34.6			40.5			22.7			28.8	
Approach LOS		C			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	18.9	51.7		34.4	20.9	49.7		34.4
Change Period (Y+Rc), s	5.0	5.0		* 4.3	5.0	5.0		* 4.3
Max Green Setting (Gmax), s	10.0	46.7		* 34	12.0	44.7		* 34
Max Q Clear Time (g_c+I1), s	8.0	34.6		29.4	6.7	29.3		23.8
Green Ext Time (p_c), s	0.0	9.0		0.7	0.1	9.4		2.0

Intersection Summary			
HCM 2010 Ctrl Delay		28.3	
HCM 2010 LOS		C	

Notes



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	110	30	50	25	105	10	60	525	0	5	460	195
Future Volume (vph)	110	30	50	25	105	10	60	525	0	5	460	195
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.7	4.7		4.7	4.7	4.7	5.1		4.7	5.1	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	0.96	
Flt Protected		0.96	1.00		0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1792	1583		1845	1583	1770	1863		1770	1780	
Flt Permitted		0.68	1.00		0.91	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1269	1583		1701	1583	1770	1863		1770	1780	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	120	33	54	27	114	11	65	571	0	5	500	212
RTOR Reduction (vph)	0	0	44	0	0	9	0	0	0	0	19	0
Lane Group Flow (vph)	0	153	10	0	141	2	65	571	0	5	693	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)		11.8	11.8		11.8	11.8	5.3	37.3		1.4	33.4	
Effective Green, g (s)		11.8	11.8		11.8	11.8	5.3	37.3		1.4	33.4	
Actuated g/C Ratio		0.18	0.18		0.18	0.18	0.08	0.57		0.02	0.51	
Clearance Time (s)		4.7	4.7		4.7	4.7	4.7	5.1		4.7	5.1	
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		230	287		308	287	144	1069		38	914	
v/s Ratio Prot							0.04	c0.31		0.00	c0.39	
v/s Ratio Perm		c0.12	0.01		0.08	0.00						
v/c Ratio		0.67	0.03		0.46	0.01	0.45	0.53		0.13	0.76	
Uniform Delay, d1		24.8	21.9		23.7	21.8	28.5	8.5		31.2	12.6	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		7.1	0.0		1.1	0.0	2.2	1.9		1.6	5.9	
Delay (s)		31.8	22.0		24.8	21.8	30.7	10.4		32.8	18.4	
Level of Service		C	C		C	C	C	B		C	B	
Approach Delay (s)		29.3			24.6			12.5			18.5	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	18.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	68.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	85	225	165	25	280	85	325	1210	20	95	945	100
Future Volume (veh/h)	85	225	165	25	280	85	325	1210	20	95	945	100
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	92	245	179	27	304	92	353	1315	22	103	1027	109
Adj No. of Lanes	1	1	1	1	2	0	2	2	0	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	116	337	286	55	394	117	414	1401	23	379	1723	771
Arrive On Green	0.07	0.18	0.18	0.03	0.15	0.15	0.12	0.39	0.39	0.21	0.49	0.49
Sat Flow, veh/h	1774	1863	1583	1774	2691	800	3442	3562	60	1774	3539	1583
Grp Volume(v), veh/h	92	245	179	27	198	198	353	653	684	103	1027	109
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	1770	1722	1721	1770	1852	1774	1770	1583
Q Serve(g_s), s	5.4	13.0	11.0	1.6	11.3	11.6	10.6	37.3	37.3	5.1	22.0	4.0
Cycle Q Clear(g_c), s	5.4	13.0	11.0	1.6	11.3	11.6	10.6	37.3	37.3	5.1	22.0	4.0
Prop In Lane	1.00		1.00	1.00		0.46	1.00		0.03	1.00		1.00
Lane Grp Cap(c), veh/h	116	337	286	55	259	252	414	696	729	379	1723	771
V/C Ratio(X)	0.79	0.73	0.63	0.49	0.76	0.78	0.85	0.94	0.94	0.27	0.60	0.14
Avail Cap(c_a), veh/h	130	562	478	101	506	492	426	696	729	379	1723	771
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.78	0.78	0.78
Uniform Delay (d), s/veh	48.4	40.6	39.7	50.0	43.1	43.2	45.3	30.6	30.6	34.5	19.5	14.8
Incr Delay (d2), s/veh	24.0	2.2	1.7	4.9	3.5	4.0	15.0	21.9	21.4	0.3	1.2	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.4	6.9	4.9	0.8	5.8	5.8	5.9	22.4	23.3	2.5	11.0	1.8
LnGrp Delay(d),s/veh	72.4	42.8	41.4	54.9	46.5	47.2	60.3	52.6	52.0	34.8	20.7	15.1
LnGrp LOS	E	D	D	D	D	D	E	D	D	C	C	B
Approach Vol, veh/h		516			423			1690			1239	
Approach Delay, s/veh		47.6			47.4			54.0			21.4	
Approach LOS		D			D			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	27.4	46.3	7.6	23.7	17.6	56.1	11.2	20.1
Change Period (Y+Rc), s	5.0	5.0	* 4.3	* 4.7	5.0	5.0	* 4.3	* 4.7
Max Green Setting (Gmax), s	7.0	41.3	* 6	* 32	13.0	35.3	* 7.7	* 30
Max Q Clear Time (g_c+I1), s	7.1	39.3	3.6	15.0	12.6	24.0	7.4	13.6
Green Ext Time (p_c), s	0.0	1.7	0.0	1.5	0.1	7.0	0.0	1.7

Intersection Summary	
HCM 2010 Ctrl Delay	41.9
HCM 2010 LOS	D

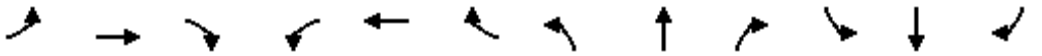
Notes



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	555	5	1355	540	0	1010
Future Volume (vph)	555	5	1355	540	0	1010
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.1	5.1	5.1	5.1		5.1
Lane Util. Factor	0.97	1.00	0.91	1.00		0.91
Frt	1.00	0.85	1.00	0.85		1.00
Flt Protected	0.95	1.00	1.00	1.00		1.00
Satd. Flow (prot)	3433	1583	5085	1583		5085
Flt Permitted	0.95	1.00	1.00	1.00		1.00
Satd. Flow (perm)	3433	1583	5085	1583		5085
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	603	5	1473	587	0	1098
RTOR Reduction (vph)	0	2	0	0	0	0
Lane Group Flow (vph)	603	3	1473	587	0	1098
Turn Type	Prot	Prot	NA	pt+ov		NA
Protected Phases	4	4	6	4 6		2
Permitted Phases					2	
Actuated Green, G (s)	16.4	16.4	38.4	65.0		38.4
Effective Green, g (s)	16.4	16.4	38.4	65.0		38.4
Actuated g/C Ratio	0.25	0.25	0.59	1.00		0.59
Clearance Time (s)	5.1	5.1	5.1			5.1
Vehicle Extension (s)	2.5	2.5	4.0			4.0
Lane Grp Cap (vph)	866	399	3004	1583		3004
v/s Ratio Prot	c0.18	0.00	c0.29	0.37		0.22
v/s Ratio Perm						
v/c Ratio	0.70	0.01	0.49	0.37		0.37
Uniform Delay, d1	22.0	18.2	7.7	0.0		6.9
Progression Factor	1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2	2.3	0.0	0.6	0.1		0.3
Delay (s)	24.3	18.2	8.2	0.1		7.3
Level of Service	C	B	A	A		A
Approach Delay (s)	24.3		5.9			7.3
Approach LOS	C		A			A

Intersection Summary			
HCM 2000 Control Delay	9.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	14.2
Intersection Capacity Utilization	61.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	760	105	0	670	245	0	0	0	645	0	435
Future Volume (vph)	0	760	105	0	670	245	0	0	0	645	0	435
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.1			5.1	5.1				4.7	4.7	
Lane Util. Factor		1.00			1.00	1.00				0.95	0.95	
Frt		0.98			1.00	0.85				1.00	0.87	
Flt Protected		1.00			1.00	1.00				0.95	0.99	
Satd. Flow (prot)		1832			1863	1583				1681	1533	
Flt Permitted		1.00			1.00	1.00				0.95	0.99	
Satd. Flow (perm)		1832			1863	1583				1681	1533	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	826	114	0	728	266	0	0	0	701	0	473
RTOR Reduction (vph)	0	4	0	0	0	119	0	0	0	0	113	0
Lane Group Flow (vph)	0	936	0	0	728	147	0	0	0	617	444	0
Turn Type		NA			NA	Perm				Split	NA	
Protected Phases		2			6					4	4	
Permitted Phases						6						
Actuated Green, G (s)		64.7			64.7	64.7				45.5	45.5	
Effective Green, g (s)		64.7			64.7	64.7				45.5	45.5	
Actuated g/C Ratio		0.54			0.54	0.54				0.38	0.38	
Clearance Time (s)		5.1			5.1	5.1				4.7	4.7	
Vehicle Extension (s)		2.0			2.0	2.0				2.0	2.0	
Lane Grp Cap (vph)		987			1004	853				637	581	
v/s Ratio Prot		c0.51			0.39					c0.37	0.29	
v/s Ratio Perm						0.09						
v/c Ratio		0.95			0.73	0.17				0.97	0.76	
Uniform Delay, d1		26.1			20.9	14.0				36.5	32.6	
Progression Factor		1.00			0.54	0.44				1.00	1.00	
Incremental Delay, d2		18.6			3.9	0.4				27.5	5.4	
Delay (s)		44.6			15.3	6.5				64.0	37.9	
Level of Service		D			B	A				E	D	
Approach Delay (s)		44.6			12.9			0.0			51.6	
Approach LOS		D			B			A			D	

Intersection Summary			
HCM 2000 Control Delay	37.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.8
Intersection Capacity Utilization	85.7%	ICU Level of Service	E
Analysis Period (min)	15		

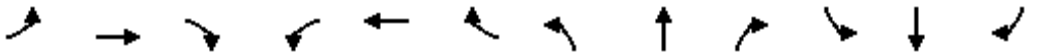
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	415	995	0	0	800	645	120	0	310	0	0	0
Future Volume (veh/h)	415	995	0	0	800	645	120	0	310	0	0	0
Number	5	2	12	1	6	16	3	8	18			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1863	1863	0	0	1863	1863	1900	1863	1863			
Adj Flow Rate, veh/h	451	1082	0	0	870	0	130	0	0			
Adj No. of Lanes	1	2	0	0	2	1	0	1	1			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	875	2923	0	0	1027	460	160	0	142			
Arrive On Green	0.99	1.00	0.00	0.00	0.10	0.00	0.09	0.00	0.00			
Sat Flow, veh/h	1774	3632	0	0	3632	1583	1774	0	1583			
Grp Volume(v), veh/h	451	1082	0	0	870	0	130	0	0			
Grp Sat Flow(s),veh/h/ln	1774	1770	0	0	1770	1583	1774	0	1583			
Q Serve(g_s), s	0.8	0.0	0.0	0.0	29.0	0.0	8.6	0.0	0.0			
Cycle Q Clear(g_c), s	0.8	0.0	0.0	0.0	29.0	0.0	8.6	0.0	0.0			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	875	2923	0	0	1027	460	160	0	142			
V/C Ratio(X)	0.52	0.37	0.00	0.00	0.85	0.00	0.81	0.00	0.00			
Avail Cap(c_a), veh/h	875	2923	0	0	1354	606	325	0	290			
HCM Platoon Ratio	2.00	2.00	1.00	1.00	0.33	0.33	1.00	1.00	1.00			
Upstream Filter(I)	0.19	0.19	0.00	0.00	0.65	0.00	1.00	0.00	0.00			
Uniform Delay (d), s/veh	0.4	0.0	0.0	0.0	51.6	0.0	53.6	0.0	0.0			
Incr Delay (d2), s/veh	0.0	0.1	0.0	0.0	5.8	0.0	3.8	0.0	0.0			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.2	0.0	0.0	0.0	15.1	0.0	4.4	0.0	0.0			
LnGrp Delay(d),s/veh	0.5	0.1	0.0	0.0	57.4	0.0	57.4	0.0	0.0			
LnGrp LOS	A	A			E		E					
Approach Vol, veh/h		1533			870			130				
Approach Delay, s/veh		0.2			57.4			57.4				
Approach LOS		A			E			E				

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		104.2			64.3	39.9		15.8
Change Period (Y+Rc), s		5.1			5.1	* 5.1		5.0
Max Green Setting (Gmax), s		87.9			37.3	* 46		22.0
Max Q Clear Time (g_c+I1), s		2.0			2.8	31.0		10.6
Green Ext Time (p_c), s		6.5			0.7	3.8		0.3

Intersection Summary	
HCM 2010 Ctrl Delay	22.8
HCM 2010 LOS	C

Notes



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	70	1020	190	35	795	165	320	120	35	270	80	210
Future Volume (vph)	70	1020	190	35	795	165	320	120	35	270	80	210
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	5.1	5.1	4.7	5.1	5.1	4.7	4.7	4.7	4.7	4.7	4.7
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1762	1504	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	1762	1504	1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	76	1109	207	38	864	179	348	130	38	293	87	228
RTOR Reduction (vph)	0	0	87	0	0	65	0	1	27	0	0	182
Lane Group Flow (vph)	76	1109	120	38	864	114	348	133	7	293	87	46
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2		1	6		3	3		4	4	
Permitted Phases			2			6			3			4
Actuated Green, G (s)	8.8	44.5	44.5	6.6	42.3	42.3	25.6	25.6	25.6	24.1	24.1	24.1
Effective Green, g (s)	8.8	44.5	44.5	6.6	42.3	42.3	25.6	25.6	25.6	24.1	24.1	24.1
Actuated g/C Ratio	0.07	0.37	0.37	0.05	0.35	0.35	0.21	0.21	0.21	0.20	0.20	0.20
Clearance Time (s)	4.7	5.1	5.1	4.7	5.1	5.1	4.7	4.7	4.7	4.7	4.7	4.7
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0	4.0	2.5	2.5	2.5	2.0	2.0	2.0
Lane Grp Cap (vph)	129	1312	587	97	1247	558	377	375	320	355	374	317
v/s Ratio Prot	0.04	c0.31		0.02	c0.24		c0.20	0.08		c0.17	0.05	
v/s Ratio Perm			0.08			0.07			0.00			0.03
v/c Ratio	0.59	0.85	0.20	0.39	0.69	0.20	0.92	0.36	0.02	0.83	0.23	0.14
Uniform Delay, d1	53.8	34.6	25.7	54.8	33.3	27.1	46.2	40.2	37.3	45.9	40.2	39.5
Progression Factor	0.89	0.99	0.85	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.9	6.1	0.7	1.0	3.2	0.8	27.7	0.4	0.0	13.8	0.1	0.1
Delay (s)	51.7	40.3	22.6	55.7	36.5	27.9	74.0	40.6	37.3	59.7	40.3	39.5
Level of Service	D	D	C	E	D	C	E	D	D	E	D	D
Approach Delay (s)		38.3			35.7			62.9			49.4	
Approach LOS		D			D			E			D	

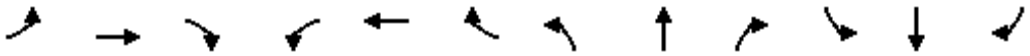
Intersection Summary			
HCM 2000 Control Delay	42.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	19.2
Intersection Capacity Utilization	81.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	90	440	690	260	265	45	420	1365	185	95	1340	175
Future Volume (veh/h)	90	440	690	260	265	45	420	1365	185	95	1340	175
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	98	478	0	283	288	49	457	1484	0	103	1457	0
Adj No. of Lanes	1	1	1	1	1	0	2	3	0	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	276	400	340	258	317	54	439	1744	0	244	1250	559
Arrive On Green	0.16	0.21	0.00	0.15	0.20	0.20	0.13	0.34	0.00	0.14	0.35	0.00
Sat Flow, veh/h	1774	1863	1583	1774	1552	264	3442	5253	0	1774	3539	1583
Grp Volume(v), veh/h	98	478	0	283	0	337	457	1484	0	103	1457	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	0	1816	1721	1695	0	1774	1770	1583
Q Serve(g_s), s	6.4	27.9	0.0	18.9	0.0	23.6	16.6	35.2	0.0	6.9	45.9	0.0
Cycle Q Clear(g_c), s	6.4	27.9	0.0	18.9	0.0	23.6	16.6	35.2	0.0	6.9	45.9	0.0
Prop In Lane	1.00		1.00	1.00		0.15	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	276	400	340	258	0	371	439	1744	0	244	1250	559
V/C Ratio(X)	0.36	1.20	0.00	1.10	0.00	0.91	1.04	0.85	0.00	0.42	1.17	0.00
Avail Cap(c_a), veh/h	276	400	340	258	0	514	439	1964	0	244	1250	559
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	49.1	51.1	0.0	55.5	0.0	50.5	56.7	39.6	0.0	51.3	42.0	0.0
Incr Delay (d2), s/veh	0.6	110.1	0.0	84.5	0.0	13.2	53.7	5.4	0.0	0.4	83.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.2	26.5	0.0	15.3	0.0	13.2	11.1	17.4	0.0	3.4	36.9	0.0
LnGrp Delay(d),s/veh	49.6	161.1	0.0	140.1	0.0	63.7	110.4	45.1	0.0	51.7	125.8	0.0
LnGrp LOS	D	F		F		E	F	D		D	F	
Approach Vol, veh/h		576			620			1941			1560	
Approach Delay, s/veh		142.1			98.6			60.4			120.9	
Approach LOS		F			F			E			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	22.0	51.0	25.3	31.7	23.0	50.0	24.0	33.0
Change Period (Y+Rc), s	5.4	5.1	5.1	5.1	5.1	5.4	5.1	5.1
Max Green Setting (Gmax), s	16.6	45.9	10.0	36.8	12.3	50.2	18.9	27.9
Max Q Clear Time (g_c+I1), s	18.6	47.9	8.4	25.6	8.9	37.2	20.9	29.9
Green Ext Time (p_c), s	0.0	0.0	0.0	1.0	0.0	7.4	0.0	0.0

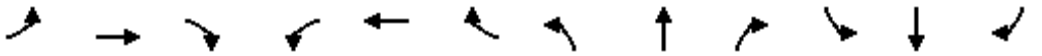
Intersection Summary	
HCM 2010 Ctrl Delay	95.6
HCM 2010 LOS	F



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	530	35	65	335	40	30	115	120	25	85	65
Future Volume (vph)	20	530	35	65	335	40	30	115	120	25	85	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.1			4.7			6.4	6.4		6.4	
Lane Util. Factor		0.91			0.95			1.00	1.00		1.00	
Frt		0.99			0.99			1.00	0.85		0.95	
Flt Protected		1.00			0.99			0.99	1.00		0.99	
Satd. Flow (prot)		5031			3466			1843	1583		1756	
Flt Permitted		0.90			0.99			0.90	1.00		0.94	
Satd. Flow (perm)		4555			3466			1681	1583		1662	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	576	38	71	364	43	33	125	130	27	92	71
RTOR Reduction (vph)	0	5	0	0	5	0	0	0	87	0	14	0
Lane Group Flow (vph)	0	631	0	0	473	0	0	158	43	0	176	0
Turn Type	Perm	NA		Split	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		3		5 8	5 8			6			6	
Permitted Phases	3						6		6	6		
Actuated Green, G (s)		29.5			58.1			51.2	51.2		51.2	
Effective Green, g (s)		29.5			53.0			51.2	51.2		51.2	
Actuated g/C Ratio		0.19			0.34			0.33	0.33		0.33	
Clearance Time (s)		5.1						6.4	6.4		6.4	
Vehicle Extension (s)		4.0						3.0	3.0		3.0	
Lane Grp Cap (vph)		866			1185			555	522		548	
v/s Ratio Prot					c0.14							
v/s Ratio Perm		c0.14						0.09	0.03		c0.11	
v/c Ratio		0.73			0.40			0.28	0.08		0.32	
Uniform Delay, d1		59.0			38.9			38.4	35.7		38.9	
Progression Factor		1.00			0.18			1.00	1.00		1.00	
Incremental Delay, d2		3.3			0.1			1.3	0.3		1.5	
Delay (s)		62.3			6.9			39.6	36.0		40.4	
Level of Service		E			A			D	D		D	
Approach Delay (s)		62.3			6.9			38.0			40.4	
Approach LOS		E			A			D			D	

Intersection Summary			
HCM 2000 Control Delay	38.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	155.0	Sum of lost time (s)	21.3
Intersection Capacity Utilization	53.8%	ICU Level of Service	A
Analysis Period (min)	15		

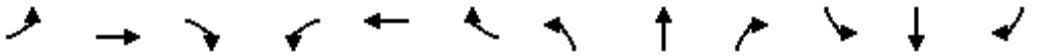
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	150	95	240	15	125	5	255	375	20	10	380	255
Future Volume (vph)	150	95	240	15	125	5	255	375	20	10	380	255
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.1	5.1	5.1		5.1		4.7	5.4		4.7	5.4	5.4
Lane Util. Factor	1.00	1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85		1.00		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00		0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583		1845		1770	1848		1770	1863	1583
Flt Permitted	0.58	1.00	1.00		0.97		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1079	1863	1583		1795		1770	1848		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	163	103	261	16	136	5	277	408	22	11	413	277
RTOR Reduction (vph)	0	0	199	0	1	0	0	1	0	0	0	53
Lane Group Flow (vph)	163	103	62	0	156	0	277	429	0	11	413	224
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		8			8		1	6		5	2	
Permitted Phases	8		8	8								2
Actuated Green, G (s)	23.4	23.4	23.4		23.4		22.7	58.9		1.1	37.3	37.3
Effective Green, g (s)	23.4	23.4	23.4		23.4		22.7	58.9		1.1	37.3	37.3
Actuated g/C Ratio	0.24	0.24	0.24		0.24		0.23	0.60		0.01	0.38	0.38
Clearance Time (s)	5.1	5.1	5.1		5.1		4.7	5.4		4.7	5.4	5.4
Vehicle Extension (s)	3.0	3.0	3.0		3.0		3.0	5.0		3.0	5.0	5.0
Lane Grp Cap (vph)	256	442	375		425		407	1103		19	704	598
v/s Ratio Prot		0.06					c0.16	0.23		0.01	c0.22	
v/s Ratio Perm	c0.15		0.04		0.09							0.14
v/c Ratio	0.64	0.23	0.17		0.37		0.68	0.39		0.58	0.59	0.37
Uniform Delay, d1	33.8	30.4	29.8		31.4		34.6	10.4		48.5	24.5	22.2
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	5.1	0.3	0.2		0.5		4.6	0.5		36.3	1.9	0.8
Delay (s)	38.9	30.6	30.1		32.0		39.3	10.9		84.8	26.4	23.0
Level of Service	D	C	C		C		D	B		F	C	C
Approach Delay (s)		32.9			32.0			22.0			26.0	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	26.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	98.6	Sum of lost time (s)	15.2
Intersection Capacity Utilization	67.1%	ICU Level of Service	C
Analysis Period (min)	15		

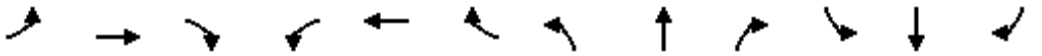
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	95	65	110	70	135	30	1400	115	35	795	10
Future Volume (vph)	25	95	65	110	70	135	30	1400	115	35	795	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.1	7.1	5.1	5.1		4.7	6.4	6.4	4.7	6.4	6.4
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt		1.00	0.85	1.00	0.90		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1844	1583	1770	1679		1770	3539	1583	1770	3539	1583
Flt Permitted		0.22	1.00	0.67	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		414	1583	1255	1679		1770	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	103	71	120	76	147	33	1522	125	38	864	11
RTOR Reduction (vph)	0	0	54	0	49	0	0	0	56	0	0	7
Lane Group Flow (vph)	0	130	17	120	174	0	33	1522	69	38	864	4
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		3			8		5	2		1	6	
Permitted Phases	3		3	8					2			6
Actuated Green, G (s)		40.0	40.0	20.4	20.4		11.0	64.5	64.5	8.8	62.3	62.3
Effective Green, g (s)		38.0	38.0	20.4	20.4		11.0	64.5	64.5	8.8	62.3	62.3
Actuated g/C Ratio		0.25	0.25	0.13	0.13		0.07	0.42	0.42	0.06	0.40	0.40
Clearance Time (s)		5.1	5.1	5.1	5.1		4.7	6.4	6.4	4.7	6.4	6.4
Vehicle Extension (s)		4.0	4.0	2.0	2.0		2.0	4.0	4.0	2.0	4.0	4.0
Lane Grp Cap (vph)		101	388	165	220		125	1472	658	100	1422	636
v/s Ratio Prot					c0.10		0.02	c0.43		0.02	c0.24	
v/s Ratio Perm		c0.31	0.01	0.10					0.04			0.00
v/c Ratio		1.29	0.04	0.73	0.79		0.26	1.03	0.10	0.38	0.61	0.01
Uniform Delay, d1		58.5	44.6	64.6	65.2		68.2	45.2	27.6	70.5	36.7	27.8
Progression Factor		0.81	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		183.9	0.1	12.7	15.7		0.4	32.7	0.3	0.9	1.9	0.0
Delay (s)		231.4	44.7	77.3	80.9		68.6	77.9	27.9	71.3	38.6	27.8
Level of Service		F	D	E	F		E	E	C	E	D	C
Approach Delay (s)		165.4			79.7			74.0			39.8	
Approach LOS		F			E			E			D	

Intersection Summary			
HCM 2000 Control Delay	70.6	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	155.0	Sum of lost time (s)	23.3
Intersection Capacity Utilization	76.2%	ICU Level of Service	D
Analysis Period (min)	15		

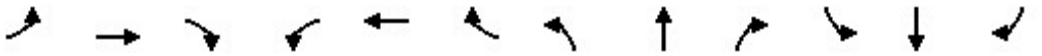
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	70	15	35	25	50	5	150	20	130	125	10
Future Volume (vph)	5	70	15	35	25	50	5	150	20	130	125	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.1			4.7			6.4		6.4	6.4	
Lane Util. Factor		1.00			1.00			1.00		1.00	1.00	
Frt		0.98			0.94			0.98		1.00	0.99	
Flt Protected		1.00			0.98			1.00		0.95	1.00	
Satd. Flow (prot)		1817			1721			1831		1770	1842	
Flt Permitted		0.99			0.98			0.99		0.59	1.00	
Satd. Flow (perm)		1800			1721			1823		1101	1842	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	76	16	38	27	54	5	163	22	141	136	11
RTOR Reduction (vph)	0	4	0	0	22	0	0	3	0	0	2	0
Lane Group Flow (vph)	0	93	0	0	97	0	0	187	0	141	145	0
Turn Type	Perm	NA		Split	NA		Perm	NA		Perm	NA	
Protected Phases		3		5 8	5 8			6			6	
Permitted Phases	3						6			6		
Actuated Green, G (s)		40.0			36.5			62.3		62.3	62.3	
Effective Green, g (s)		40.0			31.4			62.3		62.3	62.3	
Actuated g/C Ratio		0.26			0.20			0.40		0.40	0.40	
Clearance Time (s)		5.1						6.4		6.4	6.4	
Vehicle Extension (s)		4.0						4.0		4.0	4.0	
Lane Grp Cap (vph)		464			348			732		442	740	
v/s Ratio Prot					c0.06						0.08	
v/s Ratio Perm		c0.05						0.10		c0.13		
v/c Ratio		0.20			0.28			0.26		0.32	0.20	
Uniform Delay, d1		45.0			52.2			30.9		31.8	30.1	
Progression Factor		1.00			0.22			1.00		1.00	1.00	
Incremental Delay, d2		0.3			0.1			0.8		1.9	0.6	
Delay (s)		45.3			11.9			31.7		33.7	30.7	
Level of Service		D			B			C		C	C	
Approach Delay (s)		45.3			11.9			31.7			32.2	
Approach LOS		D			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	30.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	155.0	Sum of lost time (s)	21.3
Intersection Capacity Utilization	52.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	95	345	285	360	255	55	130	1420	225	55	1015	35
Future Volume (vph)	95	345	285	360	255	55	130	1420	225	55	1015	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.1	5.1	5.1	5.1		4.7	6.4	6.4	4.7	6.4	6.4
Lane Util. Factor		0.91	0.91	0.91	0.91		0.97	0.95	1.00	1.00	0.95	1.00
Frt		0.98	0.85	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00	0.95	0.98		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		3305	1441	1610	3273		3433	3539	1583	1770	3539	1583
Flt Permitted		0.54	1.00	0.44	0.64		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1805	1441	751	2144		3433	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	103	375	310	391	277	60	141	1543	245	60	1103	38
RTOR Reduction (vph)	0	6	164	0	6	0	0	0	109	0	0	25
Lane Group Flow (vph)	0	528	90	195	527	0	141	1543	136	60	1103	13
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		3			8		5	2		1	6	
Permitted Phases	3		3	8					2			6
Actuated Green, G (s)		29.6	29.6	41.6	41.6		11.0	53.7	53.7	8.8	51.5	51.5
Effective Green, g (s)		29.6	29.6	41.6	41.6		11.0	53.7	53.7	8.8	51.5	51.5
Actuated g/C Ratio		0.19	0.19	0.27	0.27		0.07	0.35	0.35	0.06	0.33	0.33
Clearance Time (s)		5.1	5.1	5.1	5.1		4.7	6.4	6.4	4.7	6.4	6.4
Vehicle Extension (s)		4.0	4.0	2.0	2.0		2.0	3.0	3.0	2.0	3.0	3.0
Lane Grp Cap (vph)		344	275	201	575		243	1226	548	100	1175	525
v/s Ratio Prot							0.04	c0.44		0.03	c0.31	
v/s Ratio Perm		c0.29	0.06	c0.26	0.25				0.09			0.01
v/c Ratio		2.02dl	0.33	0.97	0.92		0.58	1.26	0.25	0.60	0.94	0.02
Uniform Delay, d1		62.7	54.1	56.1	55.0		69.8	50.6	36.2	71.4	50.2	34.8
Progression Factor		0.32	0.07	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		252.9	0.8	54.5	19.1		2.3	123.1	1.1	6.3	15.1	0.1
Delay (s)		272.7	4.3	110.6	74.1		72.0	173.8	37.3	77.7	65.4	34.9
Level of Service		F	A	F	E		E	F	D	E	E	C
Approach Delay (s)		186.2			83.9			149.0			65.0	
Approach LOS		F			F			F			E	

Intersection Summary			
HCM 2000 Control Delay	123.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.21		
Actuated Cycle Length (s)	155.0	Sum of lost time (s)	21.3
Intersection Capacity Utilization	94.3%	ICU Level of Service	F
Analysis Period (min)	15		

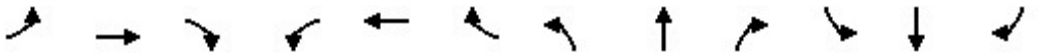
dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	975	15	105	690	155	50	70	220	195	110	40
Future Volume (veh/h)	40	975	15	105	690	155	50	70	220	195	110	40
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	43	1060	16	114	750	168	54	76	239	212	120	43
Adj No. of Lanes	1	2	1	1	2	0	1	1	1	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	55	1579	706	142	1424	319	287	473	402	304	333	119
Arrive On Green	0.03	0.45	0.45	0.08	0.50	0.50	0.25	0.25	0.25	0.25	0.25	0.25
Sat Flow, veh/h	1774	3539	1583	1774	2875	644	1218	1863	1583	1060	1310	470
Grp Volume(v), veh/h	43	1060	16	114	462	456	54	76	239	212	0	163
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1749	1218	1863	1583	1060	0	1780
Q Serve(g_s), s	2.5	24.9	0.6	6.6	18.7	18.7	4.0	3.3	13.9	20.4	0.0	7.9
Cycle Q Clear(g_c), s	2.5	24.9	0.6	6.6	18.7	18.7	11.9	3.3	13.9	23.7	0.0	7.9
Prop In Lane	1.00		1.00	1.00		0.37	1.00		1.00	1.00		0.26
Lane Grp Cap(c), veh/h	55	1579	706	142	876	866	287	473	402	304	0	452
V/C Ratio(X)	0.78	0.67	0.02	0.80	0.53	0.53	0.19	0.16	0.59	0.70	0.00	0.36
Avail Cap(c_a), veh/h	101	1579	706	220	876	866	344	561	477	354	0	536
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.94	0.94	0.94	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	50.5	23.0	16.3	47.5	18.1	18.1	37.0	30.4	34.4	39.7	0.0	32.1
Incr Delay (d2), s/veh	28.5	2.3	0.1	10.6	2.1	2.2	0.3	0.2	1.4	4.9	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	12.6	0.3	3.7	9.6	9.5	1.4	1.7	6.2	6.4	0.0	4.0
LnGrp Delay(d),s/veh	79.0	25.3	16.3	58.1	20.2	20.3	37.3	30.6	35.8	44.5	0.0	32.6
LnGrp LOS	E	C	B	E	C	C	D	C	D	D		C
Approach Vol, veh/h		1119			1032			369			375	
Approach Delay, s/veh		27.2			24.4			35.0			39.4	
Approach LOS		C			C			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	8.2	57.0		32.1	13.4	51.8		32.1
Change Period (Y+Rc), s	5.0	5.0		5.4	5.0	5.0		5.4
Max Green Setting (Gmax), s	6.0	52.0		31.6	13.0	45.0		31.6
Max Q Clear Time (g_c+I1), s	4.5	20.7		15.9	8.6	26.9		25.7
Green Ext Time (p_c), s	0.0	7.0		1.3	0.1	7.5		1.0

Intersection Summary	
HCM 2010 Ctrl Delay	28.8
HCM 2010 LOS	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	980	440	570	895	0	0	0	0	155	0	65
Future Volume (vph)	0	980	440	570	895	0	0	0	0	155	0	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6	4.6	4.0	4.6					4.0	4.0	
Lane Util. Factor		0.91	0.91	0.97	0.95					0.95	0.95	
Frt		0.99	0.85	1.00	1.00					1.00	0.91	
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.98	
Satd. Flow (prot)		3368	1441	3433	3539					1681	1576	
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.98	
Satd. Flow (perm)		3368	1441	3433	3539					1681	1576	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1065	478	620	973	0	0	0	0	168	0	71
RTOR Reduction (vph)	0	2	191	0	0	0	0	0	0	0	61	0
Lane Group Flow (vph)	0	1111	239	620	973	0	0	0	0	124	54	0
Turn Type		NA	Perm	Prot	NA					Perm	NA	
Protected Phases		2		1	6						4	
Permitted Phases			2							4		
Actuated Green, G (s)		55.5	55.5	18.0	77.5					13.9	13.9	
Effective Green, g (s)		55.5	55.5	18.0	77.5					13.9	13.9	
Actuated g/C Ratio		0.56	0.56	0.18	0.78					0.14	0.14	
Clearance Time (s)		4.6	4.6	4.0	4.6					4.0	4.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0					3.0	3.0	
Lane Grp Cap (vph)		1869	799	617	2742					233	219	
v/s Ratio Prot		c0.33		c0.18	0.27							
v/s Ratio Perm			0.17							c0.07	0.03	
v/c Ratio		0.59	0.30	1.00	0.35					0.53	0.25	
Uniform Delay, d1		14.8	11.9	41.0	3.5					40.0	38.4	
Progression Factor		1.00	1.00	0.69	0.41					1.00	1.00	
Incremental Delay, d2		1.4	1.0	32.3	0.3					2.3	0.6	
Delay (s)		16.2	12.8	60.7	1.7					42.4	39.0	
Level of Service		B	B	E	A					D	D	
Approach Delay (s)		15.2			24.7			0.0			40.7	
Approach LOS		B			C			A			D	

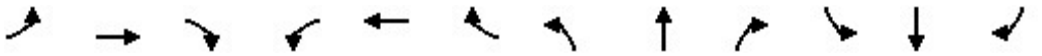
Intersection Summary			
HCM 2000 Control Delay	21.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.6
Intersection Capacity Utilization	71.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	110	1025	0	0	1155	150	345	0	785	0	0	0
Future Volume (vph)	110	1025	0	0	1155	150	345	0	785	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.6			4.6			4.0	4.0			
Lane Util. Factor	1.00	0.95			0.86			0.95	0.95			
Frt	1.00	1.00			0.98			0.94	0.85			
Flt Protected	0.95	1.00			1.00			0.97	1.00			
Satd. Flow (prot)	1770	3539			6297			1614	1504			
Flt Permitted	0.95	1.00			1.00			0.97	1.00			
Satd. Flow (perm)	1770	3539			6297			1614	1504			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	120	1114	0	0	1255	163	375	0	853	0	0	0
RTOR Reduction (vph)	0	0	0	0	21	0	0	35	35	0	0	0
Lane Group Flow (vph)	120	1114	0	0	1397	0	0	596	562	0	0	0
Turn Type	Prot	NA			NA		Perm	NA	Perm			
Protected Phases	5	2			6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	9.8	49.5			35.7			41.9	41.9			
Effective Green, g (s)	9.8	49.5			35.7			41.9	41.9			
Actuated g/C Ratio	0.10	0.50			0.36			0.42	0.42			
Clearance Time (s)	4.0	4.6			4.6			4.0	4.0			
Vehicle Extension (s)	2.0	2.0			2.0			2.0	2.0			
Lane Grp Cap (vph)	173	1751			2248			676	630			
v/s Ratio Prot	0.07	c0.31			0.22							
v/s Ratio Perm								0.37	c0.37			
v/c Ratio	0.69	0.64			0.62			0.88	0.89			
Uniform Delay, d1	43.6	18.6			26.6			26.8	26.9			
Progression Factor	1.00	0.58			1.00			1.00	1.00			
Incremental Delay, d2	4.0	0.7			1.3			12.5	14.5			
Delay (s)	47.8	11.6			27.9			39.3	41.4			
Level of Service	D	B			C			D	D			
Approach Delay (s)		15.1			27.9			40.3			0.0	
Approach LOS		B			C			D			A	

Intersection Summary			
HCM 2000 Control Delay	27.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.6
Intersection Capacity Utilization	97.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	165	1195	155	115	890	50	250	65	145	50	90	190
Future Volume (vph)	165	1195	155	115	890	50	250	65	145	50	90	190
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.3	4.3		4.3	4.3		4.7	4.7	4.7	4.7	4.7	4.7
Lane Util. Factor	0.97	0.95		0.97	0.95		0.97	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.98		1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3478		3433	3511		3433	1863	1583	1681	1765	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3478		3433	3511		3433	1863	1583	1681	1765	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	179	1299	168	125	967	54	272	71	158	54	98	207
RTOR Reduction (vph)	0	7	0	0	3	0	0	0	143	0	0	169
Lane Group Flow (vph)	179	1460	0	125	1018	0	272	71	15	49	103	38
Turn Type	Prot	NA		Prot	NA		Split	NA	Perm	Split	NA	Perm
Protected Phases	1	6		5	2		4	4		3	3	
Permitted Phases									4			3
Actuated Green, G (s)	9.9	59.2		5.3	54.6		10.2	10.2	10.2	12.3	12.3	12.3
Effective Green, g (s)	9.9	59.2		5.3	54.6		10.2	10.2	10.2	12.3	12.3	12.3
Actuated g/C Ratio	0.09	0.56		0.05	0.52		0.10	0.10	0.10	0.12	0.12	0.12
Clearance Time (s)	4.3	4.3		4.3	4.3		4.7	4.7	4.7	4.7	4.7	4.7
Vehicle Extension (s)	2.0	4.0		2.0	4.0		2.0	2.0	2.0	3.0	3.0	3.0
Lane Grp Cap (vph)	323	1960		173	1825		333	180	153	196	206	185
v/s Ratio Prot	0.05	c0.42		0.04	c0.29		c0.08	0.04		0.03	c0.06	
v/s Ratio Perm									0.01			0.02
v/c Ratio	0.55	0.74		0.72	0.56		0.82	0.39	0.10	0.25	0.50	0.21
Uniform Delay, d1	45.4	17.2		49.1	17.0		46.5	44.5	43.2	42.2	43.5	41.9
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.2	2.6		11.9	1.2		13.6	0.5	0.1	0.7	1.9	0.6
Delay (s)	46.6	19.8		61.0	18.3		60.1	45.0	43.3	42.8	45.4	42.5
Level of Service	D	B		E	B		E	D	D	D	D	D
Approach Delay (s)		22.8			22.9			52.7			43.4	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	28.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	67.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	140	875	90	115	740	290	110	240	175	315	355	155
Future Volume (veh/h)	140	875	90	115	740	290	110	240	175	315	355	155
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	152	951	0	125	804	0	120	261	0	342	386	0
Adj No. of Lanes	2	2	1	2	2	1	2	2	1	2	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	322	1081	484	184	939	420	179	1224	548	407	1458	0
Arrive On Green	0.09	0.31	0.00	0.05	0.27	0.00	0.05	0.35	0.00	0.12	0.41	0.00
Sat Flow, veh/h	3442	3539	1583	3442	3539	1583	3442	3539	1583	3442	3632	0
Grp Volume(v), veh/h	152	951	0	125	804	0	120	261	0	342	386	0
Grp Sat Flow(s),veh/h/ln	1721	1770	1583	1721	1770	1583	1721	1770	1583	1721	1770	0
Q Serve(g_s), s	4.4	26.8	0.0	3.7	22.7	0.0	3.6	5.5	0.0	10.2	7.6	0.0
Cycle Q Clear(g_c), s	4.4	26.8	0.0	3.7	22.7	0.0	3.6	5.5	0.0	10.2	7.6	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	322	1081	484	184	939	420	179	1224	548	407	1458	0
V/C Ratio(X)	0.47	0.88	0.00	0.68	0.86	0.00	0.67	0.21	0.00	0.84	0.26	0.00
Avail Cap(c_a), veh/h	322	1180	528	197	1079	483	252	1224	548	482	1458	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	45.1	34.6	0.0	48.8	36.7	0.0	48.9	24.3	0.0	45.3	20.4	0.0
Incr Delay (d2), s/veh	1.1	7.5	0.0	6.6	6.3	0.0	1.6	0.4	0.0	9.6	0.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	14.2	0.0	2.0	11.9	0.0	1.8	2.8	0.0	5.4	3.8	0.0
LnGrp Delay(d),s/veh	46.2	42.1	0.0	55.4	43.0	0.0	50.5	24.7	0.0	54.9	20.8	0.0
LnGrp LOS	D	D		E	D		D	C		D	C	
Approach Vol, veh/h		1103			929			381			728	
Approach Delay, s/veh		42.7			44.6			32.8			36.8	
Approach LOS		D			D			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.8	32.8	16.7	40.6	10.6	37.1	9.8	47.6
Change Period (Y+Rc), s	5.0	5.0	* 4.3	* 4.3	5.0	5.0	* 4.3	* 4.3
Max Green Setting (Gmax), s	9.0	32.0	* 15	* 31	6.0	35.0	* 7.7	* 38
Max Q Clear Time (g_c+I1), s	6.4	24.7	12.2	7.5	5.7	28.8	5.6	9.6
Green Ext Time (p_c), s	0.1	3.2	0.2	1.6	0.0	3.3	0.0	2.7

Intersection Summary	
HCM 2010 Ctrl Delay	40.7
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	80	500	255	85	570	160	370	295	60	170	290	115
Future Volume (veh/h)	80	500	255	85	570	160	370	295	60	170	290	115
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	87	543	0	92	620	174	402	321	0	185	315	125
Adj No. of Lanes	1	2	1	2	2	0	2	1	1	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	110	1146	513	146	830	233	472	360	306	216	443	173
Arrive On Green	0.06	0.32	0.00	0.04	0.30	0.30	0.14	0.19	0.00	0.12	0.18	0.18
Sat Flow, veh/h	1774	3539	1583	3442	2732	765	3442	1863	1583	1774	2492	969
Grp Volume(v), veh/h	87	543	0	92	401	393	402	321	0	185	222	218
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1721	1770	1728	1721	1863	1583	1774	1770	1692
Q Serve(g_s), s	5.1	12.9	0.0	2.8	21.4	21.5	12.0	17.6	0.0	10.7	12.4	12.8
Cycle Q Clear(g_c), s	5.1	12.9	0.0	2.8	21.4	21.5	12.0	17.6	0.0	10.7	12.4	12.8
Prop In Lane	1.00		1.00	1.00		0.44	1.00		1.00	1.00		0.57
Lane Grp Cap(c), veh/h	110	1146	513	146	538	525	472	360	306	216	315	301
V/C Ratio(X)	0.79	0.47	0.00	0.63	0.75	0.75	0.85	0.89	0.00	0.86	0.70	0.72
Avail Cap(c_a), veh/h	152	1146	513	197	538	525	629	465	395	291	408	390
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	48.6	28.4	0.0	49.5	32.9	32.9	44.2	41.3	0.0	45.2	40.6	40.7
Incr Delay (d2), s/veh	11.5	1.4	0.0	1.7	9.1	9.4	6.7	13.7	0.0	13.6	3.8	4.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.8	6.5	0.0	1.4	11.8	11.6	6.1	10.5	0.0	6.1	6.4	6.4
LnGrp Delay(d),s/veh	60.1	29.8	0.0	51.1	42.0	42.3	50.9	55.0	0.0	58.8	44.3	45.4
LnGrp LOS	E	C		D	D	D	D	E		E	D	D
Approach Vol, veh/h		630			886			723			625	
Approach Delay, s/veh		33.9			43.1			52.7			49.0	
Approach LOS		C			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.5	36.9	18.6	26.1	9.4	39.0	20.2	24.5
Change Period (Y+Rc), s	5.0	5.0	5.8	5.8	5.0	5.0	5.8	5.8
Max Green Setting (Gmax), s	9.0	31.0	17.2	26.2	6.0	34.0	19.2	24.2
Max Q Clear Time (g_c+I1), s	7.1	23.5	12.7	19.6	4.8	14.9	14.0	14.8
Green Ext Time (p_c), s	0.0	3.0	0.1	0.7	0.0	3.5	0.4	1.8

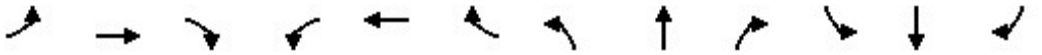
Intersection Summary	
HCM 2010 Ctrl Delay	44.8
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	275	725	155	175	565	60	130	330	200	65	245	265
Future Volume (veh/h)	275	725	155	175	565	60	130	330	200	65	245	265
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	299	788	168	190	614	65	141	359	217	71	266	288
Adj No. of Lanes	1	2	1	1	2	0	2	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	350	1117	500	234	808	85	220	560	333	92	442	396
Arrive On Green	0.20	0.32	0.32	0.13	0.25	0.25	0.06	0.26	0.26	0.05	0.25	0.25
Sat Flow, veh/h	1774	3539	1583	1774	3231	341	3442	2138	1271	1774	1770	1583
Grp Volume(v), veh/h	299	788	168	190	336	343	141	296	280	71	266	288
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1802	1721	1770	1639	1774	1770	1583
Q Serve(g_s), s	13.2	15.9	6.6	8.5	14.3	14.3	3.3	12.1	12.4	3.2	10.8	13.6
Cycle Q Clear(g_c), s	13.2	15.9	6.6	8.5	14.3	14.3	3.3	12.1	12.4	3.2	10.8	13.6
Prop In Lane	1.00		1.00	1.00		0.19	1.00		0.78	1.00		1.00
Lane Grp Cap(c), veh/h	350	1117	500	234	443	451	220	464	429	92	442	396
V/C Ratio(X)	0.85	0.71	0.34	0.81	0.76	0.76	0.64	0.64	0.65	0.77	0.60	0.73
Avail Cap(c_a), veh/h	785	1997	893	525	739	753	436	724	671	268	768	687
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.5	24.5	21.3	34.3	28.2	28.3	37.2	26.6	26.7	38.1	26.9	28.0
Incr Delay (d2), s/veh	5.9	0.8	0.4	6.6	2.7	2.7	3.1	2.1	2.4	12.7	1.9	3.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.1	7.9	2.9	4.6	7.3	7.5	1.6	6.1	5.9	1.9	5.5	6.3
LnGrp Delay(d),s/veh	37.4	25.3	21.7	40.9	30.9	30.9	40.3	28.7	29.1	50.8	28.8	31.6
LnGrp LOS	D	C	C	D	C	C	D	C	C	D	C	C
Approach Vol, veh/h		1255			869			717			625	
Approach Delay, s/veh		27.7			33.1			31.1			32.6	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.9	26.0	15.7	30.7	9.9	25.0	21.1	25.4
Change Period (Y+Rc), s	* 4.7	* 4.7	5.0	5.0	* 4.7	* 4.7	5.0	5.0
Max Green Setting (Gmax), s	* 12	* 33	24.1	45.9	* 10	* 35	36.0	34.0
Max Q Clear Time (g_c+I1), s	5.2	14.4	10.5	17.9	5.3	15.6	15.2	16.3
Green Ext Time (p_c), s	0.1	4.8	0.4	6.8	0.2	4.8	0.9	4.0

Intersection Summary	
HCM 2010 Ctrl Delay	30.7
HCM 2010 LOS	C

Notes



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	160	565	105	110	510	190	120	410	55	145	565	185
Future Volume (veh/h)	160	565	105	110	510	190	120	410	55	145	565	185
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	174	614	114	120	554	207	130	446	60	158	614	201
Adj No. of Lanes	1	2	1	1	2	1	1	2	1	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	205	1544	691	150	1434	641	160	564	252	252	749	335
Arrive On Green	0.12	0.44	0.44	0.08	0.41	0.41	0.09	0.16	0.16	0.14	0.21	0.21
Sat Flow, veh/h	1774	3539	1583	1774	3539	1583	1774	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	174	614	114	120	554	207	130	446	60	158	614	201
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1583	1774	1770	1583	1774	1770	1583
Q Serve(g_s), s	9.4	11.6	2.9	6.5	10.8	5.4	7.1	11.9	2.6	8.2	16.2	8.3
Cycle Q Clear(g_c), s	9.4	11.6	2.9	6.5	10.8	5.4	7.1	11.9	2.6	8.2	16.2	8.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	205	1544	691	150	1434	641	160	564	252	252	749	335
V/C Ratio(X)	0.85	0.40	0.17	0.80	0.39	0.32	0.82	0.79	0.24	0.63	0.82	0.60
Avail Cap(c_a), veh/h	226	1544	691	239	1434	641	177	961	430	252	1047	469
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.5	18.8	7.8	44.0	20.6	7.5	43.8	39.6	22.7	39.6	36.8	19.1
Incr Delay (d2), s/veh	21.3	0.8	0.5	9.5	0.8	1.3	22.7	1.0	0.2	3.7	2.5	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.9	5.8	1.8	3.6	5.5	3.5	4.5	5.9	1.4	4.3	8.2	4.3
LnGrp Delay(d),s/veh	63.8	19.6	8.3	53.6	21.3	8.8	66.5	40.6	22.9	43.2	39.4	19.8
LnGrp LOS	E	B	A	D	C	A	E	D	C	D	D	B
Approach Vol, veh/h		902			881			636			973	
Approach Delay, s/veh		26.7			22.8			44.2			36.0	
Approach LOS		C			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	18.1	19.8	12.8	47.3	13.0	24.9	15.8	44.2
Change Period (Y+Rc), s	* 4.2	* 4.2	4.5	4.5	* 4.2	* 4.2	4.5	4.5
Max Green Setting (Gmax), s	* 12	* 27	13.2	28.6	* 9.8	* 29	12.5	29.3
Max Q Clear Time (g_c+I1), s	10.2	13.9	8.5	13.6	9.1	18.2	11.4	12.8
Green Ext Time (p_c), s	0.0	1.7	0.1	2.7	0.0	2.5	0.0	2.7

Intersection Summary	
HCM 2010 Ctrl Delay	31.6
HCM 2010 LOS	C

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	135	295	175	115	275	235	135	740	45	270	855	120
Future Volume (veh/h)	135	295	175	115	275	235	135	740	45	270	855	120
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	147	321	190	125	299	255	147	804	49	293	929	130
Adj No. of Lanes	1	2	1	1	2	1	1	2	1	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	127	541	242	91	469	210	145	917	410	209	1046	468
Arrive On Green	0.07	0.15	0.15	0.05	0.13	0.13	0.08	0.26	0.26	0.12	0.30	0.30
Sat Flow, veh/h	1774	3539	1583	1774	3539	1583	1774	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	147	321	190	125	299	255	147	804	49	293	929	130
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1583	1774	1770	1583	1774	1770	1583
Q Serve(g_s), s	7.0	8.3	11.3	5.0	7.8	6.3	8.0	21.3	1.1	11.6	24.6	6.2
Cycle Q Clear(g_c), s	7.0	8.3	11.3	5.0	7.8	6.3	8.0	21.3	1.1	11.6	24.6	6.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	127	541	242	91	469	210	145	917	410	209	1046	468
V/C Ratio(X)	1.16	0.59	0.78	1.38	0.64	1.22	1.02	0.88	0.12	1.40	0.89	0.28
Avail Cap(c_a), veh/h	127	1264	565	91	1192	533	145	1047	469	209	1156	517
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	45.5	38.7	40.0	46.5	40.3	10.1	45.0	34.8	6.7	43.2	33.0	26.5
Incr Delay (d2), s/veh	129.4	0.4	2.1	226.1	6.5	132.3	78.8	7.1	0.0	206.0	7.6	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.0	4.1	5.1	8.1	4.2	12.6	7.1	11.3	1.0	17.6	13.1	2.7
LnGrp Delay(d),s/veh	174.9	39.1	42.1	272.6	46.8	142.3	123.9	41.9	6.7	249.2	40.6	26.6
LnGrp LOS	F	D	D	F	D	F	F	D	A	F	D	C
Approach Vol, veh/h		658			679			1000			1352	
Approach Delay, s/veh		70.3			124.2			52.2			84.4	
Approach LOS		E			F			D			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	16.6	30.4	9.0	19.0	13.0	34.0	11.0	17.0
Change Period (Y+Rc), s	5.0	5.0	4.0	4.0	5.0	5.0	4.0	4.0
Max Green Setting (Gmax), s	11.0	29.0	5.0	35.0	8.0	32.0	7.0	33.0
Max Q Clear Time (g_c+I1), s	13.6	23.3	7.0	13.3	10.0	26.6	9.0	9.8
Green Ext Time (p_c), s	0.0	2.0	0.0	1.7	0.0	2.4	0.0	1.7

Intersection Summary	
HCM 2010 Ctrl Delay	80.5
HCM 2010 LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	115	40	60	10	310	115	85	625	20
Future Volume (veh/h)	0	0	0	115	40	60	10	310	115	85	625	20
Number				7	4	14	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1900	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h				125	43	65	11	337	125	92	679	22
Adj No. of Lanes				0	2	0	1	2	0	1	2	0
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				2	2	2	2	2	2	2	2	2
Cap, veh/h				200	76	114	76	784	286	182	1290	42
Arrive On Green				0.11	0.11	0.11	0.04	0.31	0.31	0.10	0.37	0.37
Sat Flow, veh/h				1774	670	1013	1774	2542	927	1774	3499	113
Grp Volume(v), veh/h				125	0	108	11	233	229	92	343	358
Grp Sat Flow(s),veh/h/ln				1774	0	1684	1774	1770	1699	1774	1770	1843
Q Serve(g_s), s				4.7	0.0	4.3	0.4	7.3	7.5	3.4	10.6	10.6
Cycle Q Clear(g_c), s				4.7	0.0	4.3	0.4	7.3	7.5	3.4	10.6	10.6
Prop In Lane				1.00		0.60	1.00		0.55	1.00		0.06
Lane Grp Cap(c), veh/h				200	0	190	76	546	524	182	652	679
V/C Ratio(X)				0.63	0.00	0.57	0.14	0.43	0.44	0.50	0.53	0.53
Avail Cap(c_a), veh/h				684	0	650	79	546	524	185	652	679
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh				29.6	0.0	29.4	32.3	19.3	19.3	29.7	17.3	17.3
Incr Delay (d2), s/veh				3.2	0.0	2.7	0.9	2.4	2.6	2.1	3.0	2.9
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				2.5	0.0	2.1	0.2	3.9	3.9	1.8	5.7	5.9
LnGrp Delay(d),s/veh				32.8	0.0	32.1	33.1	21.7	22.0	31.9	20.3	20.2
LnGrp LOS				C		C	C	C	C	C	C	C
Approach Vol, veh/h					233			473			793	
Approach Delay, s/veh					32.5			22.1			21.6	
Approach LOS					C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		
Phs Duration (G+Y+Rc), s	11.9	26.3		12.6	7.7	30.5		
Change Period (Y+Rc), s	* 4.7	* 4.7		* 4.7	* 4.7	* 4.7		
Max Green Setting (Gmax), s	* 7.3	* 22		* 27	* 3.1	* 26		
Max Q Clear Time (g_c+I1), s	5.4	9.5		6.7	2.4	12.6		
Green Ext Time (p_c), s	0.0	2.2		1.3	0.0	3.6		

Intersection Summary	
HCM 2010 Ctrl Delay	23.5
HCM 2010 LOS	C

Notes



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	85	220	75	1345	1035	100
Future Volume (veh/h)	85	220	75	1345	1035	100
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	92	239	82	1462	1125	109
Adj No. of Lanes	1	1	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	310	277	408	2601	1618	724
Arrive On Green	0.17	0.17	0.23	0.73	0.46	0.46
Sat Flow, veh/h	1774	1583	1774	3632	3632	1583
Grp Volume(v), veh/h	92	239	82	1462	1125	109
Grp Sat Flow(s),veh/h/ln	1774	1583	1774	1770	1770	1583
Q Serve(g_s), s	4.7	15.4	3.9	19.6	26.6	4.2
Cycle Q Clear(g_c), s	4.7	15.4	3.9	19.6	26.6	4.2
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	310	277	408	2601	1618	724
V/C Ratio(X)	0.30	0.86	0.20	0.56	0.70	0.15
Avail Cap(c_a), veh/h	549	490	408	2601	1618	724
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.7	42.1	32.6	6.3	22.7	16.6
Incr Delay (d2), s/veh	0.5	7.9	0.2	0.9	2.5	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	13.3	1.9	9.7	13.5	1.9
LnGrp Delay(d),s/veh	38.2	50.0	32.9	7.2	25.2	17.1
LnGrp LOS	D	D	C	A	C	B
Approach Vol, veh/h	331			1544	1234	
Approach Delay, s/veh	46.8			8.5	24.5	
Approach LOS	D			A	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		82.2		22.8	29.2	53.0		
Change Period (Y+Rc), s		5.0		4.5	5.0	* 5		
Max Green Setting (Gmax), s		63.0		32.5	10.5	* 48		
Max Q Clear Time (g_c+I1), s		21.6		17.4	5.9	28.6		
Green Ext Time (p_c), s		16.3		0.9	0.1	8.7		

Intersection Summary	
HCM 2010 Ctrl Delay	18.9
HCM 2010 LOS	B

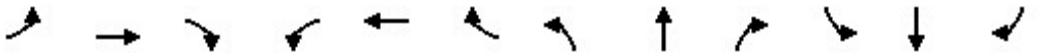
Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	45	170	45	60	275	85	85	1230	70	100	1020	100
Future Volume (veh/h)	45	170	45	60	275	85	85	1230	70	100	1020	100
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	49	185	49	65	299	92	92	1337	76	109	1109	109
Adj No. of Lanes	1	1	0	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	142	393	104	261	379	116	286	1574	704	252	1507	674
Arrive On Green	0.28	0.28	0.28	0.28	0.28	0.28	0.32	0.89	0.89	0.14	0.43	0.43
Sat Flow, veh/h	989	1420	376	1142	1368	421	1774	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	49	0	234	65	0	391	92	1337	76	109	1109	109
Grp Sat Flow(s),veh/h/ln	989	0	1796	1142	0	1788	1774	1770	1583	1774	1770	1583
Q Serve(g_s), s	5.1	0.0	11.4	5.3	0.0	21.2	4.1	17.9	0.6	5.9	27.5	4.5
Cycle Q Clear(g_c), s	26.3	0.0	11.4	16.6	0.0	21.2	4.1	17.9	0.6	5.9	27.5	4.5
Prop In Lane	1.00		0.21	1.00		0.24	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	142	0	497	261	0	495	286	1574	704	252	1507	674
V/C Ratio(X)	0.34	0.00	0.47	0.25	0.00	0.79	0.32	0.85	0.11	0.43	0.74	0.16
Avail Cap(c_a), veh/h	191	0	585	315	0	579	286	1574	704	252	1507	674
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.60	0.60	0.60	1.00	1.00	1.00
Uniform Delay (d), s/veh	47.3	0.0	31.6	38.5	0.0	35.1	31.2	4.2	3.3	41.2	25.2	18.6
Incr Delay (d2), s/veh	1.4	0.0	0.7	0.5	0.0	6.3	0.4	3.7	0.2	1.2	3.2	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	0.0	5.8	1.7	0.0	11.3	2.0	8.4	0.3	3.0	14.1	2.0
LnGrp Delay(d),s/veh	48.7	0.0	32.3	39.0	0.0	41.4	31.6	7.9	3.4	42.3	28.5	19.1
LnGrp LOS	D		C	D		D	C	A	A	D	C	B
Approach Vol, veh/h		283			456			1505			1327	
Approach Delay, s/veh		35.1			41.1			9.1			28.8	
Approach LOS		D			D			A			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	19.9	51.7		33.4	21.9	49.7		33.4
Change Period (Y+Rc), s	5.0	5.0		* 4.3	5.0	5.0		* 4.3
Max Green Setting (Gmax), s	10.0	46.7		* 34	12.0	44.7		* 34
Max Q Clear Time (g_c+I1), s	7.9	19.9		28.3	6.1	29.5		23.2
Green Ext Time (p_c), s	0.0	16.1		0.8	0.1	9.3		2.0

Intersection Summary			
HCM 2010 Ctrl Delay		22.6	
HCM 2010 LOS		C	

Notes



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	105	30	50	25	105	10	55	525	0	5	460	195
Future Volume (vph)	105	30	50	25	105	10	55	525	0	5	460	195
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.7	4.7		4.7	4.7	4.7	5.1		4.7	5.1	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	0.96	
Flt Protected		0.96	1.00		0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1793	1583		1845	1583	1770	1863		1770	1780	
Flt Permitted		0.68	1.00		0.91	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1273	1583		1702	1583	1770	1863		1770	1780	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	114	33	54	27	114	11	60	571	0	5	500	212
RTOR Reduction (vph)	0	0	44	0	0	9	0	0	0	0	19	0
Lane Group Flow (vph)	0	147	10	0	141	2	60	571	0	5	693	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)		11.5	11.5		11.5	11.5	5.3	37.6		1.4	33.7	
Effective Green, g (s)		11.5	11.5		11.5	11.5	5.3	37.6		1.4	33.7	
Actuated g/C Ratio		0.18	0.18		0.18	0.18	0.08	0.58		0.02	0.52	
Clearance Time (s)		4.7	4.7		4.7	4.7	4.7	5.1		4.7	5.1	
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		225	280		301	280	144	1077		38	922	
v/s Ratio Prot							0.03	c0.31		0.00	c0.39	
v/s Ratio Perm		c0.12	0.01		0.08	0.00						
v/c Ratio		0.65	0.03		0.47	0.01	0.42	0.53		0.13	0.75	
Uniform Delay, d1		24.9	22.2		24.0	22.0	28.4	8.3		31.2	12.4	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		6.7	0.0		1.2	0.0	1.9	1.9		1.6	5.6	
Delay (s)		31.5	22.2		25.2	22.1	30.3	10.2		32.8	18.0	
Level of Service		C	C		C	C	C	B		C	B	
Approach Delay (s)		29.0			24.9			12.1			18.1	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	17.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	68.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	95	225	165	25	280	85	330	1205	20	95	940	100
Future Volume (veh/h)	95	225	165	25	280	85	330	1205	20	95	940	100
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	103	245	179	27	304	92	359	1310	22	103	1022	109
Adj No. of Lanes	1	1	1	1	2	0	2	2	0	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	129	350	297	55	394	117	393	1401	24	367	1719	769
Arrive On Green	0.07	0.19	0.19	0.03	0.15	0.15	0.11	0.39	0.39	0.21	0.49	0.49
Sat Flow, veh/h	1774	1863	1583	1774	2691	800	3442	3562	60	1774	3539	1583
Grp Volume(v), veh/h	103	245	179	27	198	198	359	651	681	103	1022	109
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	1770	1722	1721	1770	1852	1774	1770	1583
Q Serve(g_s), s	6.0	12.9	10.9	1.6	11.3	11.6	10.8	37.0	37.1	5.1	21.9	4.0
Cycle Q Clear(g_c), s	6.0	12.9	10.9	1.6	11.3	11.6	10.8	37.0	37.1	5.1	21.9	4.0
Prop In Lane	1.00		1.00	1.00		0.46	1.00		0.03	1.00		1.00
Lane Grp Cap(c), veh/h	129	350	297	55	259	252	393	696	729	367	1719	769
V/C Ratio(X)	0.80	0.70	0.60	0.49	0.76	0.78	0.91	0.93	0.94	0.28	0.59	0.14
Avail Cap(c_a), veh/h	130	562	478	101	506	492	393	696	729	367	1719	769
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.79	0.79	0.79
Uniform Delay (d), s/veh	48.0	39.9	39.0	50.0	43.1	43.2	46.0	30.6	30.6	35.1	19.5	14.9
Incr Delay (d2), s/veh	28.0	1.9	1.5	4.9	3.5	4.0	25.2	21.4	20.8	0.3	1.2	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.9	6.9	4.9	0.8	5.8	5.8	6.5	22.2	23.1	2.6	10.9	1.8
LnGrp Delay(d),s/veh	75.9	41.8	40.5	54.9	46.5	47.2	71.2	52.0	51.4	35.4	20.7	15.2
LnGrp LOS	E	D	D	D	D	D	E	D	D	D	C	B
Approach Vol, veh/h		527			423			1691			1234	
Approach Delay, s/veh		48.0			47.4			55.8			21.5	
Approach LOS		D			D			E			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	26.7	46.3	7.6	24.4	17.0	56.0	11.9	20.1
Change Period (Y+Rc), s	5.0	5.0	* 4.3	* 4.7	5.0	5.0	* 4.3	* 4.7
Max Green Setting (Gmax), s	7.0	41.3	* 6	* 32	12.0	36.3	* 7.7	* 30
Max Q Clear Time (g_c+I1), s	7.1	39.1	3.6	14.9	12.8	23.9	8.0	13.6
Green Ext Time (p_c), s	0.0	1.9	0.0	1.5	0.0	7.5	0.0	1.7

Intersection Summary	
HCM 2010 Ctrl Delay	42.9
HCM 2010 LOS	D

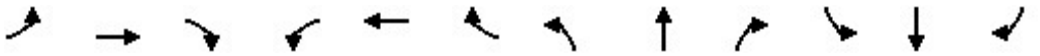
Notes



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	555	5	1350	545	0	1005
Future Volume (vph)	555	5	1350	545	0	1005
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.1	5.1	5.1	5.1		5.1
Lane Util. Factor	0.97	1.00	0.91	1.00		0.91
Frt	1.00	0.85	1.00	0.85		1.00
Flt Protected	0.95	1.00	1.00	1.00		1.00
Satd. Flow (prot)	3433	1583	5085	1583		5085
Flt Permitted	0.95	1.00	1.00	1.00		1.00
Satd. Flow (perm)	3433	1583	5085	1583		5085
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	603	5	1467	592	0	1092
RTOR Reduction (vph)	0	2	0	0	0	0
Lane Group Flow (vph)	603	3	1467	592	0	1092
Turn Type	Prot	Prot	NA	pt+ov		NA
Protected Phases	4	4	6	4 6		2
Permitted Phases					2	
Actuated Green, G (s)	16.4	16.4	38.4	65.0		38.4
Effective Green, g (s)	16.4	16.4	38.4	65.0		38.4
Actuated g/C Ratio	0.25	0.25	0.59	1.00		0.59
Clearance Time (s)	5.1	5.1	5.1			5.1
Vehicle Extension (s)	2.5	2.5	4.0			4.0
Lane Grp Cap (vph)	866	399	3004	1583		3004
v/s Ratio Prot	c0.18	0.00	c0.29	0.37		0.21
v/s Ratio Perm						
v/c Ratio	0.70	0.01	0.49	0.37		0.36
Uniform Delay, d1	22.0	18.2	7.6	0.0		6.9
Progression Factor	1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2	2.3	0.0	0.6	0.1		0.3
Delay (s)	24.3	18.2	8.2	0.1		7.3
Level of Service	C	B	A	A		A
Approach Delay (s)	24.3		5.9			7.3
Approach LOS	C		A			A

Intersection Summary			
HCM 2000 Control Delay	9.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	14.2
Intersection Capacity Utilization	61.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	760	105	0	670	245	0	0	0	650	0	435
Future Volume (vph)	0	760	105	0	670	245	0	0	0	650	0	435
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.1			5.1	5.1				4.7	4.7	
Lane Util. Factor		1.00			1.00	1.00				0.95	0.95	
Frt		0.98			1.00	0.85				1.00	0.87	
Flt Protected		1.00			1.00	1.00				0.95	0.99	
Satd. Flow (prot)		1832			1863	1583				1681	1535	
Flt Permitted		1.00			1.00	1.00				0.95	0.99	
Satd. Flow (perm)		1832			1863	1583				1681	1535	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	826	114	0	728	266	0	0	0	707	0	473
RTOR Reduction (vph)	0	4	0	0	0	119	0	0	0	0	113	0
Lane Group Flow (vph)	0	936	0	0	728	147	0	0	0	615	452	0
Turn Type		NA			NA	Perm				Split	NA	
Protected Phases		2			6					4	4	
Permitted Phases						6						
Actuated Green, G (s)		64.8			64.8	64.8				45.4	45.4	
Effective Green, g (s)		64.8			64.8	64.8				45.4	45.4	
Actuated g/C Ratio		0.54			0.54	0.54				0.38	0.38	
Clearance Time (s)		5.1			5.1	5.1				4.7	4.7	
Vehicle Extension (s)		2.0			2.0	2.0				2.0	2.0	
Lane Grp Cap (vph)		989			1006	854				635	580	
v/s Ratio Prot		c0.51			0.39					c0.37	0.29	
v/s Ratio Perm						0.09						
v/c Ratio		0.95			0.72	0.17				0.97	0.78	
Uniform Delay, d1		26.0			20.8	14.0				36.6	32.9	
Progression Factor		1.00			0.55	0.44				1.00	1.00	
Incremental Delay, d2		18.3			3.9	0.4				27.5	6.0	
Delay (s)		44.2			15.3	6.6				64.1	38.9	
Level of Service		D			B	A				E	D	
Approach Delay (s)		44.2			12.9			0.0			52.0	
Approach LOS		D			B			A			D	

Intersection Summary			
HCM 2000 Control Delay	37.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.8
Intersection Capacity Utilization	85.9%	ICU Level of Service	E
Analysis Period (min)	15		

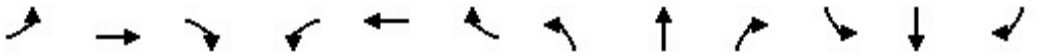
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	410	1000	0	0	800	645	120	0	310	0	0	0
Future Volume (veh/h)	410	1000	0	0	800	645	120	0	310	0	0	0
Number	5	2	12	1	6	16	3	8	18			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1863	1863	0	0	1863	1863	1900	1863	1863			
Adj Flow Rate, veh/h	446	1087	0	0	870	0	130	0	0			
Adj No. of Lanes	1	2	0	0	2	1	0	1	1			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	875	2923	0	0	1027	460	160	0	142			
Arrive On Green	0.99	1.00	0.00	0.00	0.10	0.00	0.09	0.00	0.00			
Sat Flow, veh/h	1774	3632	0	0	3632	1583	1774	0	1583			
Grp Volume(v), veh/h	446	1087	0	0	870	0	130	0	0			
Grp Sat Flow(s),veh/h/ln	1774	1770	0	0	1770	1583	1774	0	1583			
Q Serve(g_s), s	0.8	0.0	0.0	0.0	29.0	0.0	8.6	0.0	0.0			
Cycle Q Clear(g_c), s	0.8	0.0	0.0	0.0	29.0	0.0	8.6	0.0	0.0			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	875	2923	0	0	1027	460	160	0	142			
V/C Ratio(X)	0.51	0.37	0.00	0.00	0.85	0.00	0.81	0.00	0.00			
Avail Cap(c_a), veh/h	875	2923	0	0	1354	606	325	0	290			
HCM Platoon Ratio	2.00	2.00	1.00	1.00	0.33	0.33	1.00	1.00	1.00			
Upstream Filter(I)	0.20	0.20	0.00	0.00	0.65	0.00	1.00	0.00	0.00			
Uniform Delay (d), s/veh	0.4	0.0	0.0	0.0	51.6	0.0	53.6	0.0	0.0			
Incr Delay (d2), s/veh	0.0	0.1	0.0	0.0	5.8	0.0	3.8	0.0	0.0			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.2	0.0	0.0	0.0	15.1	0.0	4.4	0.0	0.0			
LnGrp Delay(d),s/veh	0.5	0.1	0.0	0.0	57.4	0.0	57.4	0.0	0.0			
LnGrp LOS	A	A			E		E					
Approach Vol, veh/h		1533			870			130				
Approach Delay, s/veh		0.2			57.4			57.4				
Approach LOS		A			E			E				

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		104.2			64.3	39.9		15.8
Change Period (Y+Rc), s		5.1			5.1	* 5.1		5.0
Max Green Setting (Gmax), s		87.9			37.3	* 46		22.0
Max Q Clear Time (g_c+I1), s		2.0			2.8	31.0		10.6
Green Ext Time (p_c), s		6.5			0.7	3.8		0.3

Intersection Summary	
HCM 2010 Ctrl Delay	22.8
HCM 2010 LOS	C

Notes



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	70	1025	190	35	795	165	320	120	35	270	80	210
Future Volume (vph)	70	1025	190	35	795	165	320	120	35	270	80	210
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	5.1	5.1	4.7	5.1	5.1	4.7	4.7	4.7	4.7	4.7	4.7
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1762	1504	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	1762	1504	1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	76	1114	207	38	864	179	348	130	38	293	87	228
RTOR Reduction (vph)	0	0	86	0	0	65	0	1	27	0	0	182
Lane Group Flow (vph)	76	1114	121	38	864	114	348	133	7	293	87	46
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2		1	6		3	3		4	4	
Permitted Phases			2			6			3			4
Actuated Green, G (s)	8.8	44.5	44.5	6.6	42.3	42.3	25.6	25.6	25.6	24.1	24.1	24.1
Effective Green, g (s)	8.8	44.5	44.5	6.6	42.3	42.3	25.6	25.6	25.6	24.1	24.1	24.1
Actuated g/C Ratio	0.07	0.37	0.37	0.05	0.35	0.35	0.21	0.21	0.21	0.20	0.20	0.20
Clearance Time (s)	4.7	5.1	5.1	4.7	5.1	5.1	4.7	4.7	4.7	4.7	4.7	4.7
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0	4.0	2.5	2.5	2.5	2.0	2.0	2.0
Lane Grp Cap (vph)	129	1312	587	97	1247	558	377	375	320	355	374	317
v/s Ratio Prot	0.04	c0.31		0.02	c0.24		c0.20	0.08		c0.17	0.05	
v/s Ratio Perm			0.08			0.07			0.00			0.03
v/c Ratio	0.59	0.85	0.21	0.39	0.69	0.20	0.92	0.36	0.02	0.83	0.23	0.14
Uniform Delay, d1	53.8	34.7	25.7	54.8	33.3	27.1	46.2	40.2	37.3	45.9	40.2	39.5
Progression Factor	0.89	0.99	0.86	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.9	6.2	0.7	1.0	3.2	0.8	27.7	0.4	0.0	13.8	0.1	0.1
Delay (s)	51.8	40.6	22.7	55.7	36.5	27.9	74.0	40.6	37.3	59.7	40.3	39.5
Level of Service	D	D	C	E	D	C	E	D	D	E	D	D
Approach Delay (s)		38.6			35.7			62.9			49.4	
Approach LOS		D			D			E			D	

Intersection Summary			
HCM 2000 Control Delay	43.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	19.2
Intersection Capacity Utilization	81.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	90	440	695	260	265	45	420	1365	185	95	1335	175
Future Volume (veh/h)	90	440	695	260	265	45	420	1365	185	95	1335	175
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	98	478	0	283	288	49	457	1484	0	103	1451	0
Adj No. of Lanes	1	1	1	1	1	0	2	3	0	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	276	400	340	258	317	54	439	1744	0	244	1250	559
Arrive On Green	0.16	0.21	0.00	0.15	0.20	0.20	0.13	0.34	0.00	0.14	0.35	0.00
Sat Flow, veh/h	1774	1863	1583	1774	1552	264	3442	5253	0	1774	3539	1583
Grp Volume(v), veh/h	98	478	0	283	0	337	457	1484	0	103	1451	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	0	1816	1721	1695	0	1774	1770	1583
Q Serve(g_s), s	6.4	27.9	0.0	18.9	0.0	23.6	16.6	35.2	0.0	6.9	45.9	0.0
Cycle Q Clear(g_c), s	6.4	27.9	0.0	18.9	0.0	23.6	16.6	35.2	0.0	6.9	45.9	0.0
Prop In Lane	1.00		1.00	1.00		0.15	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	276	400	340	258	0	371	439	1744	0	244	1250	559
V/C Ratio(X)	0.36	1.20	0.00	1.10	0.00	0.91	1.04	0.85	0.00	0.42	1.16	0.00
Avail Cap(c_a), veh/h	276	400	340	258	0	514	439	1964	0	244	1250	559
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	49.1	51.1	0.0	55.5	0.0	50.5	56.7	39.6	0.0	51.3	42.0	0.0
Incr Delay (d2), s/veh	0.6	110.1	0.0	84.5	0.0	13.2	53.7	5.4	0.0	0.4	81.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.2	26.5	0.0	15.3	0.0	13.2	11.1	17.4	0.0	3.4	36.6	0.0
LnGrp Delay(d),s/veh	49.6	161.1	0.0	140.1	0.0	63.7	110.4	45.1	0.0	51.7	123.8	0.0
LnGrp LOS	D	F		F		E	F	D		D	F	
Approach Vol, veh/h		576			620			1941			1554	
Approach Delay, s/veh		142.1			98.6			60.4			119.0	
Approach LOS		F			F			E			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	22.0	51.0	25.3	31.7	23.0	50.0	24.0	33.0
Change Period (Y+Rc), s	5.4	5.1	5.1	5.1	5.1	5.4	5.1	5.1
Max Green Setting (Gmax), s	16.6	45.9	10.0	36.8	12.3	50.2	18.9	27.9
Max Q Clear Time (g_c+I1), s	18.6	47.9	8.4	25.6	8.9	37.2	20.9	29.9
Green Ext Time (p_c), s	0.0	0.0	0.0	1.0	0.0	7.4	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	94.9
HCM 2010 LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	530	35	65	330	40	30	115	120	25	85	65
Future Volume (vph)	20	530	35	65	330	40	30	115	120	25	85	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.1			4.7			6.4	6.4		6.4	
Lane Util. Factor		0.91			0.95			1.00	1.00		1.00	
Frt		0.99			0.99			1.00	0.85		0.95	
Flt Protected		1.00			0.99			0.99	1.00		0.99	
Satd. Flow (prot)		5031			3465			1843	1583		1756	
Flt Permitted		0.90			0.99			0.90	1.00		0.94	
Satd. Flow (perm)		4557			3465			1681	1583		1662	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	576	38	71	359	43	33	125	130	27	92	71
RTOR Reduction (vph)	0	5	0	0	5	0	0	0	87	0	14	0
Lane Group Flow (vph)	0	631	0	0	468	0	0	158	43	0	176	0
Turn Type	Perm	NA		Split	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		3		5 8	5 8			6			6	
Permitted Phases	3						6		6	6		
Actuated Green, G (s)		29.6			57.7			51.5	51.5		51.5	
Effective Green, g (s)		29.6			52.6			51.5	51.5		51.5	
Actuated g/C Ratio		0.19			0.34			0.33	0.33		0.33	
Clearance Time (s)		5.1						6.4	6.4		6.4	
Vehicle Extension (s)		4.0						3.0	3.0		3.0	
Lane Grp Cap (vph)		870			1175			558	525		552	
v/s Ratio Prot					c0.13							
v/s Ratio Perm		c0.14						0.09	0.03		c0.11	
v/c Ratio		0.73			0.40			0.28	0.08		0.32	
Uniform Delay, d1		58.9			39.1			38.1	35.5		38.6	
Progression Factor		1.00			0.17			1.00	1.00		1.00	
Incremental Delay, d2		3.2			0.1			1.3	0.3		1.5	
Delay (s)		62.1			6.7			39.4	35.8		40.2	
Level of Service		E			A			D	D		D	
Approach Delay (s)		62.1			6.7			37.8			40.2	
Approach LOS		E			A			D			D	

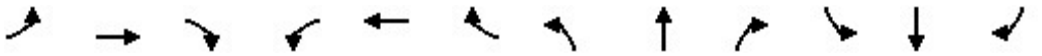
Intersection Summary			
HCM 2000 Control Delay	38.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	155.0	Sum of lost time (s)	21.3
Intersection Capacity Utilization	53.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	155	95	245	15	130	5	260	375	20	10	380	260
Future Volume (vph)	155	95	245	15	130	5	260	375	20	10	380	260
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.1	5.1	5.1		5.1		4.7	5.4		4.7	5.4	5.4
Lane Util. Factor	1.00	1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85		1.00		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00		1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583		1846		1770	1848		1770	1863	1583
Flt Permitted	0.57	1.00	1.00		0.97		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1063	1863	1583		1798		1770	1848		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	168	103	266	16	141	5	283	408	22	11	413	283
RTOR Reduction (vph)	0	0	201	0	1	0	0	1	0	0	0	54
Lane Group Flow (vph)	168	103	65	0	161	0	283	429	0	11	413	229
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		8			8		1	6		5	2	
Permitted Phases	8		8	8								2
Actuated Green, G (s)	24.5	24.5	24.5		24.5		23.4	60.2		1.1	37.9	37.9
Effective Green, g (s)	24.5	24.5	24.5		24.5		23.4	60.2		1.1	37.9	37.9
Actuated g/C Ratio	0.24	0.24	0.24		0.24		0.23	0.60		0.01	0.38	0.38
Clearance Time (s)	5.1	5.1	5.1		5.1		4.7	5.4		4.7	5.4	5.4
Vehicle Extension (s)	3.0	3.0	3.0		3.0		3.0	5.0		3.0	5.0	5.0
Lane Grp Cap (vph)	257	451	383		436		410	1101		19	699	594
v/s Ratio Prot		0.06					c0.16	0.23		0.01	c0.22	
v/s Ratio Perm	c0.16		0.04		0.09							0.14
v/c Ratio	0.65	0.23	0.17		0.37		0.69	0.39		0.58	0.59	0.38
Uniform Delay, d1	34.4	30.7	30.2		31.8		35.5	10.7		49.7	25.3	23.0
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	5.9	0.3	0.2		0.5		5.0	0.5		36.3	2.0	0.9
Delay (s)	40.3	30.9	30.4		32.4		40.4	11.2		86.0	27.3	23.9
Level of Service	D	C	C		C		D	B		F	C	C
Approach Delay (s)		33.6			32.4			22.8			26.9	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	27.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	101.0	Sum of lost time (s)	15.2
Intersection Capacity Utilization	67.9%	ICU Level of Service	C
Analysis Period (min)	15		

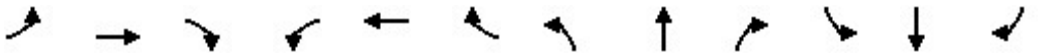
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	95	65	110	70	135	30	1400	115	35	795	10
Future Volume (vph)	25	95	65	110	70	135	30	1400	115	35	795	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.1	7.1	5.1	5.1		4.7	6.4	6.4	4.7	6.4	6.4
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt		1.00	0.85	1.00	0.90		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1844	1583	1770	1679		1770	3539	1583	1770	3539	1583
Flt Permitted		0.22	1.00	0.67	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		414	1583	1255	1679		1770	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	103	71	120	76	147	33	1522	125	38	864	11
RTOR Reduction (vph)	0	0	54	0	49	0	0	0	56	0	0	7
Lane Group Flow (vph)	0	130	17	120	174	0	33	1522	69	38	864	4
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		3			8		5	2		1	6	
Permitted Phases	3		3	8					2			6
Actuated Green, G (s)		40.0	40.0	20.4	20.4		11.0	64.5	64.5	8.8	62.3	62.3
Effective Green, g (s)		38.0	38.0	20.4	20.4		11.0	64.5	64.5	8.8	62.3	62.3
Actuated g/C Ratio		0.25	0.25	0.13	0.13		0.07	0.42	0.42	0.06	0.40	0.40
Clearance Time (s)		5.1	5.1	5.1	5.1		4.7	6.4	6.4	4.7	6.4	6.4
Vehicle Extension (s)		4.0	4.0	2.0	2.0		2.0	4.0	4.0	2.0	4.0	4.0
Lane Grp Cap (vph)		101	388	165	220		125	1472	658	100	1422	636
v/s Ratio Prot					c0.10		0.02	c0.43		0.02	c0.24	
v/s Ratio Perm		c0.31	0.01	0.10					0.04			0.00
v/c Ratio		1.29	0.04	0.73	0.79		0.26	1.03	0.10	0.38	0.61	0.01
Uniform Delay, d1		58.5	44.6	64.6	65.2		68.2	45.2	27.6	70.5	36.7	27.8
Progression Factor		0.81	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		183.9	0.1	12.7	15.7		0.4	32.7	0.3	0.9	1.9	0.0
Delay (s)		231.4	44.7	77.3	80.9		68.6	77.9	27.9	71.3	38.6	27.8
Level of Service		F	D	E	F		E	E	C	E	D	C
Approach Delay (s)		165.4			79.7			74.0			39.8	
Approach LOS		F			E			E			D	

Intersection Summary			
HCM 2000 Control Delay	70.6	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	155.0	Sum of lost time (s)	23.3
Intersection Capacity Utilization	76.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	70	15	35	25	50	5	150	20	130	125	10
Future Volume (vph)	5	70	15	35	25	50	5	150	20	130	125	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.1			4.7			6.4		6.4	6.4	
Lane Util. Factor		1.00			1.00			1.00		1.00	1.00	
Frt		0.98			0.94			0.98		1.00	0.99	
Flt Protected		1.00			0.98			1.00		0.95	1.00	
Satd. Flow (prot)		1817			1721			1831		1770	1842	
Flt Permitted		0.99			0.98			0.99		0.59	1.00	
Satd. Flow (perm)		1800			1721			1823		1101	1842	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	76	16	38	27	54	5	163	22	141	136	11
RTOR Reduction (vph)	0	4	0	0	22	0	0	3	0	0	2	0
Lane Group Flow (vph)	0	93	0	0	97	0	0	187	0	141	145	0
Turn Type	Perm	NA		Split	NA		Perm	NA		Perm	NA	
Protected Phases		3		5 8	5 8			6			6	
Permitted Phases	3						6			6		
Actuated Green, G (s)		40.0			36.5			62.3		62.3	62.3	
Effective Green, g (s)		40.0			31.4			62.3		62.3	62.3	
Actuated g/C Ratio		0.26			0.20			0.40		0.40	0.40	
Clearance Time (s)		5.1						6.4		6.4	6.4	
Vehicle Extension (s)		4.0						4.0		4.0	4.0	
Lane Grp Cap (vph)		464			348			732		442	740	
v/s Ratio Prot					c0.06						0.08	
v/s Ratio Perm		c0.05						0.10		c0.13		
v/c Ratio		0.20			0.28			0.26		0.32	0.20	
Uniform Delay, d1		45.0			52.2			30.9		31.8	30.1	
Progression Factor		1.00			0.22			1.00		1.00	1.00	
Incremental Delay, d2		0.3			0.1			0.8		1.9	0.6	
Delay (s)		45.3			11.9			31.7		33.7	30.7	
Level of Service		D			B			C		C	C	
Approach Delay (s)		45.3			11.9			31.7			32.2	
Approach LOS		D			B			C			C	

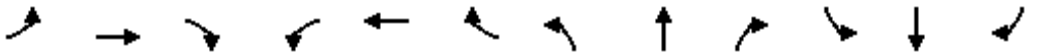
Intersection Summary			
HCM 2000 Control Delay	30.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	155.0	Sum of lost time (s)	21.3
Intersection Capacity Utilization	52.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	290	800	280	285	45	440	1310	200	30	1290	145
Future Volume (veh/h)	50	290	800	280	285	45	440	1310	200	30	1290	145
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	54	315	0	304	310	0	478	1424	0	33	1402	0
Adj No. of Lanes	2	1	1	1	1	1	2	2	0	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	528	328	279	288	345	293	439	1488	0	145	1326	593
Arrive On Green	0.15	0.18	0.00	0.16	0.19	0.00	0.13	0.42	0.00	0.08	0.37	0.00
Sat Flow, veh/h	3442	1863	1583	1774	1863	1583	3442	3632	0	1774	3539	1583
Grp Volume(v), veh/h	54	315	0	304	310	0	478	1424	0	33	1402	0
Grp Sat Flow(s),veh/h/ln	1721	1863	1583	1774	1863	1583	1721	1770	0	1774	1770	1583
Q Serve(g_s), s	1.8	21.8	0.0	21.1	21.1	0.0	16.6	50.7	0.0	2.3	48.7	0.0
Cycle Q Clear(g_c), s	1.8	21.8	0.0	21.1	21.1	0.0	16.6	50.7	0.0	2.3	48.7	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	528	328	279	288	345	293	439	1488	0	145	1326	593
V/C Ratio(X)	0.10	0.96	0.00	1.06	0.90	0.00	1.09	0.96	0.00	0.23	1.06	0.00
Avail Cap(c_a), veh/h	528	328	279	288	502	426	439	1506	0	145	1326	593
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	47.3	53.1	0.0	54.5	51.8	0.0	56.7	36.5	0.0	55.8	40.6	0.0
Incr Delay (d2), s/veh	0.1	38.7	0.0	68.5	11.1	0.0	68.7	15.1	0.0	0.3	41.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	14.7	0.0	15.8	11.9	0.0	12.1	27.9	0.0	1.1	31.4	0.0
LnGrp Delay(d),s/veh	47.4	91.8	0.0	122.9	62.9	0.0	125.4	51.7	0.0	56.1	82.1	0.0
LnGrp LOS	D	F		F	E		F	D		E	F	
Approach Vol, veh/h		369			614			1902			1435	
Approach Delay, s/veh		85.3			92.6			70.2			81.5	
Approach LOS		F			F			E			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	22.0	53.8	25.0	29.2	15.8	60.0	26.2	28.0
Change Period (Y+Rc), s	5.4	5.1	5.1	5.1	5.1	5.4	5.1	5.1
Max Green Setting (Gmax), s	16.6	48.7	9.0	35.0	10.0	55.3	21.1	22.9
Max Q Clear Time (g_c+I1), s	18.6	50.7	3.8	23.1	4.3	52.7	23.1	23.8
Green Ext Time (p_c), s	0.0	0.0	0.0	0.9	0.0	1.9	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	78.4
HCM 2010 LOS	E



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	210	205	230	230	35	350	1100	220	50	1375	40
Future Volume (vph)	45	210	205	230	230	35	350	1100	220	50	1375	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.1	5.1	5.1	5.1		4.7	6.4	6.4	4.7	6.4	6.4
Lane Util. Factor		0.91	0.91	0.91	0.91		0.97	0.95	1.00	1.00	0.95	1.00
Frt		0.97	0.85	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00	0.95	0.99		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		3270	1441	1610	3298		3433	3539	1583	1770	3539	1583
Flt Permitted		0.53	1.00	0.54	0.75		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1760	1441	912	2510		3433	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	49	228	223	250	250	38	380	1196	239	54	1495	43
RTOR Reduction (vph)	0	12	134	0	5	0	0	0	122	0	0	27
Lane Group Flow (vph)	0	330	24	152	381	0	380	1196	117	54	1495	16
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		3			8		5	2		1	6	
Permitted Phases	3		3	8					2			6
Actuated Green, G (s)		24.9	24.9	33.9	33.9		24.2	73.0	73.0	11.9	60.7	60.7
Effective Green, g (s)		24.9	24.9	33.9	33.9		24.2	73.0	73.0	11.9	60.7	60.7
Actuated g/C Ratio		0.15	0.15	0.21	0.21		0.15	0.44	0.44	0.07	0.37	0.37
Clearance Time (s)		5.1	5.1	5.1	5.1		4.7	6.4	6.4	4.7	6.4	6.4
Vehicle Extension (s)		4.0	4.0	2.0	2.0		2.0	3.0	3.0	2.0	3.0	3.0
Lane Grp Cap (vph)		265	217	187	515		503	1565	700	127	1301	582
v/s Ratio Prot							0.11	c0.34		0.03	c0.42	
v/s Ratio Perm		c0.19	0.02	c0.17	0.15				0.07			0.01
v/c Ratio		1.25	0.11	0.81	0.74		0.76	0.76	0.17	0.43	1.15	0.03
Uniform Delay, d1		70.0	60.5	62.5	61.4		67.6	38.8	27.7	73.3	52.1	33.3
Progression Factor		0.22	0.02	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		134.2	0.3	21.8	5.0		5.7	3.6	0.5	0.8	76.5	0.1
Delay (s)		149.3	1.2	84.4	66.4		73.2	42.4	28.2	74.1	128.6	33.4
Level of Service		F	A	F	E		E	D	C	E	F	C
Approach Delay (s)		102.5			71.5			47.0			124.2	
Approach LOS		F			E			D			F	

Intersection Summary			
HCM 2000 Control Delay	83.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	165.0	Sum of lost time (s)	21.3
Intersection Capacity Utilization	85.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	670	40	195	900	185	45	50	175	185	120	55
Future Volume (veh/h)	20	670	40	195	900	185	45	50	175	185	120	55
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1900	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	22	728	43	212	978	201	49	54	190	201	130	60
Adj No. of Lanes	1	2	0	1	2	0	0	1	1	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	32	1132	67	336	1477	303	202	206	477	279	363	168
Arrive On Green	0.02	0.33	0.33	0.19	0.50	0.50	0.30	0.30	0.30	0.30	0.30	0.30
Sat Flow, veh/h	1774	3396	201	1774	2926	600	502	683	1583	1131	1207	557
Grp Volume(v), veh/h	22	379	392	212	591	588	103	0	190	201	0	190
Grp Sat Flow(s),veh/h/ln	1774	1770	1827	1774	1770	1757	1186	0	1583	1131	0	1764
Q Serve(g_s), s	1.3	19.1	19.1	11.6	26.1	26.2	3.2	0.0	10.0	18.5	0.0	8.9
Cycle Q Clear(g_c), s	1.3	19.1	19.1	11.6	26.1	26.2	12.1	0.0	10.0	30.5	0.0	8.9
Prop In Lane	1.00		0.11	1.00		0.34	0.48		1.00	1.00		0.32
Lane Grp Cap(c), veh/h	32	590	609	336	893	887	407	0	477	279	0	531
V/C Ratio(X)	0.69	0.64	0.64	0.63	0.66	0.66	0.25	0.00	0.40	0.72	0.00	0.36
Avail Cap(c_a), veh/h	84	590	609	389	893	887	407	0	477	279	0	531
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.85	0.85	0.85	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	51.3	29.7	29.7	39.2	19.3	19.4	29.9	0.0	29.2	42.3	0.0	28.8
Incr Delay (d2), s/veh	31.2	5.3	5.2	2.2	3.3	3.3	0.3	0.0	0.5	8.7	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	10.1	10.5	5.9	13.5	13.4	2.5	0.0	4.4	6.4	0.0	4.4
LnGrp Delay(d),s/veh	82.4	35.0	34.9	41.4	22.6	22.7	30.2	0.0	29.7	51.0	0.0	29.2
LnGrp LOS	F	D	C	D	C	C	C		C	D		C
Approach Vol, veh/h		793			1391			293			391	
Approach Delay, s/veh		36.3			25.5			29.9			40.4	
Approach LOS		D			C			C			D	

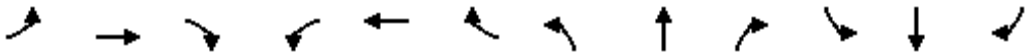
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	6.9	58.0		37.0	24.9	40.0		37.0
Change Period (Y+Rc), s	5.0	5.0		5.4	5.0	5.0		5.4
Max Green Setting (Gmax), s	5.0	53.0		31.6	23.0	35.0		31.6
Max Q Clear Time (g_c+I1), s	3.3	28.2		14.1	13.6	21.1		32.5
Green Ext Time (p_c), s	0.0	9.2		1.1	0.4	4.2		0.0

Intersection Summary		
HCM 2010 Ctrl Delay		31.0
HCM 2010 LOS		C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	735	305	755	1255	0	0	0	0	225	5	75
Future Volume (vph)	0	735	305	755	1255	0	0	0	0	225	5	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6		4.0	4.6					4.0	4.0	
Lane Util. Factor		0.95		0.97	0.95					0.95	0.95	
Frt		0.96		1.00	1.00					1.00	0.92	
Flt Protected		1.00		0.95	1.00					0.95	0.98	
Satd. Flow (prot)		3383		3433	3539					1681	1598	
Flt Permitted		1.00		0.95	1.00					0.95	0.98	
Satd. Flow (perm)		3383		3433	3539					1681	1598	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	799	332	821	1364	0	0	0	0	245	5	82
RTOR Reduction (vph)	0	31	0	0	0	0	0	0	0	0	30	0
Lane Group Flow (vph)	0	1100	0	821	1364	0	0	0	0	171	131	0
Turn Type		NA		Prot	NA					Perm	NA	
Protected Phases		2		1	6						4	
Permitted Phases										4		
Actuated Green, G (s)		51.8		20.0	75.8					15.6	15.6	
Effective Green, g (s)		51.8		20.0	75.8					15.6	15.6	
Actuated g/C Ratio		0.52		0.20	0.76					0.16	0.16	
Clearance Time (s)		4.6		4.0	4.6					4.0	4.0	
Vehicle Extension (s)		2.0		2.0	2.0					3.0	3.0	
Lane Grp Cap (vph)		1752		686	2682					262	249	
v/s Ratio Prot		c0.33		c0.24	0.39							
v/s Ratio Perm										c0.10	0.08	
v/c Ratio		0.63		1.20	0.51					0.65	0.53	
Uniform Delay, d1		17.2		40.0	4.8					39.7	38.8	
Progression Factor		1.00		0.86	0.41					1.00	1.00	
Incremental Delay, d2		1.7		97.6	0.4					5.7	2.0	
Delay (s)		18.9		131.8	2.4					45.4	40.8	
Level of Service		B		F	A					D	D	
Approach Delay (s)		18.9			51.0			0.0			43.2	
Approach LOS		B			D			A			D	

Intersection Summary			
HCM 2000 Control Delay	40.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.6
Intersection Capacity Utilization	78.8%	ICU Level of Service	D
Analysis Period (min)	15		

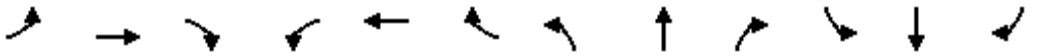
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	940	0	0	1645	225	415	0	705	0	0	0
Future Volume (vph)	60	940	0	0	1645	225	415	0	705	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.6			4.6			4.0	4.0			
Lane Util. Factor	1.00	0.95			0.86			0.95	0.95			
Frt	1.00	1.00			0.98			0.96	0.85			
Flt Protected	0.95	1.00			1.00			0.97	1.00			
Satd. Flow (prot)	1770	3539			6292			1635	1504			
Flt Permitted	0.95	1.00			1.00			0.97	1.00			
Satd. Flow (perm)	1770	3539			6292			1635	1504			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	65	1022	0	0	1788	245	451	0	766	0	0	0
RTOR Reduction (vph)	0	0	0	0	23	0	0	37	39	0	0	0
Lane Group Flow (vph)	65	1022	0	0	2010	0	0	598	543	0	0	0
Turn Type	Prot	NA			NA		Perm	NA	Perm			
Protected Phases	5	2			6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	5.0	51.5			42.5			39.9	39.9			
Effective Green, g (s)	5.0	51.5			42.5			39.9	39.9			
Actuated g/C Ratio	0.05	0.52			0.42			0.40	0.40			
Clearance Time (s)	4.0	4.6			4.6			4.0	4.0			
Vehicle Extension (s)	2.0	2.0			2.0			2.0	2.0			
Lane Grp Cap (vph)	88	1822			2674			652	600			
v/s Ratio Prot	c0.04	0.29			c0.32							
v/s Ratio Perm								0.37	0.36			
v/c Ratio	0.74	0.56			0.75			0.92	0.90			
Uniform Delay, d1	46.9	16.5			24.3			28.5	28.3			
Progression Factor	1.23	0.41			1.00			1.00	1.00			
Incremental Delay, d2	21.1	1.1			2.0			17.5	16.8			
Delay (s)	78.8	7.9			26.3			46.0	45.1			
Level of Service	E	A			C			D	D			
Approach Delay (s)		12.1			26.3			45.6			0.0	
Approach LOS		B			C			D			A	

Intersection Summary			
HCM 2000 Control Delay	28.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.6
Intersection Capacity Utilization	78.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	300	1055	140	175	1170	140	375	115	180	150	95	225
Future Volume (vph)	300	1055	140	175	1170	140	375	115	180	150	95	225
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.3	4.3		4.3	4.3		4.7	4.7	4.7	4.7	4.7	4.7
Lane Util. Factor	0.97	0.95		0.97	0.95		0.97	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.98		1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	0.99	1.00
Satd. Flow (prot)	3433	3477		3433	3483		3433	1863	1583	1681	1748	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	0.99	1.00
Satd. Flow (perm)	3433	3477		3433	3483		3433	1863	1583	1681	1748	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	326	1147	152	190	1272	152	408	125	196	163	103	245
RTOR Reduction (vph)	0	8	0	0	8	0	0	0	175	0	0	156
Lane Group Flow (vph)	326	1291	0	190	1416	0	408	125	21	130	136	89
Turn Type	Prot	NA		Prot	NA		Split	NA	Perm	Split	NA	Perm
Protected Phases	1	6		5	2		4	4		3	3	
Permitted Phases									4			3
Actuated Green, G (s)	17.2	54.3		6.7	43.8		11.3	11.3	11.3	14.7	14.7	14.7
Effective Green, g (s)	17.2	54.3		6.7	43.8		11.3	11.3	11.3	14.7	14.7	14.7
Actuated g/C Ratio	0.16	0.52		0.06	0.42		0.11	0.11	0.11	0.14	0.14	0.14
Clearance Time (s)	4.3	4.3		4.3	4.3		4.7	4.7	4.7	4.7	4.7	4.7
Vehicle Extension (s)	2.0	4.0		2.0	4.0		2.0	2.0	2.0	3.0	3.0	3.0
Lane Grp Cap (vph)	562	1798		219	1452		369	200	170	235	244	221
v/s Ratio Prot	0.09	c0.37		0.06	c0.41		c0.12	0.07		0.08	c0.08	
v/s Ratio Perm									0.01			0.06
v/c Ratio	0.58	0.72		0.87	0.98		1.11	0.62	0.12	0.55	0.56	0.40
Uniform Delay, d1	40.6	19.5		48.7	30.1		46.9	44.8	42.4	42.1	42.1	41.2
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	2.5		27.5	18.4		78.5	4.3	0.1	2.8	2.7	1.2
Delay (s)	41.5	22.0		76.3	48.4		125.3	49.2	42.5	44.9	44.9	42.4
Level of Service	D	C		E	D		F	D	D	D	D	D
Approach Delay (s)		25.9			51.7			90.0			43.7	
Approach LOS		C			D			F			D	

Intersection Summary			
HCM 2000 Control Delay	47.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	73.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	135	885	150	255	1090	1435	170	245	185	330	325	145
Future Volume (veh/h)	135	885	150	255	1090	1435	170	245	185	330	325	145
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	147	962	0	277	1185	0	185	266	0	359	353	0
Adj No. of Lanes	2	2	1	2	2	1	2	2	1	2	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	131	1120	501	387	1383	619	350	1168	523	220	1035	0
Arrive On Green	0.04	0.32	0.00	0.11	0.39	0.00	0.10	0.33	0.00	0.06	0.29	0.00
Sat Flow, veh/h	3442	3539	1583	3442	3539	1583	3442	3539	1583	3442	3632	0
Grp Volume(v), veh/h	147	962	0	277	1185	0	185	266	0	359	353	0
Grp Sat Flow(s),veh/h/ln	1721	1770	1583	1721	1770	1583	1721	1770	1583	1721	1770	0
Q Serve(g_s), s	4.0	26.8	0.0	8.2	32.2	0.0	5.4	5.7	0.0	6.7	8.2	0.0
Cycle Q Clear(g_c), s	4.0	26.8	0.0	8.2	32.2	0.0	5.4	5.7	0.0	6.7	8.2	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	131	1120	501	387	1383	619	350	1168	523	220	1035	0
V/C Ratio(X)	1.12	0.86	0.00	0.72	0.86	0.00	0.53	0.23	0.00	1.63	0.34	0.00
Avail Cap(c_a), veh/h	131	1281	573	426	1584	709	350	1168	523	220	1035	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	50.5	33.7	0.0	45.0	29.3	0.0	44.8	25.5	0.0	49.2	29.2	0.0
Incr Delay (d2), s/veh	114.8	5.5	0.0	4.1	4.4	0.0	0.8	0.5	0.0	305.4	0.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.0	13.9	0.0	4.1	16.5	0.0	2.6	2.9	0.0	12.5	4.1	0.0
LnGrp Delay(d),s/veh	165.3	39.2	0.0	49.0	33.7	0.0	45.6	25.9	0.0	354.5	30.1	0.0
LnGrp LOS	F	D		D	C		D	C		F	C	
Approach Vol, veh/h		1109			1462			451			712	
Approach Delay, s/veh		55.9			36.6			34.0			193.7	
Approach LOS		E			D			C			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.0	46.0	11.0	39.0	16.8	38.2	15.0	35.0
Change Period (Y+Rc), s	5.0	5.0	* 4.3	* 4.3	5.0	5.0	* 4.3	* 4.3
Max Green Setting (Gmax), s	4.0	47.0	* 6.7	* 29	13.0	38.0	* 4.7	* 31
Max Q Clear Time (g_c+I1), s	6.0	34.2	8.7	7.7	10.2	28.8	7.4	10.2
Green Ext Time (p_c), s	0.0	6.8	0.0	1.6	0.2	4.5	0.0	2.2

Intersection Summary	
HCM 2010 Ctrl Delay	72.0
HCM 2010 LOS	E

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	120	745	365	175	505	175	435	345	40	165	365	105
Future Volume (veh/h)	120	745	365	175	505	175	435	345	40	165	365	105
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	130	810	0	190	549	190	473	375	0	179	397	114
Adj No. of Lanes	1	2	1	2	2	0	2	1	1	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	146	987	441	478	882	304	521	380	323	193	439	125
Arrive On Green	0.08	0.28	0.00	0.14	0.34	0.34	0.15	0.20	0.00	0.11	0.16	0.16
Sat Flow, veh/h	1774	3539	1583	3442	2584	891	3442	1863	1583	1774	2722	773
Grp Volume(v), veh/h	130	810	0	190	375	364	473	375	0	179	257	254
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1721	1770	1705	1721	1863	1583	1774	1770	1726
Q Serve(g_s), s	5.8	17.1	0.0	4.0	14.2	14.3	10.8	16.1	0.0	8.0	11.4	11.6
Cycle Q Clear(g_c), s	5.8	17.1	0.0	4.0	14.2	14.3	10.8	16.1	0.0	8.0	11.4	11.6
Prop In Lane	1.00		1.00	1.00		0.52	1.00		1.00	1.00		0.45
Lane Grp Cap(c), veh/h	146	987	441	478	604	582	521	380	323	193	285	278
V/C Ratio(X)	0.89	0.82	0.00	0.40	0.62	0.62	0.91	0.99	0.00	0.93	0.90	0.91
Avail Cap(c_a), veh/h	146	1168	522	478	604	582	521	380	323	193	285	278
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.3	27.0	0.0	31.4	22.0	22.1	33.4	31.8	0.0	35.3	32.9	33.0
Incr Delay (d2), s/veh	43.3	7.6	0.0	0.2	4.8	5.0	19.4	42.8	0.0	48.2	28.9	32.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.6	9.4	0.0	1.9	7.7	7.5	6.5	12.7	0.0	6.5	7.8	8.0
LnGrp Delay(d),s/veh	79.6	34.6	0.0	31.6	26.8	27.1	52.8	74.6	0.0	83.6	61.8	65.4
LnGrp LOS	E	C		C	C	C	D	E		F	E	E
Approach Vol, veh/h		940			929			848			690	
Approach Delay, s/veh		40.9			27.9			62.4			68.8	
Approach LOS		D			C			E			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.1	32.3	14.5	22.1	16.1	27.3	17.9	18.7
Change Period (Y+Rc), s	4.5	5.0	5.8	5.8	5.0	5.0	5.8	5.8
Max Green Setting (Gmax), s	6.6	27.3	8.7	16.3	7.0	26.4	12.1	12.9
Max Q Clear Time (g_c+I1), s	7.8	16.3	10.0	18.1	6.0	19.1	12.8	13.6
Green Ext Time (p_c), s	0.0	3.6	0.0	0.0	0.0	3.2	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	48.3
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	175	675	225	200	710	80	165	285	160	115	405	235
Future Volume (veh/h)	175	675	225	200	710	80	165	285	160	115	405	235
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	190	734	245	217	772	87	179	310	174	125	440	255
Adj No. of Lanes	1	2	1	1	2	0	2	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	220	886	396	246	851	96	643	773	424	153	540	310
Arrive On Green	0.12	0.25	0.25	0.14	0.27	0.27	0.19	0.35	0.35	0.09	0.25	0.25
Sat Flow, veh/h	1774	3539	1583	1774	3207	361	3442	2208	1211	1774	2167	1246
Grp Volume(v), veh/h	190	734	245	217	426	433	179	247	237	125	359	336
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1799	1721	1770	1649	1774	1770	1643
Q Serve(g_s), s	11.7	21.8	9.7	13.3	25.8	25.9	5.0	11.7	12.1	7.7	21.2	21.4
Cycle Q Clear(g_c), s	11.7	21.8	9.7	13.3	25.8	25.9	5.0	11.7	12.1	7.7	21.2	21.4
Prop In Lane	1.00		1.00	1.00		0.20	1.00		0.73	1.00		0.76
Lane Grp Cap(c), veh/h	220	886	396	246	470	477	643	619	577	153	441	409
V/C Ratio(X)	0.87	0.83	0.62	0.88	0.91	0.91	0.28	0.40	0.41	0.82	0.81	0.82
Avail Cap(c_a), veh/h	256	957	428	272	494	502	643	619	577	197	539	500
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	47.7	39.3	14.8	46.9	39.4	39.4	38.7	27.3	27.4	49.9	39.2	39.3
Incr Delay (d2), s/veh	22.8	5.8	2.4	25.2	19.8	19.6	0.2	1.9	2.2	18.6	8.7	9.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.1	11.3	5.8	8.2	15.2	15.5	2.4	6.0	5.9	4.6	11.4	10.8
LnGrp Delay(d),s/veh	70.5	45.1	17.2	72.1	59.3	59.1	38.9	29.2	29.5	68.5	47.9	49.2
LnGrp LOS	E	D	B	E	E	E	D	C	C	E	D	D
Approach Vol, veh/h		1169			1076			663			820	
Approach Delay, s/veh		43.4			61.8			31.9			51.6	
Approach LOS		D			E			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.3	43.5	20.4	32.8	25.4	32.4	18.7	34.5
Change Period (Y+Rc), s	* 4.7	* 4.7	5.0	5.0	* 4.7	* 4.7	5.0	5.0
Max Green Setting (Gmax), s	* 12	* 32	17.0	30.0	* 11	* 34	16.0	31.0
Max Q Clear Time (g_c+I1), s	9.7	14.1	15.3	23.8	7.0	23.4	13.7	27.9
Green Ext Time (p_c), s	0.1	3.9	0.1	3.0	0.2	4.2	0.1	1.6

Intersection Summary	
HCM 2010 Ctrl Delay	48.5
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	190	545	80	120	550	165	245	540	90	165	640	215
Future Volume (veh/h)	190	545	80	120	550	165	245	540	90	165	640	215
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	207	592	87	130	598	179	266	587	98	179	696	234
Adj No. of Lanes	1	2	0	1	2	1	1	2	0	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	235	757	111	158	710	318	295	681	113	298	800	358
Arrive On Green	0.13	0.24	0.24	0.09	0.20	0.20	0.17	0.22	0.22	0.17	0.23	0.23
Sat Flow, veh/h	1774	3098	454	1774	3539	1583	1774	3037	506	1774	3539	1583
Grp Volume(v), veh/h	207	338	341	130	598	179	266	341	344	179	696	234
Grp Sat Flow(s),veh/h/ln	1774	1770	1783	1774	1770	1583	1774	1770	1773	1774	1770	1583
Q Serve(g_s), s	12.7	19.8	19.9	8.0	18.0	11.3	16.3	20.6	20.7	10.4	21.0	14.9
Cycle Q Clear(g_c), s	12.7	19.8	19.9	8.0	18.0	11.3	16.3	20.6	20.7	10.4	21.0	14.9
Prop In Lane	1.00		0.25	1.00		1.00	1.00		0.29	1.00		1.00
Lane Grp Cap(c), veh/h	235	433	436	158	710	318	295	397	398	298	800	358
V/C Ratio(X)	0.88	0.78	0.78	0.82	0.84	0.56	0.90	0.86	0.86	0.60	0.87	0.65
Avail Cap(c_a), veh/h	248	525	528	190	934	418	316	531	532	298	925	414
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	47.3	39.2	39.2	49.7	42.7	40.0	45.4	41.4	41.4	42.7	41.4	39.0
Incr Delay (d2), s/veh	26.3	4.9	5.0	21.3	11.6	7.0	26.4	8.5	8.8	2.4	7.3	1.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.9	10.2	10.4	4.9	9.9	5.6	10.1	11.0	11.1	5.3	11.1	6.7
LnGrp Delay(d),s/veh	73.6	44.0	44.2	71.0	54.2	47.0	71.8	49.9	50.2	45.1	48.7	40.9
LnGrp LOS	E	D	D	E	D	D	E	D	D	D	D	D
Approach Vol, veh/h		886			907			951			1109	
Approach Delay, s/veh		51.0			55.2			56.1			46.5	
Approach LOS		D			E			E			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	22.9	29.1	14.4	31.6	22.6	29.3	19.2	26.8
Change Period (Y+Rc), s	* 4.2	* 4.2	4.5	4.5	* 4.2	* 4.2	4.5	4.5
Max Green Setting (Gmax), s	* 16	* 33	11.9	32.9	* 20	* 29	15.5	29.3
Max Q Clear Time (g_c+I1), s	12.4	22.7	10.0	21.9	18.3	23.0	14.7	20.0
Green Ext Time (p_c), s	0.1	2.2	0.1	2.2	0.1	2.1	0.0	2.2

Intersection Summary	
HCM 2010 Ctrl Delay	51.9
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	180	290	165	140	270	175	135	930	40	285	975	160
Future Volume (veh/h)	180	290	165	140	270	175	135	930	40	285	975	160
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	196	315	179	152	293	190	147	1011	43	310	1060	174
Adj No. of Lanes	1	2	1	1	2	0	1	2	0	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	208	1052	471	160	563	356	221	966	41	304	1153	516
Arrive On Green	0.12	0.30	0.30	0.09	0.27	0.27	0.12	0.28	0.28	0.17	0.33	0.33
Sat Flow, veh/h	1774	3539	1583	1774	2085	1316	1774	3459	147	1774	3539	1583
Grp Volume(v), veh/h	196	315	179	152	248	235	147	517	537	310	1060	174
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1631	1774	1770	1837	1774	1770	1583
Q Serve(g_s), s	12.2	7.6	7.0	9.5	13.2	13.7	8.8	31.0	31.0	19.0	32.0	6.5
Cycle Q Clear(g_c), s	12.2	7.6	7.0	9.5	13.2	13.7	8.8	31.0	31.0	19.0	32.0	6.5
Prop In Lane	1.00		1.00	1.00		0.81	1.00		0.08	1.00		1.00
Lane Grp Cap(c), veh/h	208	1052	471	160	478	441	221	494	513	304	1153	516
V/C Ratio(X)	0.94	0.30	0.38	0.95	0.52	0.53	0.66	1.05	1.05	1.02	0.92	0.34
Avail Cap(c_a), veh/h	208	1052	471	160	478	441	221	494	513	304	1212	542
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	48.6	30.1	15.4	50.3	34.4	34.5	46.4	40.0	40.0	46.0	36.0	14.1
Incr Delay (d2), s/veh	46.5	0.7	2.3	56.6	0.5	0.7	7.3	53.2	52.4	57.1	10.6	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.7	3.8	4.1	7.2	6.5	6.2	4.7	22.4	23.1	14.1	17.3	3.5
LnGrp Delay(d),s/veh	95.2	30.8	17.8	106.9	34.8	35.2	53.6	93.2	92.4	103.1	46.6	14.3
LnGrp LOS	F	C	B	F	C	D	D	F	F	F	D	B
Approach Vol, veh/h		690			635			1201			1544	
Approach Delay, s/veh		45.7			52.2			88.0			54.3	
Approach LOS		D			D			F			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	24.0	36.0	14.0	37.0	18.8	41.2	17.0	34.0
Change Period (Y+Rc), s	5.0	5.0	4.0	4.0	5.0	5.0	4.0	4.0
Max Green Setting (Gmax), s	19.0	31.0	10.0	33.0	12.0	38.0	13.0	30.0
Max Q Clear Time (g_c+I1), s	21.0	33.0	11.5	9.6	10.8	34.0	14.2	15.7
Green Ext Time (p_c), s	0.0	0.0	0.0	1.6	0.0	2.2	0.0	1.7

Intersection Summary	
HCM 2010 Ctrl Delay	62.5
HCM 2010 LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	125	70	125	15	425	110	135	855	25
Future Volume (veh/h)	0	0	0	125	70	125	15	425	110	135	855	25
Number				7	4	14	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1900	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h				136	76	136	16	462	120	147	929	27
Adj No. of Lanes				0	2	0	1	2	0	1	2	0
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				0	2	0	2	2	2	2	2	2
Cap, veh/h				202	115	213	76	860	222	185	1300	38
Arrive On Green				0.15	0.15	0.15	0.04	0.31	0.31	0.10	0.37	0.37
Sat Flow, veh/h				1303	741	1374	1774	2787	719	1774	3512	102
Grp Volume(v), veh/h				188	0	160	16	292	290	147	468	488
Grp Sat Flow(s),veh/h/ln				1798	0	1620	1774	1770	1736	1774	1770	1845
Q Serve(g_s), s				6.9	0.0	6.5	0.6	9.6	9.7	5.7	15.9	15.9
Cycle Q Clear(g_c), s				6.9	0.0	6.5	0.6	9.6	9.7	5.7	15.9	15.9
Prop In Lane				0.72		0.85	1.00		0.41	1.00		0.06
Lane Grp Cap(c), veh/h				278	0	251	76	546	536	185	655	683
V/C Ratio(X)				0.67	0.00	0.64	0.21	0.54	0.54	0.79	0.71	0.71
Avail Cap(c_a), veh/h				693	0	625	79	546	536	185	655	683
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh				27.9	0.0	27.7	32.4	20.0	20.1	30.6	18.9	18.9
Incr Delay (d2), s/veh				2.8	0.0	2.7	1.4	3.7	3.9	20.8	6.6	6.3
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				3.6	0.0	3.1	0.3	5.2	5.2	3.8	8.9	9.2
LnGrp Delay(d),s/veh				30.7	0.0	30.4	33.7	23.8	24.0	51.4	25.4	25.2
LnGrp LOS				C		C	C	C	C	D	C	C
Approach Vol, veh/h					348			598			1103	
Approach Delay, s/veh					30.6			24.1			28.8	
Approach LOS					C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		
Phs Duration (G+Y+Rc), s	12.0	26.3		15.5	7.7	30.6		
Change Period (Y+Rc), s	* 4.7	* 4.7		* 4.7	* 4.7	* 4.7		
Max Green Setting (Gmax), s	* 7.3	* 22		* 27	* 3.1	* 26		
Max Q Clear Time (g_c+I1), s	7.7	11.7		8.9	2.6	17.9		
Green Ext Time (p_c), s	0.0	2.6		2.0	0.0	3.7		

Intersection Summary	
HCM 2010 Ctrl Delay	27.7
HCM 2010 LOS	C

Notes



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	110	370	170	1120	1200	155
Future Volume (veh/h)	110	370	170	1120	1200	155
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	120	402	185	1217	1304	168
Adj No. of Lanes	1	1	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	485	433	238	2140	1497	670
Arrive On Green	0.27	0.27	0.13	0.60	0.42	0.42
Sat Flow, veh/h	1774	1583	1774	3632	3632	1583
Grp Volume(v), veh/h	120	402	185	1217	1304	168
Grp Sat Flow(s),veh/h/ln	1774	1583	1774	1770	1770	1583
Q Serve(g_s), s	5.5	26.0	10.6	21.7	35.4	7.2
Cycle Q Clear(g_c), s	5.5	26.0	10.6	21.7	35.4	7.2
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	485	433	238	2140	1497	670
V/C Ratio(X)	0.25	0.93	0.78	0.57	0.87	0.25
Avail Cap(c_a), veh/h	541	483	247	2140	1497	670
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	29.7	37.1	43.9	12.5	27.7	19.6
Incr Delay (d2), s/veh	0.3	23.1	14.0	1.1	7.2	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	22.9	6.1	10.8	18.7	3.3
LnGrp Delay(d),s/veh	30.0	60.2	57.9	13.6	34.9	20.5
LnGrp LOS	C	E	E	B	C	C
Approach Vol, veh/h	522			1402	1472	
Approach Delay, s/veh	53.2			19.5	33.3	
Approach LOS	D			B	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		68.5		33.2	19.1	49.4		
Change Period (Y+Rc), s		5.0		4.5	5.0	* 5		
Max Green Setting (Gmax), s		63.5		32.0	14.6	* 44		
Max Q Clear Time (g_c+I1), s		23.7		28.0	12.6	37.4		
Green Ext Time (p_c), s		12.1		0.8	0.1	5.0		

Intersection Summary	
HCM 2010 Ctrl Delay	30.6
HCM 2010 LOS	C

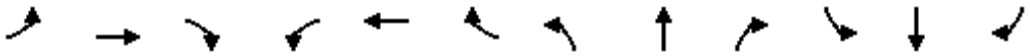
Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	130	350	70	60	280	135	120	1010	75	205	1225	140
Future Volume (veh/h)	130	350	70	60	280	135	120	1010	75	205	1225	140
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	141	380	76	65	304	147	130	1098	82	223	1332	152
Adj No. of Lanes	1	1	0	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	201	544	109	204	429	207	152	1281	573	253	1483	663
Arrive On Green	0.36	0.36	0.36	0.36	0.36	0.36	0.09	0.36	0.36	0.14	0.42	0.42
Sat Flow, veh/h	936	1508	302	931	1187	574	1774	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	141	0	456	65	0	451	130	1098	82	223	1332	152
Grp Sat Flow(s),veh/h/ln	936	0	1810	931	0	1761	1774	1770	1583	1774	1770	1583
Q Serve(g_s), s	14.8	0.0	22.6	6.7	0.0	23.1	7.6	30.1	3.7	12.9	36.8	6.5
Cycle Q Clear(g_c), s	37.9	0.0	22.6	29.3	0.0	23.1	7.6	30.1	3.7	12.9	36.8	6.5
Prop In Lane	1.00		0.17	1.00		0.33	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	201	0	653	204	0	636	152	1281	573	253	1483	663
V/C Ratio(X)	0.70	0.00	0.70	0.32	0.00	0.71	0.85	0.86	0.14	0.88	0.90	0.23
Avail Cap(c_a), veh/h	201	0	653	204	0	636	152	1281	573	253	1483	663
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.77	0.77	0.77	1.00	1.00	1.00
Uniform Delay (d), s/veh	45.6	0.0	28.7	41.2	0.0	28.8	47.4	31.0	22.5	44.1	28.4	19.6
Incr Delay (d2), s/veh	10.5	0.0	3.3	0.9	0.0	3.7	28.9	6.0	0.4	27.9	9.0	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.7	0.0	11.9	1.8	0.0	11.8	4.9	15.7	1.7	8.3	19.8	3.0
LnGrp Delay(d),s/veh	56.1	0.0	31.9	42.1	0.0	32.5	76.2	37.0	22.9	72.0	37.4	20.4
LnGrp LOS	E		C	D		C	E	D	C	E	D	C
Approach Vol, veh/h		597			516			1310			1707	
Approach Delay, s/veh		37.6			33.7			40.0			40.4	
Approach LOS		D			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	20.0	43.0		42.2	14.0	49.0		42.2
Change Period (Y+Rc), s	5.0	5.0		* 4.3	5.0	5.0		* 4.3
Max Green Setting (Gmax), s	15.0	38.0		* 38	9.0	44.0		* 38
Max Q Clear Time (g_c+I1), s	14.9	32.1		39.9	9.6	38.8		31.3
Green Ext Time (p_c), s	0.0	4.3		0.0	0.0	4.3		1.7

Intersection Summary	
HCM 2010 Ctrl Delay	39.0
HCM 2010 LOS	D

Notes



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	210	50	95	5	55	5	65	495	5	5	605	210
Future Volume (vph)	210	50	95	5	55	5	65	495	5	5	605	210
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.7	4.7		4.7	4.7	4.7	5.1		4.7	5.1	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	0.96	
Flt Protected		0.96	1.00		1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1790	1583		1856	1583	1770	1860		1770	1791	
Flt Permitted		0.72	1.00		0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1347	1583		1813	1583	1770	1860		1770	1791	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	228	54	103	5	60	5	71	538	5	5	658	228
RTOR Reduction (vph)	0	0	74	0	0	4	0	1	0	0	18	0
Lane Group Flow (vph)	0	282	29	0	65	1	71	542	0	5	868	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)		18.0	18.0		18.0	18.0	6.8	31.5		1.0	25.7	
Effective Green, g (s)		18.0	18.0		18.0	18.0	6.8	31.5		1.0	25.7	
Actuated g/C Ratio		0.28	0.28		0.28	0.28	0.10	0.48		0.02	0.40	
Clearance Time (s)		4.7	4.7		4.7	4.7	4.7	5.1		4.7	5.1	
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		373	438		502	438	185	901		27	708	
v/s Ratio Prot							0.04	c0.29		0.00	c0.48	
v/s Ratio Perm		c0.21	0.02		0.04	0.00						
v/c Ratio		0.76	0.07		0.13	0.00	0.38	0.60		0.19	1.23	
Uniform Delay, d1		21.5	17.3		17.6	17.0	27.1	12.2		31.6	19.7	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		8.5	0.1		0.1	0.0	1.3	3.0		3.3	113.9	
Delay (s)		30.0	17.4		17.7	17.0	28.5	15.2		34.9	133.6	
Level of Service		C	B		B	B	C	B		C	F	
Approach Delay (s)		26.6			17.7			16.7			133.0	
Approach LOS		C			B			B			F	

Intersection Summary			
HCM 2000 Control Delay	71.6	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	83.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	85	200	270	25	275	60	270	995	40	55	1140	145
Future Volume (veh/h)	85	200	270	25	275	60	270	995	40	55	1140	145
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	92	217	293	27	299	65	293	1082	43	60	1239	158
Adj No. of Lanes	1	1	1	1	2	0	2	2	0	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	115	394	335	56	516	111	301	1391	55	103	1316	589
Arrive On Green	0.07	0.21	0.21	0.03	0.18	0.18	0.09	0.40	0.40	0.06	0.37	0.37
Sat Flow, veh/h	1774	1863	1583	1774	2901	622	3442	3470	138	1774	3539	1583
Grp Volume(v), veh/h	92	217	293	27	181	183	293	552	573	60	1239	158
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	1770	1753	1721	1770	1838	1774	1770	1583
Q Serve(g_s), s	5.3	10.7	18.4	1.5	9.6	9.9	8.7	27.9	28.0	3.4	34.9	7.2
Cycle Q Clear(g_c), s	5.3	10.7	18.4	1.5	9.6	9.9	8.7	27.9	28.0	3.4	34.9	7.2
Prop In Lane	1.00		1.00	1.00		0.35	1.00		0.08	1.00		1.00
Lane Grp Cap(c), veh/h	115	394	335	56	315	312	301	710	737	103	1316	589
V/C Ratio(X)	0.80	0.55	0.87	0.49	0.57	0.59	0.97	0.78	0.78	0.58	0.94	0.27
Avail Cap(c_a), veh/h	115	555	472	103	515	511	301	710	737	103	1316	589
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.46	0.46	0.46
Uniform Delay (d), s/veh	47.5	36.2	39.3	49.1	38.8	38.9	46.9	26.9	26.9	47.3	31.3	22.6
Incr Delay (d2), s/veh	30.3	0.9	11.3	4.8	1.2	1.3	44.7	8.2	7.9	3.7	7.8	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.6	5.6	9.1	0.8	4.8	4.9	6.0	15.3	15.8	1.8	18.5	3.2
LnGrp Delay(d),s/veh	77.8	37.1	50.6	53.9	40.0	40.2	91.6	35.0	34.8	51.0	39.1	23.1
LnGrp LOS	E	D	D	D	D	D	F	D	C	D	D	C
Approach Vol, veh/h		602			391			1418			1457	
Approach Delay, s/veh		49.9			41.0			46.6			37.9	
Approach LOS		D			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.0	46.3	7.5	26.5	14.0	43.3	11.0	23.0
Change Period (Y+Rc), s	5.0	5.0	* 4.3	* 4.7	5.0	5.0	* 4.3	* 4.7
Max Green Setting (Gmax), s	6.0	41.3	* 6	* 31	9.0	38.3	* 6.7	* 30
Max Q Clear Time (g_c+I1), s	5.4	30.0	3.5	20.4	10.7	36.9	7.3	11.9
Green Ext Time (p_c), s	0.0	7.0	0.0	1.4	0.0	1.2	0.0	1.6

Intersection Summary	
HCM 2010 Ctrl Delay	43.3
HCM 2010 LOS	D

Notes

Movement	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	NBR2
Lane Configurations												
Traffic Volume (vph)	49	43	161	53	7	164	135	13	36	381	97	9
Future Volume (vph)	49	43	161	53	7	164	135	13	36	381	97	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5			5.0			3.5	5.0		5.0
Lane Util. Factor		1.00	1.00			1.00			1.00	1.00		1.00
Frt		1.00	0.96			0.94			1.00	0.97		0.85
Flt Protected		0.95	1.00			1.00			0.95	1.00		1.00
Satd. Flow (prot)		1770	1793			1744			1770	1806		1583
Flt Permitted		0.95	1.00			0.99			0.95	1.00		1.00
Satd. Flow (perm)		1770	1793			1730			1770	1806		1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	53	47	175	58	8	178	147	14	39	414	105	10
RTOR Reduction (vph)	0	0	6	0	0	1	0	0	0	0	0	7
Lane Group Flow (vph)	0	100	227	0	0	346	0	0	39	519	0	3
Turn Type	Prot	Prot	NA		Perm	NA			Prot	NA		Perm
Protected Phases	4	4				7			1	6		
Permitted Phases			4		7							6
Actuated Green, G (s)		24.7	24.7			39.0			5.6	59.8		59.8
Effective Green, g (s)		24.7	24.7			39.0			5.6	59.8		59.8
Actuated g/C Ratio		0.13	0.13			0.21			0.03	0.32		0.32
Clearance Time (s)		4.5	4.5			5.0			3.5	5.0		5.0
Vehicle Extension (s)		3.5	3.5			4.0			3.5	6.0		6.0
Lane Grp Cap (vph)		231	234			356			52	571		500
v/s Ratio Prot		0.06							0.02	c0.29		
v/s Ratio Perm			c0.13			c0.20						0.00
v/c Ratio		0.43	0.97			0.97			0.75	0.91		0.01
Uniform Delay, d1		75.7	81.8			74.5			91.0	62.0		44.2
Progression Factor		1.00	1.00			1.00			1.00	1.00		1.00
Incremental Delay, d2		1.5	49.9			40.3			46.3	19.9		0.0
Delay (s)		77.2	131.7			114.7			137.3	81.9		44.3
Level of Service		E	F			F			F	F		D
Approach Delay (s)			115.3			114.7				85.0		
Approach LOS			F			F				F		

Intersection Summary			
HCM 2000 Control Delay	90.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	189.0	Sum of lost time (s)	23.5
Intersection Capacity Utilization	92.9%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group



Movement	SBL2	SBL	SBT	SBR	SWL2	SWL	SWR	SWR2
Lane Configurations								
Traffic Volume (vph)	14	186	482	34	37	52	25	1
Future Volume (vph)	14	186	482	34	37	52	25	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	5.0			5.0		
Lane Util. Factor		1.00	1.00			1.00		
Frt		1.00	0.99			0.97		
Flt Protected		0.95	1.00			0.96		
Satd. Flow (prot)		1770	1844			1739		
Flt Permitted		0.95	1.00			0.96		
Satd. Flow (perm)		1770	1844			1739		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	15	202	524	37	40	57	27	1
RTOR Reduction (vph)	0	0	1	0	0	99	0	0
Lane Group Flow (vph)	0	217	560	0	0	26	0	0
Turn Type	Prot	Prot	NA		Prot	Prot		
Protected Phases	5	5	2		3	3		
Permitted Phases								
Actuated Green, G (s)		24.0	78.7			18.0		
Effective Green, g (s)		24.0	78.7			18.0		
Actuated g/C Ratio		0.13	0.42			0.10		
Clearance Time (s)		4.0	5.0			5.0		
Vehicle Extension (s)		3.0	6.0			3.5		
Lane Grp Cap (vph)		224	767			165		
v/s Ratio Prot		c0.12	0.30			c0.02		
v/s Ratio Perm								
v/c Ratio		0.97	0.73			0.16		
Uniform Delay, d1		82.1	46.2			78.6		
Progression Factor		1.00	1.00			1.00		
Incremental Delay, d2		50.7	6.0			2.1		
Delay (s)		132.8	52.3			80.6		
Level of Service		F	D			F		
Approach Delay (s)			74.7			80.6		
Approach LOS			E			F		

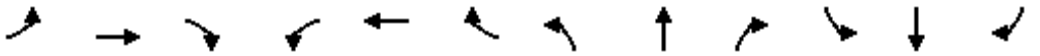
Intersection Summary



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	600	10	1175	720	0	1425
Future Volume (vph)	600	10	1175	720	0	1425
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.1	5.1	5.1	5.1		5.1
Lane Util. Factor	1.00	1.00	0.95	1.00		0.95
Frt	1.00	0.85	1.00	0.85		1.00
Flt Protected	0.95	1.00	1.00	1.00		1.00
Satd. Flow (prot)	1770	1583	3539	1583		3539
Flt Permitted	0.95	1.00	1.00	1.00		1.00
Satd. Flow (perm)	1770	1583	3539	1583		3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	652	11	1277	783	0	1549
RTOR Reduction (vph)	0	3	0	0	0	0
Lane Group Flow (vph)	652	8	1277	783	0	1549
Turn Type	Prot	Prot	NA	pt+ov		NA
Protected Phases	4	4	6	4 6		2
Permitted Phases					2	
Actuated Green, G (s)	21.0	21.0	33.8	65.0		33.8
Effective Green, g (s)	21.0	21.0	33.8	65.0		33.8
Actuated g/C Ratio	0.32	0.32	0.52	1.00		0.52
Clearance Time (s)	5.1	5.1	5.1			5.1
Vehicle Extension (s)	2.5	2.5	4.0			4.0
Lane Grp Cap (vph)	571	511	1840	1583		1840
v/s Ratio Prot	c0.37	0.01	0.36	0.49		c0.44
v/s Ratio Perm						
v/c Ratio	1.14	0.02	0.69	0.49		0.84
Uniform Delay, d1	22.0	15.0	11.7	0.0		13.3
Progression Factor	1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2	83.3	0.0	2.2	0.2		4.9
Delay (s)	105.3	15.0	13.9	0.2		18.2
Level of Service	F	B	B	A		B
Approach Delay (s)	103.8		8.7			18.2
Approach LOS	F		A			B

Intersection Summary			
HCM 2000 Control Delay	26.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	14.2
Intersection Capacity Utilization	92.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	595	85	0	805	280	0	0	0	645	0	370
Future Volume (vph)	0	595	85	0	805	280	0	0	0	645	0	370
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.1			5.1	5.1				4.7	4.7	
Lane Util. Factor		1.00			1.00	1.00				0.95	0.95	
Frt		0.98			1.00	0.85				1.00	0.89	
Flt Protected		1.00			1.00	1.00				0.95	0.99	
Satd. Flow (prot)		1831			1863	1583				1681	1549	
Flt Permitted		1.00			1.00	1.00				0.95	0.99	
Satd. Flow (perm)		1831			1863	1583				1681	1549	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	647	92	0	875	304	0	0	0	701	0	402
RTOR Reduction (vph)	0	6	0	0	0	151	0	0	0	0	71	0
Lane Group Flow (vph)	0	733	0	0	875	153	0	0	0	575	457	0
Turn Type		NA			NA	Perm				Split	NA	
Protected Phases		2			6					4	4	
Permitted Phases						6						
Actuated Green, G (s)		38.8			38.8	38.8				28.5	28.5	
Effective Green, g (s)		38.8			38.8	38.8				28.5	28.5	
Actuated g/C Ratio		0.50			0.50	0.50				0.37	0.37	
Clearance Time (s)		5.1			5.1	5.1				4.7	4.7	
Vehicle Extension (s)		2.0			2.0	2.0				2.0	2.0	
Lane Grp Cap (vph)		921			937	796				621	572	
v/s Ratio Prot		0.40			c0.47					c0.34	0.29	
v/s Ratio Perm						0.10						
v/c Ratio		0.80			0.93	0.19				0.93	0.80	
Uniform Delay, d1		15.9			17.9	10.5				23.3	21.7	
Progression Factor		1.00			1.00	1.00				1.00	1.00	
Incremental Delay, d2		4.5			15.6	0.0				19.5	7.2	
Delay (s)		20.4			33.5	10.6				42.8	28.9	
Level of Service		C			C	B				D	C	
Approach Delay (s)		20.4			27.6			0.0			36.2	
Approach LOS		C			C			A			D	

Intersection Summary			
HCM 2000 Control Delay	29.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	77.1	Sum of lost time (s)	9.8
Intersection Capacity Utilization	79.7%	ICU Level of Service	D
Analysis Period (min)	15		

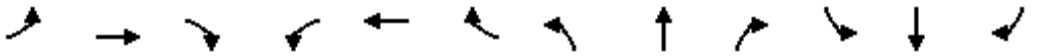
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	265	1020	0	0	870	560	165	0	360	0	0	0
Future Volume (veh/h)	265	1020	0	0	870	560	165	0	360	0	0	0
Number	5	2	12	1	6	16	3	8	18			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1863	1863	0	0	1863	1863	1900	1863	1863			
Adj Flow Rate, veh/h	288	1109	0	0	946	0	179	0	0			
Adj No. of Lanes	1	2	0	0	2	1	0	1	1			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	353	2344	0	0	1309	586	243	0	217			
Arrive On Green	0.20	0.66	0.00	0.00	0.37	0.00	0.14	0.00	0.00			
Sat Flow, veh/h	1774	3632	0	0	3632	1583	1774	0	1583			
Grp Volume(v), veh/h	288	1109	0	0	946	0	179	0	0			
Grp Sat Flow(s),veh/h/ln	1774	1770	0	0	1770	1583	1774	0	1583			
Q Serve(g_s), s	7.8	7.7	0.0	0.0	11.6	0.0	4.9	0.0	0.0			
Cycle Q Clear(g_c), s	7.8	7.7	0.0	0.0	11.6	0.0	4.9	0.0	0.0			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	353	2344	0	0	1309	586	243	0	217			
V/C Ratio(X)	0.82	0.47	0.00	0.00	0.72	0.00	0.74	0.00	0.00			
Avail Cap(c_a), veh/h	893	4993	0	0	2880	1289	1024	0	914			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	1.00	1.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00			
Uniform Delay (d), s/veh	19.3	4.2	0.0	0.0	13.6	0.0	20.8	0.0	0.0			
Incr Delay (d2), s/veh	1.8	0.1	0.0	0.0	0.3	0.0	1.6	0.0	0.0			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	3.9	3.7	0.0	0.0	5.6	0.0	2.5	0.0	0.0			
LnGrp Delay(d),s/veh	21.0	4.2	0.0	0.0	13.9	0.0	22.5	0.0	0.0			
LnGrp LOS	C	A			B		C					
Approach Vol, veh/h		1397			946			179				
Approach Delay, s/veh		7.7			13.9			22.5				
Approach LOS		A			B			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		38.4			14.7	23.7		11.9
Change Period (Y+Rc), s		5.1			* 4.7	5.1		5.0
Max Green Setting (Gmax), s		70.9			* 25	40.9		29.0
Max Q Clear Time (g_c+I1), s		9.7			9.8	13.6		6.9
Green Ext Time (p_c), s		6.7			0.4	5.0		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	11.1
HCM 2010 LOS	B

Notes



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	910	180	65	1020	205	350	165	50	325	200	110
Future Volume (vph)	130	910	180	65	1020	205	350	165	50	325	200	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	5.1		4.7	5.1		4.7	4.7	4.7	4.7	4.7	
Lane Util. Factor	1.00	0.95		1.00	0.95		0.95	0.95	1.00	1.00	1.00	
Frt	1.00	0.98		1.00	0.97		1.00	1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	0.98	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3451		1770	3450		1681	1737	1583	1770	1763	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	0.98	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3451		1770	3450		1681	1737	1583	1770	1763	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	141	989	196	71	1109	223	380	179	54	353	217	120
RTOR Reduction (vph)	0	12	0	0	12	0	0	0	45	0	16	0
Lane Group Flow (vph)	141	1173	0	71	1320	0	274	285	9	353	321	0
Turn Type	Prot	NA		Prot	NA		Split	NA	Perm	Split	NA	
Protected Phases	5	2		1	6		3	3		4	4	
Permitted Phases									3			
Actuated Green, G (s)	12.1	52.5		8.9	49.3		20.7	20.7	20.7	28.7	28.7	
Effective Green, g (s)	12.1	52.5		8.9	49.3		20.7	20.7	20.7	28.7	28.7	
Actuated g/C Ratio	0.09	0.40		0.07	0.38		0.16	0.16	0.16	0.22	0.22	
Clearance Time (s)	4.7	5.1		4.7	5.1		4.7	4.7	4.7	4.7	4.7	
Vehicle Extension (s)	2.0	4.0		2.0	4.0		2.5	2.5	2.5	2.0	2.0	
Lane Grp Cap (vph)	164	1393		121	1308		267	276	252	390	389	
v/s Ratio Prot	0.08	c0.34		0.04	c0.38		0.16	c0.16		c0.20	0.18	
v/s Ratio Perm									0.01			
v/c Ratio	0.86	0.84		0.59	1.01		1.03	1.03	0.03	0.91	0.83	
Uniform Delay, d1	58.1	35.0		58.8	40.4		54.6	54.6	46.2	49.3	48.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	32.4	6.3		4.6	27.1		62.0	62.9	0.0	23.3	12.8	
Delay (s)	90.6	41.3		63.4	67.4		116.7	117.5	46.2	72.7	61.1	
Level of Service	F	D		E	E		F	F	D	E	E	
Approach Delay (s)		46.6			67.2			110.9			67.0	
Approach LOS		D			E			F			E	

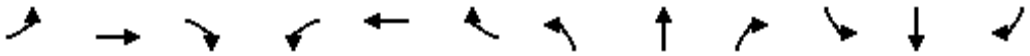
Intersection Summary			
HCM 2000 Control Delay	67.0	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	19.2
Intersection Capacity Utilization	91.9%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	135	350	510	190	350	100	540	1485	170	100	1465	200
Future Volume (veh/h)	135	350	510	190	350	100	540	1485	170	100	1465	200
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	147	380	0	207	380	109	587	1614	0	109	1592	0
Adj No. of Lanes	1	1	1	1	1	0	2	2	0	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	138	361	306	199	317	91	506	1669	0	133	1413	632
Arrive On Green	0.08	0.19	0.00	0.11	0.23	0.23	0.15	0.47	0.00	0.07	0.40	0.00
Sat Flow, veh/h	1774	1863	1583	1774	1393	399	3442	3632	0	1774	3539	1583
Grp Volume(v), veh/h	147	380	0	207	0	489	587	1614	0	109	1592	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	0	1792	1721	1770	0	1774	1770	1583
Q Serve(g_s), s	10.9	27.1	0.0	15.7	0.0	31.9	20.6	62.0	0.0	8.5	55.9	0.0
Cycle Q Clear(g_c), s	10.9	27.1	0.0	15.7	0.0	31.9	20.6	62.0	0.0	8.5	55.9	0.0
Prop In Lane	1.00		1.00	1.00		0.22	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	138	361	306	199	0	408	506	1669	0	133	1413	632
V/C Ratio(X)	1.06	1.05	0.00	1.04	0.00	1.20	1.16	0.97	0.00	0.82	1.13	0.00
Avail Cap(c_a), veh/h	138	361	306	199	0	408	506	1681	0	133	1413	632
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	64.6	56.5	0.0	62.2	0.0	54.1	59.7	35.9	0.0	63.8	42.0	0.0
Incr Delay (d2), s/veh	94.8	62.3	0.0	74.8	0.0	110.4	91.8	15.5	0.0	30.2	66.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.0	20.2	0.0	11.8	0.0	28.3	16.2	33.9	0.0	5.3	40.4	0.0
LnGrp Delay(d),s/veh	159.4	118.7	0.0	137.0	0.0	164.4	151.5	51.4	0.0	94.1	108.7	0.0
LnGrp LOS	F	F		F		F	F	D		F	F	
Approach Vol, veh/h		527			696			2201			1701	
Approach Delay, s/veh		130.1			156.3			78.1			107.8	
Approach LOS		F			F			E			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	26.0	61.0	16.0	37.0	15.6	71.4	20.8	32.2
Change Period (Y+Rc), s	5.4	5.1	5.1	5.1	5.1	5.4	5.1	5.1
Max Green Setting (Gmax), s	20.6	55.9	10.9	31.9	10.0	66.5	15.7	27.1
Max Q Clear Time (g_c+I1), s	22.6	57.9	12.9	33.9	10.5	64.0	17.7	29.1
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0

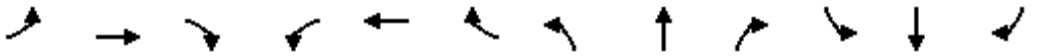
Intersection Summary	
HCM 2010 Ctrl Delay	103.9
HCM 2010 LOS	F



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	375	25	60	535	45	20	65	50	60	165	35
Future Volume (vph)	10	375	25	60	535	45	20	65	50	60	165	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.1			4.7			6.4	6.4		6.4	
Lane Util. Factor		0.91			0.95			1.00	1.00		1.00	
Frt		0.99			0.99			1.00	0.85		0.98	
Flt Protected		1.00			1.00			0.99	1.00		0.99	
Satd. Flow (prot)		5033			3486			1841	1583		1808	
Flt Permitted		0.91			1.00			0.89	1.00		0.90	
Satd. Flow (perm)		4586			3486			1650	1583		1648	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	408	27	65	582	49	22	71	54	65	179	38
RTOR Reduction (vph)	0	4	0	0	4	0	0	0	34	0	3	0
Lane Group Flow (vph)	0	442	0	0	692	0	0	93	20	0	279	0
Turn Type	Perm	NA		Split	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		3		5 8	5 8			6			6	
Permitted Phases	3						6		6	6		
Actuated Green, G (s)		24.9			63.2			60.7	60.7		60.7	
Effective Green, g (s)		24.9			58.1			60.7	60.7		60.7	
Actuated g/C Ratio		0.15			0.35			0.37	0.37		0.37	
Clearance Time (s)		5.1						6.4	6.4		6.4	
Vehicle Extension (s)		4.0						3.0	3.0		3.0	
Lane Grp Cap (vph)		692			1227			607	582		606	
v/s Ratio Prot					c0.20							
v/s Ratio Perm		c0.10						0.06	0.01		c0.17	
v/c Ratio		0.64			0.56			0.15	0.03		0.46	
Uniform Delay, d1		65.8			43.2			34.9	33.4		39.7	
Progression Factor		1.00			0.34			1.00	1.00		1.00	
Incremental Delay, d2		2.2			0.3			0.5	0.1		2.5	
Delay (s)		68.0			14.9			35.5	33.5		42.2	
Level of Service		E			B			D	C		D	
Approach Delay (s)		68.0			14.9			34.7			42.2	
Approach LOS		E			B			C			D	

Intersection Summary			
HCM 2000 Control Delay	36.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	165.0	Sum of lost time (s)	21.3
Intersection Capacity Utilization	62.3%	ICU Level of Service	B
Analysis Period (min)	15		

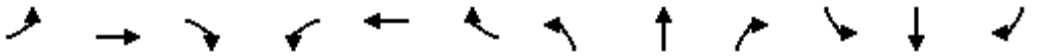
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	190	95	225	15	90	10	185	485	30	10	545	555
Future Volume (vph)	190	95	225	15	90	10	185	485	30	10	545	555
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.1	5.1	5.1		5.1		4.7	5.4		4.7	5.4	5.4
Lane Util. Factor	1.00	1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85		0.99		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00		0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583		1829		1770	1846		1770	1863	1583
Flt Permitted	0.62	1.00	1.00		0.96		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1156	1863	1583		1768		1770	1846		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	207	103	245	16	98	11	201	527	33	11	592	603
RTOR Reduction (vph)	0	0	186	0	2	0	0	1	0	0	0	83
Lane Group Flow (vph)	207	103	59	0	123	0	201	559	0	11	592	520
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		8			8		1	6		5	2	
Permitted Phases	8		8	8								2
Actuated Green, G (s)	28.7	28.7	28.7		28.7		19.8	72.2		2.4	54.8	54.8
Effective Green, g (s)	28.7	28.7	28.7		28.7		19.8	72.2		2.4	54.8	54.8
Actuated g/C Ratio	0.24	0.24	0.24		0.24		0.17	0.61		0.02	0.46	0.46
Clearance Time (s)	5.1	5.1	5.1		5.1		4.7	5.4		4.7	5.4	5.4
Vehicle Extension (s)	3.0	3.0	3.0		3.0		3.0	5.0		3.0	5.0	5.0
Lane Grp Cap (vph)	279	451	383		428		295	1124		35	861	732
v/s Ratio Prot		0.06					c0.11	0.30		0.01	0.32	
v/s Ratio Perm	c0.18		0.04		0.07							c0.33
v/c Ratio	0.74	0.23	0.15		0.29		0.68	0.50		0.31	0.69	0.71
Uniform Delay, d1	41.5	36.0	35.4		36.6		46.4	13.0		57.2	25.1	25.5
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	10.2	0.3	0.2		0.4		6.3	0.7		5.1	3.0	4.0
Delay (s)	51.6	36.3	35.5		36.9		52.7	13.7		62.3	28.1	29.5
Level of Service	D	D	D		D		D	B		E	C	C
Approach Delay (s)		41.7			36.9			24.0			29.1	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	30.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	118.5	Sum of lost time (s)	15.2
Intersection Capacity Utilization	68.8%	ICU Level of Service	C
Analysis Period (min)	15		

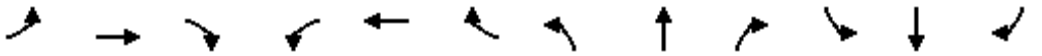
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	75	50	65	120	75	75	890	95	135	1435	35
Future Volume (vph)	5	75	50	65	120	75	75	890	95	135	1435	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.1	7.1	5.1	5.1		4.7	6.4	6.4	4.7	6.4	6.4
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt		1.00	0.85	1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1857	1583	1770	1755		1770	3539	1583	1770	3539	1583
Flt Permitted		0.42	1.00	0.70	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		774	1583	1305	1755		1770	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	82	54	71	130	82	82	967	103	147	1560	38
RTOR Reduction (vph)	0	0	48	0	15	0	0	0	54	0	0	18
Lane Group Flow (vph)	0	87	6	71	197	0	82	967	49	147	1560	20
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		3			8		5	2		1	6	
Permitted Phases	3		3	8					2			6
Actuated Green, G (s)		21.2	21.2	22.9	22.9		12.4	65.2	65.2	34.4	87.2	87.2
Effective Green, g (s)		19.2	19.2	22.9	22.9		12.4	65.2	65.2	34.4	87.2	87.2
Actuated g/C Ratio		0.12	0.12	0.14	0.14		0.08	0.40	0.40	0.21	0.53	0.53
Clearance Time (s)		5.1	5.1	5.1	5.1		4.7	6.4	6.4	4.7	6.4	6.4
Vehicle Extension (s)		4.0	4.0	2.0	2.0		2.0	4.0	4.0	2.0	4.0	4.0
Lane Grp Cap (vph)		90	184	181	243		133	1398	625	369	1870	836
v/s Ratio Prot					c0.11		0.05	c0.27		0.08	c0.44	
v/s Ratio Perm		c0.11	0.00	0.05					0.03			0.01
v/c Ratio		0.97	0.03	0.39	0.81		0.62	0.69	0.08	0.40	0.83	0.02
Uniform Delay, d1		72.6	64.7	64.7	69.0		74.0	41.5	31.1	56.4	32.8	18.6
Progression Factor		0.81	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		83.2	0.1	0.5	17.5		5.9	2.8	0.2	0.3	4.6	0.1
Delay (s)		141.7	64.8	65.2	86.4		79.8	44.4	31.4	56.6	37.4	18.6
Level of Service		F	E	E	F		E	D	C	E	D	B
Approach Delay (s)		112.2			81.1			45.7			38.6	
Approach LOS		F			F			D			D	

Intersection Summary			
HCM 2000 Control Delay	47.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	165.0	Sum of lost time (s)	23.3
Intersection Capacity Utilization	76.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	30	10	55	45	120	10	105	20	80	195	25
Future Volume (vph)	5	30	10	55	45	120	10	105	20	80	195	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.1			4.7			6.4		6.4	6.4	
Lane Util. Factor		1.00			1.00			1.00		1.00	1.00	
Frt		0.97			0.93			0.98		1.00	0.98	
Flt Protected		0.99			0.99			1.00		0.95	1.00	
Satd. Flow (prot)		1797			1705			1818		1770	1831	
Flt Permitted		0.96			0.99			0.97		0.66	1.00	
Satd. Flow (perm)		1737			1705			1775		1235	1831	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	33	11	60	49	130	11	114	22	87	212	27
RTOR Reduction (vph)	0	6	0	0	29	0	0	3	0	0	2	0
Lane Group Flow (vph)	0	43	0	0	210	0	0	144	0	87	237	0
Turn Type	Perm	NA		Split	NA		Perm	NA		Perm	NA	
Protected Phases		3		5 8	5 8			6			6	
Permitted Phases	3						6			6		
Actuated Green, G (s)		21.2			40.4			87.2		87.2	87.2	
Effective Green, g (s)		21.2			35.3			87.2		87.2	87.2	
Actuated g/C Ratio		0.13			0.21			0.53		0.53	0.53	
Clearance Time (s)		5.1						6.4		6.4	6.4	
Vehicle Extension (s)		4.0						4.0		4.0	4.0	
Lane Grp Cap (vph)		223			364			938		652	967	
v/s Ratio Prot					c0.12						c0.13	
v/s Ratio Perm		c0.02						0.08		0.07		
v/c Ratio		0.19			0.58			0.15		0.13	0.24	
Uniform Delay, d1		64.3			58.2			20.0		19.7	21.1	
Progression Factor		1.00			0.43			1.00		1.00	1.00	
Incremental Delay, d2		0.6			1.2			0.3		0.4	0.6	
Delay (s)		64.8			26.3			20.3		20.2	21.7	
Level of Service		E			C			C		C	C	
Approach Delay (s)		64.8			26.3			20.3			21.3	
Approach LOS		E			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	25.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	165.0	Sum of lost time (s)	21.3
Intersection Capacity Utilization	59.0%	ICU Level of Service	B
Analysis Period (min)	15		

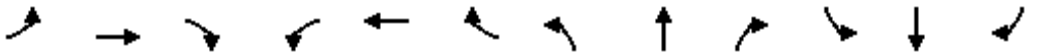
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	645	70	525	935	30	115	0	415	30	5	5
Future Volume (veh/h)	5	645	70	525	935	30	115	0	415	30	5	5
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1900	1863	1863	1900	1863	1863
Adj Flow Rate, veh/h	5	701	76	571	1016	33	125	0	451	33	5	5
Adj No. of Lanes	1	2	1	2	2	0	0	1	1	0	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	25	900	403	993	1863	61	75	0	478	70	6	478
Arrive On Green	0.01	0.25	0.25	0.29	0.53	0.53	0.30	0.00	0.30	0.30	0.30	0.30
Sat Flow, veh/h	1774	3539	1583	3442	3499	114	0	0	1583	0	19	1583
Grp Volume(v), veh/h	5	701	76	571	514	535	125	0	451	38	0	5
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1721	1770	1843	0	0	1583	19	0	1583
Q Serve(g_s), s	0.3	17.7	3.6	13.6	18.4	18.4	0.0	0.0	26.7	0.0	0.0	0.2
Cycle Q Clear(g_c), s	0.3	17.7	3.6	13.6	18.4	18.4	29.0	0.0	26.7	29.0	0.0	0.2
Prop In Lane	1.00		1.00	1.00		0.06	1.00		1.00	0.87		1.00
Lane Grp Cap(c), veh/h	25	900	403	993	942	981	75	0	478	76	0	478
V/C Ratio(X)	0.20	0.78	0.19	0.58	0.55	0.55	1.67	0.00	0.94	0.50	0.00	0.01
Avail Cap(c_a), veh/h	203	1113	498	993	942	981	75	0	478	76	0	478
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	46.8	33.3	28.0	29.1	14.8	14.8	48.0	0.0	32.7	43.5	0.0	23.5
Incr Delay (d2), s/veh	1.4	6.6	1.0	0.5	2.3	2.2	351.2	0.0	27.1	1.9	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	9.5	1.7	6.5	9.4	9.8	9.3	0.0	15.2	1.0	0.0	0.1
LnGrp Delay(d),s/veh	48.2	39.9	29.1	29.7	17.0	17.0	399.2	0.0	59.8	45.4	0.0	23.5
LnGrp LOS	D	D	C	C	B	B	F		E	D		C
Approach Vol, veh/h		782			1620			576			43	
Approach Delay, s/veh		38.9			21.5			133.4			42.9	
Approach LOS		D			C			F			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	32.8	29.5		33.7	6.1	56.2		33.7
Change Period (Y+Rc), s	5.1	* 5.1		* 4.7	* 4.7	5.1		* 4.7
Max Green Setting (Gmax), s	22.3	* 30		* 29	* 11	41.5		* 29
Max Q Clear Time (g_c+I1), s	15.6	19.7		31.0	2.3	20.4		31.0
Green Ext Time (p_c), s	0.8	4.7		0.0	0.0	9.8		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	47.6
HCM 2010 LOS	D

Notes



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	225	180	225	205	45	295	1145	245	65	1430	40
Future Volume (vph)	45	225	180	225	205	45	295	1145	245	65	1430	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.1	5.1	5.1	5.1		4.7	6.4	6.4	4.7	6.4	6.4
Lane Util. Factor		0.91	0.91	0.91	0.91		0.97	0.95	1.00	1.00	0.95	1.00
Frt		0.98	0.85	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00	0.95	0.99		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		3304	1441	1610	3279		3433	3539	1583	1770	3539	1583
Flt Permitted		0.54	1.00	0.54	0.75		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1789	1441	919	2489		3433	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	49	245	196	245	223	49	321	1245	266	71	1554	43
RTOR Reduction (vph)	0	6	133	0	7	0	0	0	136	0	0	26
Lane Group Flow (vph)	0	329	22	147	363	0	321	1245	130	71	1554	17
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		3			8		5	2		1	6	
Permitted Phases	3		3	8					2			6
Actuated Green, G (s)		23.9	23.9	33.3	33.3		21.9	70.2	70.2	16.3	64.6	64.6
Effective Green, g (s)		23.9	23.9	33.3	33.3		21.9	70.2	70.2	16.3	64.6	64.6
Actuated g/C Ratio		0.14	0.14	0.20	0.20		0.13	0.43	0.43	0.10	0.39	0.39
Clearance Time (s)		5.1	5.1	5.1	5.1		4.7	6.4	6.4	4.7	6.4	6.4
Vehicle Extension (s)		4.0	4.0	2.0	2.0		2.0	3.0	3.0	2.0	3.0	3.0
Lane Grp Cap (vph)		259	208	185	502		455	1505	673	174	1385	619
v/s Ratio Prot							0.09	c0.35		0.04	c0.44	
v/s Ratio Perm		c0.18	0.02	c0.16	0.15				0.08			0.01
v/c Ratio		1.27	0.11	0.79	0.72		0.71	0.83	0.19	0.41	1.12	0.03
Uniform Delay, d1		70.5	61.3	62.6	61.5		68.5	42.0	29.7	69.8	50.2	30.9
Progression Factor		0.38	0.09	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		141.1	0.2	19.3	4.3		4.0	5.4	0.6	0.6	65.0	0.1
Delay (s)		167.6	5.8	81.9	65.9		72.5	47.4	30.3	70.4	115.2	31.0
Level of Service		F	A	F	E		E	D	C	E	F	C
Approach Delay (s)		116.4			70.4			49.3			111.1	
Approach LOS		F			E			D			F	

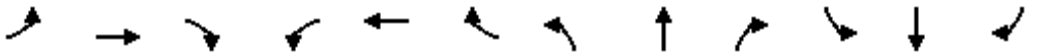
Intersection Summary			
HCM 2000 Control Delay	81.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	165.0	Sum of lost time (s)	21.3
Intersection Capacity Utilization	86.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	660	40	195	890	190	45	55	175	185	125	55
Future Volume (veh/h)	20	660	40	195	890	190	45	55	175	185	125	55
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	22	717	43	212	967	207	49	60	190	201	136	60
Adj No. of Lanes	1	2	1	1	2	0	1	1	1	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	32	1180	528	336	1465	313	227	429	364	299	282	125
Arrive On Green	0.02	0.33	0.33	0.19	0.50	0.50	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	1774	3539	1583	1774	2903	620	1182	1863	1583	1125	1226	541
Grp Volume(v), veh/h	22	717	43	212	589	585	49	60	190	201	0	196
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1753	1182	1863	1583	1125	0	1767
Q Serve(g_s), s	1.3	17.8	2.0	11.6	25.9	26.0	3.9	2.7	11.0	18.2	0.0	10.1
Cycle Q Clear(g_c), s	1.3	17.8	2.0	11.6	25.9	26.0	14.0	2.7	11.0	20.9	0.0	10.1
Prop In Lane	1.00		1.00	1.00		0.35	1.00		1.00	1.00		0.31
Lane Grp Cap(c), veh/h	32	1180	528	336	893	885	227	429	364	299	0	407
V/C Ratio(X)	0.69	0.61	0.08	0.63	0.66	0.66	0.22	0.14	0.52	0.67	0.00	0.48
Avail Cap(c_a), veh/h	84	1180	528	389	893	885	311	561	477	378	0	532
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.86	0.86	0.86	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	51.3	29.3	24.0	39.2	19.3	19.3	41.1	32.1	35.4	40.4	0.0	35.0
Incr Delay (d2), s/veh	31.2	2.3	0.3	2.2	3.3	3.3	0.5	0.1	1.2	3.2	0.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	9.0	0.9	5.9	13.4	13.3	1.3	1.4	4.9	5.9	0.0	5.0
LnGrp Delay(d),s/veh	82.4	31.6	24.3	41.4	22.6	22.6	41.5	32.3	36.5	43.7	0.0	35.9
LnGrp LOS	F	C	C	D	C	C	D	C	D	D		D
Approach Vol, veh/h		782			1386			299			397	
Approach Delay, s/veh		32.6			25.5			36.5			39.8	
Approach LOS		C			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	6.9	58.0		29.6	24.9	40.0		29.6
Change Period (Y+Rc), s	5.0	5.0		5.4	5.0	5.0		5.4
Max Green Setting (Gmax), s	5.0	53.0		31.6	23.0	35.0		31.6
Max Q Clear Time (g_c+I1), s	3.3	28.0		16.0	13.6	19.8		22.9
Green Ext Time (p_c), s	0.0	9.1		1.0	0.4	4.5		1.3

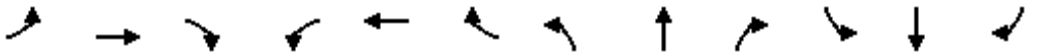
Intersection Summary	
HCM 2010 Ctrl Delay	30.6
HCM 2010 LOS	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	725	305	745	1240	0	0	0	0	230	5	75
Future Volume (vph)	0	725	305	745	1240	0	0	0	0	230	5	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6	4.6	4.0	4.6					4.0	4.0	
Lane Util. Factor		0.91	0.91	0.97	0.95					0.95	0.95	
Frt		0.99	0.85	1.00	1.00					1.00	0.93	
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.98	
Satd. Flow (prot)		3370	1441	3433	3539					1681	1600	
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.98	
Satd. Flow (perm)		3370	1441	3433	3539					1681	1600	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	788	332	810	1348	0	0	0	0	250	5	82
RTOR Reduction (vph)	0	2	159	0	0	0	0	0	0	0	30	0
Lane Group Flow (vph)	0	819	140	810	1348	0	0	0	0	172	135	0
Turn Type		NA	Perm	Prot	NA					Perm	NA	
Protected Phases		2		1	6						4	
Permitted Phases			2							4		
Actuated Green, G (s)		46.7	46.7	25.0	75.7					15.7	15.7	
Effective Green, g (s)		46.7	46.7	25.0	75.7					15.7	15.7	
Actuated g/C Ratio		0.47	0.47	0.25	0.76					0.16	0.16	
Clearance Time (s)		4.6	4.6	4.0	4.6					4.0	4.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0					3.0	3.0	
Lane Grp Cap (vph)		1573	672	858	2679					263	251	
v/s Ratio Prot		0.24		c0.24	c0.38							
v/s Ratio Perm			0.10							c0.10	0.08	
v/c Ratio		0.52	0.21	0.94	0.50					0.65	0.54	
Uniform Delay, d1		18.8	15.7	36.8	4.8					39.6	38.8	
Progression Factor		1.00	1.00	0.89	0.43					1.00	1.00	
Incremental Delay, d2		1.2	0.7	13.3	0.4					5.7	2.2	
Delay (s)		20.0	16.4	46.1	2.5					45.3	41.0	
Level of Service		C	B	D	A					D	D	
Approach Delay (s)		19.0			18.9			0.0			43.2	
Approach LOS		B			B			A			D	

Intersection Summary			
HCM 2000 Control Delay	21.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.6
Intersection Capacity Utilization	77.6%	ICU Level of Service	D
Analysis Period (min)	15		

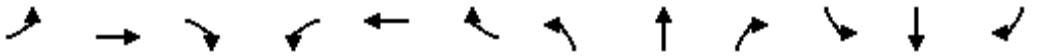
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	935	0	0	1630	220	405	0	690	0	0	0
Future Volume (vph)	55	935	0	0	1630	220	405	0	690	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.6			4.6			4.0	4.0			
Lane Util. Factor	1.00	0.95			0.86			0.95	0.95			
Frt	1.00	1.00			0.98			0.96	0.85			
Flt Protected	0.95	1.00			1.00			0.97	1.00			
Satd. Flow (prot)	1770	3539			6294			1635	1504			
Flt Permitted	0.95	1.00			1.00			0.97	1.00			
Satd. Flow (perm)	1770	3539			6294			1635	1504			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	60	1016	0	0	1772	239	440	0	750	0	0	0
RTOR Reduction (vph)	0	0	0	0	22	0	0	37	40	0	0	0
Lane Group Flow (vph)	60	1016	0	0	1989	0	0	583	530	0	0	0
Turn Type	Prot	NA			NA		Perm	NA	Perm			
Protected Phases	5	2			6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	5.1	52.1			43.0			39.3	39.3			
Effective Green, g (s)	5.1	52.1			43.0			39.3	39.3			
Actuated g/C Ratio	0.05	0.52			0.43			0.39	0.39			
Clearance Time (s)	4.0	4.6			4.6			4.0	4.0			
Vehicle Extension (s)	2.0	2.0			2.0			2.0	2.0			
Lane Grp Cap (vph)	90	1843			2706			642	591			
v/s Ratio Prot	0.03	c0.29			c0.32							
v/s Ratio Perm								0.36	0.35			
v/c Ratio	0.67	0.55			0.73			0.91	0.90			
Uniform Delay, d1	46.6	16.1			23.8			28.6	28.4			
Progression Factor	1.33	0.29			1.00			1.00	1.00			
Incremental Delay, d2	12.4	1.1			1.8			16.3	15.8			
Delay (s)	74.2	5.8			25.6			44.9	44.3			
Level of Service	E	A			C			D	D			
Approach Delay (s)		9.6			25.6			44.6			0.0	
Approach LOS		A			C			D			A	

Intersection Summary			
HCM 2000 Control Delay	26.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.6
Intersection Capacity Utilization	77.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	300	1045	140	175	1140	135	375	115	180	150	100	225
Future Volume (vph)	300	1045	140	175	1140	135	375	115	180	150	100	225
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.3	4.3		4.3	4.3		4.7	4.7	4.7	4.7	4.7	4.7
Lane Util. Factor	0.97	0.95		0.97	0.95		0.97	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.98		1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	0.99	1.00
Satd. Flow (prot)	3433	3477		3433	3483		3433	1863	1583	1681	1751	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	0.99	1.00
Satd. Flow (perm)	3433	3477		3433	3483		3433	1863	1583	1681	1751	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	326	1136	152	190	1239	147	408	125	196	163	109	245
RTOR Reduction (vph)	0	8	0	0	8	0	0	0	175	0	0	156
Lane Group Flow (vph)	326	1280	0	190	1378	0	408	125	21	134	138	89
Turn Type	Prot	NA		Prot	NA		Split	NA	Perm	Split	NA	Perm
Protected Phases	1	6		5	2		4	4		3	3	
Permitted Phases									4			3
Actuated Green, G (s)	17.2	53.9		6.7	43.4		11.3	11.3	11.3	15.1	15.1	15.1
Effective Green, g (s)	17.2	53.9		6.7	43.4		11.3	11.3	11.3	15.1	15.1	15.1
Actuated g/C Ratio	0.16	0.51		0.06	0.41		0.11	0.11	0.11	0.14	0.14	0.14
Clearance Time (s)	4.3	4.3		4.3	4.3		4.7	4.7	4.7	4.7	4.7	4.7
Vehicle Extension (s)	2.0	4.0		2.0	4.0		2.0	2.0	2.0	3.0	3.0	3.0
Lane Grp Cap (vph)	562	1784		219	1439		369	200	170	241	251	227
v/s Ratio Prot	0.09	c0.37		0.06	c0.40		c0.12	0.07		c0.08	0.08	
v/s Ratio Perm									0.01			0.06
v/c Ratio	0.58	0.72		0.87	0.96		1.11	0.62	0.12	0.56	0.55	0.39
Uniform Delay, d1	40.6	19.7		48.7	29.9		46.9	44.8	42.4	41.8	41.8	40.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	2.5		27.5	15.5		78.5	4.3	0.1	2.8	2.5	1.1
Delay (s)	41.5	22.2		76.3	45.4		125.3	49.2	42.5	44.6	44.2	41.9
Level of Service	D	C		E	D		F	D	D	D	D	D
Approach Delay (s)		26.1			49.2			90.0			43.2	
Approach LOS		C			D			F			D	

Intersection Summary			
HCM 2000 Control Delay	46.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	72.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	140	865	155	250	1050	1430	165	245	175	315	325	145
Future Volume (veh/h)	140	865	155	250	1050	1430	165	245	175	315	325	145
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	152	940	0	272	1141	0	179	266	0	342	353	0
Adj No. of Lanes	2	2	1	2	2	1	2	2	1	2	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	131	1110	497	368	1354	606	411	1198	536	220	1001	0
Arrive On Green	0.04	0.31	0.00	0.11	0.38	0.00	0.12	0.34	0.00	0.06	0.28	0.00
Sat Flow, veh/h	3442	3539	1583	3442	3539	1583	3442	3539	1583	3442	3632	0
Grp Volume(v), veh/h	152	940	0	272	1141	0	179	266	0	342	353	0
Grp Sat Flow(s),veh/h/ln	1721	1770	1583	1721	1770	1583	1721	1770	1583	1721	1770	0
Q Serve(g_s), s	4.0	26.1	0.0	8.0	30.8	0.0	5.1	5.6	0.0	6.7	8.3	0.0
Cycle Q Clear(g_c), s	4.0	26.1	0.0	8.0	30.8	0.0	5.1	5.6	0.0	6.7	8.3	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	131	1110	497	368	1354	606	411	1198	536	220	1001	0
V/C Ratio(X)	1.16	0.85	0.00	0.74	0.84	0.00	0.44	0.22	0.00	1.56	0.35	0.00
Avail Cap(c_a), veh/h	131	1315	588	426	1618	724	411	1198	536	220	1001	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	50.5	33.7	0.0	45.5	29.5	0.0	42.9	24.8	0.0	49.2	30.0	0.0
Incr Delay (d2), s/veh	127.8	4.6	0.0	4.5	3.6	0.0	0.3	0.4	0.0	271.9	1.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.2	13.4	0.0	4.0	15.7	0.0	2.4	2.8	0.0	11.5	4.2	0.0
LnGrp Delay(d),s/veh	178.3	38.3	0.0	49.9	33.2	0.0	43.2	25.3	0.0	321.1	31.0	0.0
LnGrp LOS	F	D		D	C		D	C		F	C	
Approach Vol, veh/h		1092			1413			445			695	
Approach Delay, s/veh		57.8			36.4			32.5			173.7	
Approach LOS		E			D			C			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.0	45.2	11.0	39.8	16.2	37.9	16.8	34.0
Change Period (Y+Rc), s	5.0	5.0	* 4.3	* 4.3	5.0	5.0	* 4.3	* 4.3
Max Green Setting (Gmax), s	4.0	48.0	* 6.7	* 28	13.0	39.0	* 4.7	* 30
Max Q Clear Time (g_c+I1), s	6.0	32.8	8.7	7.6	10.0	28.1	7.1	10.3
Green Ext Time (p_c), s	0.0	7.3	0.0	1.6	0.2	4.9	0.0	2.2

Intersection Summary	
HCM 2010 Ctrl Delay	68.5
HCM 2010 LOS	E

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	105	740	365	185	500	155	435	320	40	155	345	95
Future Volume (veh/h)	105	740	365	185	500	155	435	320	40	155	345	95
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	114	804	0	201	543	168	473	348	0	168	375	103
Adj No. of Lanes	1	2	1	2	2	0	2	1	1	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	142	939	420	329	762	235	636	387	329	257	462	126
Arrive On Green	0.08	0.27	0.00	0.10	0.29	0.29	0.18	0.21	0.00	0.14	0.17	0.17
Sat Flow, veh/h	1774	3539	1583	3442	2666	822	3442	1863	1583	1774	2753	747
Grp Volume(v), veh/h	114	804	0	201	360	351	473	348	0	168	239	239
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1721	1770	1718	1721	1863	1583	1774	1770	1731
Q Serve(g_s), s	6.6	22.7	0.0	5.9	19.1	19.3	13.6	19.1	0.0	9.4	13.7	14.0
Cycle Q Clear(g_c), s	6.6	22.7	0.0	5.9	19.1	19.3	13.6	19.1	0.0	9.4	13.7	14.0
Prop In Lane	1.00		1.00	1.00		0.48	1.00		1.00	1.00		0.43
Lane Grp Cap(c), veh/h	142	939	420	329	506	491	636	387	329	257	297	291
V/C Ratio(X)	0.80	0.86	0.00	0.61	0.71	0.72	0.74	0.90	0.00	0.65	0.81	0.82
Avail Cap(c_a), veh/h	194	1079	483	329	506	491	636	483	410	257	391	382
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	47.5	36.7	0.0	45.6	33.6	33.7	40.5	40.5	0.0	42.4	42.0	42.2
Incr Delay (d2), s/veh	15.6	9.9	0.0	2.4	8.3	8.6	4.2	15.1	0.0	12.3	8.9	10.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.9	12.3	0.0	2.9	10.5	10.3	6.9	11.5	0.0	5.5	7.4	7.5
LnGrp Delay(d),s/veh	63.1	46.6	0.0	48.0	41.9	42.3	44.7	55.6	0.0	54.7	51.0	52.5
LnGrp LOS	E	D		D	D	D	D	E		D	D	D
Approach Vol, veh/h		918			912			821			646	
Approach Delay, s/veh		48.7			43.4			49.3			52.5	
Approach LOS		D			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.9	35.0	21.0	27.6	15.0	32.8	25.2	23.4
Change Period (Y+Rc), s	4.5	5.0	5.8	5.8	5.0	5.0	5.8	5.8
Max Green Setting (Gmax), s	11.5	30.0	15.2	27.2	9.0	32.0	19.2	23.2
Max Q Clear Time (g_c+I1), s	8.6	21.3	11.4	21.1	7.9	24.7	15.6	16.0
Green Ext Time (p_c), s	0.1	3.0	0.1	0.7	0.0	3.2	0.4	1.7

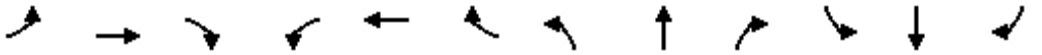
Intersection Summary	
HCM 2010 Ctrl Delay	48.1
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	175	635	190	200	715	80	160	290	155	105	395	235
Future Volume (veh/h)	175	635	190	200	715	80	160	290	155	105	395	235
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	190	690	207	217	777	87	174	315	168	114	429	255
Adj No. of Lanes	1	2	1	1	2	0	2	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	220	888	397	247	855	96	646	801	418	141	531	313
Arrive On Green	0.12	0.25	0.25	0.14	0.27	0.27	0.19	0.36	0.36	0.08	0.25	0.25
Sat Flow, veh/h	1774	3539	1583	1774	3210	359	3442	2251	1174	1774	2145	1264
Grp Volume(v), veh/h	190	690	207	217	428	436	174	246	237	114	353	331
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1799	1721	1770	1656	1774	1770	1640
Q Serve(g_s), s	11.7	20.1	7.9	13.3	26.0	26.0	4.8	11.5	11.9	7.0	20.8	21.1
Cycle Q Clear(g_c), s	11.7	20.1	7.9	13.3	26.0	26.0	4.8	11.5	11.9	7.0	20.8	21.1
Prop In Lane	1.00		1.00	1.00		0.20	1.00		0.71	1.00		0.77
Lane Grp Cap(c), veh/h	220	888	397	247	471	479	646	630	589	141	438	406
V/C Ratio(X)	0.87	0.78	0.52	0.88	0.91	0.91	0.27	0.39	0.40	0.81	0.81	0.82
Avail Cap(c_a), veh/h	256	925	414	288	494	503	646	630	589	181	547	507
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	47.7	38.7	14.4	46.9	39.4	39.4	38.6	26.7	26.9	50.3	39.3	39.4
Incr Delay (d2), s/veh	22.8	4.1	1.1	22.8	20.2	20.0	0.2	1.8	2.0	18.9	8.0	9.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.1	10.4	4.8	8.1	15.4	15.6	2.3	6.0	5.8	4.2	11.2	10.6
LnGrp Delay(d),s/veh	70.5	42.8	15.4	69.7	59.6	59.4	38.8	28.6	28.9	69.2	47.3	48.5
LnGrp LOS	E	D	B	E	E	E	D	C	C	E	D	D
Approach Vol, veh/h		1087			1081			657			798	
Approach Delay, s/veh		42.4			61.6			31.4			50.9	
Approach LOS		D			E			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.5	44.2	20.5	32.8	25.5	32.2	18.7	34.6
Change Period (Y+Rc), s	* 4.7	* 4.7	5.0	5.0	* 4.7	* 4.7	5.0	5.0
Max Green Setting (Gmax), s	* 11	* 33	18.0	29.0	* 10	* 34	16.0	31.0
Max Q Clear Time (g_c+I1), s	9.0	13.9	15.3	22.1	6.8	23.1	13.7	28.0
Green Ext Time (p_c), s	0.1	4.0	0.2	3.0	0.2	4.4	0.1	1.5

Intersection Summary	
HCM 2010 Ctrl Delay	48.0
HCM 2010 LOS	D

Notes

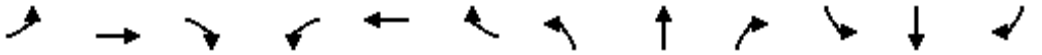


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	175	520	65	110	560	175	230	530	90	180	605	220
Future Volume (veh/h)	175	520	65	110	560	175	230	530	90	180	605	220
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	190	565	71	120	609	190	250	576	98	196	658	239
Adj No. of Lanes	1	2	1	1	2	1	1	2	1	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	219	860	385	148	719	322	280	681	305	323	767	343
Arrive On Green	0.12	0.24	0.24	0.08	0.20	0.20	0.16	0.19	0.19	0.18	0.22	0.22
Sat Flow, veh/h	1774	3539	1583	1774	3539	1583	1774	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	190	565	71	120	609	190	250	576	98	196	658	239
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1583	1774	1770	1583	1774	1770	1583
Q Serve(g_s), s	11.7	16.0	2.0	7.4	18.4	12.1	15.3	17.4	3.7	11.3	19.9	15.5
Cycle Q Clear(g_c), s	11.7	16.0	2.0	7.4	18.4	12.1	15.3	17.4	3.7	11.3	19.9	15.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	219	860	385	148	719	322	280	681	305	323	767	343
V/C Ratio(X)	0.87	0.66	0.18	0.81	0.85	0.59	0.89	0.85	0.32	0.61	0.86	0.70
Avail Cap(c_a), veh/h	254	941	421	240	912	408	321	893	399	337	925	414
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	47.8	37.9	8.3	50.0	42.6	40.1	45.8	43.2	15.0	41.7	41.8	40.1
Incr Delay (d2), s/veh	21.3	1.1	0.1	10.1	11.9	7.8	23.4	4.7	0.2	2.0	6.1	2.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.0	7.9	1.6	4.0	10.1	5.9	9.3	8.9	2.4	5.7	10.3	7.0
LnGrp Delay(d),s/veh	69.1	38.9	8.4	60.1	54.4	47.8	69.3	47.9	15.2	43.7	47.9	42.7
LnGrp LOS	E	D	A	E	D	D	E	D	B	D	D	D
Approach Vol, veh/h		826			919			924			1093	
Approach Delay, s/veh		43.2			53.8			50.2			46.0	
Approach LOS		D			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	24.4	25.6	13.8	31.5	21.7	28.3	18.2	27.0
Change Period (Y+Rc), s	* 4.2	* 4.2	4.5	4.5	* 4.2	* 4.2	4.5	4.5
Max Green Setting (Gmax), s	* 21	* 28	15.0	29.5	* 20	* 29	15.9	28.6
Max Q Clear Time (g_c+I1), s	13.3	19.4	9.4	18.0	17.3	21.9	13.7	20.4
Green Ext Time (p_c), s	0.2	1.9	0.1	2.2	0.2	2.2	0.1	2.2

Intersection Summary	
HCM 2010 Ctrl Delay	48.3
HCM 2010 LOS	D

Notes



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	185	285	165	135	275	185	135	920	45	290	975	165
Future Volume (veh/h)	185	285	165	135	275	185	135	920	45	290	975	165
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	201	310	179	147	299	201	147	1000	49	315	1060	179
Adj No. of Lanes	1	2	1	1	2	1	1	2	1	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	208	1052	471	160	957	428	221	988	442	304	1153	516
Arrive On Green	0.12	0.30	0.30	0.09	0.27	0.27	0.12	0.28	0.28	0.17	0.33	0.33
Sat Flow, veh/h	1774	3539	1583	1774	3539	1583	1774	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	201	310	179	147	299	201	147	1000	49	315	1060	179
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1583	1774	1770	1583	1774	1770	1583
Q Serve(g_s), s	12.5	7.5	7.0	9.1	7.5	7.7	8.8	31.0	1.9	19.0	32.0	6.7
Cycle Q Clear(g_c), s	12.5	7.5	7.0	9.1	7.5	7.7	8.8	31.0	1.9	19.0	32.0	6.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	208	1052	471	160	957	428	221	988	442	304	1153	516
V/C Ratio(X)	0.97	0.29	0.38	0.92	0.31	0.47	0.66	1.01	0.11	1.04	0.92	0.35
Avail Cap(c_a), veh/h	208	1052	471	160	957	428	221	988	442	304	1212	542
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	48.8	30.0	15.4	50.1	32.3	14.5	46.4	40.0	17.3	46.0	36.0	14.2
Incr Delay (d2), s/veh	52.9	0.7	2.3	48.3	0.1	0.3	7.3	31.5	0.0	61.7	10.6	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.2	3.8	4.1	6.6	3.7	4.5	4.7	19.4	1.1	14.5	17.3	3.7
LnGrp Delay(d),s/veh	101.7	30.7	17.8	98.4	32.3	14.8	53.6	71.5	17.3	107.7	46.6	14.3
LnGrp LOS	F	C	B	F	C	B	D	F	B	F	D	B
Approach Vol, veh/h		690			647			1196			1554	
Approach Delay, s/veh		48.1			41.9			67.1			55.3	
Approach LOS		D			D			E			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	24.0	36.0	14.0	37.0	18.8	41.2	17.0	34.0
Change Period (Y+Rc), s	5.0	5.0	4.0	4.0	5.0	5.0	4.0	4.0
Max Green Setting (Gmax), s	19.0	31.0	10.0	33.0	12.0	38.0	13.0	30.0
Max Q Clear Time (g_c+I1), s	21.0	33.0	11.1	9.5	10.8	34.0	14.5	9.7
Green Ext Time (p_c), s	0.0	0.0	0.0	1.6	0.0	2.2	0.0	1.6

Intersection Summary	
HCM 2010 Ctrl Delay	55.4
HCM 2010 LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	135	70	115	15	455	125	125	865	20
Future Volume (veh/h)	0	0	0	135	70	115	15	455	125	125	865	20
Number				7	4	14	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1900	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h				147	76	125	16	495	136	136	940	22
Adj No. of Lanes				0	2	0	1	2	0	1	2	0
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				0	2	0	2	2	2	2	2	2
Cap, veh/h				218	116	197	76	848	232	183	1304	31
Arrive On Green				0.15	0.15	0.15	0.04	0.31	0.31	0.10	0.37	0.37
Sat Flow, veh/h				1409	750	1271	1774	2749	751	1774	3535	83
Grp Volume(v), veh/h				187	0	161	16	318	313	136	471	491
Grp Sat Flow(s),veh/h/ln				1792	0	1638	1774	1770	1730	1774	1770	1848
Q Serve(g_s), s				6.9	0.0	6.5	0.6	10.6	10.7	5.2	16.0	16.0
Cycle Q Clear(g_c), s				6.9	0.0	6.5	0.6	10.6	10.7	5.2	16.0	16.0
Prop In Lane				0.79		0.78	1.00		0.43	1.00		0.04
Lane Grp Cap(c), veh/h				277	0	254	76	546	534	183	653	682
V/C Ratio(X)				0.67	0.00	0.64	0.21	0.58	0.59	0.74	0.72	0.72
Avail Cap(c_a), veh/h				691	0	632	79	546	534	185	653	682
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh				27.9	0.0	27.7	32.4	20.4	20.4	30.5	19.0	19.0
Incr Delay (d2), s/veh				2.8	0.0	2.6	1.4	4.5	4.7	14.8	6.8	6.5
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				3.6	0.0	3.1	0.3	5.8	5.7	3.3	8.9	9.3
LnGrp Delay(d),s/veh				30.8	0.0	30.4	33.7	24.9	25.1	45.3	25.8	25.5
LnGrp LOS				C		C	C	C	C	D	C	C
Approach Vol, veh/h					348			647			1098	
Approach Delay, s/veh					30.6			25.2			28.1	
Approach LOS					C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		
Phs Duration (G+Y+Rc), s	11.9	26.3		15.5	7.7	30.5		
Change Period (Y+Rc), s	* 4.7	* 4.7		* 4.7	* 4.7	* 4.7		
Max Green Setting (Gmax), s	* 7.3	* 22		* 27	* 3.1	* 26		
Max Q Clear Time (g_c+I1), s	7.2	12.7		8.9	2.6	18.0		
Green Ext Time (p_c), s	0.0	2.6		2.0	0.0	3.7		

Intersection Summary	
HCM 2010 Ctrl Delay	27.6
HCM 2010 LOS	C

Notes



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	110	345	160	1130	1200	155
Future Volume (veh/h)	110	345	160	1130	1200	155
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	120	375	174	1228	1304	168
Adj No. of Lanes	1	1	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	458	409	237	2140	1500	671
Arrive On Green	0.26	0.26	0.13	0.60	0.42	0.42
Sat Flow, veh/h	1774	1583	1774	3632	3632	1583
Grp Volume(v), veh/h	120	375	174	1228	1304	168
Grp Sat Flow(s),veh/h/ln	1774	1583	1774	1770	1770	1583
Q Serve(g_s), s	5.7	24.2	9.9	22.0	35.3	7.2
Cycle Q Clear(g_c), s	5.7	24.2	9.9	22.0	35.3	7.2
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	458	409	237	2140	1500	671
V/C Ratio(X)	0.26	0.92	0.74	0.57	0.87	0.25
Avail Cap(c_a), veh/h	541	483	245	2140	1500	671
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.0	37.8	43.7	12.6	27.6	19.5
Incr Delay (d2), s/veh	0.3	20.5	10.6	1.1	7.1	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.8	21.3	5.5	11.1	18.7	3.3
LnGrp Delay(d),s/veh	31.3	58.3	54.3	13.7	34.7	20.4
LnGrp LOS	C	E	D	B	C	C
Approach Vol, veh/h	495			1402	1472	
Approach Delay, s/veh	51.8			18.7	33.1	
Approach LOS	D			B	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		68.5		31.6	19.0	49.5		
Change Period (Y+Rc), s		5.0		4.5	5.0	* 5		
Max Green Setting (Gmax), s		63.5		32.0	14.5	* 45		
Max Q Clear Time (g_c+I1), s		24.0		26.2	11.9	37.3		
Green Ext Time (p_c), s		12.2		0.9	0.1	5.0		

Intersection Summary	
HCM 2010 Ctrl Delay	29.9
HCM 2010 LOS	C

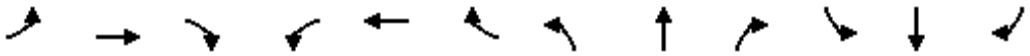
Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	130	340	75	60	285	135	120	1010	75	195	1215	140
Future Volume (veh/h)	130	340	75	60	285	135	120	1010	75	195	1215	140
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	141	370	82	65	310	147	130	1098	82	212	1321	152
Adj No. of Lanes	1	1	0	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	196	533	118	206	432	205	152	1315	588	237	1483	663
Arrive On Green	0.36	0.36	0.36	0.36	0.36	0.36	0.09	0.37	0.37	0.13	0.42	0.42
Sat Flow, veh/h	931	1478	327	935	1196	567	1774	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	141	0	452	65	0	457	130	1098	82	212	1321	152
Grp Sat Flow(s),veh/h/ln	931	0	1805	935	0	1763	1774	1770	1583	1774	1770	1583
Q Serve(g_s), s	14.4	0.0	22.4	6.7	0.0	23.5	7.6	29.7	3.6	12.4	36.3	6.5
Cycle Q Clear(g_c), s	37.9	0.0	22.4	29.1	0.0	23.5	7.6	29.7	3.6	12.4	36.3	6.5
Prop In Lane	1.00		0.18	1.00		0.32	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	196	0	652	206	0	636	152	1315	588	237	1483	663
V/C Ratio(X)	0.72	0.00	0.69	0.31	0.00	0.72	0.85	0.84	0.14	0.90	0.89	0.23
Avail Cap(c_a), veh/h	196	0	652	206	0	636	152	1315	588	237	1483	663
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.78	0.78	0.78	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.0	0.0	28.6	41.0	0.0	28.9	47.4	30.1	21.9	44.8	28.3	19.6
Incr Delay (d2), s/veh	11.9	0.0	3.2	0.9	0.0	3.9	28.9	5.0	0.4	32.5	8.4	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.7	0.0	11.8	1.8	0.0	12.1	4.9	15.4	1.6	8.2	19.4	3.0
LnGrp Delay(d),s/veh	57.9	0.0	31.8	41.9	0.0	32.9	76.3	35.1	22.3	77.3	36.7	20.4
LnGrp LOS	E		C	D		C	E	D	C	E	D	C
Approach Vol, veh/h		593			522			1310			1685	
Approach Delay, s/veh		38.0			34.0			38.4			40.3	
Approach LOS		D			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	19.0	44.0		42.2	14.0	49.0		42.2
Change Period (Y+Rc), s	5.0	5.0		* 4.3	5.0	5.0		* 4.3
Max Green Setting (Gmax), s	14.0	39.0		* 38	9.0	44.0		* 38
Max Q Clear Time (g_c+I1), s	14.4	31.7		39.9	9.6	38.3		31.1
Green Ext Time (p_c), s	0.0	5.1		0.0	0.0	4.7		1.8

Intersection Summary	
HCM 2010 Ctrl Delay	38.6
HCM 2010 LOS	D

Notes



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	210	50	95	5	55	5	65	500	5	5	595	215
Future Volume (vph)	210	50	95	5	55	5	65	500	5	5	595	215
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.7	4.7		4.7	4.7	4.7	5.1		4.7	5.1	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	0.96	
Flt Protected		0.96	1.00		1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1790	1583		1856	1583	1770	1860		1770	1789	
Flt Permitted		0.72	1.00		0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1347	1583		1813	1583	1770	1860		1770	1789	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	228	54	103	5	60	5	71	543	5	5	647	234
RTOR Reduction (vph)	0	0	74	0	0	4	0	1	0	0	19	0
Lane Group Flow (vph)	0	282	29	0	65	1	71	547	0	5	862	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)		18.0	18.0		18.0	18.0	6.8	31.5		1.0	25.7	
Effective Green, g (s)		18.0	18.0		18.0	18.0	6.8	31.5		1.0	25.7	
Actuated g/C Ratio		0.28	0.28		0.28	0.28	0.10	0.48		0.02	0.40	
Clearance Time (s)		4.7	4.7		4.7	4.7	4.7	5.1		4.7	5.1	
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		373	438		502	438	185	901		27	707	
v/s Ratio Prot							0.04	c0.29		0.00	c0.48	
v/s Ratio Perm		c0.21	0.02		0.04	0.00						
v/c Ratio		0.76	0.07		0.13	0.00	0.38	0.61		0.19	1.22	
Uniform Delay, d1		21.5	17.3		17.6	17.0	27.1	12.2		31.6	19.7	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		8.5	0.1		0.1	0.0	1.3	3.0		3.3	111.4	
Delay (s)		30.0	17.4		17.7	17.0	28.5	15.3		34.9	131.0	
Level of Service		C	B		B	B	C	B		C	F	
Approach Delay (s)		26.6			17.7			16.8			130.5	
Approach LOS		C			B			B			F	

Intersection Summary			
HCM 2000 Control Delay	70.1	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	83.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	95	200	270	25	270	65	265	980	35	55	1130	145
Future Volume (veh/h)	95	200	270	25	270	65	265	980	35	55	1130	145
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	103	217	293	27	293	71	288	1065	38	60	1228	158
Adj No. of Lanes	1	1	1	1	2	0	2	2	0	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	121	395	335	56	497	119	301	1388	50	103	1306	584
Arrive On Green	0.07	0.21	0.21	0.03	0.18	0.18	0.09	0.40	0.40	0.06	0.37	0.37
Sat Flow, veh/h	1774	1863	1583	1774	2836	677	3442	3486	124	1774	3539	1583
Grp Volume(v), veh/h	103	217	293	27	181	183	288	541	562	60	1228	158
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	1770	1743	1721	1770	1841	1774	1770	1583
Q Serve(g_s), s	5.9	10.7	18.4	1.5	9.7	10.0	8.6	27.3	27.3	3.4	34.5	7.2
Cycle Q Clear(g_c), s	5.9	10.7	18.4	1.5	9.7	10.0	8.6	27.3	27.3	3.4	34.5	7.2
Prop In Lane	1.00		1.00	1.00		0.39	1.00		0.07	1.00		1.00
Lane Grp Cap(c), veh/h	121	395	335	56	310	306	301	704	733	103	1306	584
V/C Ratio(X)	0.85	0.55	0.87	0.49	0.58	0.60	0.96	0.77	0.77	0.58	0.94	0.27
Avail Cap(c_a), veh/h	121	561	477	103	515	508	301	704	733	103	1306	584
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.47	0.47	0.47
Uniform Delay (d), s/veh	47.5	36.2	39.3	49.1	39.0	39.1	46.8	26.9	26.9	47.3	31.4	22.8
Incr Delay (d2), s/veh	40.8	0.9	11.0	4.8	1.3	1.4	40.5	7.8	7.6	3.8	7.9	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.3	5.6	9.1	0.8	4.8	4.9	5.8	14.7	15.3	1.8	18.3	3.2
LnGrp Delay(d),s/veh	88.3	37.1	50.2	53.9	40.3	40.5	87.3	34.7	34.4	51.1	39.3	23.3
LnGrp LOS	F	D	D	D	D	D	F	C	C	D	D	C
Approach Vol, veh/h		613			391			1391			1446	
Approach Delay, s/veh		52.0			41.4			45.5			38.0	
Approach LOS		D			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.0	46.0	7.5	26.5	14.0	43.0	11.3	22.8
Change Period (Y+Rc), s	5.0	5.0	* 4.3	* 4.7	5.0	5.0	* 4.3	* 4.7
Max Green Setting (Gmax), s	6.0	41.0	* 6	* 31	9.0	38.0	* 7	* 30
Max Q Clear Time (g_c+I1), s	5.4	29.3	3.5	20.4	10.6	36.5	7.9	12.0
Green Ext Time (p_c), s	0.0	7.0	0.0	1.4	0.0	1.2	0.0	1.6

Intersection Summary	
HCM 2010 Ctrl Delay	43.3
HCM 2010 LOS	D

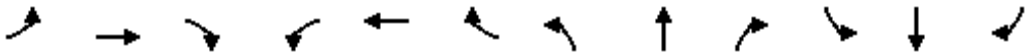
Notes



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	555	5	1140	675	0	1405
Future Volume (vph)	555	5	1140	675	0	1405
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.1	5.1	5.1	5.1		5.1
Lane Util. Factor	0.97	1.00	0.91	1.00		0.91
Frt	1.00	0.85	1.00	0.85		1.00
Flt Protected	0.95	1.00	1.00	1.00		1.00
Satd. Flow (prot)	3433	1583	5085	1583		5085
Flt Permitted	0.95	1.00	1.00	1.00		1.00
Satd. Flow (perm)	3433	1583	5085	1583		5085
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	603	5	1239	734	0	1527
RTOR Reduction (vph)	0	2	0	0	0	0
Lane Group Flow (vph)	603	3	1239	734	0	1527
Turn Type	Prot	Prot	NA	pt+ov		NA
Protected Phases	4	4	6	4 6		2
Permitted Phases					2	
Actuated Green, G (s)	16.6	16.6	38.2	65.0		38.2
Effective Green, g (s)	16.6	16.6	38.2	65.0		38.2
Actuated g/C Ratio	0.26	0.26	0.59	1.00		0.59
Clearance Time (s)	5.1	5.1	5.1			5.1
Vehicle Extension (s)	2.5	2.5	4.0			4.0
Lane Grp Cap (vph)	876	404	2988	1583		2988
v/s Ratio Prot	c0.18	0.00	0.24	c0.46		0.30
v/s Ratio Perm						
v/c Ratio	0.69	0.01	0.41	0.46		0.51
Uniform Delay, d1	21.9	18.1	7.3	0.0		7.9
Progression Factor	1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2	2.1	0.0	0.4	0.2		0.6
Delay (s)	23.9	18.1	7.7	0.2		8.5
Level of Service	C	B	A	A		A
Approach Delay (s)	23.9		4.9			8.5
Approach LOS	C		A			A

Intersection Summary			
HCM 2000 Control Delay	9.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	14.2
Intersection Capacity Utilization	77.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	585	85	0	795	275	0	0	0	655	0	355
Future Volume (vph)	0	585	85	0	795	275	0	0	0	655	0	355
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.1			5.1	5.1				4.7	4.7	
Lane Util. Factor		1.00			1.00	1.00				0.95	0.95	
Frt		0.98			1.00	0.85				1.00	0.89	
Flt Protected		1.00			1.00	1.00				0.95	0.99	
Satd. Flow (prot)		1831			1863	1583				1681	1555	
Flt Permitted		1.00			1.00	1.00				0.95	0.99	
Satd. Flow (perm)		1831			1863	1583				1681	1555	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	636	92	0	864	299	0	0	0	712	0	386
RTOR Reduction (vph)	0	6	0	0	0	149	0	0	0	0	73	0
Lane Group Flow (vph)	0	722	0	0	864	150	0	0	0	570	455	0
Turn Type		NA			NA	Perm				Split	NA	
Protected Phases		2			6					4	4	
Permitted Phases						6						
Actuated Green, G (s)		38.3			38.3	38.3				28.3	28.3	
Effective Green, g (s)		38.3			38.3	38.3				28.3	28.3	
Actuated g/C Ratio		0.50			0.50	0.50				0.37	0.37	
Clearance Time (s)		5.1			5.1	5.1				4.7	4.7	
Vehicle Extension (s)		2.0			2.0	2.0				2.0	2.0	
Lane Grp Cap (vph)		917			933	793				622	576	
v/s Ratio Prot		0.39			c0.46					c0.34	0.29	
v/s Ratio Perm						0.09						
v/c Ratio		0.79			0.93	0.19				0.92	0.79	
Uniform Delay, d1		15.7			17.7	10.5				22.9	21.4	
Progression Factor		1.00			1.00	1.00				1.00	1.00	
Incremental Delay, d2		4.2			14.4	0.0				18.0	6.6	
Delay (s)		19.9			32.2	10.5				40.9	28.0	
Level of Service		B			C	B				D	C	
Approach Delay (s)		19.9			26.6			0.0			34.7	
Approach LOS		B			C			A			C	

Intersection Summary			
HCM 2000 Control Delay	27.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	76.4	Sum of lost time (s)	9.8
Intersection Capacity Utilization	79.0%	ICU Level of Service	D
Analysis Period (min)	15		

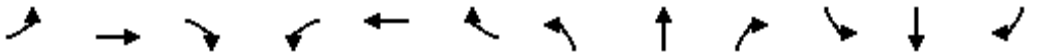
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	260	1025	0	0	855	580	160	0	365	0	0	0
Future Volume (veh/h)	260	1025	0	0	855	580	160	0	365	0	0	0
Number	5	2	12	1	6	16	3	8	18			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1863	1863	0	0	1863	1863	1900	1863	1863			
Adj Flow Rate, veh/h	283	1114	0	0	929	0	174	0	0			
Adj No. of Lanes	1	2	0	0	2	1	0	1	1			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	349	2336	0	0	1300	582	237	0	212			
Arrive On Green	0.20	0.66	0.00	0.00	0.37	0.00	0.13	0.00	0.00			
Sat Flow, veh/h	1774	3632	0	0	3632	1583	1774	0	1583			
Grp Volume(v), veh/h	283	1114	0	0	929	0	174	0	0			
Grp Sat Flow(s),veh/h/ln	1774	1770	0	0	1770	1583	1774	0	1583			
Q Serve(g_s), s	7.5	7.6	0.0	0.0	11.0	0.0	4.6	0.0	0.0			
Cycle Q Clear(g_c), s	7.5	7.6	0.0	0.0	11.0	0.0	4.6	0.0	0.0			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	349	2336	0	0	1300	582	237	0	212			
V/C Ratio(X)	0.81	0.48	0.00	0.00	0.71	0.00	0.73	0.00	0.00			
Avail Cap(c_a), veh/h	881	5129	0	0	3031	1356	1052	0	939			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	1.00	1.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00			
Uniform Delay (d), s/veh	18.8	4.1	0.0	0.0	13.3	0.0	20.4	0.0	0.0			
Incr Delay (d2), s/veh	1.8	0.1	0.0	0.0	0.3	0.0	1.7	0.0	0.0			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	3.8	3.6	0.0	0.0	5.3	0.0	2.3	0.0	0.0			
LnGrp Delay(d),s/veh	20.5	4.2	0.0	0.0	13.6	0.0	22.0	0.0	0.0			
LnGrp LOS	C	A			B		C					
Approach Vol, veh/h		1397			929			174				
Approach Delay, s/veh		7.5			13.6			22.0				
Approach LOS		A			B			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		37.4			14.3	23.1		11.5
Change Period (Y+Rc), s		5.1			* 4.7	5.1		5.0
Max Green Setting (Gmax), s		70.9			* 24	41.9		29.0
Max Q Clear Time (g_c+I1), s		9.6			9.5	13.0		6.6
Green Ext Time (p_c), s		6.8			0.4	5.0		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	10.8
HCM 2010 LOS	B

Notes



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	915	180	60	1020	205	355	165	50	330	205	110
Future Volume (vph)	130	915	180	60	1020	205	355	165	50	330	205	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	5.1	5.1	4.7	5.1	5.1	4.7	4.7	4.7	4.7	4.7	4.7
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1762	1504	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	1762	1504	1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	141	995	196	65	1109	223	386	179	54	359	223	120
RTOR Reduction (vph)	0	0	86	0	0	60	0	1	38	0	0	94
Lane Group Flow (vph)	141	995	110	65	1109	163	386	183	11	359	223	26
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2		1	6		3	3		4	4	
Permitted Phases			2			6			3			4
Actuated Green, G (s)	11.9	48.1	48.1	9.0	45.2	45.2	29.3	29.3	29.3	29.4	29.4	29.4
Effective Green, g (s)	11.9	48.1	48.1	9.0	45.2	45.2	29.3	29.3	29.3	29.4	29.4	29.4
Actuated g/C Ratio	0.09	0.36	0.36	0.07	0.33	0.33	0.22	0.22	0.22	0.22	0.22	0.22
Clearance Time (s)	4.7	5.1	5.1	4.7	5.1	5.1	4.7	4.7	4.7	4.7	4.7	4.7
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0	4.0	2.5	2.5	2.5	2.0	2.0	2.0
Lane Grp Cap (vph)	156	1260	564	118	1184	530	384	382	326	385	405	344
v/s Ratio Prot	0.08	c0.28		0.04	c0.31		c0.22	0.10		c0.20	0.12	
v/s Ratio Perm			0.07			0.10			0.01			0.02
v/c Ratio	0.90	0.79	0.19	0.55	0.94	0.31	1.01	0.48	0.03	0.93	0.55	0.08
Uniform Delay, d1	61.0	38.9	30.1	61.0	43.5	33.3	52.9	46.2	41.7	51.8	46.9	42.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	44.1	5.1	0.8	3.1	14.8	1.5	47.2	0.7	0.0	28.9	0.9	0.0
Delay (s)	105.0	44.0	30.8	64.2	58.3	34.8	100.1	46.9	41.7	80.7	47.9	42.0
Level of Service	F	D	C	E	E	C	F	D	D	F	D	D
Approach Delay (s)		48.5			54.8			79.6			63.7	
Approach LOS		D			D			E			E	

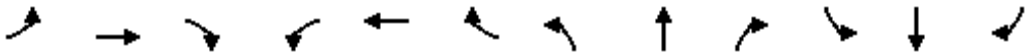
Intersection Summary			
HCM 2000 Control Delay	58.1	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	135.0	Sum of lost time (s)	19.2
Intersection Capacity Utilization	83.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	140	350	510	190	345	100	535	1485	175	100	1465	205
Future Volume (veh/h)	140	350	510	190	345	100	535	1485	175	100	1465	205
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	152	380	0	207	375	109	582	1614	0	109	1592	0
Adj No. of Lanes	1	1	1	1	1	0	2	3	0	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	138	358	304	189	306	89	506	1946	0	303	1438	644
Arrive On Green	0.08	0.19	0.00	0.11	0.22	0.22	0.15	0.38	0.00	0.17	0.41	0.00
Sat Flow, veh/h	1774	1863	1583	1774	1388	403	3442	5253	0	1774	3539	1583
Grp Volume(v), veh/h	152	380	0	207	0	484	582	1614	0	109	1592	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	0	1792	1721	1695	0	1774	1770	1583
Q Serve(g_s), s	10.9	26.9	0.0	14.9	0.0	30.9	20.6	40.2	0.0	7.6	56.9	0.0
Cycle Q Clear(g_c), s	10.9	26.9	0.0	14.9	0.0	30.9	20.6	40.2	0.0	7.6	56.9	0.0
Prop In Lane	1.00		1.00	1.00		0.23	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	138	358	304	189	0	395	506	1946	0	303	1438	644
V/C Ratio(X)	1.10	1.06	0.00	1.10	0.00	1.22	1.15	0.83	0.00	0.36	1.11	0.00
Avail Cap(c_a), veh/h	138	358	304	189	0	395	506	2368	0	303	1438	644
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	64.6	56.6	0.0	62.5	0.0	54.6	59.7	39.1	0.0	51.3	41.6	0.0
Incr Delay (d2), s/veh	106.1	64.8	0.0	93.6	0.0	121.5	88.0	4.3	0.0	0.3	58.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.4	20.3	0.0	12.2	0.0	28.6	16.0	19.6	0.0	3.7	39.5	0.0
LnGrp Delay(d),s/veh	170.6	121.4	0.0	156.2	0.0	176.0	147.7	43.3	0.0	51.5	100.2	0.0
LnGrp LOS	F	F		F		F	F	D		D	F	
Approach Vol, veh/h		532			691			2196			1701	
Approach Delay, s/veh		135.4			170.1			71.0			97.1	
Approach LOS		F			F			E			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	26.0	62.0	16.0	36.0	29.0	59.0	20.0	32.0
Change Period (Y+Rc), s	5.4	5.1	5.1	5.1	5.1	5.4	5.1	5.1
Max Green Setting (Gmax), s	20.6	56.9	10.9	30.9	12.3	65.2	14.9	26.9
Max Q Clear Time (g_c+I1), s	22.6	58.9	12.9	32.9	9.6	42.2	16.9	28.9
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	11.4	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	99.7
HCM 2010 LOS	F

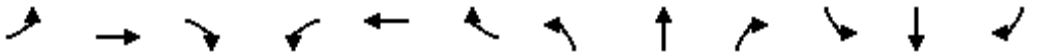


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	100	310	15	25	390	255	5	155	10	75	180	70
Future Volume (vph)	100	310	15	25	390	255	5	155	10	75	180	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.1			4.7			6.4	6.4		6.4	
Lane Util. Factor		0.91			0.95			1.00	1.00		1.00	
Frt		0.99			0.94			1.00	0.85		0.97	
Flt Protected		0.99			1.00			1.00	1.00		0.99	
Satd. Flow (prot)		5000			3331			1860	1583		1788	
Flt Permitted		0.71			1.00			0.99	1.00		0.85	
Satd. Flow (perm)		3581			3331			1843	1583		1539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	109	337	16	27	424	277	5	168	11	82	196	76
RTOR Reduction (vph)	0	3	0	0	61	0	0	0	7	0	6	0
Lane Group Flow (vph)	0	459	0	0	667	0	0	173	4	0	348	0
Turn Type	Perm	NA		Split	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		3		5 8	5 8			6			6	
Permitted Phases	3						6		6	6		
Actuated Green, G (s)		23.9			60.3			64.6	64.6		64.6	
Effective Green, g (s)		23.9			55.2			64.6	64.6		64.6	
Actuated g/C Ratio		0.14			0.33			0.39	0.39		0.39	
Clearance Time (s)		5.1						6.4	6.4		6.4	
Vehicle Extension (s)		4.0						3.0	3.0		3.0	
Lane Grp Cap (vph)		518			1114			721	619		602	
v/s Ratio Prot					c0.20							
v/s Ratio Perm		c0.13						0.09	0.00		c0.23	
v/c Ratio		1.06dl			0.60			0.24	0.01		0.58	
Uniform Delay, d1		69.2			45.7			33.7	30.6		39.5	
Progression Factor		1.00			0.42			1.00	1.00		1.00	
Incremental Delay, d2		17.0			0.5			0.8	0.0		4.0	
Delay (s)		86.2			19.6			34.5	30.6		43.5	
Level of Service		F			B			C	C		D	
Approach Delay (s)		86.2			19.6			34.3			43.5	
Approach LOS		F			B			C			D	

Intersection Summary			
HCM 2000 Control Delay	43.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	165.0	Sum of lost time (s)	21.3
Intersection Capacity Utilization	78.9%	ICU Level of Service	D
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

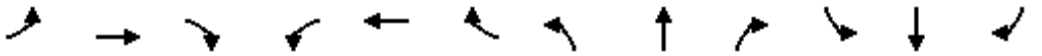
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	190	95	220	15	90	10	190	485	30	10	540	565
Future Volume (vph)	190	95	220	15	90	10	190	485	30	10	540	565
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.1	5.1	5.1		5.1		4.7	5.4		4.7	5.4	5.4
Lane Util. Factor	1.00	1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85		0.99		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00		0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583		1829		1770	1846		1770	1863	1583
Flt Permitted	0.62	1.00	1.00		0.96		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1151	1863	1583		1768		1770	1846		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	207	103	239	16	98	11	207	527	33	11	587	614
RTOR Reduction (vph)	0	0	182	0	2	0	0	1	0	0	0	86
Lane Group Flow (vph)	207	103	57	0	123	0	207	559	0	11	587	528
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		8			8		1	6		5	2	
Permitted Phases	8		8	8								2
Actuated Green, G (s)	28.7	28.7	28.7		28.7		20.2	73.4		2.4	55.6	55.6
Effective Green, g (s)	28.7	28.7	28.7		28.7		20.2	73.4		2.4	55.6	55.6
Actuated g/C Ratio	0.24	0.24	0.24		0.24		0.17	0.61		0.02	0.46	0.46
Clearance Time (s)	5.1	5.1	5.1		5.1		4.7	5.4		4.7	5.4	5.4
Vehicle Extension (s)	3.0	3.0	3.0		3.0		3.0	5.0		3.0	5.0	5.0
Lane Grp Cap (vph)	275	446	379		423		298	1131		35	865	735
v/s Ratio Prot		0.06					c0.12	0.30		0.01	0.32	
v/s Ratio Perm	c0.18		0.04		0.07							c0.33
v/c Ratio	0.75	0.23	0.15		0.29		0.69	0.49		0.31	0.68	0.72
Uniform Delay, d1	42.2	36.6	35.9		37.2		46.8	12.8		57.8	25.1	25.8
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	11.1	0.3	0.2		0.4		6.9	0.7		5.1	2.8	4.2
Delay (s)	53.3	36.9	36.1		37.6		53.7	13.6		62.9	27.8	29.9
Level of Service	D	D	D		D		D	B		E	C	C
Approach Delay (s)		42.7			37.6			24.4			29.2	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	31.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	119.7	Sum of lost time (s)	15.2
Intersection Capacity Utilization	68.8%	ICU Level of Service	C
Analysis Period (min)	15		

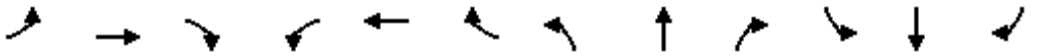
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	75	50	65	120	75	75	890	95	135	1435	35
Future Volume (vph)	5	75	50	65	120	75	75	890	95	135	1435	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.1	7.1	5.1	5.1		4.7	6.4	6.4	4.7	6.4	6.4
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt		1.00	0.85	1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1857	1583	1770	1755		1770	3539	1583	1770	3539	1583
Flt Permitted		0.42	1.00	0.70	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		774	1583	1305	1755		1770	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	82	54	71	130	82	82	967	103	147	1560	38
RTOR Reduction (vph)	0	0	48	0	15	0	0	0	54	0	0	18
Lane Group Flow (vph)	0	87	6	71	197	0	82	967	49	147	1560	20
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		3			8		5	2		1	6	
Permitted Phases	3		3	8					2			6
Actuated Green, G (s)		21.2	21.2	22.9	22.9		12.4	65.2	65.2	34.4	87.2	87.2
Effective Green, g (s)		19.2	19.2	22.9	22.9		12.4	65.2	65.2	34.4	87.2	87.2
Actuated g/C Ratio		0.12	0.12	0.14	0.14		0.08	0.40	0.40	0.21	0.53	0.53
Clearance Time (s)		5.1	5.1	5.1	5.1		4.7	6.4	6.4	4.7	6.4	6.4
Vehicle Extension (s)		4.0	4.0	2.0	2.0		2.0	4.0	4.0	2.0	4.0	4.0
Lane Grp Cap (vph)		90	184	181	243		133	1398	625	369	1870	836
v/s Ratio Prot					c0.11		0.05	c0.27		0.08	c0.44	
v/s Ratio Perm		c0.11	0.00	0.05					0.03			0.01
v/c Ratio		0.97	0.03	0.39	0.81		0.62	0.69	0.08	0.40	0.83	0.02
Uniform Delay, d1		72.6	64.7	64.7	69.0		74.0	41.5	31.1	56.4	32.8	18.6
Progression Factor		0.81	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		83.2	0.1	0.5	17.5		5.9	2.8	0.2	0.3	4.6	0.1
Delay (s)		141.8	64.8	65.2	86.4		79.8	44.4	31.4	56.6	37.4	18.6
Level of Service		F	E	E	F		E	D	C	E	D	B
Approach Delay (s)		112.3			81.1			45.7			38.6	
Approach LOS		F			F			D			D	

Intersection Summary			
HCM 2000 Control Delay	47.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	165.0	Sum of lost time (s)	23.3
Intersection Capacity Utilization	76.1%	ICU Level of Service	D
Analysis Period (min)	15		

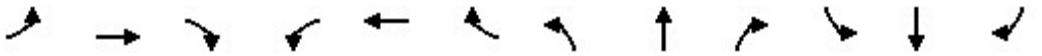
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	30	10	55	45	120	10	110	20	80	195	25
Future Volume (vph)	5	30	10	55	45	120	10	110	20	80	195	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.1			4.7			6.4		6.4	6.4	
Lane Util. Factor		1.00			1.00			1.00		1.00	1.00	
Frt		0.97			0.93			0.98		1.00	0.98	
Flt Protected		0.99			0.99			1.00		0.95	1.00	
Satd. Flow (prot)		1797			1705			1820		1770	1831	
Flt Permitted		0.96			0.99			0.97		0.66	1.00	
Satd. Flow (perm)		1737			1705			1779		1225	1831	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	33	11	60	49	130	11	120	22	87	212	27
RTOR Reduction (vph)	0	6	0	0	29	0	0	3	0	0	2	0
Lane Group Flow (vph)	0	43	0	0	210	0	0	150	0	87	237	0
Turn Type	Perm	NA		Split	NA		Perm	NA		Perm	NA	
Protected Phases		3		5 8	5 8			6			6	
Permitted Phases	3						6			6		
Actuated Green, G (s)		21.2			40.4			87.2		87.2	87.2	
Effective Green, g (s)		21.2			35.3			87.2		87.2	87.2	
Actuated g/C Ratio		0.13			0.21			0.53		0.53	0.53	
Clearance Time (s)		5.1						6.4		6.4	6.4	
Vehicle Extension (s)		4.0						4.0		4.0	4.0	
Lane Grp Cap (vph)		223			364			940		647	967	
v/s Ratio Prot					c0.12						c0.13	
v/s Ratio Perm		c0.02						0.08		0.07		
v/c Ratio		0.19			0.58			0.16		0.13	0.24	
Uniform Delay, d1		64.3			58.2			20.0		19.7	21.1	
Progression Factor		1.00			0.43			1.00		1.00	1.00	
Incremental Delay, d2		0.6			1.2			0.4		0.4	0.6	
Delay (s)		64.8			26.3			20.4		20.2	21.7	
Level of Service		E			C			C		C	C	
Approach Delay (s)		64.8			26.3			20.4			21.3	
Approach LOS		E			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	25.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	165.0	Sum of lost time (s)	21.3
Intersection Capacity Utilization	59.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	230	180	225	200	45	285	1140	240	65	1425	40
Future Volume (vph)	45	230	180	225	200	45	285	1140	240	65	1425	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.1	5.1	5.1	5.1		4.7	6.4	6.4	4.7	6.4	6.4
Lane Util. Factor		0.91	0.91	0.91	0.91		0.97	0.95	1.00	1.00	0.95	1.00
Frt		0.98	0.85	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00	0.95	0.99		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		3305	1441	1610	3277		3433	3539	1583	1770	3539	1583
Flt Permitted		0.53	1.00	0.54	0.74		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1779	1441	914	2470		3433	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	49	250	196	245	217	49	310	1239	261	71	1549	43
RTOR Reduction (vph)	0	6	132	0	8	0	0	0	133	0	0	26
Lane Group Flow (vph)	0	334	23	145	358	0	310	1239	128	71	1549	17
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		3			8		5	2		1	6	
Permitted Phases	3		3	8					2			6
Actuated Green, G (s)		24.9	24.9	33.2	33.2		21.2	69.7	69.7	15.9	64.4	64.4
Effective Green, g (s)		24.9	24.9	33.2	33.2		21.2	69.7	69.7	15.9	64.4	64.4
Actuated g/C Ratio		0.15	0.15	0.20	0.20		0.13	0.42	0.42	0.10	0.39	0.39
Clearance Time (s)		5.1	5.1	5.1	5.1		4.7	6.4	6.4	4.7	6.4	6.4
Vehicle Extension (s)		4.0	4.0	2.0	2.0		2.0	3.0	3.0	2.0	3.0	3.0
Lane Grp Cap (vph)		268	217	183	496		441	1494	668	170	1381	617
v/s Ratio Prot							0.09	c0.35		0.04	c0.44	
v/s Ratio Perm		c0.19	0.02	c0.16	0.14				0.08			0.01
v/c Ratio		1.25	0.11	0.79	0.72		0.70	0.83	0.19	0.42	1.12	0.03
Uniform Delay, d1		70.0	60.5	62.6	61.6		68.9	42.4	29.9	70.2	50.3	31.0
Progression Factor		0.37	0.07	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		131.5	0.2	19.3	4.4		4.1	5.5	0.6	0.6	64.9	0.1
Delay (s)		157.2	4.7	81.9	66.0		73.0	47.8	30.6	70.8	115.2	31.1
Level of Service		F	A	F	E		E	D	C	E	F	C
Approach Delay (s)		109.4			70.5			49.7			111.1	
Approach LOS		F			E			D			F	

Intersection Summary			
HCM 2000 Control Delay	81.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	165.0	Sum of lost time (s)	21.3
Intersection Capacity Utilization	86.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	650	40	195	880	190	45	55	180	185	125	50
Future Volume (veh/h)	20	650	40	195	880	190	45	55	180	185	125	50
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	22	707	43	212	957	207	49	60	196	201	136	54
Adj No. of Lanes	1	2	1	1	2	0	1	1	1	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	32	1146	513	336	1434	310	234	431	367	299	294	117
Arrive On Green	0.02	0.32	0.32	0.19	0.50	0.50	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	1774	3539	1583	1774	2896	626	1188	1863	1583	1119	1270	504
Grp Volume(v), veh/h	22	707	43	212	584	580	49	60	196	201	0	190
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1752	1188	1863	1583	1119	0	1774
Q Serve(g_s), s	1.3	17.7	2.0	11.6	26.1	26.2	3.9	2.7	11.4	18.3	0.0	9.7
Cycle Q Clear(g_c), s	1.3	17.7	2.0	11.6	26.1	26.2	13.6	2.7	11.4	20.9	0.0	9.7
Prop In Lane	1.00		1.00	1.00		0.36	1.00		1.00	1.00		0.28
Lane Grp Cap(c), veh/h	32	1146	513	336	876	868	234	431	367	299	0	411
V/C Ratio(X)	0.69	0.62	0.08	0.63	0.67	0.67	0.21	0.14	0.53	0.67	0.00	0.46
Avail Cap(c_a), veh/h	84	1146	513	389	876	868	328	578	492	387	0	551
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.86	0.86	0.86	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	51.3	30.0	24.7	39.2	20.0	20.0	40.6	32.0	35.4	40.4	0.0	34.7
Incr Delay (d2), s/veh	31.2	2.5	0.3	2.2	3.4	3.5	0.4	0.1	1.2	3.0	0.0	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	9.0	0.9	5.9	13.5	13.4	1.3	1.4	5.1	5.9	0.0	4.8
LnGrp Delay(d),s/veh	82.4	32.5	25.0	41.4	23.4	23.5	41.0	32.2	36.6	43.3	0.0	35.5
LnGrp LOS	F	C	C	D	C	C	D	C	D	D		D
Approach Vol, veh/h		772			1376			305			391	
Approach Delay, s/veh		33.5			26.2			36.4			39.5	
Approach LOS		C			C			D			D	

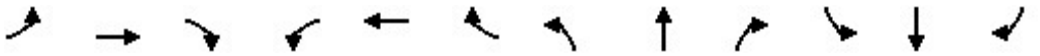
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	6.9	57.0		29.7	24.9	39.0		29.7
Change Period (Y+Rc), s	5.0	5.0		5.4	5.0	5.0		5.4
Max Green Setting (Gmax), s	5.0	52.0		32.6	23.0	34.0		32.6
Max Q Clear Time (g_c+I1), s	3.3	28.2		15.6	13.6	19.7		22.9
Green Ext Time (p_c), s	0.0	8.9		1.0	0.4	4.3		1.4

Intersection Summary		
HCM 2010 Ctrl Delay		31.1
HCM 2010 LOS		C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	725	300	735	1235	0	0	0	0	230	5	75
Future Volume (vph)	0	725	300	735	1235	0	0	0	0	230	5	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6	4.6	4.0	4.6					4.0	4.0	
Lane Util. Factor		0.91	0.91	0.97	0.95					0.95	0.95	
Frt		0.99	0.85	1.00	1.00					1.00	0.93	
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.98	
Satd. Flow (prot)		3370	1441	3433	3539					1681	1600	
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.98	
Satd. Flow (perm)		3370	1441	3433	3539					1681	1600	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	788	326	799	1342	0	0	0	0	250	5	82
RTOR Reduction (vph)	0	2	155	0	0	0	0	0	0	0	31	0
Lane Group Flow (vph)	0	819	138	799	1342	0	0	0	0	172	134	0
Turn Type		NA	Perm	Prot	NA					Perm	NA	
Protected Phases		2		1	6						4	
Permitted Phases			2							4		
Actuated Green, G (s)		47.1	47.1	24.6	75.7					15.7	15.7	
Effective Green, g (s)		47.1	47.1	24.6	75.7					15.7	15.7	
Actuated g/C Ratio		0.47	0.47	0.25	0.76					0.16	0.16	
Clearance Time (s)		4.6	4.6	4.0	4.6					4.0	4.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0					3.0	3.0	
Lane Grp Cap (vph)		1587	678	844	2679					263	251	
v/s Ratio Prot		0.24		c0.23	c0.38							
v/s Ratio Perm			0.10							c0.10	0.08	
v/c Ratio		0.52	0.20	0.95	0.50					0.65	0.53	
Uniform Delay, d1		18.5	15.5	37.1	4.8					39.6	38.8	
Progression Factor		1.00	1.00	0.89	0.42					1.00	1.00	
Incremental Delay, d2		1.2	0.7	14.0	0.4					5.7	2.2	
Delay (s)		19.7	16.2	47.1	2.4					45.3	41.0	
Level of Service		B	B	D	A					D	D	
Approach Delay (s)		18.8			19.1			0.0			43.2	
Approach LOS		B			B			A			D	

Intersection Summary			
HCM 2000 Control Delay	21.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.6
Intersection Capacity Utilization	77.0%	ICU Level of Service	D
Analysis Period (min)	15		

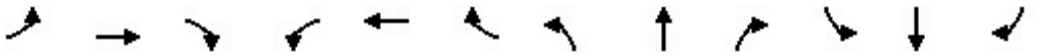
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	935	0	0	1615	215	400	0	685	0	0	0
Future Volume (vph)	55	935	0	0	1615	215	400	0	685	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.6			4.6			4.0	4.0			
Lane Util. Factor	1.00	0.95			0.86			0.95	0.95			
Frt	1.00	1.00			0.98			0.96	0.85			
Flt Protected	0.95	1.00			1.00			0.97	1.00			
Satd. Flow (prot)	1770	3539			6295			1634	1504			
Flt Permitted	0.95	1.00			1.00			0.97	1.00			
Satd. Flow (perm)	1770	3539			6295			1634	1504			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	60	1016	0	0	1755	234	435	0	745	0	0	0
RTOR Reduction (vph)	0	0	0	0	22	0	0	37	40	0	0	0
Lane Group Flow (vph)	60	1016	0	0	1967	0	0	577	526	0	0	0
Turn Type	Prot	NA			NA		Perm	NA	Perm			
Protected Phases	5	2			6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	5.2	52.4			43.2			39.0	39.0			
Effective Green, g (s)	5.2	52.4			43.2			39.0	39.0			
Actuated g/C Ratio	0.05	0.52			0.43			0.39	0.39			
Clearance Time (s)	4.0	4.6			4.6			4.0	4.0			
Vehicle Extension (s)	2.0	2.0			2.0			2.0	2.0			
Lane Grp Cap (vph)	92	1854			2719			637	586			
v/s Ratio Prot	0.03	c0.29			c0.31							
v/s Ratio Perm								0.35	0.35			
v/c Ratio	0.65	0.55			0.72			0.91	0.90			
Uniform Delay, d1	46.5	15.9			23.5			28.8	28.6			
Progression Factor	1.14	0.50			1.00			1.00	1.00			
Incremental Delay, d2	9.1	0.9			1.7			16.1	16.0			
Delay (s)	62.2	8.8			25.2			44.9	44.6			
Level of Service	E	A			C			D	D			
Approach Delay (s)		11.8			25.2			44.7			0.0	
Approach LOS		B			C			D			A	

Intersection Summary			
HCM 2000 Control Delay	27.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.6
Intersection Capacity Utilization	84.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	300	1045	140	175	1140	135	375	115	180	150	100	225
Future Volume (vph)	300	1045	140	175	1140	135	375	115	180	150	100	225
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.3	4.3		4.3	4.3		4.7	4.7	4.7	4.7	4.7	4.7
Lane Util. Factor	0.97	0.95		0.97	0.95		0.97	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.98		1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	0.99	1.00
Satd. Flow (prot)	3433	3477		3433	3483		3433	1863	1583	1681	1751	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	0.99	1.00
Satd. Flow (perm)	3433	3477		3433	3483		3433	1863	1583	1681	1751	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	326	1136	152	190	1239	147	408	125	196	163	109	245
RTOR Reduction (vph)	0	8	0	0	8	0	0	0	175	0	0	156
Lane Group Flow (vph)	326	1280	0	190	1378	0	408	125	21	134	138	89
Turn Type	Prot	NA		Prot	NA		Split	NA	Perm	Split	NA	Perm
Protected Phases	1	6		5	2		4	4		3	3	
Permitted Phases									4			3
Actuated Green, G (s)	17.2	53.9		6.7	43.4		11.3	11.3	11.3	15.1	15.1	15.1
Effective Green, g (s)	17.2	53.9		6.7	43.4		11.3	11.3	11.3	15.1	15.1	15.1
Actuated g/C Ratio	0.16	0.51		0.06	0.41		0.11	0.11	0.11	0.14	0.14	0.14
Clearance Time (s)	4.3	4.3		4.3	4.3		4.7	4.7	4.7	4.7	4.7	4.7
Vehicle Extension (s)	2.0	4.0		2.0	4.0		2.0	2.0	2.0	3.0	3.0	3.0
Lane Grp Cap (vph)	562	1784		219	1439		369	200	170	241	251	227
v/s Ratio Prot	0.09	c0.37		0.06	c0.40		c0.12	0.07		c0.08	0.08	
v/s Ratio Perm									0.01			0.06
v/c Ratio	0.58	0.72		0.87	0.96		1.11	0.62	0.12	0.56	0.55	0.39
Uniform Delay, d1	40.6	19.7		48.7	29.9		46.9	44.8	42.4	41.8	41.8	40.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	2.5		27.5	15.5		78.5	4.3	0.1	2.8	2.5	1.1
Delay (s)	41.5	22.2		76.3	45.4		125.3	49.2	42.5	44.6	44.2	41.9
Level of Service	D	C		E	D		F	D	D	D	D	D
Approach Delay (s)		26.1			49.2			90.0			43.2	
Approach LOS		C			D			F			D	

Intersection Summary			
HCM 2000 Control Delay	46.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	72.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	140	865	150	250	1050	1430	165	245	175	315	325	145
Future Volume (veh/h)	140	865	150	250	1050	1430	165	245	175	315	325	145
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	152	940	0	272	1141	0	179	266	0	342	353	0
Adj No. of Lanes	2	2	1	2	2	1	2	2	1	2	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	131	1110	497	368	1354	606	411	1198	536	220	1001	0
Arrive On Green	0.04	0.31	0.00	0.11	0.38	0.00	0.12	0.34	0.00	0.06	0.28	0.00
Sat Flow, veh/h	3442	3539	1583	3442	3539	1583	3442	3539	1583	3442	3632	0
Grp Volume(v), veh/h	152	940	0	272	1141	0	179	266	0	342	353	0
Grp Sat Flow(s),veh/h/ln	1721	1770	1583	1721	1770	1583	1721	1770	1583	1721	1770	0
Q Serve(g_s), s	4.0	26.1	0.0	8.0	30.8	0.0	5.1	5.6	0.0	6.7	8.3	0.0
Cycle Q Clear(g_c), s	4.0	26.1	0.0	8.0	30.8	0.0	5.1	5.6	0.0	6.7	8.3	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	131	1110	497	368	1354	606	411	1198	536	220	1001	0
V/C Ratio(X)	1.16	0.85	0.00	0.74	0.84	0.00	0.44	0.22	0.00	1.56	0.35	0.00
Avail Cap(c_a), veh/h	131	1315	588	426	1618	724	411	1198	536	220	1001	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	50.5	33.7	0.0	45.5	29.5	0.0	42.9	24.8	0.0	49.2	30.0	0.0
Incr Delay (d2), s/veh	127.8	4.6	0.0	4.5	3.6	0.0	0.3	0.4	0.0	271.9	1.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.2	13.4	0.0	4.0	15.7	0.0	2.4	2.8	0.0	11.5	4.2	0.0
LnGrp Delay(d),s/veh	178.3	38.3	0.0	49.9	33.2	0.0	43.2	25.3	0.0	321.1	31.0	0.0
LnGrp LOS	F	D		D	C		D	C		F	C	
Approach Vol, veh/h		1092			1413			445			695	
Approach Delay, s/veh		57.8			36.4			32.5			173.7	
Approach LOS		E			D			C			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.0	45.2	11.0	39.8	16.2	37.9	16.8	34.0
Change Period (Y+Rc), s	5.0	5.0	* 4.3	* 4.3	5.0	5.0	* 4.3	* 4.3
Max Green Setting (Gmax), s	4.0	48.0	* 6.7	* 28	13.0	39.0	* 4.7	* 30
Max Q Clear Time (g_c+I1), s	6.0	32.8	8.7	7.6	10.0	28.1	7.1	10.3
Green Ext Time (p_c), s	0.0	7.3	0.0	1.6	0.2	4.9	0.0	2.2

Intersection Summary	
HCM 2010 Ctrl Delay	68.5
HCM 2010 LOS	E

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	105	740	365	185	500	155	435	320	40	155	345	95
Future Volume (veh/h)	105	740	365	185	500	155	435	320	40	155	345	95
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	114	804	0	201	543	168	473	348	0	168	375	103
Adj No. of Lanes	1	2	1	2	2	0	2	1	1	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	142	939	420	329	762	235	636	387	329	257	462	126
Arrive On Green	0.08	0.27	0.00	0.10	0.29	0.29	0.18	0.21	0.00	0.14	0.17	0.17
Sat Flow, veh/h	1774	3539	1583	3442	2666	822	3442	1863	1583	1774	2753	747
Grp Volume(v), veh/h	114	804	0	201	360	351	473	348	0	168	239	239
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1721	1770	1718	1721	1863	1583	1774	1770	1731
Q Serve(g_s), s	6.6	22.7	0.0	5.9	19.1	19.3	13.6	19.1	0.0	9.4	13.7	14.0
Cycle Q Clear(g_c), s	6.6	22.7	0.0	5.9	19.1	19.3	13.6	19.1	0.0	9.4	13.7	14.0
Prop In Lane	1.00		1.00	1.00		0.48	1.00		1.00	1.00		0.43
Lane Grp Cap(c), veh/h	142	939	420	329	506	491	636	387	329	257	297	291
V/C Ratio(X)	0.80	0.86	0.00	0.61	0.71	0.72	0.74	0.90	0.00	0.65	0.81	0.82
Avail Cap(c_a), veh/h	194	1079	483	329	506	491	636	483	410	257	391	382
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	47.5	36.7	0.0	45.6	33.6	33.7	40.5	40.5	0.0	42.4	42.0	42.2
Incr Delay (d2), s/veh	15.6	9.9	0.0	2.4	8.3	8.6	4.2	15.1	0.0	12.3	8.9	10.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.9	12.3	0.0	2.9	10.5	10.3	6.9	11.5	0.0	5.5	7.4	7.5
LnGrp Delay(d),s/veh	63.1	46.6	0.0	48.0	41.9	42.3	44.7	55.6	0.0	54.7	51.0	52.5
LnGrp LOS	E	D		D	D	D	D	E		D	D	D
Approach Vol, veh/h		918			912			821			646	
Approach Delay, s/veh		48.7			43.4			49.3			52.5	
Approach LOS		D			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.9	35.0	21.0	27.6	15.0	32.8	25.2	23.4
Change Period (Y+Rc), s	4.5	5.0	5.8	5.8	5.0	5.0	5.8	5.8
Max Green Setting (Gmax), s	11.5	30.0	15.2	27.2	9.0	32.0	19.2	23.2
Max Q Clear Time (g_c+I1), s	8.6	21.3	11.4	21.1	7.9	24.7	15.6	16.0
Green Ext Time (p_c), s	0.1	3.0	0.1	0.7	0.0	3.2	0.4	1.7

Intersection Summary	
HCM 2010 Ctrl Delay	48.1
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	180	680	190	200	745	80	165	285	160	105	395	245
Future Volume (veh/h)	180	680	190	200	745	80	165	285	160	105	395	245
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	196	739	207	217	810	87	179	310	174	114	429	266
Adj No. of Lanes	1	2	1	1	2	0	2	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	225	920	412	246	876	94	608	766	420	141	526	323
Arrive On Green	0.13	0.26	0.26	0.14	0.27	0.27	0.18	0.35	0.35	0.08	0.25	0.25
Sat Flow, veh/h	1774	3539	1583	1774	3225	346	3442	2208	1211	1774	2108	1296
Grp Volume(v), veh/h	196	739	207	217	444	453	179	247	237	114	360	335
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1802	1721	1770	1649	1774	1770	1634
Q Serve(g_s), s	12.0	21.7	7.9	13.3	27.1	27.1	5.0	11.8	12.2	7.0	21.2	21.5
Cycle Q Clear(g_c), s	12.0	21.7	7.9	13.3	27.1	27.1	5.0	11.8	12.2	7.0	21.2	21.5
Prop In Lane	1.00		1.00	1.00		0.19	1.00		0.73	1.00		0.79
Lane Grp Cap(c), veh/h	225	920	412	246	481	490	608	614	572	141	442	408
V/C Ratio(X)	0.87	0.80	0.50	0.88	0.92	0.92	0.29	0.40	0.41	0.81	0.81	0.82
Avail Cap(c_a), veh/h	256	957	428	272	494	503	608	614	572	181	539	498
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	47.5	38.4	14.5	46.9	39.3	39.3	39.7	27.5	27.6	50.3	39.2	39.3
Incr Delay (d2), s/veh	23.9	4.9	1.0	25.2	23.0	22.7	0.3	2.0	2.2	18.9	8.7	10.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.4	11.2	4.8	8.2	16.3	16.5	2.4	6.1	5.9	4.2	11.5	10.8
LnGrp Delay(d),s/veh	71.5	43.3	15.4	72.1	62.3	62.0	39.9	29.5	29.8	69.2	47.9	49.3
LnGrp LOS	E	D	B	E	E	E	D	C	C	E	D	D
Approach Vol, veh/h		1142			1114			663			809	
Approach Delay, s/veh		43.1			64.1			32.4			51.5	
Approach LOS		D			E			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.5	43.2	20.4	33.9	24.3	32.4	19.1	35.2
Change Period (Y+Rc), s	* 4.7	* 4.7	5.0	5.0	* 4.7	* 4.7	5.0	5.0
Max Green Setting (Gmax), s	* 11	* 33	17.0	30.0	* 11	* 34	16.0	31.0
Max Q Clear Time (g_c+I1), s	9.0	14.2	15.3	23.7	7.0	23.5	14.0	29.1
Green Ext Time (p_c), s	0.1	4.0	0.1	3.0	0.2	4.2	0.1	1.1

Intersection Summary	
HCM 2010 Ctrl Delay	49.3
HCM 2010 LOS	D

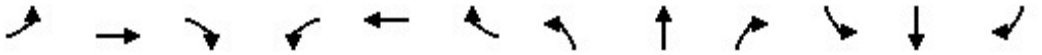
Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	190	545	80	120	560	160	255	535	90	160	645	225
Future Volume (veh/h)	190	545	80	120	560	160	255	535	90	160	645	225
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	207	592	87	130	609	174	277	582	98	174	701	245
Adj No. of Lanes	1	2	1	1	2	1	1	2	1	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	235	873	391	159	721	322	305	693	310	361	805	360
Arrive On Green	0.13	0.25	0.25	0.09	0.20	0.20	0.17	0.20	0.20	0.20	0.23	0.23
Sat Flow, veh/h	1774	3539	1583	1774	3539	1583	1774	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	207	592	87	130	609	174	277	582	98	174	701	245
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1583	1774	1770	1583	1774	1770	1583
Q Serve(g_s), s	12.7	16.8	2.6	8.0	18.4	10.9	17.0	17.6	3.9	9.6	21.2	15.7
Cycle Q Clear(g_c), s	12.7	16.8	2.6	8.0	18.4	10.9	17.0	17.6	3.9	9.6	21.2	15.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	235	873	391	159	721	322	305	693	310	361	805	360
V/C Ratio(X)	0.88	0.68	0.22	0.82	0.84	0.54	0.91	0.84	0.32	0.48	0.87	0.68
Avail Cap(c_a), veh/h	248	928	415	251	934	418	316	947	424	361	925	414
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	47.3	37.8	9.2	49.6	42.5	39.5	45.1	43.0	16.5	39.0	41.3	39.2
Incr Delay (d2), s/veh	26.3	1.4	0.1	11.0	11.7	6.3	28.0	3.8	0.2	0.4	7.4	2.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.9	8.4	2.0	4.4	10.1	5.3	10.7	8.9	2.4	4.8	11.2	7.1
LnGrp Delay(d),s/veh	73.6	39.3	9.3	60.6	54.2	45.9	73.1	46.7	16.7	39.4	48.8	41.8
LnGrp LOS	E	D	A	E	D	D	E	D	B	D	D	D
Approach Vol, veh/h		886			913			957			1120	
Approach Delay, s/veh		44.3			53.5			51.3			45.8	
Approach LOS		D			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	26.8	25.9	14.4	31.9	23.3	29.4	19.2	27.1
Change Period (Y+Rc), s	* 4.2	* 4.2	4.5	4.5	* 4.2	* 4.2	4.5	4.5
Max Green Setting (Gmax), s	* 19	* 30	15.7	29.1	* 20	* 29	15.5	29.3
Max Q Clear Time (g_c+I1), s	11.6	19.6	10.0	18.8	19.0	23.2	14.7	20.4
Green Ext Time (p_c), s	0.1	2.2	0.1	2.2	0.1	2.1	0.0	2.2

Intersection Summary	
HCM 2010 Ctrl Delay	48.6
HCM 2010 LOS	D

Notes



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	185	295	165	140	275	185	145	925	40	290	975	165
Future Volume (veh/h)	185	295	165	140	275	185	145	925	40	290	975	165
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	201	321	179	152	299	201	158	1005	43	315	1060	179
Adj No. of Lanes	1	2	1	1	2	1	1	2	1	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	208	1052	471	160	957	428	221	988	442	304	1153	516
Arrive On Green	0.12	0.30	0.30	0.09	0.27	0.27	0.12	0.28	0.28	0.17	0.33	0.33
Sat Flow, veh/h	1774	3539	1583	1774	3539	1583	1774	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	201	321	179	152	299	201	158	1005	43	315	1060	179
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1583	1774	1770	1583	1774	1770	1583
Q Serve(g_s), s	12.5	7.8	7.0	9.5	7.5	7.7	9.5	31.0	1.7	19.0	32.0	6.7
Cycle Q Clear(g_c), s	12.5	7.8	7.0	9.5	7.5	7.7	9.5	31.0	1.7	19.0	32.0	6.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	208	1052	471	160	957	428	221	988	442	304	1153	516
V/C Ratio(X)	0.97	0.31	0.38	0.95	0.31	0.47	0.71	1.02	0.10	1.04	0.92	0.35
Avail Cap(c_a), veh/h	208	1052	471	160	957	428	221	988	442	304	1212	542
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	48.8	30.1	15.4	50.3	32.3	14.5	46.7	40.0	17.2	46.0	36.0	14.2
Incr Delay (d2), s/veh	52.9	0.7	2.3	56.6	0.1	0.3	10.4	32.9	0.0	61.7	10.6	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.2	3.9	4.1	7.2	3.7	4.5	5.3	19.6	0.9	14.5	17.3	3.7
LnGrp Delay(d),s/veh	101.7	30.9	17.8	106.9	32.3	14.8	57.0	72.9	17.3	107.7	46.6	14.3
LnGrp LOS	F	C	B	F	C	B	E	F	B	F	D	B
Approach Vol, veh/h		701			652			1206			1554	
Approach Delay, s/veh		47.9			44.3			68.8			55.3	
Approach LOS		D			D			E			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	24.0	36.0	14.0	37.0	18.8	41.2	17.0	34.0
Change Period (Y+Rc), s	5.0	5.0	4.0	4.0	5.0	5.0	4.0	4.0
Max Green Setting (Gmax), s	19.0	31.0	10.0	33.0	12.0	38.0	13.0	30.0
Max Q Clear Time (g_c+I1), s	21.0	33.0	11.5	9.8	11.5	34.0	14.5	9.7
Green Ext Time (p_c), s	0.0	0.0	0.0	1.7	0.0	2.2	0.0	1.6

Intersection Summary	
HCM 2010 Ctrl Delay	56.2
HCM 2010 LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	130	70	120	15	425	115	135	845	20
Future Volume (veh/h)	0	0	0	130	70	120	15	425	115	135	845	20
Number				7	4	14	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1900	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h				141	76	130	16	462	125	147	918	22
Adj No. of Lanes				0	2	0	1	2	0	1	2	0
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				2	2	2	2	2	2	2	2	2
Cap, veh/h				209	115	204	76	852	229	185	1307	31
Arrive On Green				0.15	0.15	0.15	0.04	0.31	0.31	0.10	0.37	0.37
Sat Flow, veh/h				1355	747	1322	1774	2760	741	1774	3533	85
Grp Volume(v), veh/h				187	0	160	16	295	292	147	460	480
Grp Sat Flow(s),veh/h/ln				1795	0	1629	1774	1770	1732	1774	1770	1848
Q Serve(g_s), s				6.9	0.0	6.5	0.6	9.7	9.8	5.7	15.5	15.5
Cycle Q Clear(g_c), s				6.9	0.0	6.5	0.6	9.7	9.8	5.7	15.5	15.5
Prop In Lane				0.76		0.81	1.00		0.43	1.00		0.05
Lane Grp Cap(c), veh/h				277	0	252	76	546	534	185	655	684
V/C Ratio(X)				0.67	0.00	0.64	0.21	0.54	0.55	0.79	0.70	0.70
Avail Cap(c_a), veh/h				692	0	629	79	546	534	185	655	684
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh				27.9	0.0	27.8	32.4	20.1	20.1	30.6	18.8	18.8
Incr Delay (d2), s/veh				2.8	0.0	2.7	1.4	3.8	4.0	20.8	6.2	5.9
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				3.6	0.0	3.1	0.3	5.2	5.3	3.8	8.7	9.0
LnGrp Delay(d),s/veh				30.8	0.0	30.4	33.7	23.9	24.1	51.4	25.0	24.7
LnGrp LOS				C		C	C	C	C	D	C	C
Approach Vol, veh/h					347			603			1087	
Approach Delay, s/veh					30.6			24.3			28.4	
Approach LOS					C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		
Phs Duration (G+Y+Rc), s	12.0	26.3		15.5	7.7	30.6		
Change Period (Y+Rc), s	* 4.7	* 4.7		* 4.7	* 4.7	* 4.7		
Max Green Setting (Gmax), s	* 7.3	* 22		* 27	* 3.1	* 26		
Max Q Clear Time (g_c+I1), s	7.7	11.8		8.9	2.6	17.5		
Green Ext Time (p_c), s	0.0	2.6		2.0	0.0	3.8		

Intersection Summary	
HCM 2010 Ctrl Delay	27.6
HCM 2010 LOS	C

Notes



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	110	350	160	1120	1200	150
Future Volume (veh/h)	110	350	160	1120	1200	150
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	120	380	174	1217	1304	163
Adj No. of Lanes	1	1	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	463	413	237	2140	1500	671
Arrive On Green	0.26	0.26	0.13	0.60	0.42	0.42
Sat Flow, veh/h	1774	1583	1774	3632	3632	1583
Grp Volume(v), veh/h	120	380	174	1217	1304	163
Grp Sat Flow(s),veh/h/ln	1774	1583	1774	1770	1770	1583
Q Serve(g_s), s	5.6	24.5	9.9	21.7	35.3	6.9
Cycle Q Clear(g_c), s	5.6	24.5	9.9	21.7	35.3	6.9
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	463	413	237	2140	1500	671
V/C Ratio(X)	0.26	0.92	0.74	0.57	0.87	0.24
Avail Cap(c_a), veh/h	541	483	245	2140	1500	671
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.7	37.7	43.7	12.5	27.6	19.4
Incr Delay (d2), s/veh	0.3	20.9	10.6	1.1	7.1	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.8	21.6	5.5	10.8	18.7	3.2
LnGrp Delay(d),s/veh	31.0	58.6	54.3	13.6	34.7	20.3
LnGrp LOS	C	E	D	B	C	C
Approach Vol, veh/h	500			1391	1467	
Approach Delay, s/veh	52.0			18.7	33.1	
Approach LOS	D			B	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		68.5		31.9	19.0	49.5		
Change Period (Y+Rc), s		5.0		4.5	5.0	* 5		
Max Green Setting (Gmax), s		63.5		32.0	14.5	* 45		
Max Q Clear Time (g_c+I1), s		23.7		26.5	11.9	37.3		
Green Ext Time (p_c), s		12.1		0.9	0.1	5.0		

Intersection Summary	
HCM 2010 Ctrl Delay	30.0
HCM 2010 LOS	C

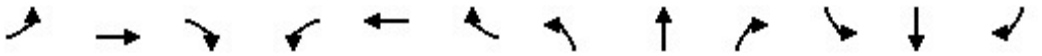
Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	125	340	75	60	285	130	125	1005	75	205	1205	140
Future Volume (veh/h)	125	340	75	60	285	130	125	1005	75	205	1205	140
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	136	370	82	65	310	141	136	1092	82	223	1310	152
Adj No. of Lanes	1	1	0	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	201	533	118	206	438	199	152	1281	573	253	1483	663
Arrive On Green	0.36	0.36	0.36	0.36	0.36	0.36	0.09	0.36	0.36	0.14	0.42	0.42
Sat Flow, veh/h	936	1478	327	935	1213	552	1774	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	136	0	452	65	0	451	136	1092	82	223	1310	152
Grp Sat Flow(s),veh/h/ln	936	0	1805	935	0	1765	1774	1770	1583	1774	1770	1583
Q Serve(g_s), s	14.9	0.0	22.4	6.7	0.0	23.0	8.0	29.9	3.7	12.9	35.8	6.5
Cycle Q Clear(g_c), s	37.9	0.0	22.4	29.1	0.0	23.0	8.0	29.9	3.7	12.9	35.8	6.5
Prop In Lane	1.00		0.18	1.00		0.31	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	201	0	652	206	0	637	152	1281	573	253	1483	663
V/C Ratio(X)	0.68	0.00	0.69	0.31	0.00	0.71	0.89	0.85	0.14	0.88	0.88	0.23
Avail Cap(c_a), veh/h	201	0	652	206	0	637	152	1281	573	253	1483	663
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.78	0.78	0.78	1.00	1.00	1.00
Uniform Delay (d), s/veh	45.2	0.0	28.6	41.0	0.0	28.8	47.5	30.9	22.5	44.1	28.1	19.6
Incr Delay (d2), s/veh	8.7	0.0	3.2	0.9	0.0	3.6	36.6	5.8	0.4	27.9	8.0	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.4	0.0	11.8	1.8	0.0	11.8	5.4	15.6	1.7	8.3	19.1	3.0
LnGrp Delay(d),s/veh	53.9	0.0	31.8	41.9	0.0	32.4	84.1	36.7	22.9	72.0	36.1	20.4
LnGrp LOS	D		C	D		C	F	D	C	E	D	C
Approach Vol, veh/h		588			516			1310			1685	
Approach Delay, s/veh		36.9			33.6			40.8			39.4	
Approach LOS		D			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	20.0	43.0		42.2	14.0	49.0		42.2
Change Period (Y+Rc), s	5.0	5.0		* 4.3	5.0	5.0		* 4.3
Max Green Setting (Gmax), s	15.0	38.0		* 38	9.0	44.0		* 38
Max Q Clear Time (g_c+I1), s	14.9	31.9		39.9	10.0	37.8		31.1
Green Ext Time (p_c), s	0.0	4.4		0.0	0.0	5.0		1.8

Intersection Summary	
HCM 2010 Ctrl Delay	38.8
HCM 2010 LOS	D

Notes



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	205	50	95	5	55	5	65	500	5	5	605	205
Future Volume (vph)	205	50	95	5	55	5	65	500	5	5	605	205
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.7	4.7		4.7	4.7	4.7	5.1		4.7	5.1	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	0.96	
Flt Protected		0.96	1.00		1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1791	1583		1856	1583	1770	1860		1770	1792	
Flt Permitted		0.72	1.00		0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1348	1583		1813	1583	1770	1860		1770	1792	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	223	54	103	5	60	5	71	543	5	5	658	223
RTOR Reduction (vph)	0	0	75	0	0	4	0	1	0	0	17	0
Lane Group Flow (vph)	0	277	28	0	65	1	71	547	0	5	864	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)		17.8	17.8		17.8	17.8	6.8	31.7		1.0	25.9	
Effective Green, g (s)		17.8	17.8		17.8	17.8	6.8	31.7		1.0	25.9	
Actuated g/C Ratio		0.27	0.27		0.27	0.27	0.10	0.49		0.02	0.40	
Clearance Time (s)		4.7	4.7		4.7	4.7	4.7	5.1		4.7	5.1	
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		369	433		496	433	185	907		27	714	
v/s Ratio Prot							0.04	c0.29		0.00	c0.48	
v/s Ratio Perm		c0.21	0.02		0.04	0.00						
v/c Ratio		0.75	0.07		0.13	0.00	0.38	0.60		0.19	1.21	
Uniform Delay, d1		21.6	17.4		17.8	17.2	27.1	12.1		31.6	19.6	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		8.3	0.1		0.1	0.0	1.3	3.0		3.3	107.1	
Delay (s)		29.9	17.5		17.9	17.2	28.5	15.1		34.9	126.6	
Level of Service		C	B		B	B	C	B		C	F	
Approach Delay (s)		26.6			17.8			16.6			126.1	
Approach LOS		C			B			B			F	

Intersection Summary			
HCM 2000 Control Delay	68.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	82.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	90	200	275	25	270	65	260	985	35	55	1125	145
Future Volume (veh/h)	90	200	275	25	270	65	260	985	35	55	1125	145
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	98	217	299	27	293	71	283	1071	38	60	1223	158
Adj No. of Lanes	1	1	1	1	2	0	2	2	0	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	115	401	341	56	515	123	301	1398	50	103	1316	589
Arrive On Green	0.07	0.22	0.22	0.03	0.18	0.18	0.09	0.40	0.40	0.06	0.37	0.37
Sat Flow, veh/h	1774	1863	1583	1774	2836	677	3442	3487	124	1774	3539	1583
Grp Volume(v), veh/h	98	217	299	27	181	183	283	543	566	60	1223	158
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	1770	1743	1721	1770	1841	1774	1770	1583
Q Serve(g_s), s	5.6	10.7	18.8	1.5	9.6	9.9	8.4	27.3	27.4	3.4	34.2	7.2
Cycle Q Clear(g_c), s	5.6	10.7	18.8	1.5	9.6	9.9	8.4	27.3	27.4	3.4	34.2	7.2
Prop In Lane	1.00		1.00	1.00		0.39	1.00		0.07	1.00		1.00
Lane Grp Cap(c), veh/h	115	401	341	56	321	317	301	710	738	103	1316	589
V/C Ratio(X)	0.85	0.54	0.88	0.49	0.56	0.58	0.94	0.77	0.77	0.58	0.93	0.27
Avail Cap(c_a), veh/h	115	555	472	103	515	508	301	710	738	103	1316	589
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.49	0.49	0.49
Uniform Delay (d), s/veh	47.7	35.9	39.1	49.1	38.4	38.5	46.7	26.7	26.7	47.3	31.1	22.6
Incr Delay (d2), s/veh	40.9	0.8	11.9	4.8	1.2	1.2	36.5	7.7	7.5	3.9	7.1	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.1	5.6	9.3	0.8	4.8	4.9	5.5	14.8	15.4	1.8	17.9	3.2
LnGrp Delay(d),s/veh	88.6	36.7	51.0	53.9	39.6	39.8	83.2	34.4	34.1	51.2	38.2	23.1
LnGrp LOS	F	D	D	D	D	D	F	C	C	D	D	C
Approach Vol, veh/h		614			391			1392			1441	
Approach Delay, s/veh		52.0			40.7			44.2			37.1	
Approach LOS		D			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.0	46.3	7.5	26.9	14.0	43.3	11.0	23.4
Change Period (Y+Rc), s	5.0	5.0	* 4.3	* 4.7	5.0	5.0	* 4.3	* 4.7
Max Green Setting (Gmax), s	6.0	41.3	* 6	* 31	9.0	38.3	* 6.7	* 30
Max Q Clear Time (g_c+I1), s	5.4	29.4	3.5	20.8	10.4	36.2	7.6	11.9
Green Ext Time (p_c), s	0.0	7.2	0.0	1.4	0.0	1.8	0.0	1.6

Intersection Summary	
HCM 2010 Ctrl Delay	42.4
HCM 2010 LOS	D

Notes



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	555	5	1140	675	0	1410
Future Volume (vph)	555	5	1140	675	0	1410
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.1	5.1	5.1	5.1		5.1
Lane Util. Factor	0.97	1.00	0.91	1.00		0.91
Frt	1.00	0.85	1.00	0.85		1.00
Flt Protected	0.95	1.00	1.00	1.00		1.00
Satd. Flow (prot)	3433	1583	5085	1583		5085
Flt Permitted	0.95	1.00	1.00	1.00		1.00
Satd. Flow (perm)	3433	1583	5085	1583		5085
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	603	5	1239	734	0	1533
RTOR Reduction (vph)	0	2	0	0	0	0
Lane Group Flow (vph)	603	3	1239	734	0	1533
Turn Type	Prot	Prot	NA	pt+ov		NA
Protected Phases	4	4	6	4 6		2
Permitted Phases					2	
Actuated Green, G (s)	16.6	16.6	38.2	65.0		38.2
Effective Green, g (s)	16.6	16.6	38.2	65.0		38.2
Actuated g/C Ratio	0.26	0.26	0.59	1.00		0.59
Clearance Time (s)	5.1	5.1	5.1			5.1
Vehicle Extension (s)	2.5	2.5	4.0			4.0
Lane Grp Cap (vph)	876	404	2988	1583		2988
v/s Ratio Prot	c0.18	0.00	0.24	c0.46		0.30
v/s Ratio Perm						
v/c Ratio	0.69	0.01	0.41	0.46		0.51
Uniform Delay, d1	21.9	18.1	7.3	0.0		7.9
Progression Factor	1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2	2.1	0.0	0.4	0.2		0.6
Delay (s)	23.9	18.1	7.7	0.2		8.5
Level of Service	C	B	A	A		A
Approach Delay (s)	23.9		4.9			8.5
Approach LOS	C		A			A

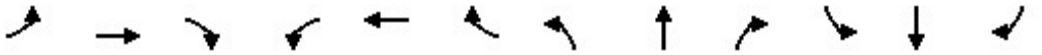
Intersection Summary			
HCM 2000 Control Delay	9.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	14.2
Intersection Capacity Utilization	77.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	580	85	0	795	275	0	0	0	655	0	365
Future Volume (vph)	0	580	85	0	795	275	0	0	0	655	0	365
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.1			5.1	5.1				4.7	4.7	
Lane Util. Factor		1.00			1.00	1.00				0.95	0.95	
Frt		0.98			1.00	0.85				1.00	0.89	
Flt Protected		1.00			1.00	1.00				0.95	0.99	
Satd. Flow (prot)		1831			1863	1583				1681	1552	
Flt Permitted		1.00			1.00	1.00				0.95	0.99	
Satd. Flow (perm)		1831			1863	1583				1681	1552	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	630	92	0	864	299	0	0	0	712	0	397
RTOR Reduction (vph)	0	6	0	0	0	149	0	0	0	0	73	0
Lane Group Flow (vph)	0	716	0	0	864	150	0	0	0	577	459	0
Turn Type		NA			NA	Perm				Split	NA	
Protected Phases		2			6					4	4	
Permitted Phases						6						
Actuated Green, G (s)		38.4			38.4	38.4				28.5	28.5	
Effective Green, g (s)		38.4			38.4	38.4				28.5	28.5	
Actuated g/C Ratio		0.50			0.50	0.50				0.37	0.37	
Clearance Time (s)		5.1			5.1	5.1				4.7	4.7	
Vehicle Extension (s)		2.0			2.0	2.0				2.0	2.0	
Lane Grp Cap (vph)		916			932	792				624	576	
v/s Ratio Prot		0.39			c0.46					c0.34	0.30	
v/s Ratio Perm						0.09						
v/c Ratio		0.78			0.93	0.19				0.92	0.80	
Uniform Delay, d1		15.7			17.8	10.6				23.1	21.5	
Progression Factor		1.00			1.00	1.00				1.00	1.00	
Incremental Delay, d2		4.0			14.6	0.0				19.3	7.1	
Delay (s)		19.7			32.4	10.6				42.4	28.6	
Level of Service		B			C	B				D	C	
Approach Delay (s)		19.7			26.8			0.0			35.8	
Approach LOS		B			C			A			D	

Intersection Summary			
HCM 2000 Control Delay	28.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	76.7	Sum of lost time (s)	9.8
Intersection Capacity Utilization	79.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

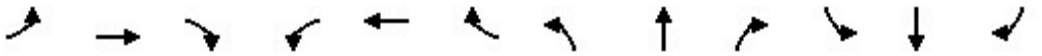


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	255	1030	0	0	855	575	160	0	365	0	0	0
Future Volume (veh/h)	255	1030	0	0	855	575	160	0	365	0	0	0
Number	5	2	12	1	6	16	3	8	18			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1863	1863	0	0	1863	1863	1900	1863	1863			
Adj Flow Rate, veh/h	277	1120	0	0	929	0	174	0	0			
Adj No. of Lanes	1	2	0	0	2	1	0	1	1			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	343	2328	0	0	1302	583	238	0	212			
Arrive On Green	0.19	0.66	0.00	0.00	0.37	0.00	0.13	0.00	0.00			
Sat Flow, veh/h	1774	3632	0	0	3632	1583	1774	0	1583			
Grp Volume(v), veh/h	277	1120	0	0	929	0	174	0	0			
Grp Sat Flow(s),veh/h/ln	1774	1770	0	0	1770	1583	1774	0	1583			
Q Serve(g_s), s	7.2	7.7	0.0	0.0	10.9	0.0	4.6	0.0	0.0			
Cycle Q Clear(g_c), s	7.2	7.7	0.0	0.0	10.9	0.0	4.6	0.0	0.0			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	343	2328	0	0	1302	583	238	0	212			
V/C Ratio(X)	0.81	0.48	0.00	0.00	0.71	0.00	0.73	0.00	0.00			
Avail Cap(c_a), veh/h	889	5100	0	0	2984	1335	1097	0	979			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	1.00	1.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00			
Uniform Delay (d), s/veh	18.7	4.2	0.0	0.0	13.1	0.0	20.2	0.0	0.0			
Incr Delay (d2), s/veh	1.7	0.1	0.0	0.0	0.3	0.0	1.6	0.0	0.0			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	3.7	3.6	0.0	0.0	5.3	0.0	2.3	0.0	0.0			
LnGrp Delay(d),s/veh	20.5	4.2	0.0	0.0	13.4	0.0	21.8	0.0	0.0			
LnGrp LOS	C	A			B		C					
Approach Vol, veh/h		1397			929			174				
Approach Delay, s/veh		7.4			13.4			21.8				
Approach LOS		A			B			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		37.0			14.1	22.9		11.5
Change Period (Y+Rc), s		5.1			* 4.7	5.1		5.0
Max Green Setting (Gmax), s		69.9			* 24	40.9		30.0
Max Q Clear Time (g_c+I1), s		9.7			9.2	12.9		6.6
Green Ext Time (p_c), s		6.8			0.4	4.9		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	10.7
HCM 2010 LOS	B

Notes



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	915	185	60	1020	205	355	165	50	330	205	110
Future Volume (vph)	130	915	185	60	1020	205	355	165	50	330	205	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	5.1	5.1	4.7	5.1	5.1	4.7	4.7	4.7	4.7	4.7	4.7
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1762	1504	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	1762	1504	1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	141	995	201	65	1109	223	386	179	54	359	223	120
RTOR Reduction (vph)	0	0	91	0	0	63	0	1	38	0	0	93
Lane Group Flow (vph)	141	995	110	65	1109	160	386	183	11	359	223	27
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2		1	6		3	3		4	4	
Permitted Phases			2			6			3			4
Actuated Green, G (s)	11.9	44.9	44.9	8.8	41.8	41.8	28.3	28.3	28.3	28.8	28.8	28.8
Effective Green, g (s)	11.9	44.9	44.9	8.8	41.8	41.8	28.3	28.3	28.3	28.8	28.8	28.8
Actuated g/C Ratio	0.09	0.35	0.35	0.07	0.32	0.32	0.22	0.22	0.22	0.22	0.22	0.22
Clearance Time (s)	4.7	5.1	5.1	4.7	5.1	5.1	4.7	4.7	4.7	4.7	4.7	4.7
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0	4.0	2.5	2.5	2.5	2.0	2.0	2.0
Lane Grp Cap (vph)	162	1222	546	119	1137	508	385	383	327	392	412	350
v/s Ratio Prot	0.08	c0.28		0.04	c0.31		c0.22	0.10		c0.20	0.12	
v/s Ratio Perm			0.07			0.10			0.01			0.02
v/c Ratio	0.87	0.81	0.20	0.55	0.98	0.31	1.00	0.48	0.03	0.92	0.54	0.08
Uniform Delay, d1	58.3	38.8	29.9	58.7	43.6	33.3	50.9	44.4	40.1	49.4	44.8	40.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	35.5	6.0	0.8	2.7	21.4	1.6	46.5	0.7	0.0	25.2	0.8	0.0
Delay (s)	93.8	44.8	30.8	61.4	65.0	34.9	97.4	45.1	40.1	74.6	45.5	40.1
Level of Service	F	D	C	E	E	C	F	D	D	E	D	D
Approach Delay (s)		47.8			60.0			77.3			59.5	
Approach LOS		D			E			E			E	

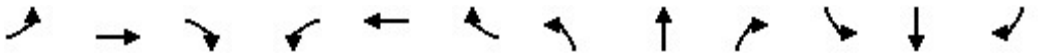
Intersection Summary			
HCM 2000 Control Delay	58.5	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	19.2
Intersection Capacity Utilization	83.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	140	350	510	190	345	100	535	1490	175	100	1465	205
Future Volume (veh/h)	140	350	510	190	345	100	535	1490	175	100	1465	205
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	152	380	0	207	375	109	582	1620	0	109	1592	0
Adj No. of Lanes	1	1	1	1	1	0	2	3	0	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	138	358	304	189	306	89	506	1952	0	301	1438	644
Arrive On Green	0.08	0.19	0.00	0.11	0.22	0.22	0.15	0.38	0.00	0.17	0.41	0.00
Sat Flow, veh/h	1774	1863	1583	1774	1388	403	3442	5253	0	1774	3539	1583
Grp Volume(v), veh/h	152	380	0	207	0	484	582	1620	0	109	1592	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	0	1792	1721	1695	0	1774	1770	1583
Q Serve(g_s), s	10.9	26.9	0.0	14.9	0.0	30.9	20.6	40.3	0.0	7.6	56.9	0.0
Cycle Q Clear(g_c), s	10.9	26.9	0.0	14.9	0.0	30.9	20.6	40.3	0.0	7.6	56.9	0.0
Prop In Lane	1.00		1.00	1.00		0.23	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	138	358	304	189	0	395	506	1952	0	301	1438	644
V/C Ratio(X)	1.10	1.06	0.00	1.10	0.00	1.22	1.15	0.83	0.00	0.36	1.11	0.00
Avail Cap(c_a), veh/h	138	358	304	189	0	395	506	2368	0	301	1438	644
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	64.6	56.6	0.0	62.5	0.0	54.6	59.7	39.0	0.0	51.4	41.6	0.0
Incr Delay (d2), s/veh	106.1	64.8	0.0	93.6	0.0	121.5	88.0	4.3	0.0	0.3	58.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.4	20.3	0.0	12.2	0.0	28.6	16.0	19.7	0.0	3.7	39.5	0.0
LnGrp Delay(d),s/veh	170.6	121.4	0.0	156.2	0.0	176.0	147.7	43.3	0.0	51.7	100.2	0.0
LnGrp LOS	F	F		F		F	F	D		D	F	
Approach Vol, veh/h		532			691			2202			1701	
Approach Delay, s/veh		135.4			170.1			70.9			97.1	
Approach LOS		F			F			E			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	26.0	62.0	16.0	36.0	28.9	59.1	20.0	32.0
Change Period (Y+Rc), s	5.4	5.1	5.1	5.1	5.1	5.4	5.1	5.1
Max Green Setting (Gmax), s	20.6	56.9	10.9	30.9	12.3	65.2	14.9	26.9
Max Q Clear Time (g_c+I1), s	22.6	58.9	12.9	32.9	9.6	42.3	16.9	28.9
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	11.4	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	99.7
HCM 2010 LOS	F



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	105	310	15	20	385	250	5	150	10	75	175	75
Future Volume (vph)	105	310	15	20	385	250	5	150	10	75	175	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.1			4.7			6.4	6.4		6.4	
Lane Util. Factor		0.91			0.95			1.00	1.00		1.00	
Frt		0.99			0.94			1.00	0.85		0.97	
Flt Protected		0.99			1.00			1.00	1.00		0.99	
Satd. Flow (prot)		4998			3331			1860	1583		1784	
Flt Permitted		0.71			1.00			0.99	1.00		0.86	
Satd. Flow (perm)		3577			3331			1842	1583		1545	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	114	337	16	22	418	272	5	163	11	82	190	82
RTOR Reduction (vph)	0	3	0	0	62	0	0	0	7	0	7	0
Lane Group Flow (vph)	0	464	0	0	650	0	0	168	4	0	347	0
Turn Type	Perm	NA		Split	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		3		5 8	5 8			6			6	
Permitted Phases	3						6		6	6		
Actuated Green, G (s)		24.9			59.5			64.4	64.4		64.4	
Effective Green, g (s)		24.9			54.4			64.4	64.4		64.4	
Actuated g/C Ratio		0.15			0.33			0.39	0.39		0.39	
Clearance Time (s)		5.1						6.4	6.4		6.4	
Vehicle Extension (s)		4.0						3.0	3.0		3.0	
Lane Grp Cap (vph)		539			1098			718	617		603	
v/s Ratio Prot					c0.20							
v/s Ratio Perm		c0.13						0.09	0.00		c0.22	
v/c Ratio		1.05dl			0.59			0.23	0.01		0.58	
Uniform Delay, d1		68.4			46.1			33.7	30.8		39.6	
Progression Factor		1.00			0.40			1.00	1.00		1.00	
Incremental Delay, d2		13.7			0.5			0.8	0.0		4.0	
Delay (s)		82.1			19.1			34.5	30.8		43.5	
Level of Service		F			B			C	C		D	
Approach Delay (s)		82.1			19.1			34.3			43.5	
Approach LOS		F			B			C			D	

Intersection Summary			
HCM 2000 Control Delay	42.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	165.0	Sum of lost time (s)	21.3
Intersection Capacity Utilization	78.5%	ICU Level of Service	D
Analysis Period (min)	15		

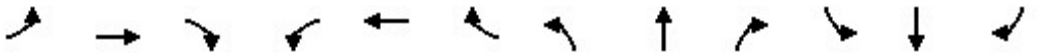
dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	190	95	230	15	90	10	190	480	30	10	540	565
Future Volume (vph)	190	95	230	15	90	10	190	480	30	10	540	565
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.1	5.1	5.1		5.1		4.7	5.4		4.7	5.4	5.4
Lane Util. Factor	1.00	1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85		0.99		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00		0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583		1829		1770	1846		1770	1863	1583
Flt Permitted	0.62	1.00	1.00		0.96		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1151	1863	1583		1768		1770	1846		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	207	103	250	16	98	11	207	522	33	11	587	614
RTOR Reduction (vph)	0	0	190	0	2	0	0	1	0	0	0	86
Lane Group Flow (vph)	207	103	60	0	123	0	207	554	0	11	587	528
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		8			8		1	6		5	2	
Permitted Phases	8		8	8								2
Actuated Green, G (s)	28.7	28.7	28.7		28.7		20.2	73.4		2.4	55.6	55.6
Effective Green, g (s)	28.7	28.7	28.7		28.7		20.2	73.4		2.4	55.6	55.6
Actuated g/C Ratio	0.24	0.24	0.24		0.24		0.17	0.61		0.02	0.46	0.46
Clearance Time (s)	5.1	5.1	5.1		5.1		4.7	5.4		4.7	5.4	5.4
Vehicle Extension (s)	3.0	3.0	3.0		3.0		3.0	5.0		3.0	5.0	5.0
Lane Grp Cap (vph)	275	446	379		423		298	1131		35	865	735
v/s Ratio Prot		0.06					c0.12	0.30		0.01	0.32	
v/s Ratio Perm	c0.18		0.04		0.07							c0.33
v/c Ratio	0.75	0.23	0.16		0.29		0.69	0.49		0.31	0.68	0.72
Uniform Delay, d1	42.2	36.6	36.0		37.2		46.8	12.8		57.8	25.1	25.8
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	11.1	0.3	0.2		0.4		6.9	0.7		5.1	2.8	4.2
Delay (s)	53.3	36.9	36.2		37.6		53.7	13.5		62.9	27.8	29.9
Level of Service	D	D	D		D		D	B		E	C	C
Approach Delay (s)		42.6			37.6			24.4			29.2	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	31.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	119.7	Sum of lost time (s)	15.2
Intersection Capacity Utilization	68.8%	ICU Level of Service	C
Analysis Period (min)	15		

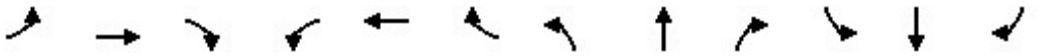
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	75	50	70	125	75	75	890	95	135	1435	35
Future Volume (vph)	5	75	50	70	125	75	75	890	95	135	1435	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.1	7.1	5.1	5.1		4.7	6.4	6.4	4.7	6.4	6.4
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt		1.00	0.85	1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1857	1583	1770	1758		1770	3539	1583	1770	3539	1583
Flt Permitted		0.42	1.00	0.70	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		774	1583	1305	1758		1770	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	82	54	76	136	82	82	967	103	147	1560	38
RTOR Reduction (vph)	0	0	48	0	14	0	0	0	55	0	0	18
Lane Group Flow (vph)	0	87	6	76	204	0	82	967	48	147	1560	20
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		3			8		5	2		1	6	
Permitted Phases	3		3	8					2			6
Actuated Green, G (s)		21.2	21.2	23.6	23.6		12.1	64.8	64.8	34.1	86.8	86.8
Effective Green, g (s)		19.2	19.2	23.6	23.6		12.1	64.8	64.8	34.1	86.8	86.8
Actuated g/C Ratio		0.12	0.12	0.14	0.14		0.07	0.39	0.39	0.21	0.53	0.53
Clearance Time (s)		5.1	5.1	5.1	5.1		4.7	6.4	6.4	4.7	6.4	6.4
Vehicle Extension (s)		4.0	4.0	2.0	2.0		2.0	4.0	4.0	2.0	4.0	4.0
Lane Grp Cap (vph)		90	184	186	251		129	1389	621	365	1861	832
v/s Ratio Prot					c0.12		0.05	c0.27		0.08	c0.44	
v/s Ratio Perm		c0.11	0.00	0.06					0.03			0.01
v/c Ratio		0.97	0.03	0.41	0.81		0.64	0.70	0.08	0.40	0.84	0.02
Uniform Delay, d1		72.6	64.7	64.3	68.6		74.3	41.9	31.4	56.6	33.1	18.8
Progression Factor		0.80	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		83.2	0.1	0.5	17.1		7.3	2.9	0.2	0.3	4.7	0.1
Delay (s)		141.6	64.8	64.9	85.7		81.6	44.8	31.6	56.9	37.9	18.8
Level of Service		F	E	E	F		F	D	C	E	D	B
Approach Delay (s)		112.2			80.3			46.2			39.0	
Approach LOS		F			F			D			D	

Intersection Summary			
HCM 2000 Control Delay	48.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	165.0	Sum of lost time (s)	23.3
Intersection Capacity Utilization	76.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	30	10	55	45	120	10	105	20	80	195	25
Future Volume (vph)	5	30	10	55	45	120	10	105	20	80	195	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.1			4.7			6.4		6.4	6.4	
Lane Util. Factor		1.00			1.00			1.00		1.00	1.00	
Frt		0.97			0.93			0.98		1.00	0.98	
Flt Protected		0.99			0.99			1.00		0.95	1.00	
Satd. Flow (prot)		1797			1705			1818		1770	1831	
Flt Permitted		0.96			0.99			0.97		0.66	1.00	
Satd. Flow (perm)		1737			1705			1775		1234	1831	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	33	11	60	49	130	11	114	22	87	212	27
RTOR Reduction (vph)	0	6	0	0	29	0	0	3	0	0	2	0
Lane Group Flow (vph)	0	43	0	0	210	0	0	144	0	87	237	0
Turn Type	Perm	NA		Split	NA		Perm	NA		Perm	NA	
Protected Phases		3		5 8	5 8			6			6	
Permitted Phases	3						6			6		
Actuated Green, G (s)		21.2			40.8			86.8		86.8	86.8	
Effective Green, g (s)		21.2			35.7			86.8		86.8	86.8	
Actuated g/C Ratio		0.13			0.22			0.53		0.53	0.53	
Clearance Time (s)		5.1						6.4		6.4	6.4	
Vehicle Extension (s)		4.0						4.0		4.0	4.0	
Lane Grp Cap (vph)		223			368			933		649	963	
v/s Ratio Prot					c0.12						c0.13	
v/s Ratio Perm		c0.02						0.08		0.07		
v/c Ratio		0.19			0.57			0.15		0.13	0.25	
Uniform Delay, d1		64.3			57.8			20.2		19.9	21.3	
Progression Factor		1.00			0.43			1.00		1.00	1.00	
Incremental Delay, d2		0.6			1.1			0.4		0.4	0.6	
Delay (s)		64.8			26.1			20.5		20.4	21.9	
Level of Service		E			C			C		C	C	
Approach Delay (s)		64.8			26.1			20.5			21.5	
Approach LOS		E			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	25.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	165.0	Sum of lost time (s)	21.3
Intersection Capacity Utilization	59.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	60	280	565	210	295	75	605	1420	370	55	1405	140
Future Volume (veh/h)	60	280	565	210	295	75	605	1420	370	55	1405	140
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	65	304	0	228	321	0	658	1543	0	60	1527	0
Adj No. of Lanes	2	1	1	1	1	1	2	2	0	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	288	278	236	214	347	295	605	1683	0	189	1438	644
Arrive On Green	0.08	0.15	0.00	0.12	0.19	0.00	0.18	0.48	0.00	0.11	0.41	0.00
Sat Flow, veh/h	3442	1863	1583	1774	1863	1583	3442	3632	0	1774	3539	1583
Grp Volume(v), veh/h	65	304	0	228	321	0	658	1543	0	60	1527	0
Grp Sat Flow(s),veh/h/ln	1721	1863	1583	1774	1863	1583	1721	1770	0	1774	1770	1583
Q Serve(g_s), s	2.5	20.9	0.0	16.9	23.7	0.0	24.6	56.8	0.0	4.4	56.9	0.0
Cycle Q Clear(g_c), s	2.5	20.9	0.0	16.9	23.7	0.0	24.6	56.8	0.0	4.4	56.9	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	288	278	236	214	347	295	605	1683	0	189	1438	644
V/C Ratio(X)	0.23	1.09	0.00	1.06	0.92	0.00	1.09	0.92	0.00	0.32	1.06	0.00
Avail Cap(c_a), veh/h	288	278	236	214	383	326	605	1808	0	189	1438	644
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	59.9	59.6	0.0	61.5	56.0	0.0	57.7	34.1	0.0	57.8	41.6	0.0
Incr Delay (d2), s/veh	0.3	81.2	0.0	79.7	25.5	0.0	62.8	9.4	0.0	0.4	42.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	17.0	0.0	13.0	14.7	0.0	17.0	29.8	0.0	2.2	36.2	0.0
LnGrp Delay(d),s/veh	60.2	140.7	0.0	141.2	81.4	0.0	120.5	43.5	0.0	58.2	83.5	0.0
LnGrp LOS	E	F		F	F		F	D		E	F	
Approach Vol, veh/h		369			549			2201			1587	
Approach Delay, s/veh		126.5			106.3			66.6			82.5	
Approach LOS		F			F			E			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	30.0	62.0	16.8	31.2	20.0	72.0	22.0	26.0
Change Period (Y+Rc), s	5.4	5.1	5.1	5.1	5.1	5.4	5.1	5.1
Max Green Setting (Gmax), s	24.6	56.9	9.0	28.8	10.0	71.5	16.9	20.9
Max Q Clear Time (g_c+I1), s	26.6	58.9	4.5	25.7	6.4	58.8	18.9	22.9
Green Ext Time (p_c), s	0.0	0.0	0.0	0.4	0.0	7.8	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	81.3
HCM 2010 LOS	F

MOVEMENT SUMMARY

Site: 101 [3rd/East/Silverado (Site Folder: Scenario B1 AM)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Silverado Trail														
1	L2	191	2.0	208	2.0	0.802	17.8	LOS C	12.2	86.9	0.82	0.54	0.85	38.7
2	T1	592	2.0	643	2.0	0.802	17.8	LOS C	12.2	86.9	0.82	0.54	0.85	38.5
3a	R1	107	2.0	116	2.0	0.802	17.8	LOS C	12.2	86.9	0.82	0.54	0.85	38.3
Approach		890	2.0	967	2.0	0.802	17.8	LOS C	12.2	86.9	0.82	0.54	0.85	38.5
NorthEast: East Avenue														
24a	L1	130	2.0	141	2.0	0.369	12.1	LOS B	1.8	12.5	0.73	0.79	0.90	40.1
26a	R1	49	2.0	53	2.0	0.369	12.1	LOS B	1.8	12.5	0.73	0.79	0.90	40.0
26b	R3	9	2.0	10	2.0	0.369	12.1	LOS B	1.8	12.5	0.73	0.79	0.90	39.2
Approach		188	2.0	204	2.0	0.369	12.1	LOS B	1.8	12.5	0.73	0.79	0.90	40.0
North: Silverado Trail														
7b	L3	20	2.0	22	2.0	0.696	16.1	LOS C	9.4	66.8	0.84	1.12	1.48	40.0
8	T1	531	2.0	577	2.0	0.696	16.1	LOS C	9.4	66.8	0.84	1.12	1.48	39.5
9	R2	27	2.0	29	2.0	0.696	16.1	LOS C	9.4	66.8	0.84	1.12	1.48	38.7
Approach		578	2.0	628	2.0	0.696	16.1	LOS C	9.4	66.8	0.84	1.12	1.48	39.5
West: 3rd Street														
10	L2	24	2.0	26	2.0	0.486	13.3	LOS B	3.0	21.1	0.75	0.89	1.09	40.3
10a	L1	67	2.0	73	2.0	0.486	13.3	LOS B	3.0	21.1	0.75	0.89	1.09	40.0
12	R2	194	2.0	211	2.0	0.486	13.3	LOS B	3.0	21.1	0.75	0.89	1.09	39.3
Approach		285	2.0	310	2.0	0.486	13.3	LOS B	3.0	21.1	0.75	0.89	1.09	39.6
All Vehicles		1941	2.0	2110	2.0	0.802	16.0	LOS C	12.2	86.9	0.81	0.79	1.08	39.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Coombsville/Silverado (Site Folder: Scenario B1 AM)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Silverado Trail														
2	T1	495	2.0	538	2.0	0.597	12.6	LOS B	6.0	42.5	0.75	0.89	1.12	41.1
3b	R3	4	2.0	4	2.0	0.597	12.6	LOS B	6.0	42.5	0.75	0.89	1.12	40.0
Approach		499	2.0	542	2.0	0.597	12.6	LOS B	6.0	42.5	0.75	0.89	1.12	41.1
SouthEast: Coombsville Road														
21b	L3	4	2.0	4	2.0	0.553	12.9	LOS B	4.4	31.3	0.76	0.93	1.14	41.5
23a	R1	395	2.0	429	2.0	0.553	12.9	LOS B	4.4	31.3	0.76	0.93	1.14	40.7
Approach		399	2.0	434	2.0	0.553	12.9	LOS B	4.4	31.3	0.76	0.93	1.14	40.7
North: Silverado Trail														
7a	L1	364	2.0	396	2.0	0.683	11.6	LOS B	8.7	61.9	0.11	0.02	0.11	40.7
8	T1	491	2.0	534	2.0	0.683	11.6	LOS B	8.7	61.9	0.11	0.02	0.11	40.9
Approach		855	2.0	929	2.0	0.683	11.6	LOS B	8.7	61.9	0.11	0.02	0.11	40.8
All Vehicles		1753	2.0	1905	2.0	0.683	12.2	LOS B	8.7	61.9	0.44	0.47	0.63	40.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [First Street (Site Folder: Scenario B1 AM)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Freeway Drive														
1	L2	105	2.0	114	2.0	0.314	12.2	LOS B	1.3	9.6	0.69	0.88	0.73	43.2
2	T1	30	2.0	33	2.0	0.314	7.7	LOS A	1.3	9.6	0.69	0.88	0.73	43.0
3	R2	555	2.0	603	2.0	0.733	9.0	LOS A	6.1	43.5	0.86	1.06	1.19	42.9
Approach		690	2.0	750	2.0	0.733	9.4	LOS A	6.1	43.5	0.82	1.02	1.10	43.0
East: First Street														
4	L2	360	2.0	391	2.0	0.566	8.2	LOS A	5.2	36.7	0.56	0.54	0.56	45.2
5	T1	485	2.0	527	2.0	0.566	4.0	LOS A	5.2	36.7	0.54	0.53	0.54	45.2
6	R2	55	2.0	60	2.0	0.178	4.3	LOS A	1.0	7.1	0.44	0.47	0.44	45.1
Approach		900	2.0	978	2.0	0.566	5.7	LOS A	5.2	36.7	0.54	0.53	0.54	45.2
North: Freeway Drive														
7	L2	15	2.0	16	2.0	0.048	11.8	LOS B	0.2	1.6	0.70	0.77	0.70	43.7
8	T1	5	2.0	5	2.0	0.048	7.3	LOS A	0.2	1.6	0.70	0.77	0.70	43.5
9	R2	5	2.0	5	2.0	0.048	8.6	LOS A	0.2	1.6	0.70	0.77	0.70	42.6
Approach		25	2.0	27	2.0	0.048	10.2	LOS B	0.2	1.6	0.70	0.77	0.70	43.5
West: First Street														
10	L2	40	2.0	43	2.0	0.437	9.7	LOS A	3.1	22.4	0.70	0.64	0.70	45.3
11	T1	765	2.0	832	2.0	0.437	5.0	LOS A	3.3	23.7	0.69	0.60	0.69	45.3
12	R2	65	2.0	71	2.0	0.437	5.1	LOS A	3.3	23.7	0.68	0.57	0.68	44.3
Approach		870	2.0	946	2.0	0.437	5.2	LOS A	3.3	23.7	0.69	0.60	0.69	45.2
All Vehicles		2485	2.0	2701	2.0	0.733	6.6	LOS A	6.1	43.5	0.67	0.69	0.75	44.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [3rd/East/Silverado (Site Folder: Scenario B1 PM)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Silverado Trail														
1	L2	218	2.0	237	2.0	0.761	15.5	LOS C	9.4	66.9	0.72	0.44	0.72	39.5
2	T1	521	2.0	566	2.0	0.761	15.5	LOS C	9.4	66.9	0.72	0.44	0.72	39.4
3a	R1	111	2.0	121	2.0	0.761	15.5	LOS C	9.4	66.9	0.72	0.44	0.72	39.1
Approach		850	2.0	924	2.0	0.761	15.5	LOS C	9.4	66.9	0.72	0.44	0.72	39.4
NorthEast: East Avenue														
24a	L1	90	2.0	98	2.0	0.223	9.3	LOS A	0.9	6.3	0.68	0.68	0.68	41.2
26a	R1	25	2.0	27	2.0	0.223	9.3	LOS A	0.9	6.3	0.68	0.68	0.68	41.1
26b	R3	1	2.0	1	2.0	0.223	9.3	LOS A	0.9	6.3	0.68	0.68	0.68	40.3
Approach		116	2.0	126	2.0	0.223	9.3	LOS A	0.9	6.3	0.68	0.68	0.68	41.1
North: Silverado Trail														
7b	L3	13	2.0	14	2.0	0.814	22.2	LOS C	17.6	125.4	0.98	1.48	2.06	37.5
8	T1	658	2.0	715	2.0	0.814	22.2	LOS C	17.6	125.4	0.98	1.48	2.06	37.1
9	R2	34	2.0	37	2.0	0.814	22.2	LOS C	17.6	125.4	0.98	1.48	2.06	36.4
Approach		705	2.0	766	2.0	0.814	22.2	LOS C	17.6	125.4	0.98	1.48	2.06	37.1
West: 3rd Street														
10	L2	49	2.0	53	2.0	0.582	17.3	LOS C	4.0	28.3	0.81	1.01	1.35	38.6
10a	L1	43	2.0	47	2.0	0.582	17.3	LOS C	4.0	28.3	0.81	1.01	1.35	38.3
12	R2	220	2.0	239	2.0	0.582	17.3	LOS C	4.0	28.3	0.81	1.01	1.35	37.7
Approach		312	2.0	339	2.0	0.582	17.3	LOS C	4.0	28.3	0.81	1.01	1.35	37.9
All Vehicles		1983	2.0	2155	2.0	0.814	17.8	LOS C	17.6	125.4	0.82	0.91	1.29	38.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Coombsville/Silverado (Site Folder: Scenario B1 PM)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Silverado Trail														
2	T1	511	2.0	555	2.0	0.604	12.6	LOS B	6.3	44.9	0.74	0.87	1.10	41.1
3b	R3	9	2.0	10	2.0	0.604	12.6	LOS B	6.3	44.9	0.74	0.87	1.10	40.0
Approach		520	2.0	565	2.0	0.604	12.6	LOS B	6.3	44.9	0.74	0.87	1.10	41.1
SouthEast: Coombsville Road														
21b	L3	7	2.0	8	2.0	0.488	11.5	LOS B	3.3	23.5	0.72	0.84	0.99	42.2
23a	R1	339	2.0	368	2.0	0.488	11.5	LOS B	3.3	23.5	0.72	0.84	0.99	41.3
Approach		346	2.0	376	2.0	0.488	11.5	LOS B	3.3	23.5	0.72	0.84	0.99	41.3
North: Silverado Trail														
7a	L1	338	2.0	367	2.0	0.736	13.3	LOS B	11.0	78.6	0.18	0.04	0.18	40.0
8	T1	580	2.0	630	2.0	0.736	13.3	LOS B	11.0	78.6	0.18	0.04	0.18	40.2
Approach		918	2.0	998	2.0	0.736	13.3	LOS B	11.0	78.6	0.18	0.04	0.18	40.1
All Vehicles		1784	2.0	1939	2.0	0.736	12.7	LOS B	11.0	78.6	0.45	0.43	0.60	40.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [First Street (Site Folder: Scenario B1 PM)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Freeway Drive														
1	L2	180	2.0	196	2.0	0.292	9.8	LOS A	1.4	9.8	0.64	0.84	0.64	44.0
2	T1	10	2.0	11	2.0	0.292	5.3	LOS A	1.4	9.8	0.64	0.84	0.64	43.8
3	R2	360	2.0	391	2.0	0.436	5.5	LOS A	2.5	18.0	0.69	0.79	0.73	44.6
Approach		550	2.0	598	2.0	0.436	6.9	LOS A	2.5	18.0	0.67	0.81	0.70	44.4
East: First Street														
4	L2	495	2.0	538	2.0	0.919	14.8	LOS B	24.0	170.9	1.00	0.89	1.28	42.7
5	T1	795	2.0	864	2.0	0.919	9.9	LOS A	24.0	170.9	0.93	0.84	1.17	42.9
6	R2	125	2.0	136	2.0	0.289	4.8	LOS A	1.8	12.6	0.52	0.55	0.52	44.9
Approach		1415	2.0	1538	2.0	0.919	11.2	LOS B	24.0	170.9	0.92	0.83	1.15	43.0
North: Freeway Drive														
7	L2	85	2.0	92	2.0	0.658	41.9	LOS D	5.3	37.6	1.00	1.21	1.54	32.4
8	T1	35	2.0	38	2.0	0.658	37.4	LOS D	5.3	37.6	1.00	1.21	1.54	32.3
9	R2	20	2.0	22	2.0	0.658	40.6	LOS D	5.3	37.6	1.00	1.21	1.54	31.8
Approach		140	2.0	152	2.0	0.658	40.6	LOS D	5.3	37.6	1.00	1.21	1.54	32.3
West: First Street														
10	L2	25	2.0	27	2.0	0.433	12.0	LOS B	3.4	24.0	0.87	0.87	0.91	44.7
11	T1	500	2.0	543	2.0	0.433	6.9	LOS A	3.6	25.7	0.88	0.82	0.90	44.7
12	R2	110	2.0	120	2.0	0.433	6.7	LOS A	3.6	25.7	0.88	0.77	0.88	43.8
Approach		635	2.0	690	2.0	0.433	7.1	LOS A	3.6	25.7	0.88	0.81	0.89	44.5
All Vehicles		2740	2.0	2978	2.0	0.919	10.9	LOS B	24.0	170.9	0.86	0.84	1.02	42.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [3rd/East/Silverado (Site Folder: Scenario B2 AM)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Silverado Trail														
1	L2	191	2.0	208	2.0	0.803	17.8	LOS C	12.4	88.1	0.82	0.54	0.86	38.6
2	T1	592	2.0	643	2.0	0.803	17.8	LOS C	12.4	88.1	0.82	0.54	0.86	38.5
3a	R1	108	2.0	117	2.0	0.803	17.8	LOS C	12.4	88.1	0.82	0.54	0.86	38.2
Approach		891	2.0	968	2.0	0.803	17.8	LOS C	12.4	88.1	0.82	0.54	0.86	38.5
NorthEast: East Avenue														
24a	L1	130	2.0	141	2.0	0.369	12.1	LOS B	1.8	12.5	0.73	0.79	0.90	40.1
26a	R1	49	2.0	53	2.0	0.369	12.1	LOS B	1.8	12.5	0.73	0.79	0.90	40.0
26b	R3	9	2.0	10	2.0	0.369	12.1	LOS B	1.8	12.5	0.73	0.79	0.90	39.2
Approach		188	2.0	204	2.0	0.369	12.1	LOS B	1.8	12.5	0.73	0.79	0.90	40.0
North: Silverado Trail														
7b	L3	20	2.0	22	2.0	0.692	15.9	LOS C	9.2	65.7	0.83	1.11	1.47	40.0
8	T1	528	2.0	574	2.0	0.692	15.9	LOS C	9.2	65.7	0.83	1.11	1.47	39.6
9	R2	27	2.0	29	2.0	0.692	15.9	LOS C	9.2	65.7	0.83	1.11	1.47	38.8
Approach		575	2.0	625	2.0	0.692	15.9	LOS C	9.2	65.7	0.83	1.11	1.47	39.5
West: 3rd Street														
10	L2	24	2.0	26	2.0	0.484	13.2	LOS B	3.0	21.0	0.75	0.89	1.09	40.3
10a	L1	67	2.0	73	2.0	0.484	13.2	LOS B	3.0	21.0	0.75	0.89	1.09	40.0
12	R2	194	2.0	211	2.0	0.484	13.2	LOS B	3.0	21.0	0.75	0.89	1.09	39.4
Approach		285	2.0	310	2.0	0.484	13.2	LOS B	3.0	21.0	0.75	0.89	1.09	39.6
All Vehicles		1939	2.0	2108	2.0	0.803	16.0	LOS C	12.4	88.1	0.81	0.79	1.08	39.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Coombsville/Silverado (Site Folder: Scenario B2 AM)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Silverado Trail														
2	T1	497	2.0	540	2.0	0.598	12.7	LOS B	6.0	42.9	0.75	0.89	1.13	41.0
3b	R3	4	2.0	4	2.0	0.598	12.7	LOS B	6.0	42.9	0.75	0.89	1.13	40.0
Approach		501	2.0	545	2.0	0.598	12.7	LOS B	6.0	42.9	0.75	0.89	1.13	41.0
SouthEast: Coombsville Road														
21b	L3	4	2.0	4	2.0	0.552	12.9	LOS B	4.4	31.3	0.76	0.93	1.14	41.5
23a	R1	394	2.0	428	2.0	0.552	12.9	LOS B	4.4	31.3	0.76	0.93	1.14	40.7
Approach		398	2.0	433	2.0	0.552	12.9	LOS B	4.4	31.3	0.76	0.93	1.14	40.7
North: Silverado Trail														
7a	L1	363	2.0	395	2.0	0.681	11.5	LOS B	8.6	61.2	0.11	0.02	0.11	40.7
8	T1	489	2.0	532	2.0	0.681	11.5	LOS B	8.6	61.2	0.11	0.02	0.11	40.9
Approach		852	2.0	926	2.0	0.681	11.5	LOS B	8.6	61.2	0.11	0.02	0.11	40.8
All Vehicles		1751	2.0	1903	2.0	0.681	12.1	LOS B	8.6	61.2	0.44	0.47	0.63	40.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [First Street (Site Folder: Scenario B2 AM)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Freeway Drive														
1	L2	95	2.0	103	2.0	0.243	11.7	LOS B	1.0	7.0	0.67	0.87	0.67	43.1
2	T1	10	2.0	11	2.0	0.243	7.3	LOS A	1.0	7.0	0.67	0.87	0.67	42.9
3	R2	570	2.0	620	2.0	0.749	9.3	LOS A	6.4	45.9	0.86	1.07	1.22	42.8
Approach		675	2.0	734	2.0	0.749	9.6	LOS A	6.4	45.9	0.83	1.04	1.14	42.8
East: First Street														
4	L2	370	2.0	402	2.0	0.527	7.7	LOS A	4.8	34.4	0.45	0.50	0.45	45.4
5	T1	505	2.0	549	2.0	0.527	3.6	LOS A	4.8	34.4	0.43	0.47	0.43	45.5
6	R2	15	2.0	16	2.0	0.166	3.8	LOS A	0.9	6.8	0.36	0.40	0.36	45.3
Approach		890	2.0	967	2.0	0.527	5.3	LOS A	4.8	34.4	0.44	0.48	0.44	45.5
North: Freeway Drive														
7	L2	15	2.0	16	2.0	0.046	11.6	LOS B	0.2	1.5	0.68	0.76	0.68	43.8
8	T1	5	2.0	5	2.0	0.046	7.1	LOS A	0.2	1.5	0.68	0.76	0.68	43.6
9	R2	5	2.0	5	2.0	0.046	8.4	LOS A	0.2	1.5	0.68	0.76	0.68	42.7
Approach		25	2.0	27	2.0	0.046	10.1	LOS B	0.2	1.5	0.68	0.76	0.68	43.6
West: First Street														
10	L2	10	2.0	11	2.0	0.431	9.8	LOS A	3.0	21.6	0.69	0.63	0.69	45.5
11	T1	790	2.0	859	2.0	0.431	5.0	LOS A	3.2	22.8	0.68	0.60	0.68	45.4
12	R2	60	2.0	65	2.0	0.431	5.2	LOS A	3.2	22.8	0.67	0.57	0.67	44.3
Approach		860	2.0	935	2.0	0.431	5.1	LOS A	3.2	22.8	0.68	0.60	0.68	45.3
All Vehicles		2450	2.0	2663	2.0	0.749	6.5	LOS A	6.4	45.9	0.63	0.68	0.72	44.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [3rd/East/Silverado (Site Folder: Scenario B2 PM)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Silverado Trail														
1	L2	217	2.0	236	2.0	0.759	15.4	LOS C	9.4	66.6	0.71	0.43	0.71	39.6
2	T1	521	2.0	566	2.0	0.759	15.4	LOS C	9.4	66.6	0.71	0.43	0.71	39.4
3a	R1	111	2.0	121	2.0	0.759	15.4	LOS C	9.4	66.6	0.71	0.43	0.71	39.1
Approach		849	2.0	923	2.0	0.759	15.4	LOS C	9.4	66.6	0.71	0.43	0.71	39.4
NorthEast: East Avenue														
24a	L1	90	2.0	98	2.0	0.223	9.3	LOS A	0.9	6.3	0.68	0.68	0.68	41.2
26a	R1	25	2.0	27	2.0	0.223	9.3	LOS A	0.9	6.3	0.68	0.68	0.68	41.1
26b	R3	1	2.0	1	2.0	0.223	9.3	LOS A	0.9	6.3	0.68	0.68	0.68	40.3
Approach		116	2.0	126	2.0	0.223	9.3	LOS A	0.9	6.3	0.68	0.68	0.68	41.2
North: Silverado Trail														
7b	L3	12	2.0	13	2.0	0.812	22.0	LOS C	17.5	124.4	0.97	1.47	2.05	37.6
8	T1	658	2.0	715	2.0	0.812	22.0	LOS C	17.5	124.4	0.97	1.47	2.05	37.2
9	R2	34	2.0	37	2.0	0.812	22.0	LOS C	17.5	124.4	0.97	1.47	2.05	36.5
Approach		704	2.0	765	2.0	0.812	22.0	LOS C	17.5	124.4	0.97	1.47	2.05	37.1
West: 3rd Street														
10	L2	49	2.0	53	2.0	0.566	16.8	LOS C	3.8	26.8	0.80	0.99	1.31	38.8
10a	L1	43	2.0	47	2.0	0.566	16.8	LOS C	3.8	26.8	0.80	0.99	1.31	38.5
12	R2	212	2.0	230	2.0	0.566	16.8	LOS C	3.8	26.8	0.80	0.99	1.31	37.9
Approach		304	2.0	330	2.0	0.566	16.8	LOS C	3.8	26.8	0.80	0.99	1.31	38.2
All Vehicles		1973	2.0	2145	2.0	0.812	17.6	LOS C	17.5	124.4	0.82	0.90	1.28	38.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Coombsville/Silverado (Site Folder: Scenario B2 PM)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Silverado Trail														
2	T1	510	2.0	554	2.0	0.633	13.9	LOS B	6.9	49.5	0.78	0.99	1.26	40.5
3b	R3	9	2.0	10	2.0	0.633	13.9	LOS B	6.9	49.5	0.78	0.99	1.26	39.4
Approach		519	2.0	564	2.0	0.633	13.9	LOS B	6.9	49.5	0.78	0.99	1.26	40.5
SouthEast: Coombsville Road														
21b	L3	7	2.0	8	2.0	0.487	11.5	LOS B	3.3	23.5	0.72	0.84	0.99	42.2
23a	R1	339	2.0	368	2.0	0.487	11.5	LOS B	3.3	23.5	0.72	0.84	0.99	41.3
Approach		346	2.0	376	2.0	0.487	11.5	LOS B	3.3	23.5	0.72	0.84	0.99	41.4
North: Silverado Trail														
7a	L1	382	2.0	415	2.0	0.770	14.7	LOS B	13.1	93.3	0.20	0.04	0.20	39.4
8	T1	578	2.0	628	2.0	0.770	14.7	LOS B	13.1	93.3	0.20	0.04	0.20	39.5
Approach		960	2.0	1043	2.0	0.770	14.7	LOS B	13.1	93.3	0.20	0.04	0.20	39.5
All Vehicles		1825	2.0	1984	2.0	0.770	13.9	LOS B	13.1	93.3	0.46	0.46	0.65	40.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [First Street (Site Folder: Scenario B2 PM)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Freeway Drive														
1	L2	115	2.0	125	2.0	0.225	10.5	LOS B	1.0	6.8	0.62	0.85	0.62	43.5
2	T1	1	2.0	1	2.0	0.225	6.1	LOS A	1.0	6.8	0.62	0.85	0.62	43.3
3	R2	405	2.0	440	2.0	0.484	5.7	LOS A	2.9	20.9	0.69	0.83	0.76	44.6
Approach		521	2.0	566	2.0	0.484	6.7	LOS A	2.9	20.9	0.68	0.83	0.73	44.4
East: First Street														
4	L2	535	2.0	582	2.0	0.846	8.6	LOS A	14.9	105.8	0.80	0.53	0.80	44.7
5	T1	875	2.0	951	2.0	0.846	4.7	LOS A	14.9	105.8	0.70	0.51	0.70	44.9
6	R2	30	2.0	33	2.0	0.266	4.0	LOS A	1.7	11.9	0.40	0.42	0.40	45.2
Approach		1440	2.0	1565	2.0	0.846	6.1	LOS A	14.9	105.8	0.73	0.52	0.73	44.8
North: Freeway Drive														
7	L2	30	2.0	33	2.0	0.157	20.0	LOS B	0.9	6.3	0.90	0.96	0.90	39.7
8	T1	5	2.0	5	2.0	0.157	15.5	LOS B	0.9	6.3	0.90	0.96	0.90	39.5
9	R2	5	2.0	5	2.0	0.157	18.4	LOS B	0.9	6.3	0.90	0.96	0.90	38.7
Approach		40	2.0	43	2.0	0.157	19.2	LOS B	0.9	6.3	0.90	0.96	0.90	39.5
West: First Street														
10	L2	5	2.0	5	2.0	0.400	11.2	LOS B	2.9	20.8	0.83	0.79	0.83	45.0
11	T1	560	2.0	609	2.0	0.400	6.3	LOS A	3.2	22.8	0.83	0.75	0.83	44.9
12	R2	65	2.0	71	2.0	0.400	6.3	LOS A	3.2	22.8	0.83	0.71	0.83	43.9
Approach		630	2.0	685	2.0	0.400	6.3	LOS A	3.2	22.8	0.83	0.74	0.83	44.8
All Vehicles		2631	2.0	2860	2.0	0.846	6.5	LOS A	14.9	105.8	0.75	0.64	0.76	44.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [3rd/East/Silverado (Site Folder: Scenario C AM)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Silverado Trail														
1	L2	192	2.0	209	2.0	0.795	17.5	LOS C	14.0	99.7	0.82	0.60	0.92	38.8
2	T1	580	2.0	630	2.0	0.795	17.5	LOS C	14.0	99.7	0.82	0.60	0.92	38.6
3a	R1	104	2.0	113	2.0	0.795	17.5	LOS C	14.0	99.7	0.82	0.60	0.92	38.4
Approach		876	2.0	952	2.0	0.795	17.5	LOS C	14.0	99.7	0.82	0.60	0.92	38.6
NorthEast: East Avenue														
24a	L1	130	2.0	141	2.0	0.366	11.9	LOS B	1.7	12.3	0.72	0.79	0.89	40.1
26a	R1	49	2.0	53	2.0	0.366	11.9	LOS B	1.7	12.3	0.72	0.79	0.89	40.0
26b	R3	9	2.0	10	2.0	0.366	11.9	LOS B	1.7	12.3	0.72	0.79	0.89	39.3
Approach		188	2.0	204	2.0	0.366	11.9	LOS B	1.7	12.3	0.72	0.79	0.89	40.1
North: Silverado Trail														
7b	L3	20	2.0	22	2.0	0.669	15.0	LOS C	8.3	59.0	0.81	1.06	1.38	40.4
8	T1	509	2.0	553	2.0	0.669	15.0	LOS C	8.3	59.0	0.81	1.06	1.38	39.9
9	R2	26	2.0	28	2.0	0.669	15.0	LOS C	8.3	59.0	0.81	1.06	1.38	39.2
Approach		555	2.0	603	2.0	0.669	15.0	LOS C	8.3	59.0	0.81	1.06	1.38	39.9
West: 3rd Street														
10	L2	26	2.0	28	2.0	0.488	13.1	LOS B	3.0	21.5	0.75	0.89	1.09	40.4
10a	L1	72	2.0	78	2.0	0.488	13.1	LOS B	3.0	21.5	0.75	0.89	1.09	40.0
12	R2	195	2.0	212	2.0	0.488	13.1	LOS B	3.0	21.5	0.75	0.89	1.09	39.4
Approach		293	2.0	318	2.0	0.488	13.1	LOS B	3.0	21.5	0.75	0.89	1.09	39.6
All Vehicles		1912	2.0	2078	2.0	0.795	15.5	LOS C	14.0	99.7	0.80	0.79	1.08	39.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Coombsville/Silverado (Site Folder: Scenario C AM)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Silverado Trail														
2	T1	493	2.0	536	2.0	0.590	12.4	LOS B	5.8	41.4	0.74	0.87	1.09	41.2
3b	R3	4	2.0	4	2.0	0.590	12.4	LOS B	5.8	41.4	0.74	0.87	1.09	40.1
Approach		497	2.0	540	2.0	0.590	12.4	LOS B	5.8	41.4	0.74	0.87	1.09	41.2
SouthEast: Coombsville Road														
21b	L3	4	2.0	4	2.0	0.535	12.4	LOS B	4.1	29.1	0.74	0.90	1.09	41.8
23a	R1	383	2.0	416	2.0	0.535	12.4	LOS B	4.1	29.1	0.74	0.90	1.09	40.9
Approach		387	2.0	421	2.0	0.535	12.4	LOS B	4.1	29.1	0.74	0.90	1.09	40.9
North: Silverado Trail														
7a	L1	358	2.0	389	2.0	0.666	11.1	LOS B	8.1	57.4	0.10	0.02	0.10	40.9
8	T1	476	2.0	517	2.0	0.666	11.1	LOS B	8.1	57.4	0.10	0.02	0.10	41.1
Approach		834	2.0	907	2.0	0.666	11.1	LOS B	8.1	57.4	0.10	0.02	0.10	41.0
All Vehicles		1718	2.0	1867	2.0	0.666	11.8	LOS B	8.1	57.4	0.43	0.46	0.61	41.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [First Street (Site Folder: Scenario C AM)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Freeway Drive														
1	L2	95	2.0	103	2.0	0.243	11.7	LOS B	1.0	7.0	0.67	0.87	0.67	43.1
2	T1	10	2.0	11	2.0	0.243	7.3	LOS A	1.0	7.0	0.67	0.87	0.67	42.9
3	R2	570	2.0	620	2.0	0.749	9.3	LOS A	6.4	45.9	0.86	1.07	1.22	42.8
Approach		675	2.0	734	2.0	0.749	9.6	LOS A	6.4	45.9	0.83	1.04	1.14	42.8
East: First Street														
4	L2	370	2.0	402	2.0	0.527	7.7	LOS A	4.8	34.4	0.45	0.50	0.45	45.4
5	T1	505	2.0	549	2.0	0.527	3.6	LOS A	4.8	34.4	0.43	0.47	0.43	45.5
6	R2	15	2.0	16	2.0	0.166	3.8	LOS A	0.9	6.8	0.36	0.40	0.36	45.3
Approach		890	2.0	967	2.0	0.527	5.3	LOS A	4.8	34.4	0.44	0.48	0.44	45.5
North: Freeway Drive														
7	L2	15	2.0	16	2.0	0.046	11.6	LOS B	0.2	1.5	0.68	0.76	0.68	43.8
8	T1	5	2.0	5	2.0	0.046	7.1	LOS A	0.2	1.5	0.68	0.76	0.68	43.6
9	R2	5	2.0	5	2.0	0.046	8.4	LOS A	0.2	1.5	0.68	0.76	0.68	42.7
Approach		25	2.0	27	2.0	0.046	10.1	LOS B	0.2	1.5	0.68	0.76	0.68	43.6
West: First Street														
10	L2	10	2.0	11	2.0	0.431	9.8	LOS A	3.0	21.6	0.69	0.63	0.69	45.5
11	T1	790	2.0	859	2.0	0.431	5.0	LOS A	3.2	22.8	0.68	0.60	0.68	45.4
12	R2	60	2.0	65	2.0	0.431	5.2	LOS A	3.2	22.8	0.67	0.57	0.67	44.3
Approach		860	2.0	935	2.0	0.431	5.1	LOS A	3.2	22.8	0.68	0.60	0.68	45.3
All Vehicles		2450	2.0	2663	2.0	0.749	6.5	LOS A	6.4	45.9	0.63	0.68	0.72	44.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [3rd/East/Silverado (Site Folder: Scenario C PM)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Silverado Trail														
1	L2	219	2.0	238	2.0	0.752	15.1	LOS C	9.1	64.7	0.71	0.43	0.71	39.7
2	T1	512	2.0	557	2.0	0.752	15.1	LOS C	9.1	64.7	0.71	0.43	0.71	39.5
3a	R1	109	2.0	118	2.0	0.752	15.1	LOS C	9.1	64.7	0.71	0.43	0.71	39.2
Approach		840	2.0	913	2.0	0.752	15.1	LOS C	9.1	64.7	0.71	0.43	0.71	39.5
NorthEast: East Avenue														
24a	L1	90	2.0	98	2.0	0.221	9.2	LOS A	0.9	6.3	0.67	0.67	0.67	41.2
26a	R1	25	2.0	27	2.0	0.221	9.2	LOS A	0.9	6.3	0.67	0.67	0.67	41.1
26b	R3	1	2.0	1	2.0	0.221	9.2	LOS A	0.9	6.3	0.67	0.67	0.67	40.3
Approach		116	2.0	126	2.0	0.221	9.2	LOS A	0.9	6.3	0.67	0.67	0.67	41.2
North: Silverado Trail														
7b	L3	11	2.0	12	2.0	0.791	20.5	LOS C	15.6	111.4	0.94	1.38	1.91	38.2
8	T1	641	2.0	697	2.0	0.791	20.5	LOS C	15.6	111.4	0.94	1.38	1.91	37.7
9	R2	32	2.0	35	2.0	0.791	20.5	LOS C	15.6	111.4	0.94	1.38	1.91	37.0
Approach		684	2.0	743	2.0	0.791	20.5	LOS C	15.6	111.4	0.94	1.38	1.91	37.7
West: 3rd Street														
10	L2	50	2.0	54	2.0	0.550	15.9	LOS C	3.6	25.6	0.79	0.97	1.26	39.1
10a	L1	45	2.0	49	2.0	0.550	15.9	LOS C	3.6	25.6	0.79	0.97	1.26	38.8
12	R2	206	2.0	224	2.0	0.550	15.9	LOS C	3.6	25.6	0.79	0.97	1.26	38.2
Approach		301	2.0	327	2.0	0.550	15.9	LOS C	3.6	25.6	0.79	0.97	1.26	38.5
All Vehicles		1941	2.0	2110	2.0	0.791	16.8	LOS C	15.6	111.4	0.80	0.87	1.21	38.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 9.0 | Copyright © 2000-2020 Akcelik and Associates Pty Ltd | sidrasolutions.com

MOVEMENT SUMMARY

Site: 101 [Coombsville/Silverado (Site Folder: Scenario C PM)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Silverado Trail														
2	T1	494	2.0	537	2.0	0.610	13.2	LOS B	6.3	44.8	0.76	0.93	1.18	40.8
3b	R3	9	2.0	10	2.0	0.610	13.2	LOS B	6.3	44.8	0.76	0.93	1.18	39.8
Approach		503	2.0	547	2.0	0.610	13.2	LOS B	6.3	44.8	0.76	0.93	1.18	40.8
SouthEast: Coombsville Road														
21b	L3	7	2.0	8	2.0	0.488	11.3	LOS B	3.3	23.8	0.72	0.83	0.98	42.3
23a	R1	346	2.0	376	2.0	0.488	11.3	LOS B	3.3	23.8	0.72	0.83	0.98	41.4
Approach		353	2.0	384	2.0	0.488	11.3	LOS B	3.3	23.8	0.72	0.83	0.98	41.4
North: Silverado Trail														
7a	L1	377	2.0	410	2.0	0.751	13.9	LOS B	11.9	84.8	0.19	0.04	0.19	39.7
8	T1	560	2.0	609	2.0	0.751	13.9	LOS B	11.9	84.8	0.19	0.04	0.19	39.9
Approach		937	2.0	1018	2.0	0.751	13.9	LOS B	11.9	84.8	0.19	0.04	0.19	39.8
All Vehicles		1793	2.0	1949	2.0	0.751	13.2	LOS B	11.9	84.8	0.45	0.45	0.62	40.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [First Street (Site Folder: Scenario C PM)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Freeway Drive														
1	L2	115	2.0	125	2.0	0.225	10.5	LOS B	0.9	6.8	0.62	0.85	0.62	43.5
2	T1	1	2.0	1	2.0	0.225	6.1	LOS A	0.9	6.8	0.62	0.85	0.62	43.3
3	R2	405	2.0	440	2.0	0.484	5.7	LOS A	2.9	20.9	0.69	0.83	0.76	44.6
Approach		521	2.0	566	2.0	0.484	6.7	LOS A	2.9	20.9	0.68	0.83	0.73	44.4
East: First Street														
4	L2	535	2.0	582	2.0	0.843	8.6	LOS A	14.7	104.5	0.79	0.53	0.79	44.7
5	T1	870	2.0	946	2.0	0.843	4.6	LOS A	14.7	104.5	0.70	0.51	0.70	44.9
6	R2	30	2.0	33	2.0	0.265	4.0	LOS A	1.7	11.8	0.40	0.42	0.40	45.2
Approach		1435	2.0	1560	2.0	0.843	6.1	LOS A	14.7	104.5	0.72	0.52	0.72	44.8
North: Freeway Drive														
7	L2	30	2.0	33	2.0	0.155	19.9	LOS B	0.9	6.2	0.90	0.96	0.90	39.7
8	T1	5	2.0	5	2.0	0.155	15.4	LOS B	0.9	6.2	0.90	0.96	0.90	39.6
9	R2	5	2.0	5	2.0	0.155	18.3	LOS B	0.9	6.2	0.90	0.96	0.90	38.8
Approach		40	2.0	43	2.0	0.155	19.1	LOS B	0.9	6.2	0.90	0.96	0.90	39.6
West: First Street														
10	L2	5	2.0	5	2.0	0.400	11.2	LOS B	2.9	20.8	0.83	0.79	0.83	45.0
11	T1	560	2.0	609	2.0	0.400	6.3	LOS A	3.2	22.8	0.83	0.75	0.83	44.9
12	R2	65	2.0	71	2.0	0.400	6.3	LOS A	3.2	22.8	0.83	0.71	0.83	43.9
Approach		630	2.0	685	2.0	0.400	6.3	LOS A	3.2	22.8	0.83	0.74	0.83	44.8
All Vehicles		2626	2.0	2854	2.0	0.843	6.5	LOS A	14.7	104.5	0.74	0.64	0.75	44.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Appendix D

Water, Wastewater and Stormwater Technical Memorandums

WEST YOST
Water. Engineered.

2020 Research Park Drive
Suite 100
Davis CA 95618

530.756.5905 phone
530.756.5991 fax
westyost.com

TECHNICAL MEMORANDUM

DATE: August 12, 2021

Project No.: 295-10-18-06
SENT VIA: EMAIL

TO: Rajeev Bhatia, Dyett & Bhatia

FROM: Doug Moore, PE, RCE #58122

REVIEWED BY: Kamie Loeser

SUBJECT: City of Napa General Plan Update Stormwater and Flood Control EIR Support



This Technical Memorandum (TM) presents the stormwater and flood control support for the EIR for the City of Napa's (City) General Plan Update 2040 (GPU). This TM includes the following sections:

- General Plan 2040 Land Use Data
- Background Information
- Relevant General Plan (GP) Policies
- Napa River Flood Control, Residual Flooding, and Storm Drain Evaluations
- Incorporation of County Land Use Island into the City

GENERAL PLAN 2040 LAND USE DATA

The land use data used for this evaluation was received from Dyett and Bhatia on June 9, 2021. The City-wide buildout land use map is provided as Figure 1A. Additionally, a summary of the land uses, large parcel-based spreadsheet of the land uses, and Geographical Information System (GIS) mapping of the land use data was received from D&B.

The buildout land use map includes five Opportunity Areas (OAs), including:

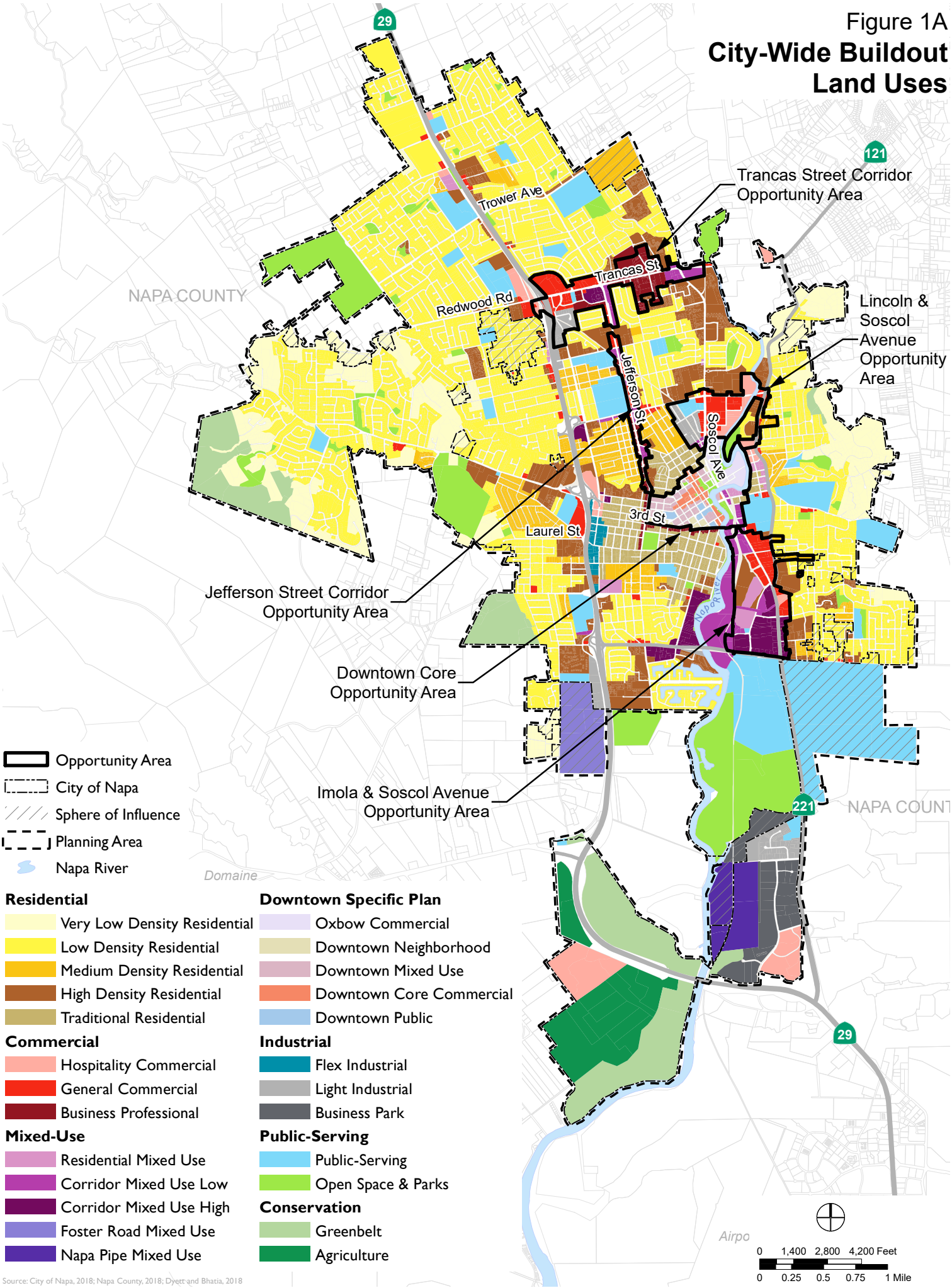
- Trancas Street Corridor
- Jefferson Street Corridor
- Lincoln & Soscol Avenue
- Downtown Core
- Imola & Soscol Avenue

There is also planned growth throughout the rest of the City. Table 1 provides a summary of the existing land uses (defined as 2018), proposed growth, and ultimate buildout development in 2040 for each OA and the rest of the City. Land use maps for the OAs are also provided in Figures 1B through 1F.

Table 1. Summary of Existing and Buildout Land Uses					
Sub Area	Housing Units	Population	Commercial SF	Industrial SF	Jobs
Existing					
Downtown Core	216	558	1,338,704	2,712	3,912
Trancas Street Corridor	255	659	554,673	85,114	7,061
Jefferson Street Corridor	30	78	151,102	-	1,419
Lincoln & Soscol Ave	43	111	232,994	324,009	1,809
Imola & Soscol Ave	250	717	438,496	-	2,709
Remaining City	29,895	77,172	3,607,983	629,125	16,722
Total	**30,689**	**79,295**	**6,323,952**	**1,040,960**	**33,632**
Change					
Downtown Core	810	2,032	465,893	-	1,540
Trancas Street Corridor	456	1,135	365,252	240,708	1,909
Jefferson Street Corridor	198	498	69,089	81,832	431
Lincoln & Soscol Ave	48	119	264,112	172,980	1,232
Imola & Soscol Ave	1,349	3,318	338,889	236,367	1,651
Remaining City	4,950	10,785	482,297	1,066,878	4,061
Total	**30,689**	**79,295**	**6,323,952**	**1,040,960**	**33,632**
Buildout					
Downtown Core	1,026	2,590	1,804,596	2,712	5,452
Trancas Street Corridor	711	1,794	919,925	325,822	8,970
Jefferson Street Corridor	228	576	220,191	81,832	1,850
Lincoln & Soscol Ave	91	230	497,106	496,989	3,041
Imola & Soscol Ave	1,599	4,035	777,385	236,367	4,360
Remaining City	34,845	87,957	4,090,280	1,696,003	20,783
Total	**38,500**	**97,181**	**8,309,485**	**2,839,725**	**44,456**

Figure 1A

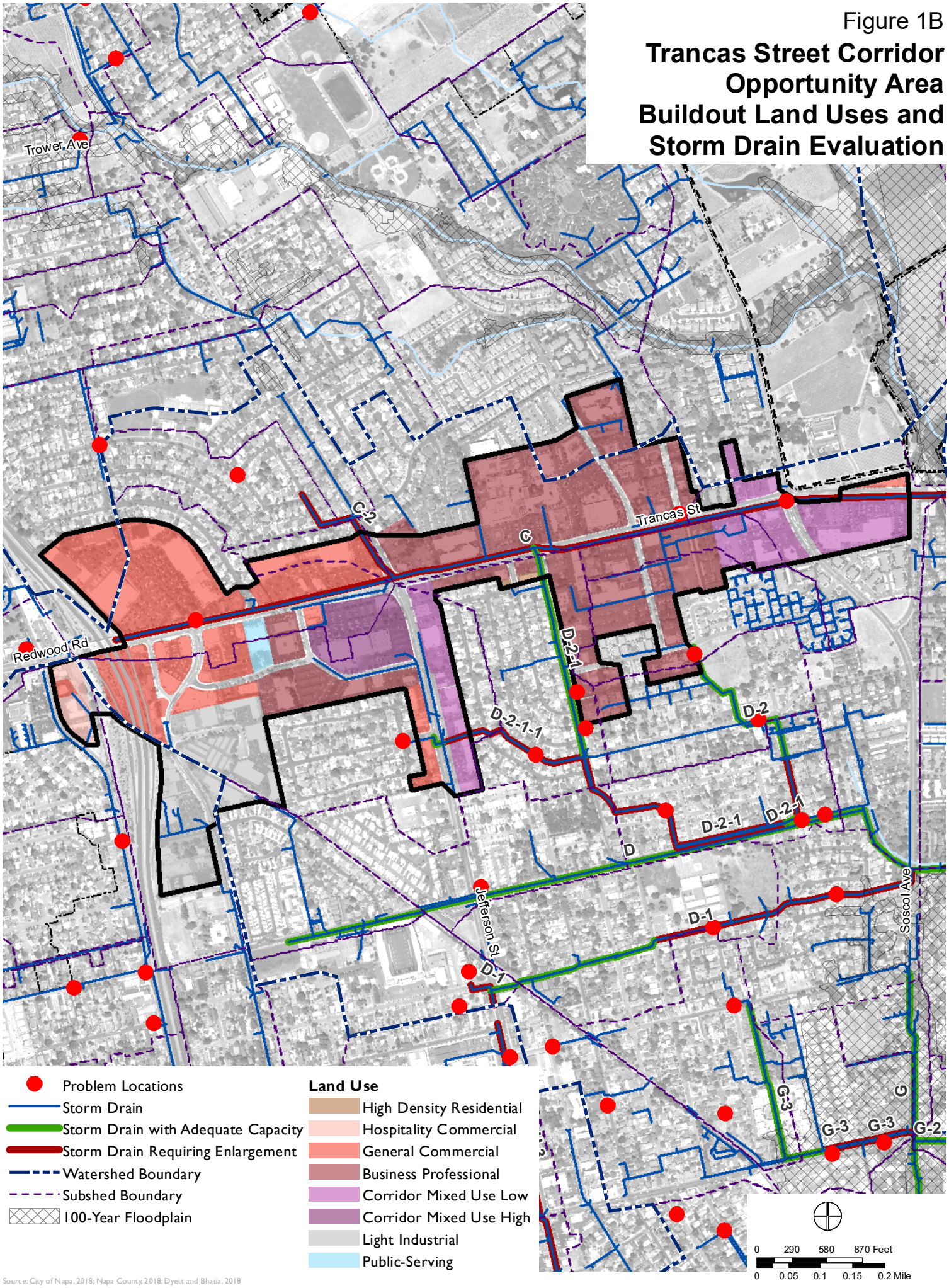
City-Wide Buildout Land Uses



Source: City of Napa, 2018; Napa County, 2018; Dyett and Bhatia, 2018

Figure 1B

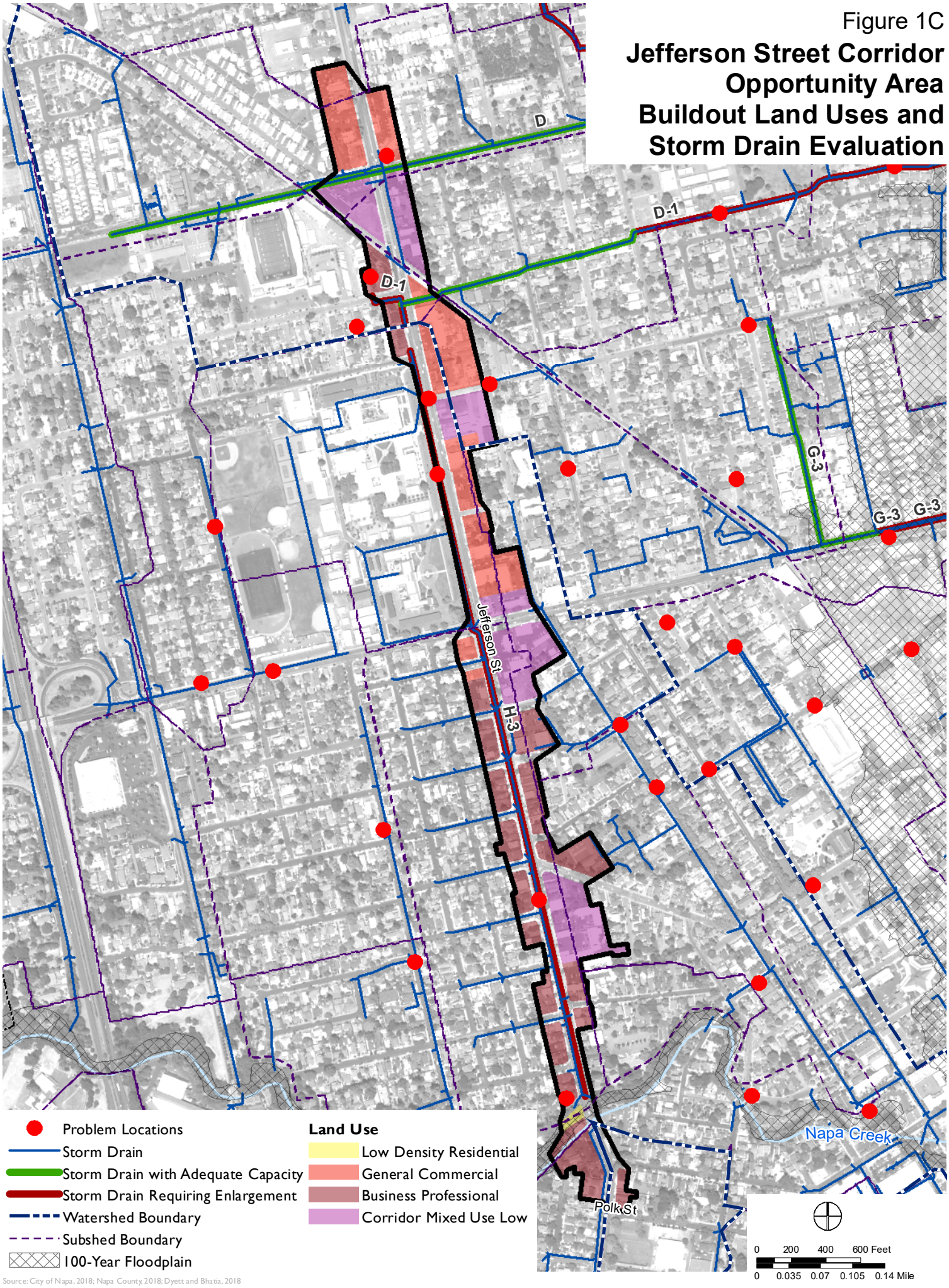
Trancas Street Corridor Opportunity Area Buildout Land Uses and Storm Drain Evaluation



Source: City of Napa, 2018; Napa County, 2018; Dyett and Bhatia, 2018

Figure 1C

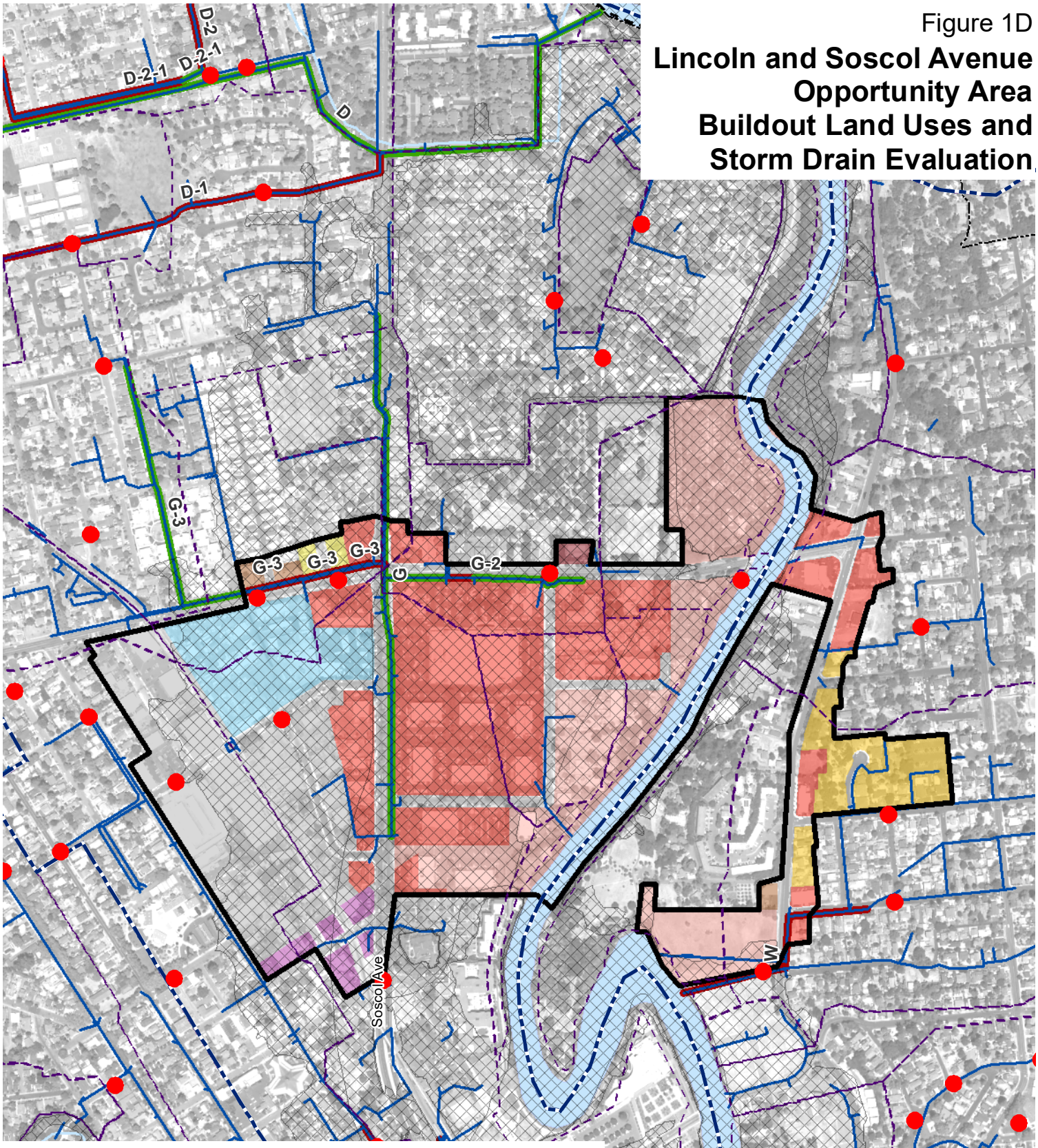
Jefferson Street Corridor Opportunity Area Buildout Land Uses and Storm Drain Evaluation



Source: City of Napa, 2018; Napa County, 2018; Dyett and Bhatia, 2018

Figure 1D

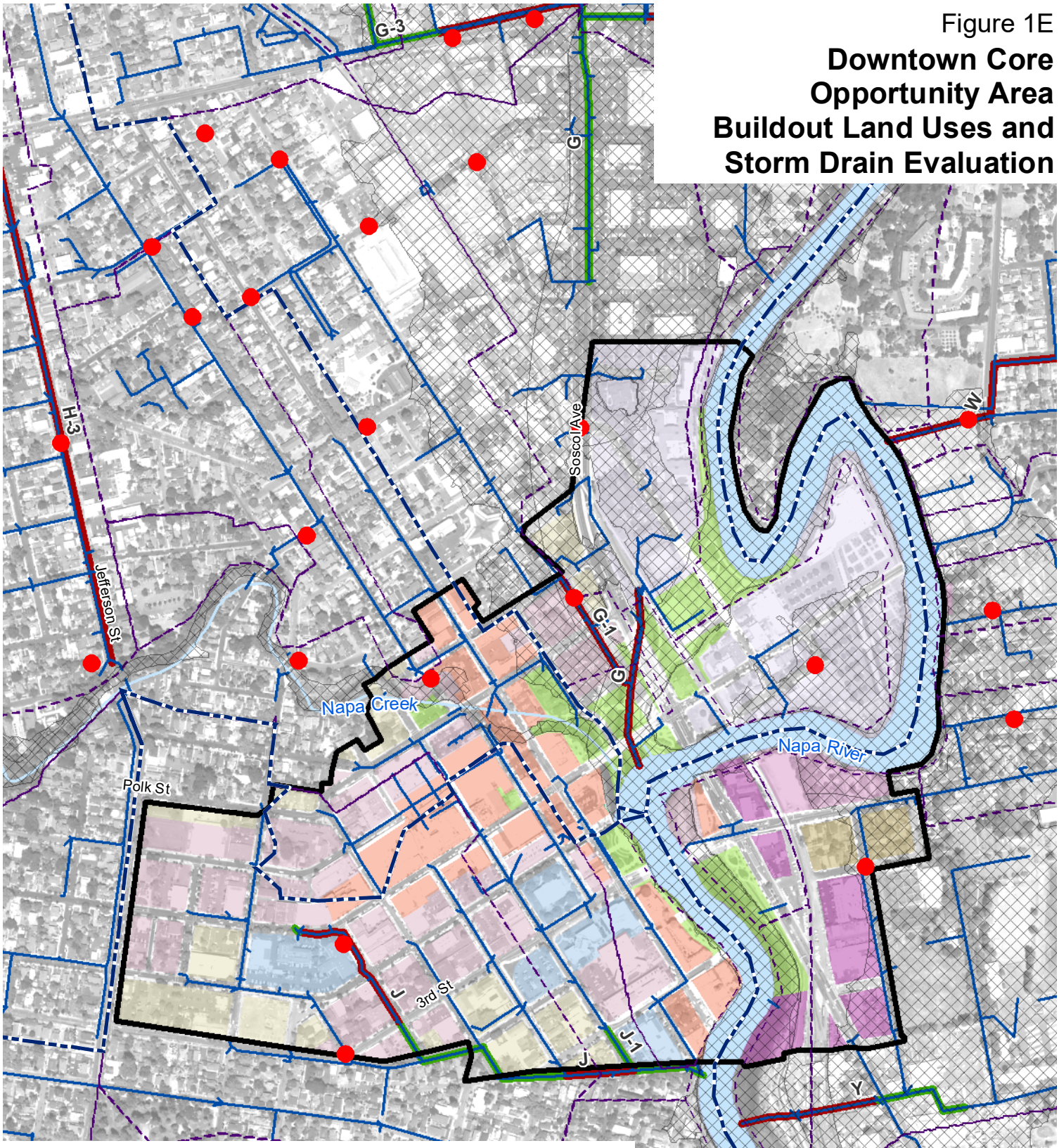
Lincoln and Soscol Avenue Opportunity Area Buildout Land Uses and Storm Drain Evaluation



Source: City of Napa, 2018; Napa County, 2018; Dyett and Bhatia, 2018

Figure 1E

Downtown Core Opportunity Area Buildout Land Uses and Storm Drain Evaluation



- Problem Locations
- Storm Drain
- Storm Drain with Adequate Capacity
- Storm Drain Requiring Enlargement
- Watershed Boundary
- Subshed Boundary
- 100-Year Floodplain

Land Use

- Traditional Residential
- Residential Mixed Use
- Corridor Mixed Use Low
- Oxbow Commercial
- Downtown Neighborhood
- Downtown Mixed Use
- Downtown Core Commercial
- Downtown Public
- Open Space & Parks
- Agriculture

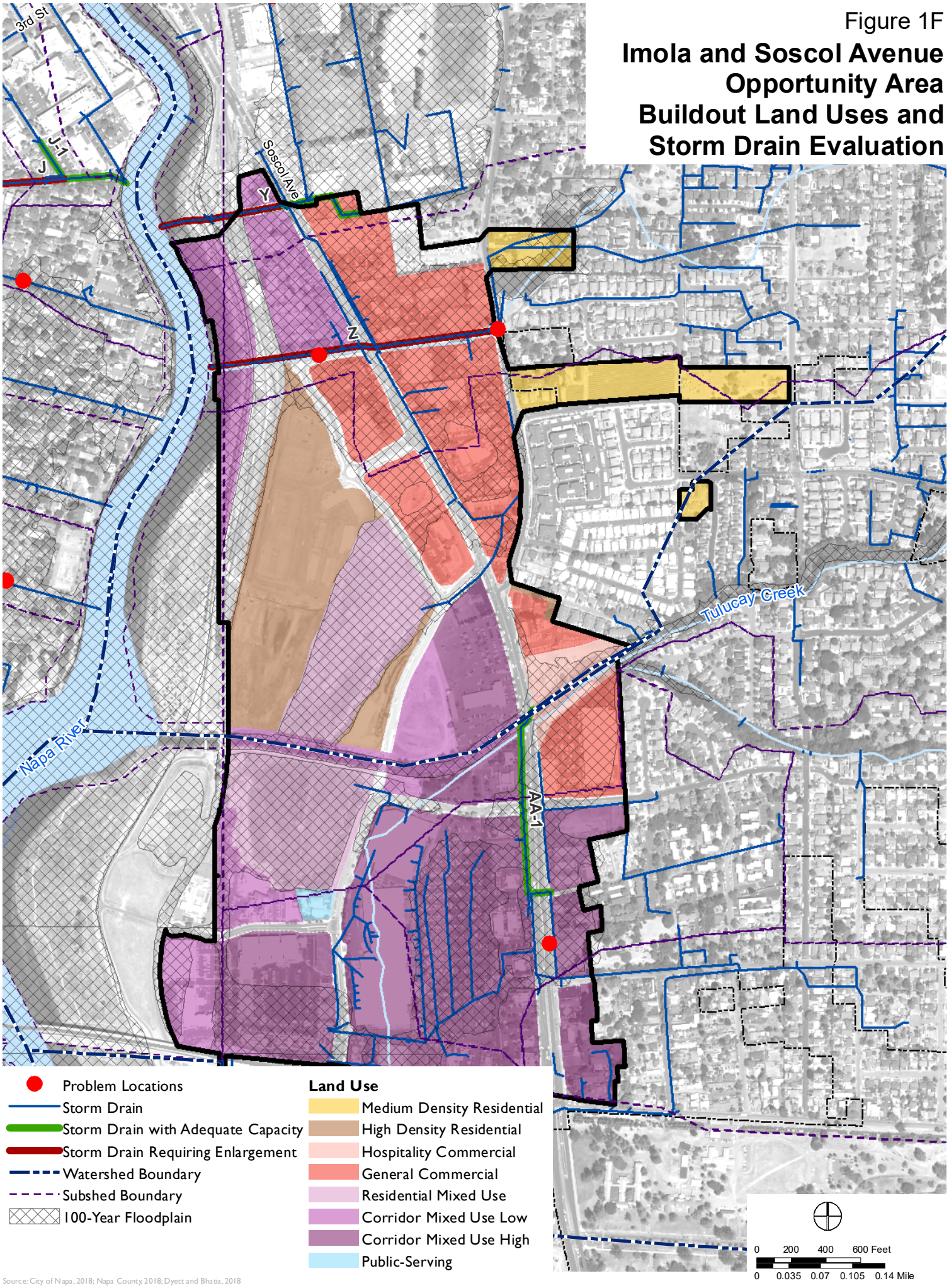
0 200 400 600 Feet

0 0.035 0.07 0.105 0.14 Mile

Source: City of Napa, 2018; Napa County, 2018; Dyett and Bhatia, 2018

Figure 1F

Imola and Soscol Avenue Opportunity Area Buildout Land Uses and Storm Drain Evaluation



Source: City of Napa, 2018; Napa County, 2018; Dyett and Bhatia, 2018

BACKGROUND INFORMATION

Relevant Background Information is provided below:

Napa Countywide Stormwater Pollutions Prevention Program

The City is a member of Napa Countywide Stormwater Pollution Prevention Program (NCSPPP). The NCSSP is a joint effort between Napa County and the cities and towns in Napa County to:

- Comply with State and Federal stormwater regulations
- Preserve beneficial uses of local waterways
- Prevent stormwater pollution
- Protect and enhance water quality in creeks and wetlands

NCSPPP references several guidance documents related to land development and redevelopment, including these three key documents:

- The State of California Construction General Permit: This permit regulates storm water runoff from construction sites with the goal of preventing stormwater pollution.
- Napa Countywide Stormwater Pollution Prevention Program Erosion and Sediment Control Plan Guidance for Applicants and Review Staff: This document provides guidance for preventing construction site runoff pollution.
- Bay Area Stormwater Management Agencies Association (BASMAA) Post-Construction Manual (January 2019): This manual promotes and provides guidance on implementing integrated Low Impact Development (LID) design. LID goals are to mimic pre-project site hydrology (both runoff rates and total volume) and protect water quality. Use of the manual results in runoff from roofs and impervious paved areas being dispersed to landscaped areas or routed to bioretention facilities to achieve the LID goals.

Napa River/Napa Creek Flood Protection Project

The Napa River/Napa Creek Flood Protection Project (NRNCFPP) includes the following major elements that will help keep the flow in the Napa River from overflowing the riverbanks and flooding the City. A summary of the NRNCFPP is provided below (from the Napa County website), and from personal communications with Richard Thomasser, Deputy Director of Public Works, Flood Control and Water Resources, Napa County.

The NRNCFPP includes improvements to six miles of the Napa River from Highway 29 at the Butler Bridge/Southern Crossing to near Trancas Street, and Napa Creek from its outfall to the Napa River for about one mile upstream. Elements of the Napa Project include bank terracing, bridge replacements, bypass channels, culverts, floodwalls, and levees. Several Project components have been completed, including:

- Over 600 acres of restored wetlands in the South Wetlands Opportunity Area
- The replacement of the Third Street, First Street, and Maxwell Bridges, and the construction of the new Soscol Avenue Bridge

- The cleanup of contaminated properties in the Oil Company Road area, the east bank terracing, and the Hatt to First Floodwall and Promenade, including the renovation of Veterans Memorial Park
- Railroad bridges over Napa River and future bypass and associated track realignment
- Napa Creek flood bypass culverts and terraces
- Napa River Dry Bypass

Other project elements that have not yet been constructed are listed below:

- Floodwalls/levees north of the Oxbow and bypass pump station
- Floodwalls and trail on west side of Napa River (Imola to Hatt)
- Floodwalls around Oxbow and Floodwalls and trail on east side of Napa River (Tulocay Creek to Third Street)

In 2018 the Napa County Flood Control and Water Conservation District (NCFCWCD) reanalyzed remaining project elements to more effectively compete for Federal funding and determine priorities moving forward.

In January 2021, the US Army Corps of Engineers (Federal Government) announced that $48.3 million of federal funds were available to substantially complete the NRNCFPP. This funding will be used for flood walls along the Napa River north and south of Lincoln Avenue and along Riverside Drive. Floodwalls in the Oxbow District area will also be constructed using local funds.

When the NRNCFPP is completed (estimated by 2027) the existing City and the future growth will be protected from flooding from the Napa River. The pre-NRNCFPP floodplain is shown on Figure 2, and the expected post-NRNCFPP floodplain maps are provided in Attachment A. A comparison of Figure 2 and the Attachment A maps shows the areas that are estimated to be protected from flooding by the NRNCFPP. The General Plan growth OAs are shown on Figure 2. These OAs are mostly outside the estimated post-NRNCFPP floodplain.

Residual Flooding Studies

When the NRFCP is complete, the river water surface elevation (WSE) of the flow within the river levees and floodwalls can exceed the elevation of the ground on the City side of the levees and floodwalls, which can prevent the runoff from the City from flowing into the river and can cause flooding in the City (called residual flooding). The City of Napa is addressing the residual flooding as described below.

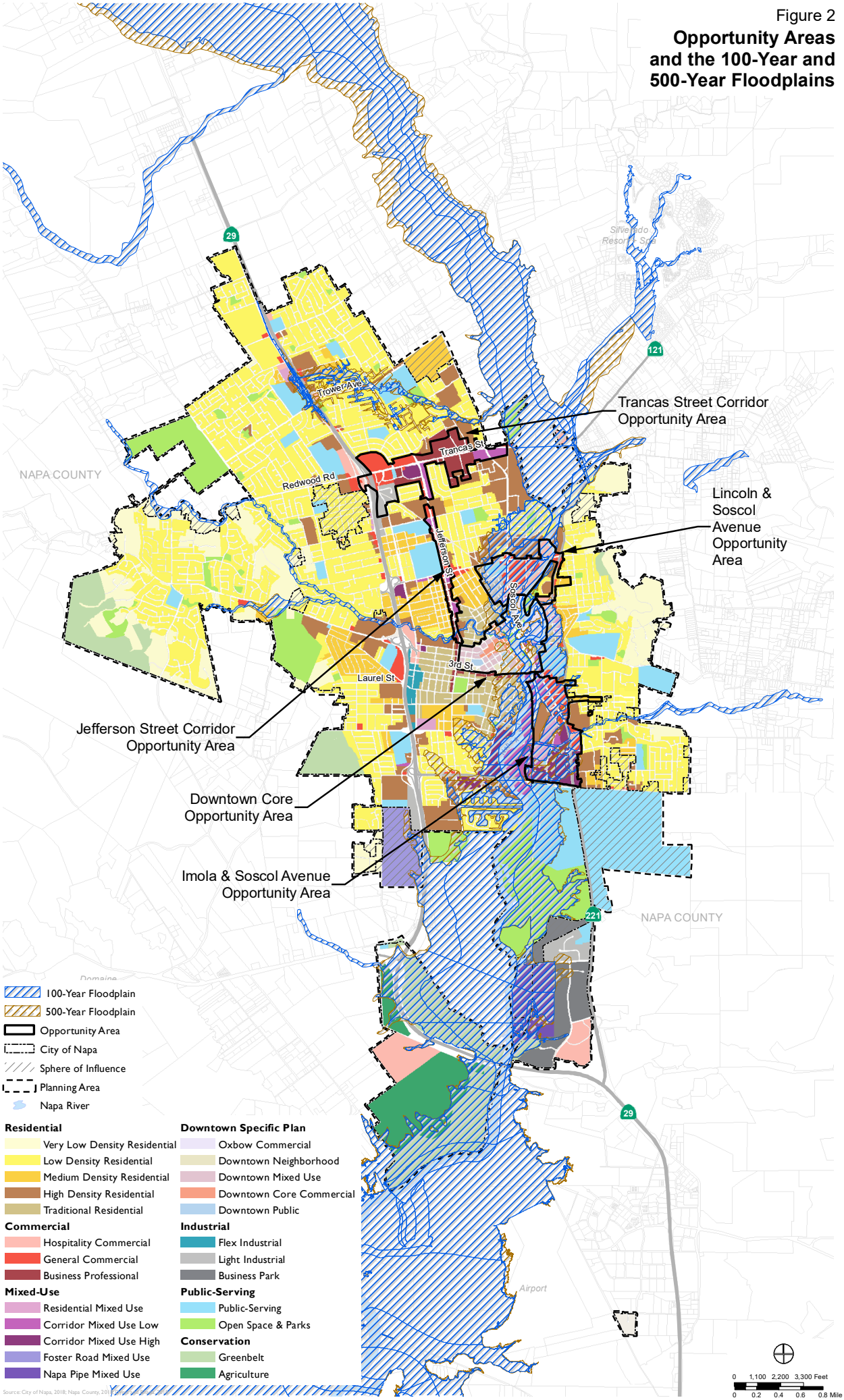
City of Napa, Soscol Gateway Interior Drainage Improvement Project (Draft, September 2011)

This Project evaluated the residual flooding in most of the Napa East Basin Watershed (the area east of the Napa River, north of Tulocay Creek, and approximately south of Summit Avenue). This study evaluated four alternatives to reduce the residual flooding in this watershed and identified a recommended alternative (Alternative 4). Alternative 4 included new storm drains, a pressurized storm drain, box culverts, detention storage in a US Army Corps of Engineers' wetland area, and a pump station to lift runoff into Tulocay Creek. Attachment B provides maps of the residual flooding after the NRNCFPP is completed, the recommended residual flooding drainage improvements, and the small amount of flooding that will remain after the residual flooding improvements are constructed.

Some of the Downtown Core OA (the part east of the Napa River) is in the area covered by this study.

Figure 2

Opportunity Areas and the 100-Year and 500-Year Floodplains



City of Napa, South Coombs Area Strategic Drainage Improvement Project (September 2012)

This Project evaluated the residual flooding in the South Coombs Area (325 acres) bounded by the Napa River to the east, Third Street and Division Street to the north, Jefferson Street to the west, and Imola Avenue to the south. This study evaluated alternatives to reduce the residual flooding in the Coombs area and identified a recommended alternative. The recommended alternative included new storm drains, two pressurized storm drains, a detention basin, and two pump stations to lift runoff into the Napa River. Attachment C provides a copy of Figure A-2 of this study showing the recommended improvements.

None of the OAs are in the area covered by this study.

City of Napa, Final Storm Drain Master Plan, Volume 1 (April 2006)

The City of Napa owns and maintains the storm drains that serve the City. The City's Final Storm Drain Master Plan (SDMP), Volume 1 (April 2006) includes an evaluation of the City's storm drain capacities and 10-year design storm peak flows. By comparing the storm drain capacities and 10-year peak flows, the available additional capacity was calculated, or the risk of flooding was identified. This SDMP also identified recommended storm drain enlargements for the storm drains with a risk of flooding. This Final SDMP represents compliance with Implementation Program CS-11.A (discussed below).

RELEVANT GENERAL PLAN GOALS AND POLICIES

The current General Plan (Envision Napa 2020) includes goals and policies relevant to flooding and storm drainage. The draft General Plan Update (Envision Napa 2040) includes similar goals and policies. The goals and policies relevant to flooding and storm drainage from the current general plan and two new policies in the GPU are listed below.

Flooding Goals and Policies (from Chapter 8 – Health and Safety of the Envision Napa 2020 General Plan)

Goal
HS-3 To reduce the risk to life and property from flooding.
Policies
HS-3.1 The City shall continue to provide for floodplain management to protect its residents and property from the hazards of development in the floodplain of the Napa River and its tributaries.
HS-3.2 The City shall continue to apply flood plain management regulations for development in the floodplain and floodway.
HS-3.3 The City shall continue to participate in the Federal Emergency Management Agency's National Flood Insurance Program.
HS-3.4 The City shall continue to utilize the Federal Emergency Management Agency's Flood Insurance Rate Map to define the flood hazard area, the floodway and the floodplain.
HS-3.5 The City shall balance the housing needs of its residents against the risk from potential flood-related hazards.
HS-3.6 The City shall support programs and methods to reduce the flooding of the Napa River and its tributaries.
HS-3.7 The City shall continue to assist the Army Corps of Engineers, Napa County, other responsible agencies, and the public to maintain funding for the development of the Napa River Flood Management Project.
HS-3.8 The City shall continue to cooperate with Napa County to maintain a reliable funding source for the local share of flood control costs.

Storm Drainage Goals and Policies (from Chapter 4 – Community Services of the Envision Napa 2020 General Plan)

Goal
CS-11 To develop and maintain a safe, attractive and environmentally sensitive drainage system for handling runoff due to seasonal rainstorms.
Policies
CS-11.1 The City shall address needed long-term improvements for the drainage system.
CS-11.2 The City shall continue to collect a Storm Water System Service Fee for needed storm drainage improvements and maintenance.
CS-11.3 The City shall plan and build storm improvements within funding limits.
CS-11.4 The City shall investigate the potential for establishing an impact fee to help accommodate the effects of additional runoff from new development.
CS-11.5 The City shall develop stormwater management programs to reduce water borne pollution discharges to the maximum extent practicable.
CS-11.6 The City shall require new development to obtain all necessary NPDES permits as required by federal law.
CS-11.7 The City shall require all new development to implement feasible best management practices (BMP) in the design of stormwater systems.
CS-11.8 The City shall require all projects in the floodplain to comply with applicable federal, state and local regulations.
CS-11.9 The City shall work with the California Department of Fish and Game and Napa County Resource Conservation District to develop an acceptable and appropriate homeowners' stewardship program aimed at reducing flooding along creek and river side properties.
Implementation Programs
CS-11.A The City shall prepare a Storm Drainage Master Plan. The scope of the Master Plan should include: Hydrologic Information and Recommendations 1. Documentation of existing facilities and conditions 2. Development and adoption of standard methodologies for future system design 3. Production of a Storm Drainage Base map with estimated design flow at critical points 4. Hydraulic analysis of the City system 5. Identification of problem areas and prioritization of improvements (projects completed as funding permits)
Water Quality Evaluation and Recommendations 1. Documentation of current and anticipated regulations 2. Runoff water quality management program including the following components: a) Existing City Programs, including Stormwater Service Fee, SWPPP and NOI requirements for projects over 5 acres, street sweeping, drain stenciling, pesticide certification for employees, implementation of erosion control measures b) Five year schedule and costs for implementation c) Refinement of General Plan policy implementation programs as needed d) Pursuit of funding for water quality education programs e) Identification of standards for erosion control design and implementation f) Bioengineer bank stabilization projects in cooperation with the Flood Control District g) Identification of small development standards for trash enclosures and other sources of runoff contamination

General Plan Update, Envision Napa 2040 New Policies

In support of GOAL HS-3 “To reduce the risk to life and property from flooding”, the GPU includes the following new policies:

1. The City shall continue to prepare Residual Flooding Project studies to identify the residual flooding risks and floodplains that will occur after the NRNCFPP is fully constructed and to identify the drainage improvements needed to eliminate the residual flooding to an

appropriate/acceptable level. The identified improvements shall be coordinated with the completion of the NRNCFPP. The identified improvements shall be designed and constructed within the City's funding limits.

2. The City shall prepare storm drain capacity evaluations and storm drain replacement predesign evaluations to identify the required storm drain improvements to provide a 10-year level of drainage service for OAs. The City shall modify the existing storm drain impact fee program or establish a new storm drain impact fee program to fund the needed storm drain improvements for the OAs. The City shall construct the needed storm drain improvements in coordination with the redevelopment and development in the OAs.

NAPA RIVER FLOOD CONTROL, RESIDUAL FLOODING, AND STORM DRAIN EVALUATIONS

Flood control and storm drainage evaluations are presented below.

Napa River Flood Control Evaluation

This flood control evaluation address large-scale flooding from the Napa River. The NRNCFPP will protect the existing City and the proposed future growth (which is within the current City limits) from flooding from the Napa River. As summarized above, the NRNCFPP has been progressing for over 20 years, and with the recent federal funding, the NRNCFPP is estimated to be completed in 2027. When completed, the current 100-year and 500-year floodplains shown on Figure 2 will be reduced in area. Attachment A provides an estimate of the future floodplain after the NRNCFPP is constructed (floodplain maps from a NRNCFPP Conditional Letter of Map Revision submitted to the Federal Emergency Management Agency in October 2008). But until the NRNCFPP is completed and a future floodplain evaluation is prepared, this future floodplain delineation is uncertain, and areas may be in or out of the future floodplain. The final future floodplain delineation will only be known when the Federal Emergency Management Agency officially modifies the Flood Insurance Rate Maps.

Potential Environmental Impact: Because the NRNCFPP is not yet fully constructed and because the future floodplain map is uncertain at this time, there is a potential, albeit temporary, impact of new growth being located in a floodplain. Because the NRNCFPP is estimated to be completed in 2027, this potential impact is only temporary. Also, the City has a goal (GOAL HS-3) of reducing the risk to life and property from flooding. The City has/is currently complying with the policies associated with this goal (Policies HS-3.1 to HS3.8), which prevent development in the floodplain. Thus, compliance with City policies reduces this potential impact to a less than significant level.

Residual Flooding Evaluation

The City has prepared two residual flooding project studies, including 1) the Soscol Gateway Interior Drainage Improvement Project study, and 2) South Coombs Area Strategic Drainage Improvement Project. These studies identified storm drainage improvements needed to reduce the residual flooding in these study areas to an acceptable level. The acceptable level includes minor street flooding, but no property damage in the 100-yer storm event. However, the recommended drainage improvements have not been constructed yet. Also, residual flooding project studies have not been prepared for Salvador Basin Watershed, the Trancas Soscol Basin Watershed, the Napa Creek North Basin Watershed, nor the Napa Creek South Basin Watersheds so the required residual floodplain improvements are not yet known for these watersheds.

Potential Environmental Impact: Because residual flooding drainage studies have not been prepared for all the City's watersheds, some of the future required residual flood improvements are yet unknown. Also, most of the currently known residual flooding improvements are not yet constructed; consequently, there is a potential environment impact of new growth being located in a residual floodplain. The General Plan Update includes a new policy addressing the need for residual floodplain studies. Compliance with this policy will result in identification of the needed residual flooding improvements and eventual construction of the improvements. The residual flood improvements are likely to include gravity storm drains, pressurized storm drains, detention basins, and pump stations. Thus, this potential impact is temporary. Also, the City has a goal (GOAL HS-3) of reducing the risk to life and property from flooding. The City has and is currently complying with the policies associated with this goal (Policies HS-3.1 to HS3.8), which prevent future growth in the floodplain and/or would reduce the risk of flood damage to the growth. Thus, the City's policies reduce this potential impact to a less than significant level.

Storm Drain Evaluation

The City of Napa owns and maintains the storm drains that serve the City. The City's Final SDMP, Volume 1 (April 2006) includes an evaluation of the City's storm drain capacities and 10-year design storm peak flows. By comparing the storm drain capacities and peak flows, the available additional capacity was calculated, or the risk of flooding was identified. The SDMP also identified known flooding problems along the storm drain systems. This SDMP also identified recommended storm drain enlargements for the storm drains with a risk of flooding. The capacity evaluations from the SDMP of the storm drains serving the OAs are summarized and discussed below.

Trancas Street Corridor OA

The Trancas Street Corridor OA storm drain evaluation is summarized below:

- This OA is shown on Figure 1B along with the storm drains that serve this OA, including the C and D-2 storm drain systems. The known flooding problems along these storm drains are also shown on this figure.
- The capacities and peak flow evaluations from the SDMP for the C and D-2 storm drains are summarized in Table 2. The number of known flooding problems on each storm drain reach are also summarized in Table 2. Table 2 also presents a ratio of the peak 10-year flow rate with the available storm drain capacity. If the storm drain peak flow rate is less than the storm drain capacity, then this ratio is less than 1.0. If this ratio is greater than 1.0, then the peak flow rate is greater than the storm drain capacity and flooding is predicted. For the C and D-2 storm drains, most of the storm drain segments are over capacity for existing conditions. Also, there are several existing flooding problems along these storm drain systems. Thus, this OA is currently at risk of flooding from inadequate storm drain capacity, and the redevelopment in this OA is also at risk of flooding. Table 2 presents preliminarily recommended storm drain sizes. The storm drain pipe sizes were estimated based on achieving a peak flow velocity of 7 feet per second. Also, the pipe sizes were adjusted to ensure that they progress from smaller upstream sizes to larger downstream sizes and a check of whether the sizes are reasonable was included. These pipe sizes are preliminary and must be verified/revised by a storm drain predesign study. The risk of flooding could be eliminated by 1) preparing a predesign study of the C and D-2 storm drains to verify/determine the recommended improvements to achieve the needed storm drain capacity. This predesign evaluation should be combined with the residual flooding evaluations discussed above. 2) Designing the recommended improvements. 3) Construct the recommended improvements.

- This OA is currently fully developed with mostly commercial and office land uses. Even in 2006 (when the SDMP was prepared), this OA was fully developed with similar land uses. Thus, as this OA is redeveloped, the overall impervious coverage and peak 10-year runoff rates will not increase and are likely to decrease slightly based on compliance with the BASMAA Post-Construction Manual requirements. Thus, the redevelopment of this OA does not result in an increased risk of flooding.

Jefferson Street Corridor OA

The Jefferson Street Corridor OA storm drain evaluation is summarized below:

- This OA is shown on Figure 1C along with the storm drains (and flooding problems) that serve this OA, including the D and D-1 storm drain which serve the north end of this OA and the H-3 drain that serves most of this OA.
- The capacity/peak flow evaluations from the SDMP for the D, D-1, and H-3 storm drains are summarized in Table 2 as well as the number of known flooding problems. The D storm drain mostly has adequate capacity, and it is likely that overall this drain is adequate. The D-1 and H-3 storm drains lack adequate capacity. Thus, this OA is at risk of flooding. The risk of flooding could be eliminated by 1) preparing a capacity study to confirm the D drain is adequate. 2) Preparing a predesign study of the D-1, and H-3 storm drains. 3) Designing the recommended improvements. 4) Constructing the recommended improvements. This OA is above the area that would be affected by residual flooding.
- This OA is currently fully developed with mostly commercial and office land uses and some residential land uses. Even in 2006 (when the SDMP was prepared), this OA was fully developed with similar land uses, but possibly more residential areas. Thus, as this OA is redeveloped, the overall impervious coverage and peak runoff rates will not increase and are likely to decrease slightly based on compliance with the BASMAA Post-Construction Manual requirements. Thus, the redevelopment of this OA does not result in an increased risk of flooding.

Lincoln and Soscol Avenue OA

The Lincoln and Soscol Avenue OA storm drain evaluation is summarized below:

- This OA is shown on Figure 1D along with the storm drains that serve this OA, including the G, G-2, G-3, and W storm drains.
- The capacity/peak flow evaluations from the SDMP for the G, G-2, G-3, and W storm drains are summarized in Table 2. The G storm drain mostly has adequate capacity, and it is likely that overall this drain is adequate. The G-2, G-3, and W storm drains lack adequate capacity. Thus, this OA is at risk of flooding. The risk of flooding could be eliminated by 1) preparing a capacity study to confirm the G drain is adequate. 2) Preparing a predesign study of the G-2, G-3, and W storm drains. 3) Designing the recommended improvements. 4) Constructing the recommended improvements. This OA is in an area that will be affected by residual flooding, and the storm drain predesign studies should be combined with a residual flooding study.
- This OA is almost fully developed with mostly commercial and office land uses and some residential land uses. However, there is some area on the east side of the Napa River that is currently undeveloped. Thus, as this OA is redeveloped, for the area on the west side of the river, the overall impervious coverage and peak runoff rates will likely decrease slightly based on compliance with the BASMAA Post-Construction Manual requirements. For the

area on the east side of the river, the new development should be included in the storm drain predesign evaluations. Thus, the redevelopment of this OA does not result in an increased risk of flooding.

Downtown Core OA

The Downtown Core OA storm drain evaluation is summarized below:

- This OA is shown on Figure 1E along with the storm drains that serve this OA, including the G, G-1, J, and J-1 storm drains.
- The capacity/peak flow evaluations from the SDMP for the G, G-1, J, and J-1 storm drains are summarized in Table 2. See the discussion above for the G storm drain. The G-1, and J storm drains lack adequate capacity. The J-1 drain has adequate capacity. Thus, this OA is at risk of flooding. The risk of flooding could be eliminated by 1) preparing a capacity study to confirm the J-1 Drain is adequate. 2) Preparing a predesign study of the G, G-1, and J storm drains. 3) Designing the recommended improvements. 4) Constructing the recommended improvements. Additionally, there are several other storm drains in this OA that were not evaluated in the SDMP. These non-evaluated storm drains should also be evaluated in the predesign evaluation. Some of this OA is in an area that will be affected by residual flooding, and the storm drain predesign studies should be combined with a residual flooding study.
- This OA is almost fully developed with mostly commercial and office land uses and some residential and park land uses. Thus, as this OA is redeveloped, the overall impervious coverage and peak runoff rates are likely to decrease slightly based on compliance with the BASMAA Post-Construction Manual requirements. Thus, the redevelopment of this OA does not result in an increased risk of flooding.

Imola and Soscol Avenue OA

The Imola and Soscol Avenue OA storm drain evaluation is summarized below:

- This OA is shown on Figure 1F along with the storm drains that serve this OA, including the Y, Z, and AA-1 storm drains.
- The capacity/peak flow evaluations from the SDMP for the Y, Z, and AA-1 storm drains are summarized in Table 2. The Y drain has adequate capacity for the 10-year design storm, but to address residual flooding, the downstream segment of the Y drain has been identified for replacement with a 14 feet by 5 feet box culvert flowing to the Z drain in the Soscol Gateway Interior Drainage Improvement Project Study. The Z drain has been identified for replacement with a 16 feet by 8 feet Box Culvert in the Soscol Gateway Interior Drainage Improvement Project Study, which is redirected from the Napa River to the USACE Wetlands in twin 12 feet by 5 feet box culverts (see Attachment B) for detention storage, and then to a future pump station located north of Tulocay Creek. The AA-1 storm has adequate capacity. Thus, this OA currently mostly has adequate storm drain capacity. However, this area and some of the future redevelopment are at risk of residual flooding. The risk of residual flooding could be eliminated by constructing the improvement identified in the Soscol Gateway Interior Drainage Improvement Project Study (or equivalent improvements).
- This OA is almost fully developed or developing currently with mostly commercial, office, park, and high-density residential land uses. The Soscol Gateway Interior Drainage Improvement Project Study was based on full buildout of this OA north of Tulocay Creek. The Soscol Gateway Interior Drainage Improvement Project Study addressed storm drain

capacities and residual flooding. Thus, some areas of this OA are at risk of flooding until the recommended residual flooding improvements are constructed. The risk of flooding would be eliminated by constructing the recommended improvements (or equivalent improvements). As this OA is developed and redeveloped, the peak runoff rates will decrease slightly based on compliance with the BASMAA Post-Construction Manual requirements. Thus, the development and redevelopment of this OA does not result in an increased risk of flooding.

Potential Environmental Impact: Because many of the existing storm drains lack adequate capacity for a 10-year storm event (see Figures 1B to 1F), there is a potential environmental impact of new development and redevelopment being located in a floodplain. Table 2 identifies preliminary sizes of the required storm drain enlargements. The General Plan Update includes a new policy about preparing storm drain capacity evaluations and designing and constructing the storm drains needed for the OAs. Compliance with this policy will result in the sizing, funding, and construction of the needed storm drain in coordination with the redevelopment/development in the OAs. Thus, this potential impact is temporary. Also, the City has a goal (GOAL HS-3) of reducing the risk to life and property from flooding. The City has and is currently complying with the policies associated with this goal (Policies HS-3.1 to HS3.8), which prevent future growth in the floodplain and/or would reduce the risk of flood damage to the growth. Thus, the City's policies reduce this potential impact to a less than significant level.

INCORPORATION OF COUNTY LAND USE ISLANDS INTO THE CITY

Attachment D shows 18 areas located within the City limits (as of May 2017) that have not been incorporated into the City (called County Islands). Since the figure was prepared, most of Island 5, a small fraction of Island 13, and about half of Island 18 have been incorporated into the City. It is likely that the rest of the County Islands will ultimately be incorporated into the City in the future.

Prior to incorporation, the City should prepare a County Island Incorporation Engineering Study that includes the following tasks to ensure there are no environmental or financial impacts to the City, County, or residents in the City or County in and near the County Islands.

- Task 1 - Storm Drain System Hydrologic and Hydraulic and Storm Water Quality Evaluations: Inventory the storm drain infrastructure within the County Islands. Calculate the peak 10-year and 100-year runoff rates for the County Islands and the downstream storm drain system capacities. Evaluate whether the existing island and downstream drainage facilities meet the City's storm drain design criteria and water quality criteria.
- Task 2 - Storm Drain System Condition Assessment: Conduct a condition assessment of the storm drain systems and facilities within the County Island to determine the remaining useful life for each of the storm drain system assets. Conduct physical evaluations of the Island's storm drain facilities and document the conditions. Factors to consider in the condition assessment may include age, material, and available performance history data (repairs, flooding problems, etc.).
- Task 3 - Recommended Improvements and Cost Estimates: Based on the findings from hydrologic/hydraulic/water quality and condition assessment evaluations, identify the improvements needed to achieve the City's current storm drain and water quality system standards. Improvements are likely to include items such as pipe improvements, detention basins, pump stations and water quality best management practices and low impact development improvements. Prepare cost estimates for the identified improvements.

Assess the costs to the parcels in the County Islands (and City areas if appropriate) on a fair-share basis. Assess the City's standard annual storm drain fees to the County Island parcels. The City should only accept the County Island for which the fair share costs and the annual storm drain fees are successfully assessed to the County Island parcels. Or phrased differently, the existing City (and its residents) should not bear the cost of upgrading the County Island drainage infrastructure to current City standards.

Potential Environmental Impact: Incorporation of the County Islands and the associated connection of the islands to the City drainage facilities could result in increased stormwater flows in the City's drainage systems, which could lead to increased flooding (and associated increased financial burden to the City). Because the level of increased flooding and financial burden to the City is yet unknown, this is a potentially significant impact.

Recommended Mitigation Measure: Preparation and implementation of the findings of the County Island Incorporation Engineering Study would reduce this potential impact to a less than significant level.

Table 2. Summary of April 2005 Final Storm Drain Master Plan for Storm Drains Serving the Opportunity Areas

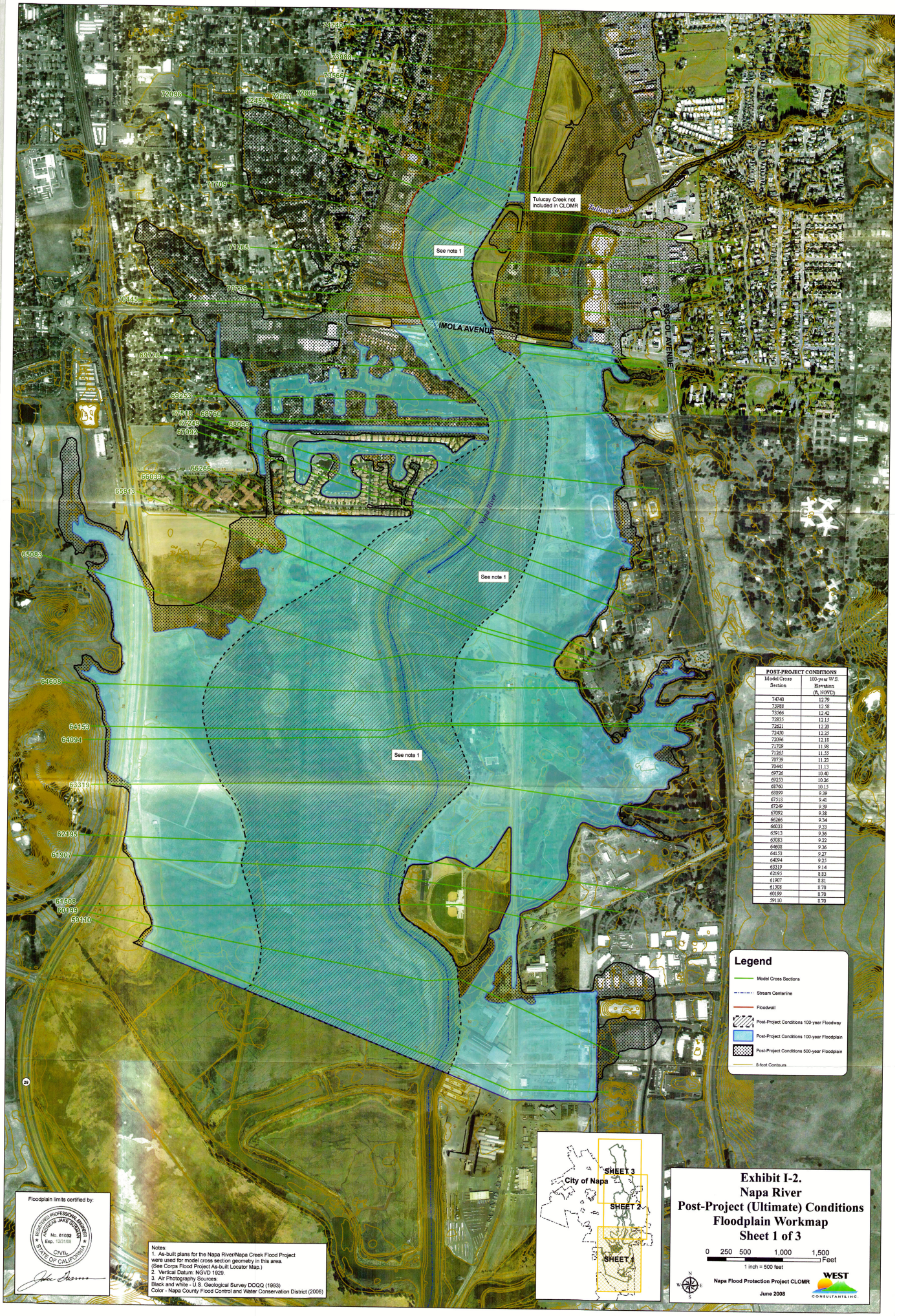
Storm Drain Number (Final Storm Drain Master Plan Volume 1, April 2006)	Existing Storm Drain Diameter, inches	Number of Barrels	Existing Storm Drain Cross Sectional Area, square feet	Existing Storm Drain Capacity, cfs	10-Year Design Storm Peak Flow, cfs	Number of Existing Flooding Problems Along the Existing Storm Drain	Ratio of Peak Flow to Existing Capacity	Preliminary Required Storm Drain Size, inches
Trancas Street Corridor								
	18	2	3.53	13	62		4.77	42
	24	1	3.14	14	62		4.43	42
	2' X 4'	1	8.00	56	62		1.11	42
	Ditch		TBD	50	62		1.24	TBD
	36	1	7.07	55	69		1.25	48
	36	1	7.07	55	74		1.35	48
	36	1	7.07	55	74		1.35	48
	36	1	7.07	55	74		1.35	48
	36	1	7.07	55	77		1.40	48
	36	1	7.07	55	77		1.40	48
	36	1	7.07	55	77		1.40	48
	36	1	7.07	55	77		1.40	48
	36	1	7.07	71	87		1.23	48
C	36	1	7.07	71	87	3	1.23	48
	36	1	7.07	54	87		1.61	48
	36	1	7.07	54	94		1.74	54
	36	1	7.07	54	94		1.74	54
	36	1	7.07	54	102		1.89	54
	42	2	9.62	157	134		0.85	54
	42	2	9.62	92	134		1.46	60
	42	2	9.62	92	157		1.71	66
	54	1	15.90	99	157		1.59	66
	54	1	15.90	99	157		1.59	66
	54	1	15.90	99	177		1.79	72
	54	1	15.90	125	177		1.42	72
	54	1	15.90	209	177		0.85	72
	54	1	15.90	34	199		5.85	78
	21	1	2.41	4	26		6.50	30
	24	1	3.14	16	26		1.63	30
C-2	30	1	4.91	4	26	0	6.50	30
	30	1	4.91	11	41		3.73	36
	30	1	4.91	23	41		1.78	36
	30	1	4.91	19	46		2.42	36
	36	1	7.07	6	31		5.17	Existing Drain is Adequate
	36	1	7.07	39	31		0.79	Existing Drain is Adequate
	36	1	7.07	69	31		0.45	Existing Drain is Adequate
D-2	24	1	3.14	16	31	2	1.94	30
	36	1	7.07	47	55		1.17	42
	Ditch		TBD	80	55		0.69	Existing Ditch is Adequate
	60	1	19.63	71	55		0.77	Existing Drain is Adequate
	60	1	19.63	71	158		2.23	66
	42	1	9.62	58	19		0.33	Existing Drain is Adequate
	42	1	9.62	45	19		0.42	Existing Drain is Adequate
	30	2	4.91	52	30		0.58	Existing Drain is Adequate
	36	2	7.07	66	74		1.12	48
D-2-1	48	1	12.57	72	101	3	1.40	54
	36	2	7.07	76	101		1.33	54
	36	2	7.07	65	101		1.55	54
	36	2	7.07	81	113		1.40	60
	36	2	7.07	131	113		0.86	Existing Drain is Adequate
	30	1	4.91	47	39		0.83	Existing Drain is Adequate
D-2-1-1	36	1	7.07	32	72	2	2.25	48
	36	1	7.07	33	72		2.18	48
	36	1	7.07	33	74		2.24	48
Jefferson Street Corridor								
	30	1	4.91	41	2.5		0.06	Existing Drain is Adequate
	30	1	4.91	35	29		0.83	Existing Drain is Adequate
	36	1	7.07	60	29		0.48	Existing Drain is Adequate
	36	1	7.07	48	29		0.60	Existing Drain is Adequate
	36	1	7.07	48	29		0.60	Existing Drain is Adequate
	36	1	7.07	48	29		0.60	Existing Drain is Adequate
	42	1	9.62	50	29		0.58	Existing Drain is Adequate
	48	1	12.57	67	56		0.84	Existing Drain is Adequate
D	48	1	12.57	63	56	3	0.89	Existing Drain is Adequate
	60	1	19.63	137	196		1.43	Existing Drain is Adequate
	60	2	19.63	278	214		0.77	Existing Drain is Adequate
	60	2	19.63	278	214		0.77	Existing Drain is Adequate
	60	2	19.63	278	214		0.77	Existing Drain is Adequate
	60	2	19.63	278	255		0.92	Existing Drain is Adequate
	72	1	28.27	226	255		1.13	Existing Drain is Adequate
	72	1	28.27	395	269		0.68	Existing Drain is Adequate
	21	1	2.41	14	25		1.79	30
	18	1	1.77	5	25		5.00	30
	18	1	1.77	11	25		2.27	30
	1.3' X 8'		10.40	71	25		0.35	Existing Drain is Adequate
	36	1	7.07	40	25		0.63	Existing Drain is Adequate
	36	1	7.07	58	44		0.76	Existing Drain is Adequate
	36	1	7.07	48	44		0.92	Existing Drain is Adequate
D-1	36	1	7.07	57	44	3	0.77	Existing Drain is Adequate
	36	1	7.07	57	44		0.77	Existing Drain is Adequate
	36	1	7.07	57	54		0.95	Existing Drain is Adequate
	36	1	7.07	33	54		1.64	42
	36	1	7.07	60	54		0.90	42
	36	1	7.07	29	63		2.17	42
	36	1	7.07	31	63		2.03	42
	36	1	7.07	22	63		2.86	42
	36	1	7.07	12	63		5.25	42
	12	1	0.79	5	6		1.20	18
	14	1	1.07	2	9		4.50	18
	14	1	1.07	2	20		10.00	24
	14	1	1.07	2	20		10.00	24
	14	1	1.07	2	20		10.00	24
	14	1	1.07	3	33		11.00	30
	24	1	3.14	25	33		1.32	30
	24	1	3.14	14	43		3.07	36
H-3	27	1	3.98	19	43	4	2.26	36
	27	1	3.98	22	43		1.95	36
	33	1	5.94	24	50		2.08	42
	33	1	5.94	24	57		2.38	42
	33	1	5.94	24	57		2.38	42
	36	1	7.07	29	57		1.97	42
	36	1	7.07	23	68		2.96	48
	42	1	9.62	54	68		1.26	48
	42	1	9.62	53	68		1.28	48
	42	1	9.62	9	79		8.78	48

Table 2. Summary of April 2005 Final Storm Drain Master Plan for Storm Drains Serving the Opportunity Areas

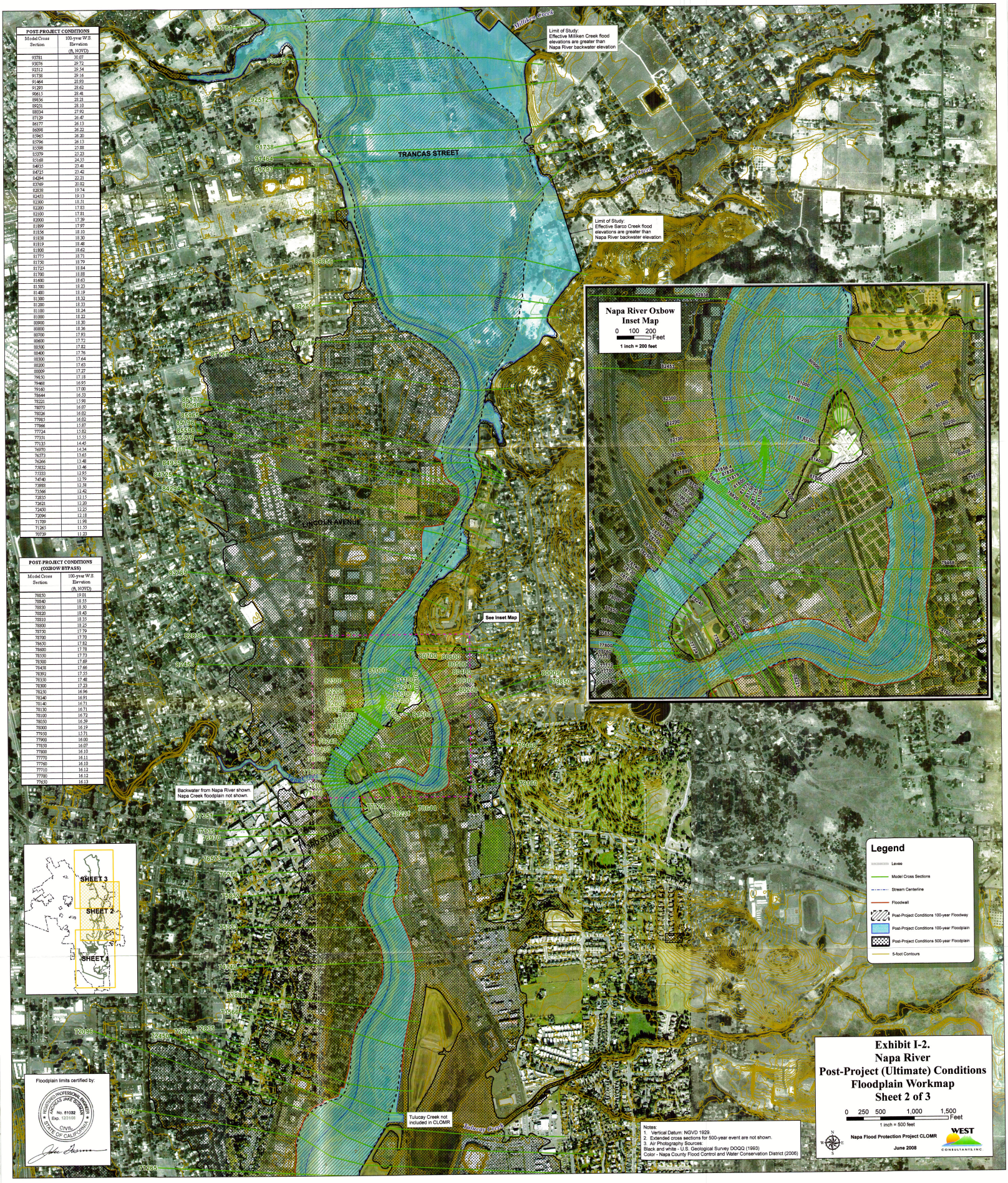
Storm Drain Number (Final Storm Drain Master Plan Volume 1, April 2006)	Existing Storm Drain Diameter, inches	Number of Barrels	Existing Storm Drain Cross Sectional Area, square feet	Existing Storm Drain Capacity, cfs	10-Year Design Storm Peak Flow, cfs	Number of Existing Flooding Problems Along the Existing Storm Drain	Ratio of Peak Flow to Existing Capacity	Preliminary Required Storm Drain Size, inches
Lincoln and Soscol Avenue								
G	36	1	7.07	56	34	0	0.61	Existing Drain is Adequate
	36	1	7.07	71	34		0.48	Existing Drain is Adequate
	36	1	7.07	25	34		1.36	Existing Drain is Adequate
	36	1	7.07	16	34		2.13	Existing Drain is Adequate
	36	2	7.07	53	34		0.64	Existing Drain is Adequate
	36	2	7.07	58	42		0.72	Existing Drain is Adequate
	36	2	7.07	52	42		0.81	Existing Drain is Adequate
	36	2	7.07	52	42		0.81	Existing Drain is Adequate
	36	2	7.07	80	42		0.53	Existing Drain is Adequate
	4' X 10'	1	40.00	510	119		0.23	Existing Drain is Adequate
	72	1	28.27	367	119		0.32	Existing Drain is Adequate
	72	1	28.27	164	142		0.87	Existing Drain is Adequate
	72	1	28.27	164	142		0.87	Existing Drain is Adequate
	72	1	28.27	164	155		0.95	Existing Drain is Adequate
	72	1	28.27	164	155		0.95	Existing Drain is Adequate
	72	1	28.27	464	155		0.33	Existing Drain is Adequate
	72	1	28.27	164	155		0.95	Existing Drain is Adequate
	72	1	28.27	164	159		0.97	Existing Drain is Adequate
	8' X 12'	2	96.00	3058	159		0.05	Existing Drain is Adequate
	42	1	9.62	39	192		4.92	72
G-2	12	1	0.79	3		1	0.00	Existing Drain is Adequate
	12	1	0.79	3	5		1.67	12
	21	1	2.41	5	5		1.00	Existing Drain is Adequate
	24	1	3.14	8	23		2.88	30
	33	1	5.94	19	23		1.21	Existing Drain is Adequate
G-3	36	1	7.07	6	15	3	2.50	Existing Drain is Adequate
	36	1	7.07	6	15		2.50	Existing Drain is Adequate
	36	1	7.07	29	28		0.97	Existing Drain is Adequate
	36	1	7.07	43	28		0.65	Existing Drain is Adequate
	42	1	9.62	60	56		0.93	Existing Drain is Adequate
	30	2	4.91	14	56		4.00	42
	30	2	4.91	45	56		1.24	42
	30	2	4.91	30	68		2.27	48
	30	2	4.91	28	74		2.64	48
	30	2	4.91	7	74		10.57	48
W	36	1	7.07	51	74	1	1.45	48
	36	1	7.07	71	77		1.08	48
	36	1	7.07	38	77		2.03	48
	Ditch			42	77		1.83	TBD
	36	1	7.07	38	95		2.50	54
Downtown Core								
G	See G Storm Drain Evaluation Above							
G-1	24	1	3.14	2	41	1	20.50	36
	30	1	4.91	29	43		1.48	36
	30	1	4.91	20	51		2.55	42
J	12	1	0.79	9	5	1	0.56	Existing Drain is Adequate
	15	1	1.23	3	5		1.67	12
	15	1	1.23	3	5		1.67	12
	18	1	1.77	4	9		2.25	18
	21	1	2.41	11	9		0.82	Existing Drain is Adequate
	42	1	9.62	70	46		0.66	Existing Drain is Adequate
	42	1	9.62	131	53		0.40	Existing Drain is Adequate
	42	1	9.62	54	72		1.33	48
	48	1	12.57	95	84		0.88	Existing Drain is Adequate
	54	1	15.90	131	84		0.64	Existing Drain is Adequate
J-1	30	1	4.91	25	19	0	0.76	Existing Drain is Adequate
Imola and Soscol Avenue								
Y	36	1	7.07	35	11	0	0.31	Existing Drain is Adequate
	36	1	7.07	54	11		0.20	Existing Drain is Adequate
	48	1	12.57	91	66		0.73	Existing Drain is Adequate
	48	1	12.57	66	66		This segment of the Y drain has been identified for replacement with a 14.5 ft x 5 ft Box Culvert in the Soscol Gateway Interior Drainage Improvement Project Study	
	48	1	12.57	77	66			
	48	1	12.57	77	66			
Z	66	1	23.76	Unknown	166	2	The Z drain has been identified for replacement with a 16 ft x 8 ft Box Culvert in the Soscol Gateway Interior Drainage Improvement Project Study	
AA-1	3' X 5'	1	15.00	108	18	1	0.17	Existing Drain is Adequate
	54	1	15.90	82	29		0.35	Existing Drain is Adequate
	54	1	15.90	61	45		0.74	Existing Drain is Adequate
	54	1	15.90	61	45		0.74	Existing Drain is Adequate

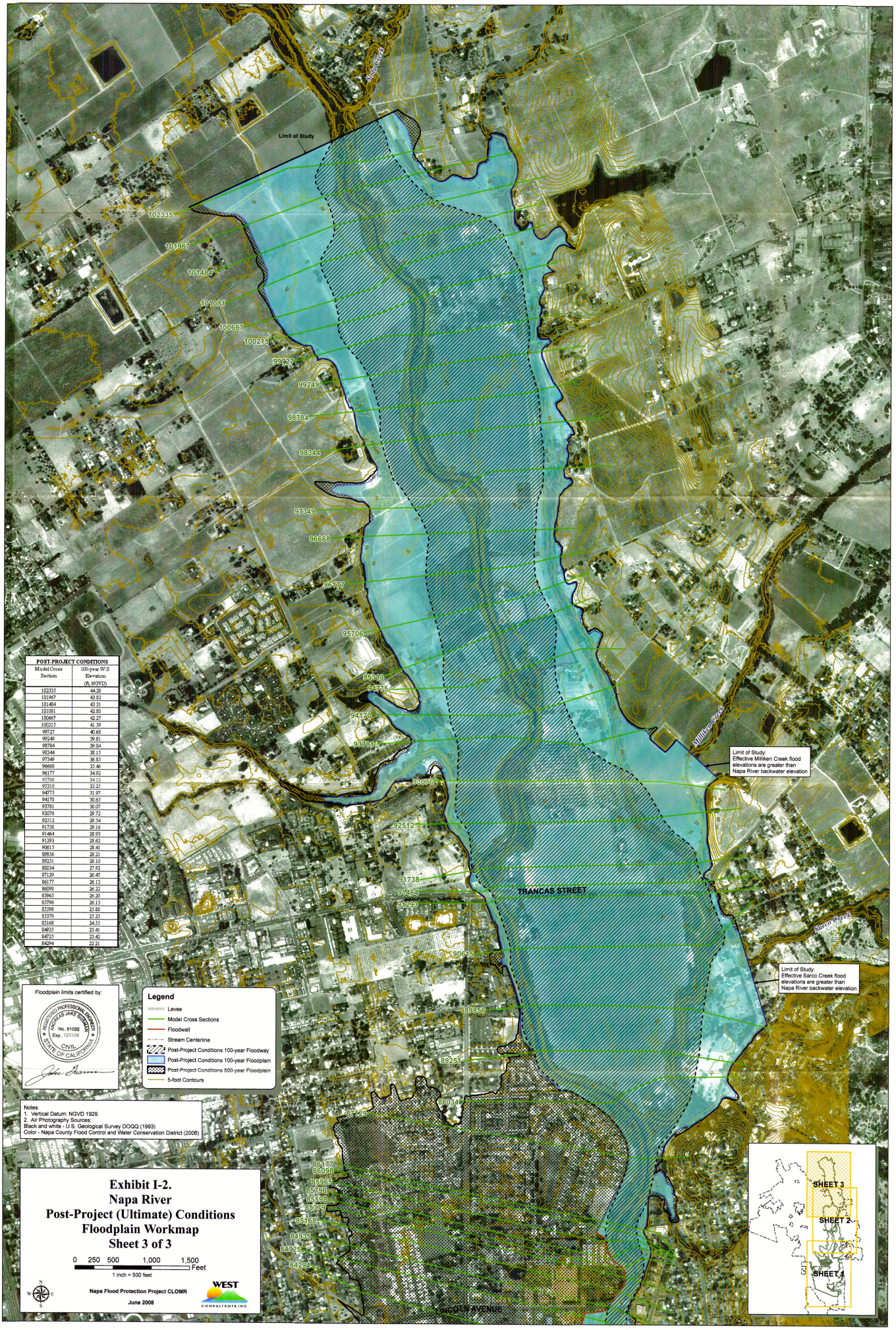
Attachment A

NRNCFPP Federal Emergency Management Agency Conditional Letter of Map Revision Floodplain Maps



POST-PROJECT CONDITIONS	
Model Cross Section	100-year WS Elevation (ft, NGVD)
74740	12.79
73988	12.38
73566	12.42
72833	12.15
72621	12.20
72450	12.25
72096	12.18
71709	11.98
71265	11.55
70739	11.23
70445	11.13
69726	10.40
69223	10.26
68760	10.15
68099	9.39
67518	9.41
67249	9.39
67092	9.38
66266	9.34
66033	9.33
65913	9.36
65083	9.22
64608	9.36
64153	9.27
64094	9.25
63319	9.14
62195	8.83
61907	8.81
61508	8.70
60199	8.70
59110	8.70


POST-PROJECT CONDITIONS
Model Cross Section
100-year W.S. Elevation (ft, NGVD)
93781 30.07
93076 29.72
92512 29.54
91738 29.16
91464 28.93
91293 28.62
90613 28.41
89856 28.21
89251 28.10
88034 27.92
87129 26.47
86777 26.13
86098 26.22
85965 26.20
85796 26.13
85598 25.88
83379 25.23
83161 24.35
84813 23.48
84723 23.42
84294 22.21
83769 20.82
82838 19.74
82453 19.13
82300 18.51
82200 17.83
82100 17.81
82000 17.39
81899 17.97
81836 18.10
81838 18.30
81819 18.48
81800 18.62
81773 18.71
81730 18.79
81723 18.84
81700 18.88
81680 18.63
81500 18.23
81400 18.19
81300 18.32
81200 18.33
81100 18.24
81000 18.22
80900 18.30
80800 18.36
80700 17.93
80600 17.72
80500 17.82
80400 17.76
80300 17.64
80200 17.63
80009 17.27
79850 17.18
79468 16.95
79160 17.00
78644 16.33
78221 15.98
78070 16.07
78026 16.02
77965 16.02
77866 15.87
77724 15.82
77591 15.35
77135 14.45
76970 14.34
76573 13.65
76266 13.48
75832 13.46
75333 12.95
74740 12.79
73988 12.58
73566 12.42
72835 12.15
72621 12.20
72450 12.25
72096 12.18
71709 11.98
71265 11.55
70739 11.23
POST-PROJECT CONDITIONS (OXBOW BYPASS)
Model Cross Section
100-year W.S. Elevation (ft, NGVD)
78850 19.01
78840 18.95
78830 18.90
78820 18.43
78810 18.35
78800 18.25
78750 17.79
78700 17.70
78650 17.82
78600 17.78
78550 17.73
78500 17.69
78438 17.66
78392 17.55
78350 17.48
78300 17.23
78230 16.96
78240 16.91
78140 16.71
78130 16.71
78100 16.72
78030 16.59
78000 16.19
77930 15.71
77900 16.00
77850 16.07
77800 16.10
77770 16.13
77760 16.10
77710 16.12
77700 16.12
77650 16.13
Limit of Study: Effective Milliken Creek flood elevations are greater than Napa River backwater elevation
Limit of Study: Effective Sarco Creek flood elevations are greater than Napa River backwater elevation
Milliken Creek
Sarco Creek
TRANCAS STREET
LINCOLN AVENUE
1ST STREET
Napa River Oxbow Inset Map
0 100 200 Feet
1 inch = 200 feet
See Inset Map
Backwater from Napa River shown. Napa Creek floodplain not shown.
Tulucay Creek not included in CLOMR
SHEET 3
SHEET 2
SHEET 1
Floodplain limits certified by:
REGISTERED PROFESSIONAL ENGINEER
No. 61032
Exp. 12/31/08
CIVIL
STATE OF CALIFORNIA
Legend
Levee
Model Cross Sections
Stream Centerline
Floodwall
Post-Project Conditions 100-year Floodway
Post-Project Conditions 100-year Floodplain
Post-Project Conditions 500-year Floodplain
5-foot Contours
Notes:
1. Vertical Datum: NGVD 1929.
2. Extended cross sections for 500-year event are not shown.
3. Air Photography Sources:
Black and white - U.S. Geological Survey DOQQ (1993)
Color - Napa County Flood Control and Water Conservation District (2006)
Exhibit I-2.
Napa River
Post-Project (Ultimate) Conditions
Floodplain Workmap
Sheet 2 of 3
0 250 500 1,000 1,500 Feet
1 inch = 500 feet
Napa Flood Protection Project CLOMR
June 2008
WEST CONSULTANTS, INC



POST-PROJECT CONDITIONS	
Model Cross Section	100-year W.S. Elevation (ft, NGVD)
102335	44.20
101967	43.82
101484	43.31
101081	42.80
100667	42.27
100215	41.59
99727	40.68
99249	39.81
98784	39.04
98344	38.15
97349	36.85
96668	35.46
96177	34.92
95706	34.12
95310	33.25
94775	31.97
94170	30.65
93781	30.07
93076	29.72
92512	29.54
91738	29.16
91464	28.93
91293	28.62
90615	28.41
89956	28.21
89251	28.10
88834	27.92
87129	26.47
86177	26.13
86098	26.22
85965	26.20
85796	26.13
85598	25.88
85379	25.23
85168	24.55
84935	23.41
84725	23.42
84294	22.21

Floodplain limits certified by:

REGISTERED PROFESSIONAL ENGINEER
REGINALD JAKE SWORAN
No. 81032
Exp. 12/31/08
CIVIL
STATE OF CALIFORNIA

Legend

- Levee
- Model Cross Sections
- Floodwall
- Stream Centerline
- Post-Project Conditions 100-year Floodway
- Post-Project Conditions 100-year Floodplain
- Post-Project Conditions 500-year Floodplain
- 5-foot Contours

Notes:
1. Vertical Datum: NGVD 1929.
2. Air Photography Sources:
Black and white - U.S. Geological Survey DOQQ (1993)
Color - Napa County Flood Control and Water Conservation District (2006)

Exhibit I-2.
Napa River
Post-Project (Ultimate) Conditions
Floodplain Workmap
Sheet 3 of 3

0 250 500 1,000 1,500 Feet

1 inch = 500 feet

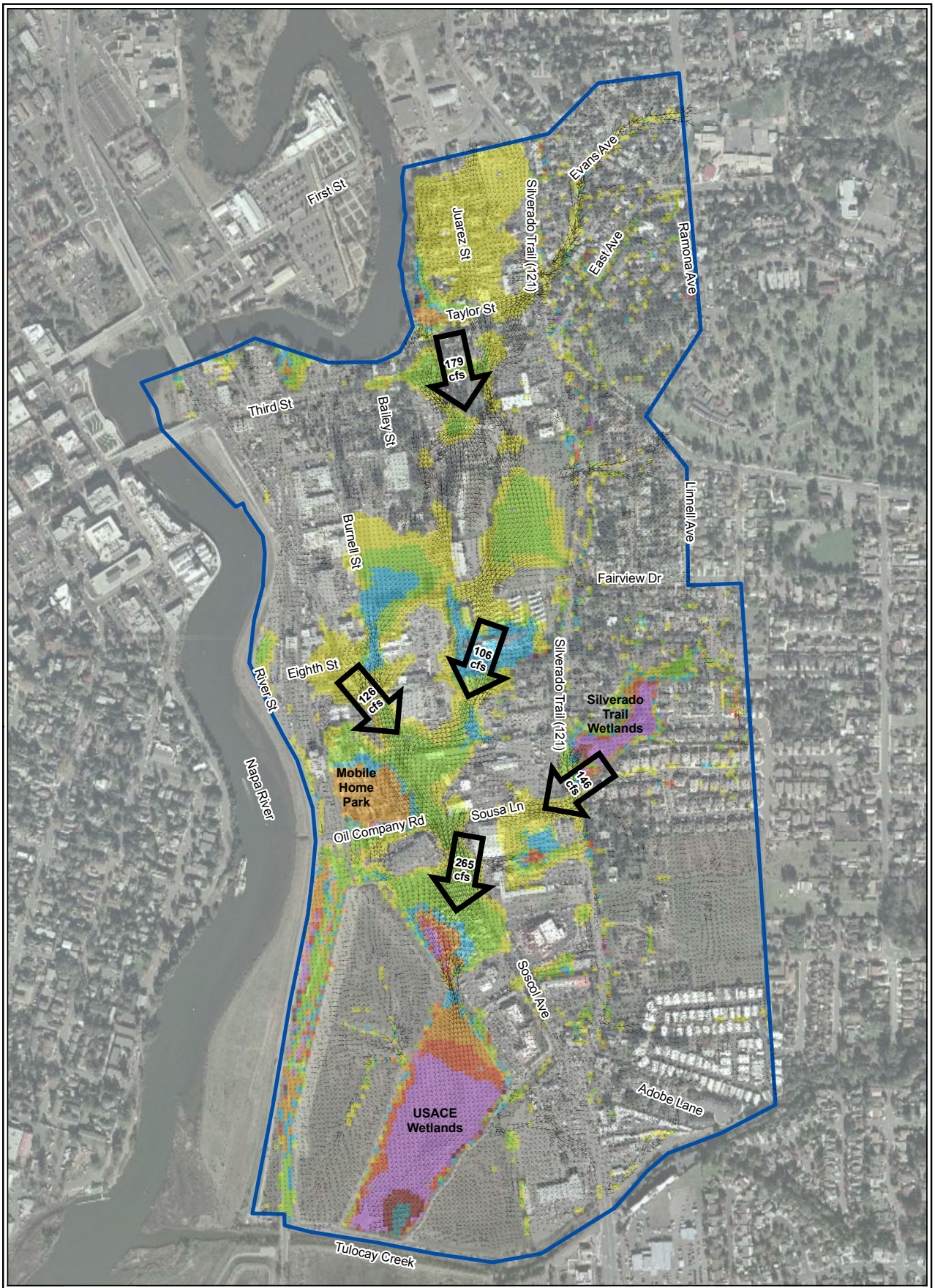
Napa Flood Protection Project CLOMR

June 2008

WEST CONSULTANTS, INC.

Attachment B

Residual Flooding and Project Improvement Maps City of Napa, Soscol Gateway Interior Drainage Improvement Project (Draft, September 2011)



Legend

Velocity Vector
- 0.0 - 0.1
- 0.1 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 1.0
- 1.0 - 1.5
- 1.5 - 2.0
- > 2.0

Maximum Water Depth (ft)
- 0.0 - 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- 1.5 - 2.0
- 2.0 - 2.5
- 2.5 - 3.0
- 3.0 - 3.5
- 3.5 - 4.0
- 4.0 - 5.0
- 5.0 - 6.0
- > 6.0

Study Area

Flood Flow Path with Peak Rate

N

0 250 500

Scale in Feet

FIGURE ES-3

City of Napa

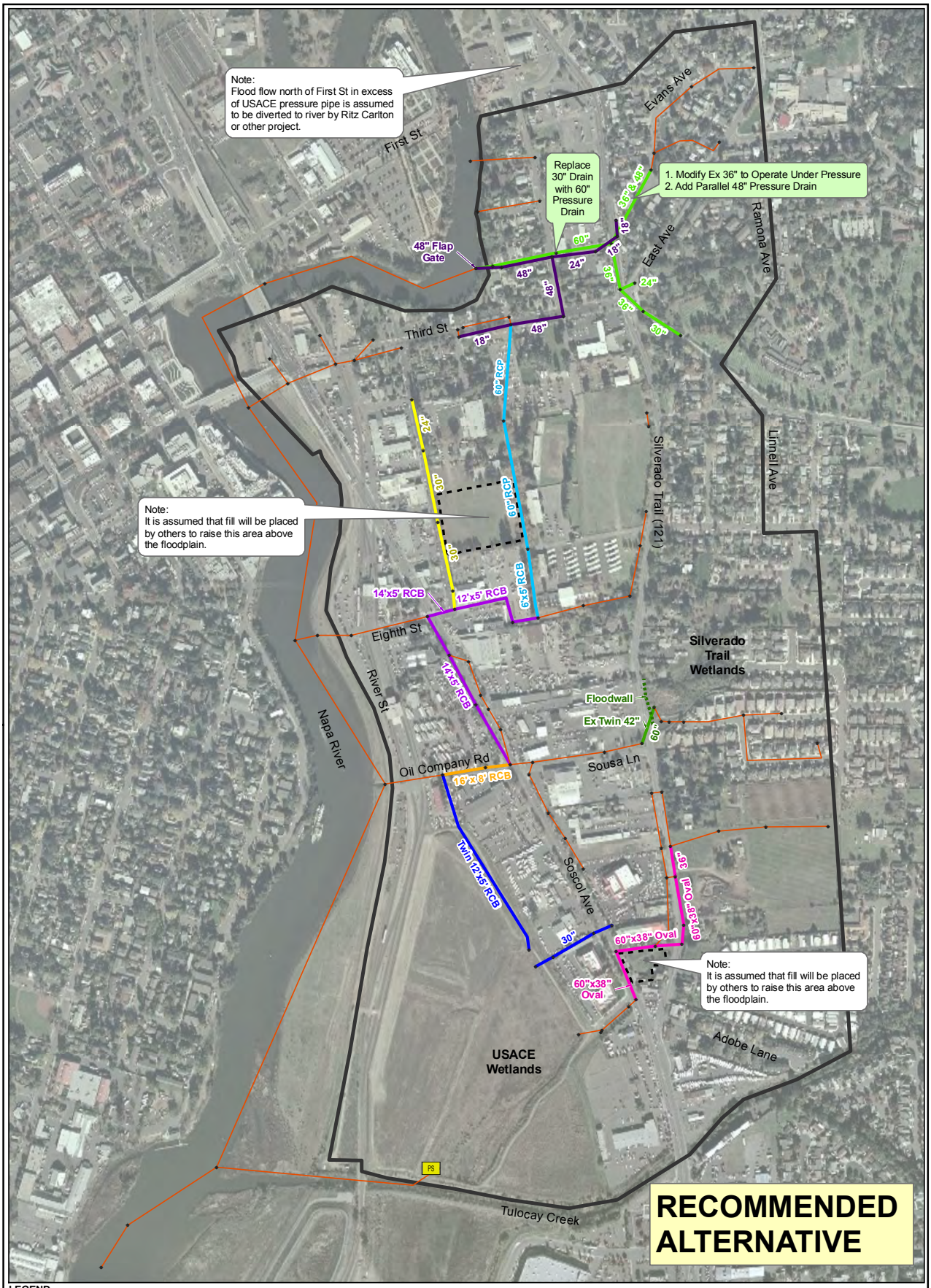
Soscol Gateway Interior

Drainage Improvement Project

Maximum 100-Year Flood Depths and Peak Flows for the Base Case

WEST YOST ASSOCIATES Consulting Engineers

N:\Clients\424 City of Napa\00-09-09 Soscol Gateway Interior Drainage Improvement Project\EIR\GR Report\Exec Summary\MXD\Figure ES-3 Max Water Depth_BC 100 Year.mxd 9/2/2011



LEGEND

- Taylor Street Pressure Drain System
- Silverado Trail to Third Street Storm Drain
- Burnell Street Storm Drain
- Third Street through Expo Property
- From Expo Property to Oil Company Road
- Sousa Lane Drain
- Oil Company Road Box Culvert System
- Gasser Foundation RCB and Drain System
- South Silverado Trail Trunk Drain
- Modeled Node
- Modeled Pipe or Channel (Base Case)
- Silverado Trail Floodwall
- PS Proposed USACE Pump Station
- Fill Areas
- 2D Model Boundary

N

0 250 500

Scale in Feet

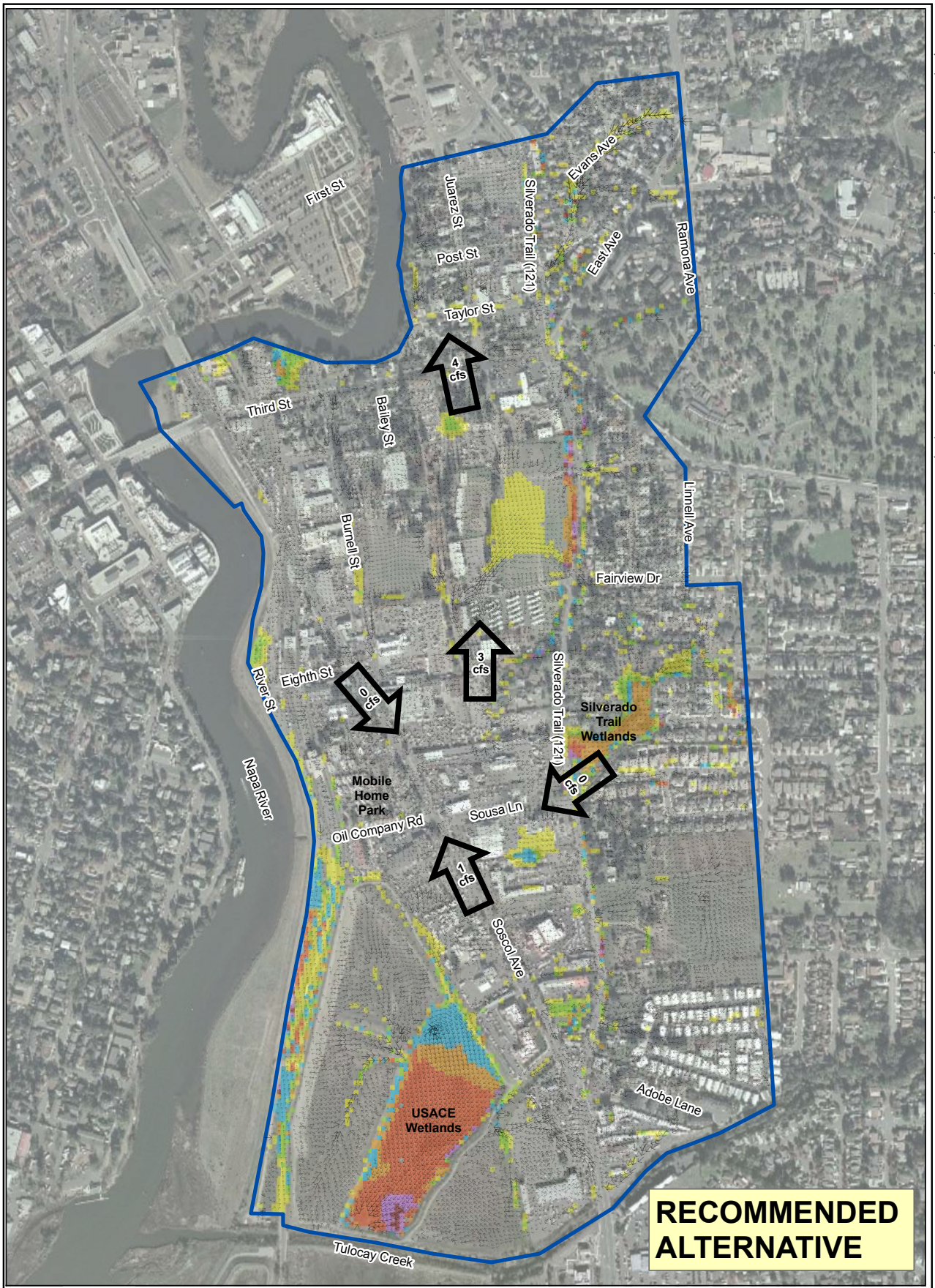
FIGURE ES-10

City of Napa
Soscol Gateway Interior
Drainage Improvement Project

Alternative 4 Facilities

WEST YOST ASSOCIATES
Consulting Engineers

N:\Clients\424 City of Napa\00-09-09 Soscol Gateway Interior Drainage Improvement Project\EN\Report\Exec Summary\MXD\Figure ES-10 Alt4 Features.mxd 9/26/2011



LEGEND

Velocity Vector
- 0.0 - 0.1
- 0.1 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 1.0
- 1.0 - 1.5
- 1.5 - 2.0
- > 2.0

2D Model Boundary

Maximum Water Depth (ft)
- 0.0 - 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- 1.5 - 2.0
- 2.0 - 2.5
- 2.5 - 3.0
- 3.0 - 3.5
- 3.5 - 4.0
- 4.0 - 5.0
- 5.0 - 6.0
- > 6.0

Flood Flow Path with Peak Rate

N

0 250 500

Scale in Feet

FIGURE ES-11

City of Napa
Soscol Gateway Interior
Drainage Improvement Project

Maximum 100-Year Flood Depths and Peak Flows for Alternative 4

WEST YOST ASSOCIATES
Consulting Engineers

N:\Clients\424 City of Napa\100-09-09 Soscol Gateway Interior Drainage Improvement Project\EIR\GR Report\Exec Summary\MXD\Figure ES-11 MaxWaterDpth 100yr Alt4.mxd 9/23/2011

Attachment C

South Coombs Area Strategic Drainage Improvement Program (September 2012), Figure A-2 Preferred Alternative

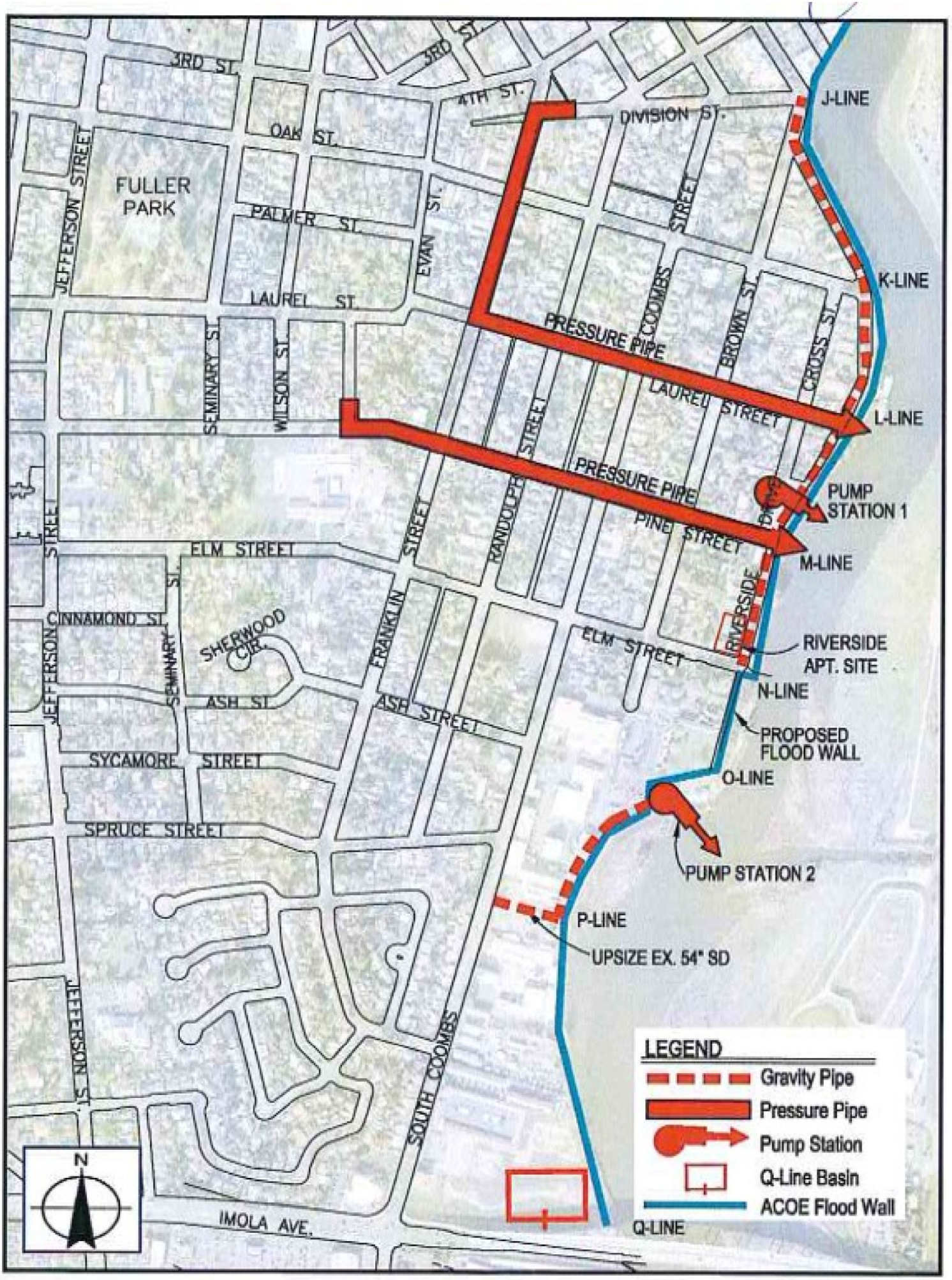
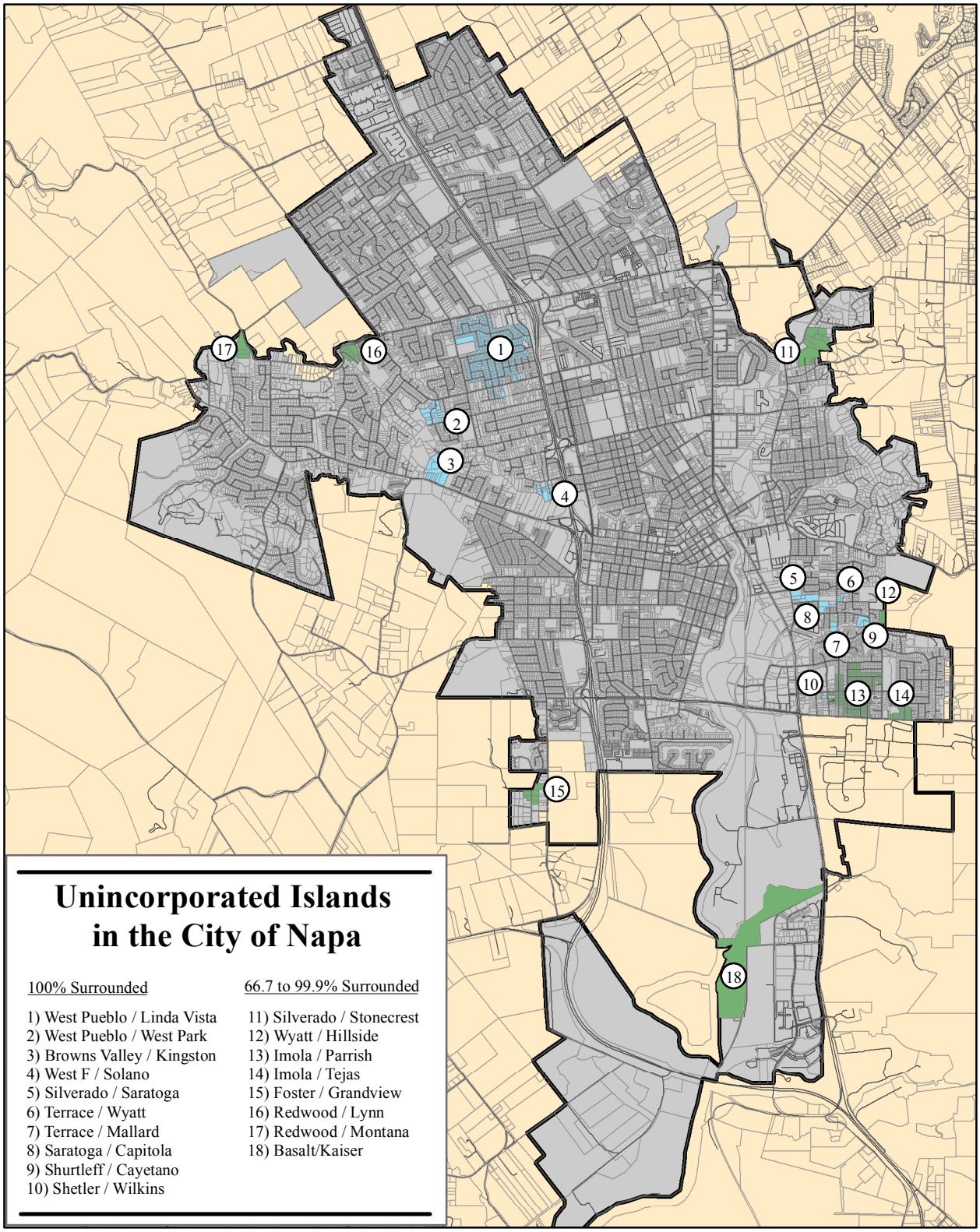


Figure A-2 Preferred Alternative

Attachment D

County Island Map

City of Napa
Unincorporated Islands



Unincorporated Islands in the City of Napa

100% Surrounded

1) West Pueblo / Linda Vista
2) West Pueblo / West Park
3) Browns Valley / Kingston
4) West F / Solano
5) Silverado / Saratoga
6) Terrace / Wyatt
7) Terrace / Mallard
8) Saratoga / Capitola
9) Shurtleff / Cayetano
10) Shetler / Wilkins

66.7 to 99.9% Surrounded

11) Silverado / Stonecrest
12) Wyatt / Hillside
13) Imola / Parrish
14) Imola / Tejas
15) Foster / Grandview
16) Redwood / Lynn
17) Redwood / Montana
18) Basalt/Kaiser

City of Napa
Napa SOI
Unincorporated Napa County
100% Surrounded
66.7 to 99.9% Surrounded



N

Not to Scale
May 25, 2017
Prepared by BF

LAFCO of Napa County
1030 Seminary Street, Suite B
Napa, California 94559
http://www.napa.lafco.ca.gov

WEST YOST
Water. Engineered.

2020 Research Park Drive
Suite 100
Davis CA 95618

530.756.5905 phone
530.756.5991 fax
westyost.com

TECHNICAL MEMORANDUM

DATE: August 13, 2021

Project No.: 295-10-18-06
SENT VIA: EMAIL

TO: Rajeev Bhatia, Dyett & Bhatia

FROM: Doug Moore, PE, RCE #58122
Roger Chu, PE, RCE #87591

REVIEWED BY: Amy Kwong, PE, RCE #73213

SUBJECT: City of Napa General Plan Update Potable Water EIR Support



This Technical Memorandum (TM) presents the potable water system evaluation in support of the EIR for the City of Napa's (City) General Plan Update 2040 and includes the following sections:

- General Plan Update 2040 Land Use Data
- Relevant General Plan Update Policies
- Background Information
- Potable Water Supplies and Demands
- Water Distribution System Evaluation
- Annexation of County Islands
- Potential Environmental Impacts and Mitigation Measures

GENERAL PLAN UPDATE 2040 LAND USE DATA

This TM references land use data that was received from Dyett and Bhatia (D&B) on June 9, 2021. The City-wide buildout land use map is provided as Figure 1A, while land use maps for each opportunity area (OA) are provided as Figures 1B through 1F. Additionally, Geographical Information System (GIS) mapping and an Excel spreadsheet of the land use data was received from D&B.

The buildout land use map includes the following five OAs:

- Trancas Street Corridor
- Jefferson Street Corridor
- Lincoln & Soscol Avenue
- Downtown Core
- Imola & Soscol Avenue

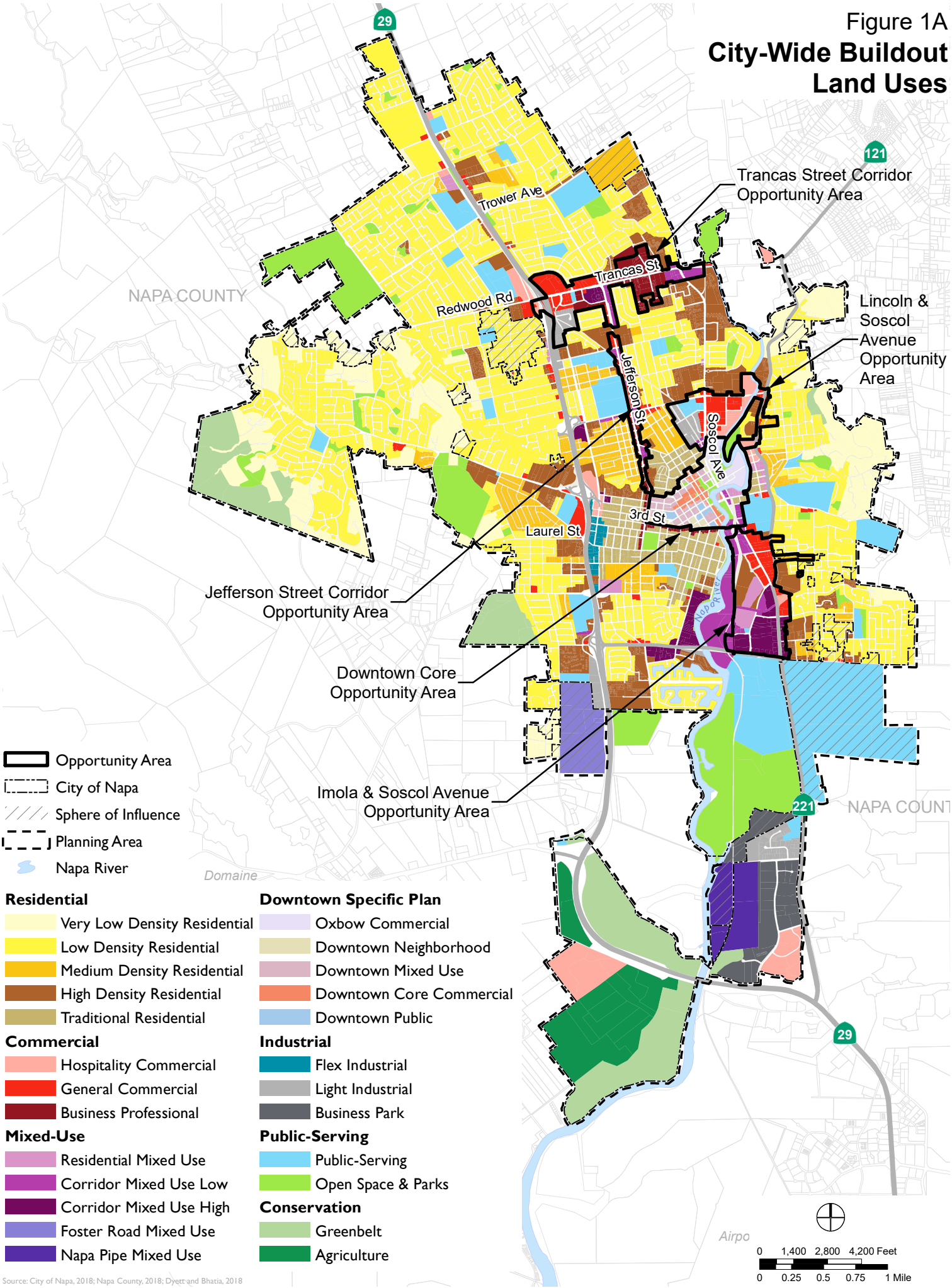
There is also planned growth throughout the rest of the City. Table 1 summarizes the existing land uses (defined as of 2018), proposed growth, and ultimate buildout development at 2040 for each OA and the rest of the City.

Table 1. Summary of Existing and Buildout Land Uses

Opportunity Area	Housing Units	Population	Commercial, square feet (SF)	Industrial, SF	Jobs
Existing					
Downtown Core	216	558	1,338,704	2,712	3,912
Trancas Street Corridor	255	659	554,673	85,114	7,061
Jefferson Street Corridor	30	78	151,102	-	1,419
Lincoln & Soscol Ave	43	111	232,994	324,009	1,809
Imola & Soscol Ave	250	717	438,496	-	2,709
Remaining City	29,895	77,172	3,607,983	629,125	16,722
Total	**30,689**	**79,295**	**6,323,952**	**1,040,960**	**33,632**
Growth					
Downtown Core	810	2,032	465,893	-	1,540
Trancas Street Corridor	456	1,135	365,252	240,708	1,909
Jefferson Street Corridor	198	498	69,089	81,832	431
Lincoln & Soscol Ave	48	119	264,112	172,980	1,232
Imola & Soscol Ave	1,349	3,318	338,889	236,367	1,651
Remaining City	4,950	10,785	482,297	1,066,878	4,061
Total	**7,811**	**17,887**	**1,985,532**	**1,798,765**	**10,824**
Buildout					
Downtown Core	1,026	2,590	1,804,597	2,712	5,452
Trancas Street Corridor	711	1,794	919,925	325,822	8,970
Jefferson Street Corridor	228	576	220,191	81,832	1,850
Lincoln & Soscol Ave	91	230	497,106	496,989	3,041
Imola & Soscol Ave	1,599	4,035	777,385	236,367	4,360
Remaining City	34,845	87,957	4,090,280	1,696,003	20,783
Total	**38,500**	**97,182**	**8,309,484**	**2,839,725**	**44,456**

Figure 1A

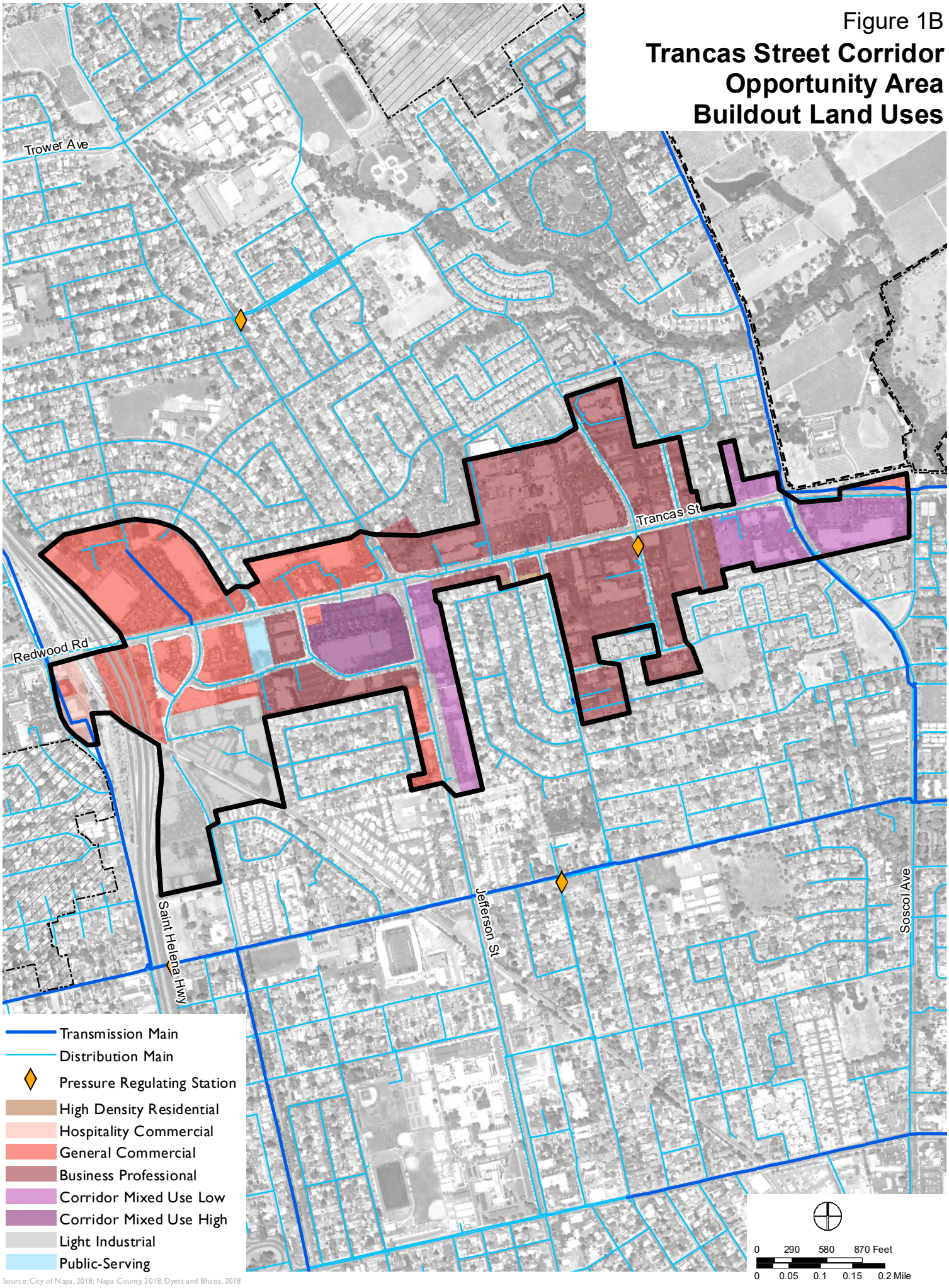
City-Wide Buildout Land Uses



Source: City of Napa, 2018; Napa County, 2018; Dyett and Bhatia, 2018

Figure 1B

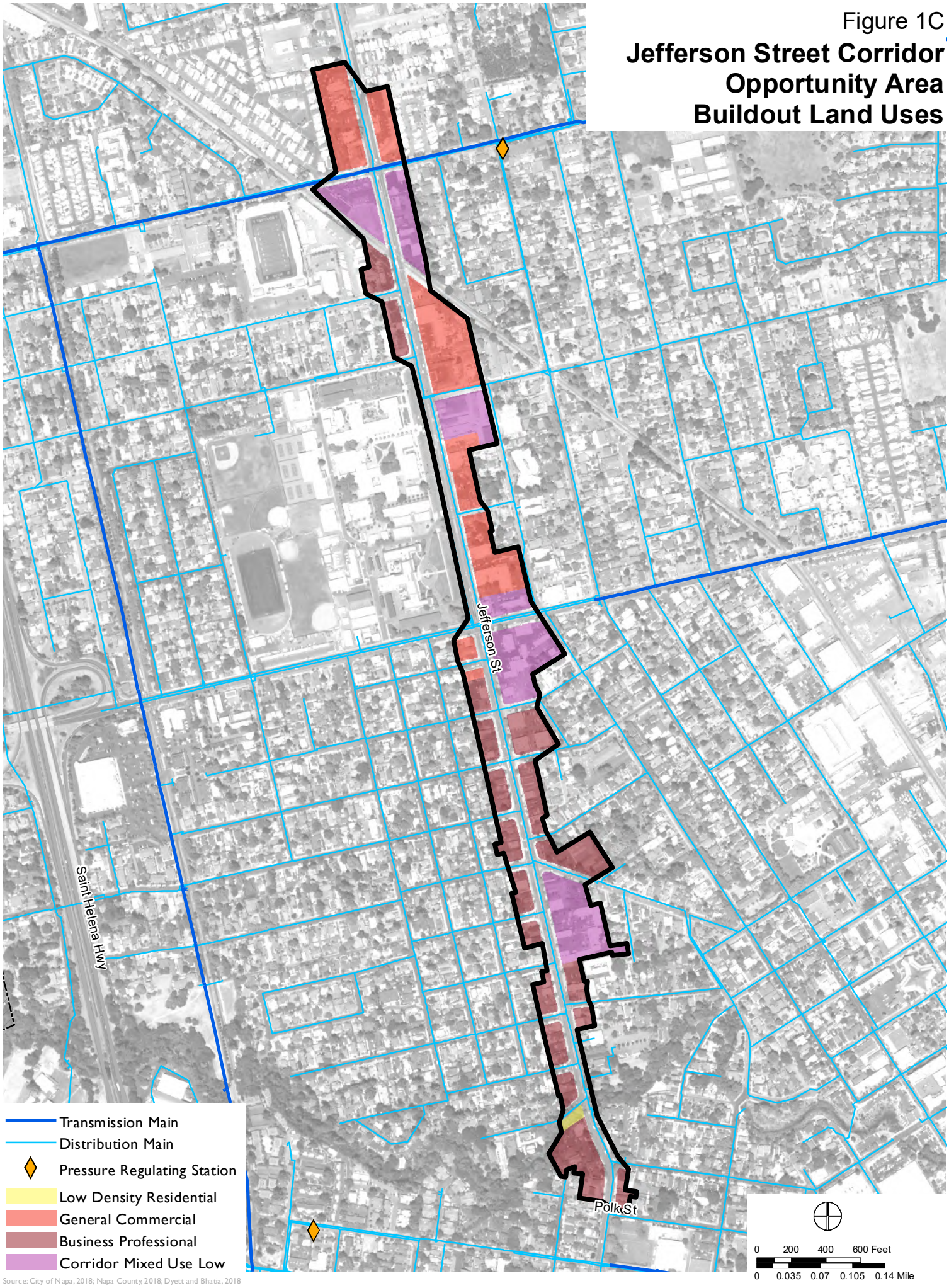
Trancas Street Corridor Opportunity Area Buildout Land Uses



Source: City of Napa, 2018; Napa County, 2018; Dyett and Bhatia, 2018

Figure 1C

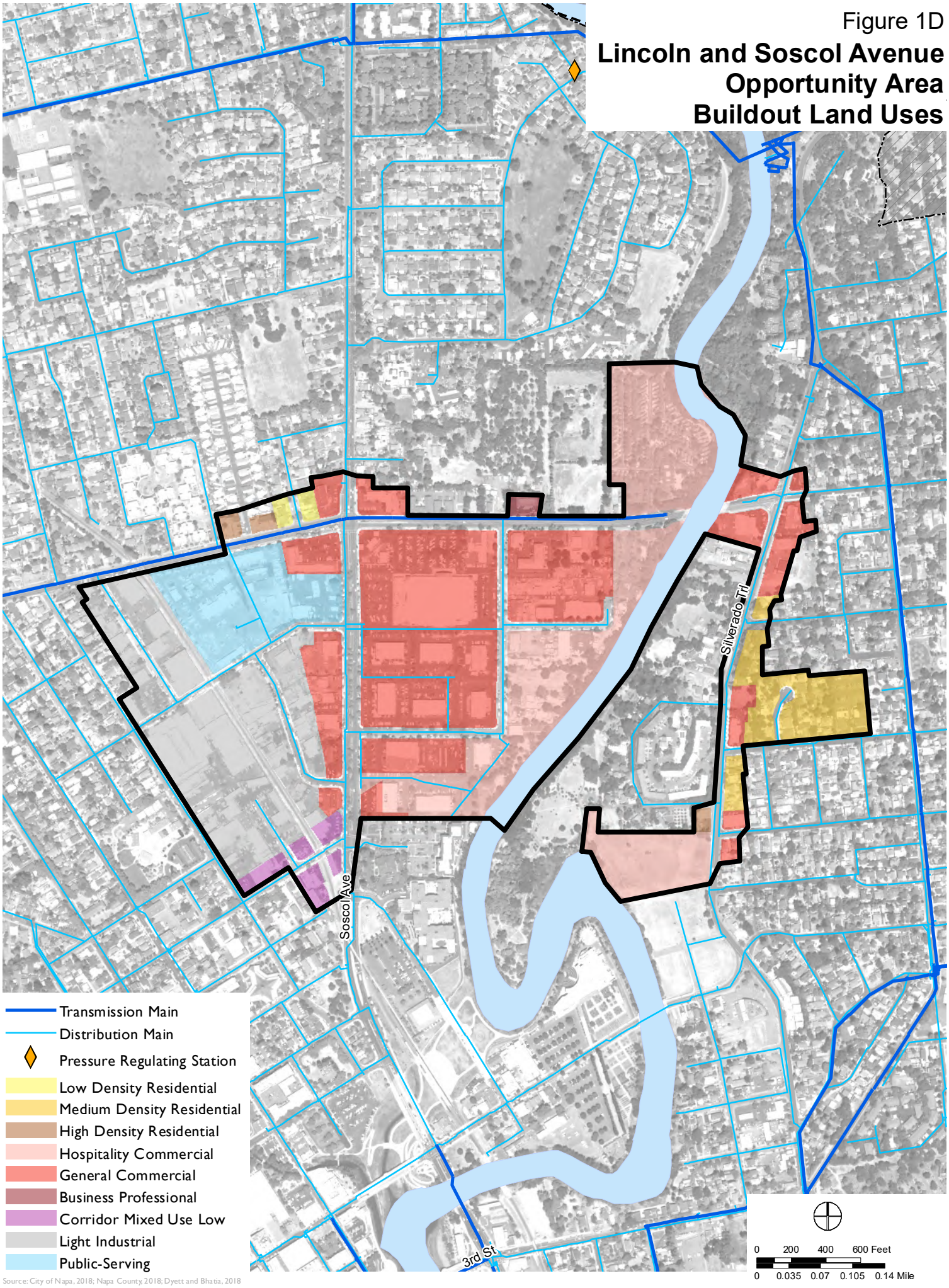
Jefferson Street Corridor Opportunity Area Buildout Land Uses



Source: City of Napa, 2018; Napa County, 2018; Dyett and Bhatia, 2018

Figure 1D

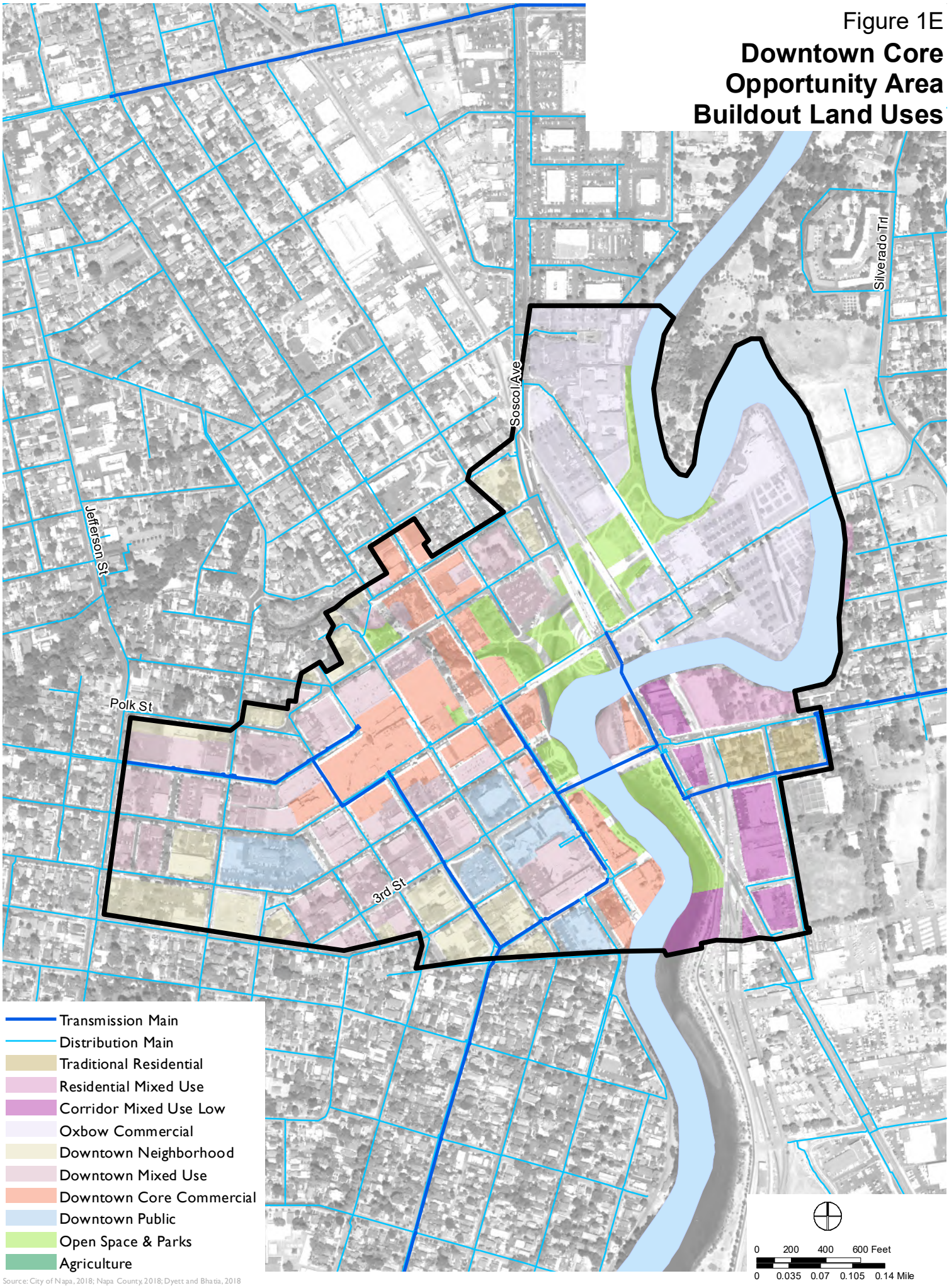
Lincoln and Soscol Avenue Opportunity Area Buildout Land Uses



Source: City of Napa, 2018; Napa County, 2018; Dyett and Bhatia, 2018

Figure 1E

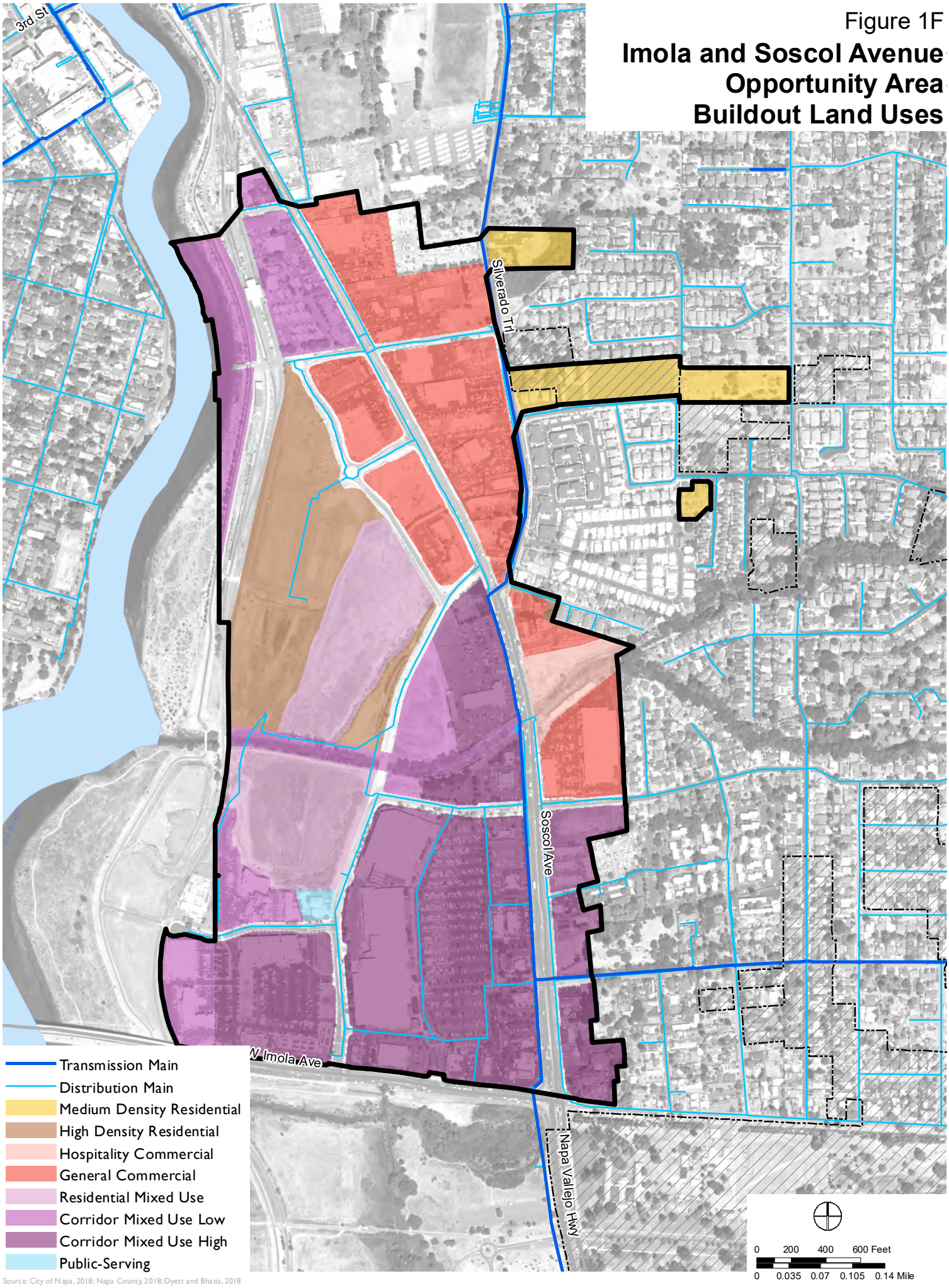
Downtown Core Opportunity Area Buildout Land Uses



Source: City of Napa, 2018; Napa County, 2018; Dyett and Bhatia, 2018

Figure 1F

Imola and Soscol Avenue Opportunity Area Buildout Land Uses



Source: City of Napa, 2018; Napa County, 2018; Dyett and Bhatia, 2018

RELEVANT GENERAL PLAN UPDATE POLICIES

Chapter 4 of the current General Plan (Envision Napa 2020) includes goals and policies relevant to potable water. The draft General Plan Update (Envision Napa 2040) includes similar goals and policies, which are listed below.

Goal
CS-9 To ensure adequate, reliable, and safe water supplies to the community, even through drought periods of similar intensity as the 1986-1992 drought.
Policies
CS-9.1 The City shall continue to implement water conservation programs that show promise of saving significant amounts of water at a reasonable cost.
CS-9.2 The City shall acquire or develop additional water supplies that would be available during drought periods to offset the shortages anticipated from existing supplies. Water Supply options include: a. Acceleration of entitlements from the State Water Project (SWP) through contract modification b. Pursuing transfer agreements with other State Water Contractors pursuant to the provisions of the Monterey Agreement c. Participation in SWP water banking program d. Participation in the SWP Drought Year Projects such as the American Basin Conjunctive Use Project and the Supplemental Water Purchase Program
CS-9.3 The City of Napa shall determine the firm yield available from existing and future SWP water supply sources and shall monitor and, if necessary, limit growth (new water system hook-ups) in order to guarantee drought year water supplies to existing and proposed development. Growth shall be monitored and, if necessary, limited as follows: 1) The City shall not issue any building permits or similar ministerial entitlements for proposed structures that would increase net potable water consumption in the City or its service area in the absence of a letter from the Department of Public Works, stating that approval of the permit or other entitlement will not adversely affect the City's ability to adequately serve the public health and safety needs of all of its water customers during drought conditions. 2) In addition, when conducting environmental review for proposed development projects requiring General Plan amendments, specific plans, use permits, tentative subdivision maps, or similar discretionary approvals, the City shall include within the environmental document, information assessing whether the City and its water suppliers are likely to have sufficient water supplies to adequately serve the proposed development and all other City water customers during drought conditions. In approving any such discretionary project, the City shall require, as a mitigation measure and condition of approval, that the applicant(s) may not receive a final subdivision map or, in the absence of the need for such a map, may not receive building permits or similar ministerial entitlements in the absence of a letter from the Department of Public Works stating that approval of the map, permit or other ministerial entitlement will not adversely affect the City's ability to adequately serve the health and safety needs of all of its water customers during drought conditions and that there will be sufficient water to serve the basic health, hygiene, and fire suppression needs of the community. When contracts are modified or are executed with the SWP to secure additional reliable water supply for drought years, or other dependable and adequate sources are guaranteed, the requirement to limit growth in the manner described above can be suspended. (Note: On December 15, 1998 the contract with the State DWR was approved, increasing the City's water allocation from the NBA.)
CS-9.4 The City shall implement the "Water System Optimization and Master Plan" (adopted 11/97) which refines policies and implementation programs for efficient water supply, storage, and delivery for projected demand to the year 2020.
CS-9.5 The City shall evaluate the feasibility and pursue the efficient use of reclaimed wastewater in appropriate locations to offset the demand for potable water supplies.
CS-9.6 The City shall promote voluntarily conservation efforts to conserve water to a reasonable extent during multi-year droughts to avoid inordinate expenditures for new water supplies.
CS-9.7 The City shall work cooperatively with other agencies having similar needs to identify water supply options that could have mutual benefit and consider entering into joint powers agreements to develop and manage a candidate project.

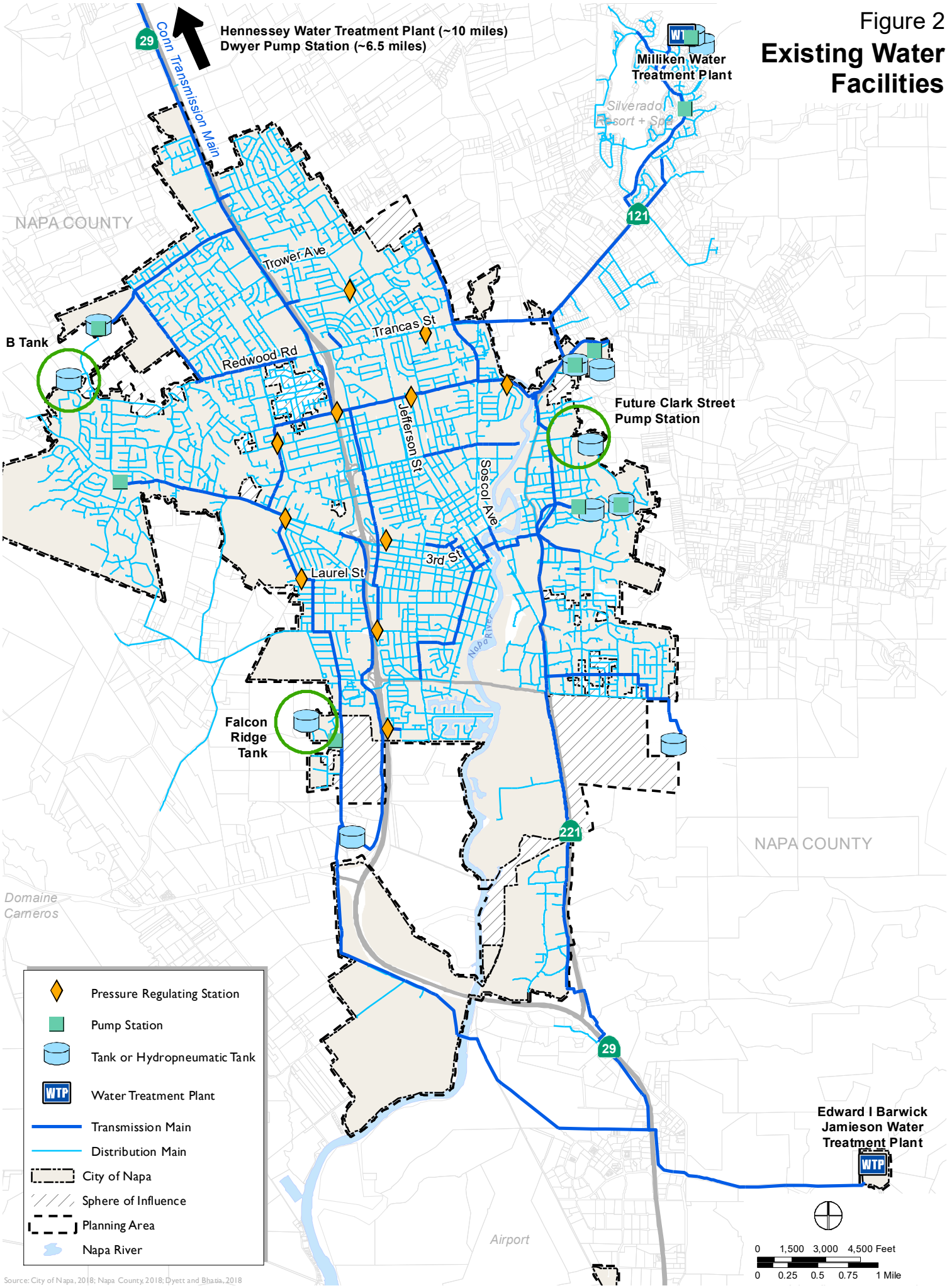
CS-9.8 The City shall encourage state and federal agencies to cooperatively establish programs and projects that will enable the SWP to meet its contractual obligations to the city predictably and reliably.
CS-9.9 The City shall monitor the State Water Contract and work with other agencies to ensure continued and increased reliable water supply deliveries from the SWP.
CS-9.10 The City shall seek to control urban development in the city's Water Service Area beyond the RUL. To this end, the City shall continue applying Policy Resolution #7 (Outside Water Service Policy) as an effective means of limiting and preventing urban development beyond the city's RUL.
Implementation Programs
CS-9.A The City shall implement the policies, programs, and long-range capital improvement plan according to the schedule adopted in the Water System Optimization and Master Plan.

BACKGROUND INFORMATION

This section describes the City's potable water system, including treatment and distribution facilities, based on information presented in the Administrative Draft of the City's 2020 Urban Water Management Plan (UWMP). The City-wide water distribution system is shown on Figure 2.

Figure 2

Existing Water Facilities



Source: City of Napa, 2018; Napa County, 2018; Dyett and Bhatia, 2018

Potable Water Treatment Facilities

The City owns and operates three water treatment plants (WTP): Hennessey WTP, Milliken WTP, and the Edward I. Barwick Jamieson Canyon WTP (Jamieson Canyon WTP). While the Hennessey and Milliken WTPs treat local surface water from Lake Hennessey and Milliken Reservoir, respectively, the Jamieson Canyon WTP treats imported surface water from the State Water Project (SWP).

Beginning operation in 1981, Hennessey WTP has a nominal treatment capacity of 20 million gallons per day (MGD) and provides complete conventional treatment, including flash mixing, coagulation, flocculation, sedimentation, filtration, and disinfection. Treated water from the Hennessey WTP is conveyed into a buried, 5.0-million-gallon (MG) concrete clearwell tank located on-site before delivery to the City's distribution system through the 20-mile long, 36-inch diameter Conn Transmission Main. The Conn Transmission Main runs parallel to Conn Creek, Highway 128, and Highway 29, traveling along easements and rights-of-way before connecting to the City's main distribution system in northwest Napa.

Milliken WTP was constructed in 1976 and has a treatment capacity of 4 MGD. Raw water from Milliken Reservoir is released into Milliken Creek and then diverted to Milliken WTP, a direct filtration plant with a contact/reaction tank and four horizontal, dual-media pressure filters operated in parallel. Treated water is stored in a 2.0 MG clearwell tank located above the WTP site before delivery to the City's distribution system through the three-mile-long Milliken Transmission Main. The Milliken Transmission Main serves customers in the Silverado Resort/Hillcrest areas before connecting to the City's main distribution system at the intersection of Silverado Trail and Monticello Road.

All SWP raw water is delivered to the City's Jamieson Canyon WTP, which was originally constructed in 1968 and upgraded in 1988 and 2011 to increase its treatment capacity to 20 MGD. The Jamieson Canyon WTP includes pre- and intermediate-ozonation, along with more conventional surface water treatment steps: rapid mixing, flocculation, sedimentation with tube settlers, gravity filtration, and disinfection. Treated water is stored in a 5.0 MG clearwell tank located on-site before delivery to the City's distribution system through the 42-inch diameter Jamieson Transmission Main. The Jamieson Transmission Main runs parallel to Jamieson Canyon Road to Highway 29, then splits into 36-inch and 24-inch diameter pipelines near the intersection of Highway 29 and Highway 221 as it joins the City's main distribution system.

Potable Water Distribution System Facilities

The City's water distribution system includes 12 storage tanks, 11 pressure regulating stations, nine pump stations, and 360 miles of pipelines to approximately 25,300 connections. While most of the City's water supply is delivered to customers within the City limits, the City also serves water outside City limits, including customers in the Monticello Road/Silverado Resort community, the independent Congress Valley Water District, and along the Conn Transmission Main. The City also provides water to the unincorporated County Islands (discussed below).

POTABLE WATER SUPPLIES AND DEMANDS

This section describes the City's potable water supplies and demands, as detailed in the Administrative Draft of the City's 2020 UWMP and summarized in Table 2. The City's potable water supply reliability in different hydrological conditions (i.e., normal years, single dry years, and multiple dry years) is also discussed in this section. Finally, this section discusses factors that could impact the City's water supply.

Potable Water Supply Sources

The City's current potable water supply is exclusively from three surface water sources: Lake Hennessey, Milliken Reservoir, and the SWP. Each source is treated at a separate WTP before delivery to the City's distribution system.

Napa Sanitation District (NapaSan) also delivers recycled water to customers within the City's potable water service area. Within the City, recycled water is mainly used for irrigation, which offsets potable water use.

Lake Hennessey is located 13 miles north of the City and is the largest local water supply source. The City's water rights to Lake Hennessey are secured through a permit with the State Water Resources Control Board (SWRCB) Division of Water Rights. Permit 006960 authorizes the City to divert and store up to 30,500 acre-feet per year (AFY) from Conn Creek for beneficial use (i.e., treating and providing it to the City's water customers). Lake Hennessey has an approximate storage capacity of 31,000 acre-feet (AF), an average yield of 17,500 AFY, and a reliable yield of 10,417 AFY.

Milliken Reservoir is located 5 miles northeast of the City and is a seasonal source of supply during the high-demand summer period. The City's water rights to Milliken Reservoir are secured through a permit with the SWRCB that authorizes the City to divert and store up to 2,350 AFY from Milliken Creek for beneficial use. Milliken Reservoir has an approximate storage capacity of 1,390 AF and an average and reliable yield of 700 AFY.

The City sub-contracts with Napa County Flood Control and Water Conservation District (NCFCWCD) for imported surface water from the SWP. The City has four entitlements with NCFCWCD that total 21,900 AFY. This is the maximum annual yield that the City could receive; actual yields depend on each year's hydrologic conditions. In the Final State Water Project Delivery Capability Report 2019, the California Department of Water Resources (DWR) estimates that 58 percent of SWP contractors' entitlements would be available during a normal year. Therefore, the City expects to receive 12,702 AF from the SWP during a normal year.

Table 2. City of Napa Existing Supplies (Normal Years)

Source	Average/Normal Yield, AFY
Lake Hennessey	17,500
Milliken Reservoir	700
State Water Project[(a)]	12,702
Total	**30,902**

(a) DWR estimates that 58 percent of SWP entitlements would be available in a normal year. The City's total SWP entitlements equal 21,900 AFY.

Potable Water Demands

Demand projections in the City's 2020 UWMP include new developments associated with buildout of the General Plan Update 2040. Table 3 summarizes the City's historical (2015 and 2020) and projected (2025-2045) potable water demands. Between 2020 and 2045, the City's potable demands are expected to grow approximately 10.4 percent.

Table 3. City of Napa Past and Projected Potable Water Demand

	Actual Volume, AFY		Projected Volume, AFY				
	2015	2020	2025	2030	2035	2040	2045
Demand[(a)]	12,034	14,092	14,230	14,655	15,005	15,330	15,555

(a) Includes authorized unmetered uses (e.g., water main flushing, fire protection) and losses.

Water Supply Reliability

The City's 2020 UWMP examines its water supply reliability during normal years, single dry years, and multiple dry years (i.e., five-year droughts) through 2045. In single dry years, the City's potable water supplies are reduced by approximately 44 percent. During a drought lasting five consecutive years, the City expects potable water supplies to be reduced by approximately 24 percent in the first year and 40 percent in the second through fifth years.

The City's supplies can meet projected demands during normal years through 2045 and five-year droughts starting from 2020 through 2045. However, during single dry years, the City's supplies are only adequate to meet projected demands through 2035. In 2040 and 2045, there is a small supply shortfall of 150 and 375 AFY, respectively, in single dry years. To match projected dry year supplies in 2040 and 2045, the City would need to reduce demands by less than 3 percent. It is assumed that the City can implement adequate water conservation efforts to achieve these demand reductions.

Table 4 summarizes the City's water supply reliability in various hydrologic conditions, as presented in the Administrative Draft of the City's 2020 UWMP. With conservation, the City has adequate water supplies for buildout of the General Plan Update 2040.

Table 4. Summary of City of Napa Water Supply Reliability

Hydrologic Condition		Volume[a], AFY				
		2025	2030	2035	2040	2045
Normal Year[b]						
Available Water Supply		31,737	31,997	28,907	28,907	28,907
Total Water Demand		15,065	15,750	16,100	16,425	16,650
Potential Surplus (Deficit)		16,672	16,247	12,807	12,482	12,257
Demand Shortfall, percent		-	-	-	-	-
Single Dry Year[c]						
Available Water Supply		17,702	17,962	16,275	16,275	16,275
Total Water Demand		15,065	15,750	16,100	16,425	16,650
Potential Surplus (Deficit)		2,637	2,212	175	(150)	(375)
Demand Shortfall, percent		-	-	-	0.9%	2.3%
Multiple Dry Years[d]						
Multiple-Dry Year 1	Available Water Supply	24,186	24,446	22,111	22,111	22,111
	Total Water Demand	15,065	15,750	16,100	16,425	16,650
	Potential Surplus (Deficit)	9,121	8,696	6,011	5,686	5,461
	Demand Shortfall, percent	-	-	-	-	-
Multiple-Dry Year 2	Available Water Supply	19,311	19,571	17,723	17,723	17,723
	Total Water Demand	15,065	15,750	16,100	16,425	16,650
	Potential Surplus (Deficit)	4,246	3,821	1,623	1,298	1,073
	Demand Shortfall, percent	-	-	-	-	-
Multiple-Dry Year 3	Available Water Supply	19,311	19,571	17,723	17,723	17,723
	Total Water Demand	15,065	15,750	16,100	16,425	16,650
	Potential Surplus (Deficit)	4,246	3,821	1,623	1,298	1,073
	Demand Shortfall, percent	-	-	-	-	-
Multiple-Dry Year 4	Available Water Supply	19,311	19,571	17,723	17,723	17,723
	Total Water Demand	15,065	15,750	16,100	16,425	16,650
	Potential Surplus (Deficit)	4,246	3,821	1,623	1,298	1,073
	Demand Shortfall, percent	-	-	-	-	-
Multiple-Dry Year 5	Available Water Supply	19,311	19,571	17,723	17,723	17,723
	Total Water Demand	15,065	15,750	16,100	16,425	16,650
	Potential Surplus (Deficit)	4,246	3,821	1,623	1,298	1,073
	Demand Shortfall, percent	-	-	-	-	-

(a) Supplies and demands include recycled water (supplied by NapaSan). The City's 2020 UWMP assumes that recycled water supplies are adequate to meet demands in all hydrologic conditions.
(b) Source: City of Napa 2020 UWMP (Table 7-6)
(c) Source: City of Napa 2020 UWMP (Table 7-7)
(d) Source: City of Napa 2020 UWMP (Table 7-8)

Factors Impacting the City's Water Supply

There are four primary factors that can impact the City's potable water supply: climatic, environmental/legal, water quality/treatment, and the development of additional supply sources or storage. These factors are discussed below.

Climatic: Weather patterns that affect hydrologic conditions help determine SWP deliveries. In 2014, a critically dry year, water systems that receive water from the SWP received as little as 5 percent of their annual entitlement. By using SWP supplies, the City is somewhat dependent on drought conditions in the Sacramento and San Joaquin river basins. Similarly, the weather patterns and annual rainfall in the Lake Hennessey and Milliken Reservoir watersheds affect the yield from these local sources.

Environmental/Legal: SWP water is conveyed through the Sacramento-San Joaquin Delta (Delta), which is a productive habitat for wildlife, including some endangered species. The Delta serves as a migration pathway for salmonid species traveling between their home streams and the Pacific Ocean. It is also home to Delta Smelt, a threatened species of fish requiring protection. Protection of the Delta Smelt involves periodic pumping restrictions affecting Delta water exports.

The City's SWP water supply is governed by an agreement with NCFCWCD, which acts as the SWP contract administrator on behalf of several municipalities in Napa County (County). The current contract expires in 2035, but the City anticipates that the contract will be extended to 2085.

While the City has a legal entitlement to use water from Lake Hennessey and Milliken Reservoir, the water rights require the City to allow sufficient releases from the reservoirs to provide minimum stream flows.

Water Quality/Treatment: SWP water is required to meet salinity and other water quality objectives for the Delta that may restrict SWP exports from the Delta. Also, SWP source water quality can provide a treatment challenge for the Jamieson Canyon WTP during winter storms, when turbidity increases. Process changes including ozonation have improved the Jamieson Canyon WTP's ability to handle high turbidity raw water. Raw water quality is also an issue for the Milliken Reservoir, as higher turbidity levels in the fall, winter, and spring reduce the effectiveness of the Milliken WTP's direct filtration system. The City is considering modifications to Milliken WTP so that Milliken Reservoir can be used as a year-round supply.

Development of Additional Supplies: The City is involved in or considering several water supply projects to enhance its future supply. In 2011, the City upgraded the Jamieson Canyon WTP and may consider modifications to Milliken WTP to provide year-round supply. The City has also considered and will continue to consider opportunities for water exchanges or transfers with water right holders if opportunities arise with acceptable terms and conditions. To this end, the City has participated in several feasibility studies for a new dam and reservoir project located on the Bear River (a tributary to the Feather River in Sacramento Valley). If approved and implemented, the project would provide substantial water supply and hydroelectric power generation benefits. The City could potentially purchase a share of this non-SWP water supply, which would supplement supplies in years of low SWP allocations. However, this project has been on hold since 2017.

Planned System Improvements: To meet growing demands and maintain its water system, the City plans to upgrade, replace, and add water mains, pressure reducing valves, and other necessary components. The City also plans on constructing a new pump station, Clark Street pump station, expanding the Dwyer pump station, and replacing or upgrading their B tank and Falcon Ridge tank to increase the storage volume. These future improvements are shown with green circles on Figure 2.

WATER DISTRIBUTION SYSTEM EVALUATION

In 1997, the City adopted the Water System Optimization and Master Plan (1997 Master Plan), which evaluated the City's potable water demands (through 2020), distribution system, and pumping, storage, and treatment capacities. Key recommendations from the 1997 Master Plan include increasing in-system storage capacity and treatment capacity at the Jamieson Canyon WTP, both of which have been completed. Following adoption of the 1997 Master Plan, the City installed over 14 MG of in-system storage tanks and increased the Jamieson Canyon WTP capacity to approximately 20 MGD.

In 2011, the City developed a 20-year Capital Improvement Program (CIP) plan, which details the water system maintenance, replacement, and upgrade projects to be completed through fiscal year 2030-2031. Since the City is close to buildout, the 20-year CIP plan focused on protecting and replacing existing infrastructure currently serving the City. While the 20-year CIP plan helps the City to continue providing reliable, safe, and high-quality water in the near-term, a more formal evaluation of buildout conditions will ensure proper planning through at least 2040.

To this end, the City plans to update its water master plan based on buildout of the General Plan Update 2040. The update process would begin with a Request for Proposals (RFP), in which the City would describe the project and desired scope of services. It is expected that the scope of services would be similar to the 1997 Master Plan (but with future land use based on the General Plan Update 2040) and would generally include the following key tasks: review existing demands; update water use factors; develop future water demand projections; perform a hydraulic analysis of the water system, evaluate supply, storage, and pumping capacities; and develop a CIP to address any deficiencies.

By updating the water master plan and constructing facilities recommended in the plan, the City will ensure the potable water distribution system can support all future development. Based on historical and planned potable water system evaluations that address the City's current and long-term water system needs, there are no foreseeable water distribution system environmental impacts from buildout of the General Plan Update 2040.

ANNEXATION OF COUNTY ISLANDS

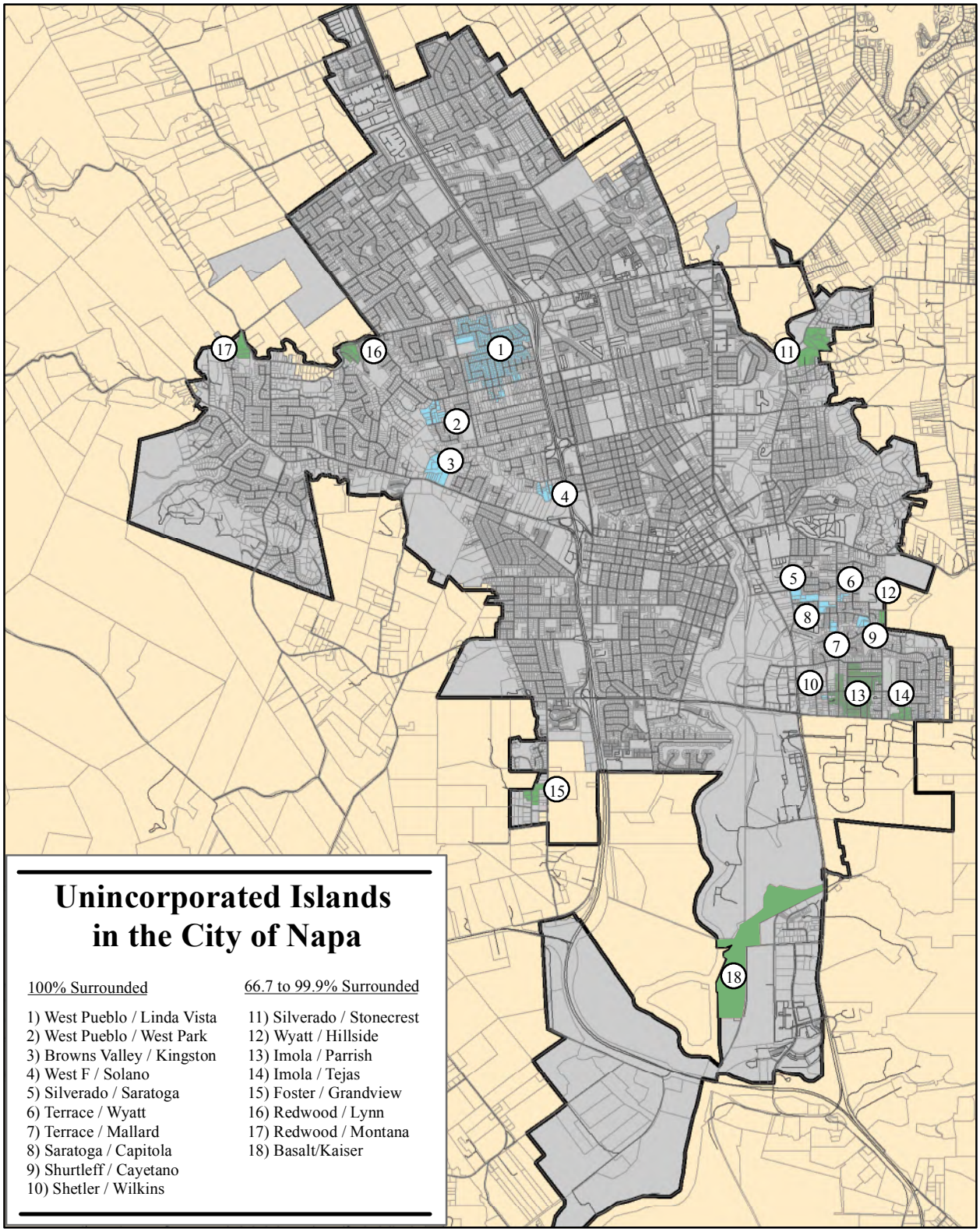
Figure 3 shows 18 areas located within the City limits but, as of May 2017, have not been incorporated into the City (called County Islands). Since the figure was prepared, most of Island 5, a small fraction of Island 13, and about half of Island 18 have been incorporated into the City. It is likely that the rest of the County Islands will ultimately be incorporated into the City in the future. These County Islands are included in the buildout land use data presented above. These County Islands currently receive potable water supply from the City; consequently, incorporation of the County Islands into the City will not increase water demands nor impact the City's potable water system.

POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Based on the discussion above, there are no foreseeable environmental impacts for providing adequate potable water service to developments associated with buildout of the General Plan Update 2040.

Figure 3

City of Napa
Unincorporated Islands



Unincorporated Islands in the City of Napa

100% Surrounded

1) West Pueblo / Linda Vista
2) West Pueblo / West Park
3) Browns Valley / Kingston
4) West F / Solano
5) Silverado / Saratoga
6) Terrace / Wyatt
7) Terrace / Mallard
8) Saratoga / Capitola
9) Shurtleff / Cayetano
10) Shetler / Wilkins

66.7 to 99.9% Surrounded

11) Silverado / Stonecrest
12) Wyatt / Hillside
13) Imola / Parrish
14) Imola / Tejas
15) Foster / Grandview
16) Redwood / Lynn
17) Redwood / Montana
18) Basalt/Kaiser

City of Napa
Napa SOI
Unincorporated Napa County
100% Surrounded
66.7 to 99.9% Surrounded



Not to Scale
May 25, 2017
Prepared by BF

N

LAFCO of Napa County
1030 Seminary Street, Suite B
Napa, California 94559
http://www.napa.lafco.ca.gov

WEST YOST
Water. Engineered.

2020 Research Park Drive
Suite 100
Davis CA 95618

530.756.5905 phone
530.756.5991 fax
westyost.com

TECHNICAL MEMORANDUM

DATE: October 11, 2021

Project No.: 295-10-18-06
SENT VIA: EMAIL

TO: Rajeev Bhatia, Dyett & Bhatia

FROM: Kamie Loeser, Practice Area Leader

REVIEWED BY: Doug Moore, PE, RCE #58122

SUBJECT: City of Napa General Plan Update Sewer and Wastewater Treatment EIR Support



This Technical Memorandum (TM) presents the Sewer Collection System and Wastewater Treatment support for the EIR for the City on Napa's 2040 General Plan Update (GPU). This TM includes the following sections:

- General Plan 2040 Land Use Data.
- Background Information
- Relevant General Plan Policies
- Sewer Collection System Evaluation
- Wastewater Treatment Plant Evaluation
- Incorporation of County Islands into the City

GENERAL PLAN 2040 LAND USE DATA

The land use data used for this evaluation was received from Dyett and Bhatia (D&B) on June 9, 2021. The City-wide buildout land use map is provided as Figure 1A. Additionally, a summary of the land uses, large parcel-based spreadsheet of the land uses, and Geographical Information System (GIS) mapping of the land use data was received from D&B.

The buildout land use map includes five Opportunity Areas (OAs, see Figures 1B-1F), including:

- Trancas Street Corridor
- Jefferson Street Corridor
- Lincoln & Soscol Avenue
- Downtown Core
- Imola & Soscol Avenue

DRAFT

There is also planned growth throughout the rest of the City. Table 1 provides a summary of the existing land uses (defined as 2018), proposed growth, and ultimate buildout development in 2040 for each OA and the rest of the City. Land use maps for the OAs are also provided in Figures 1B through 1F.

BACKGROUND INFORMATION

Relevant Background Information is provided below.

The Napa Sanitation District (NapaSan or District) provides wastewater services to the City of Napa and unincorporated portions of Napa County. NapaSan owns and operates the sanitary sewer collection system (collection system) and wastewater treatment plant (WWTP) that serve the City of Napa, as shown on Figure 2. NapaSan also produces recycled water, some of which is used by property owners within City limits for irrigation.

Table 1. Summary of Existing and Buildout Land Uses

Opportunity Area	Housing Units	Population	Commercial SF	Industrial SF	Jobs
Existing					
Downtown Core	216	558	1,338,704	2,712	3,912
Trancas Street Corridor	255	659	554,673	85,114	7,061
Jefferson Street Corridor	30	78	151,102	-	1,419
Lincoln & Soscol Avenue	43	111	232,994	324,009	1,809
Imola & Soscol Avenue	250	717	438,496	-	2,709
Remaining City	29,895	77,172	3,607,983	629,125	16,722
Total	**30,689**	**79,295**	**6,323,952**	**1,040,960**	**33,632**
Growth					
Downtown Core	810	2,032	465,893	-	1,540
Trancas Street Corridor	456	1,135	365,252	240,708	1,909
Jefferson Street Corridor	198	498	69,089	81,832	431
Lincoln & Soscol Avenue	48	119	264,112	172,980	1,232
Imola & Soscol Avenue	1,349	3,318	338,889	236,367	1,651
Remaining City	4,950	10,785	482,297	1,066,878	4,061
Total	**7,811**	**17,886**	**1,985,533**	**1,798,764**	**10,824**
Buildout					
Downtown Core	1,026	2,590	1,804,596	2,712	5,452
Trancas Street Corridor	711	1,794	919,925	325,822	8,970
Jefferson Street Corridor	228	576	220,191	81,832	1,850
Lincoln & Soscol Avenue	91	230	497,106	496,989	3,041
Imola & Soscol Avenue	1,599	4,035	777,385	236,367	4,360
Remaining City	34,845	87,957	4,090,280	1,696,003	20,783
Total	**38,500**	**97,181**	**8,309,485**	**2,839,725**	**44,456**

Information about the sewer collection system and WWTP that serve the City of Napa is taken primarily from five sources:

- Napa General Plan Update Existing Conditions Report on Utilities (December 18, 2018)
- Napa Sanitation District Strategic Plan, adopted May 2021
- NapaSan Collection System Master Plan (CSMP) completed in February 2021
- Wastewater Treatment Plant Master Plan (WWTPMP) completed in 2011
- Information about upgrades and changes to both the collection system and the WWTP that have been undertaken since the completion of the four documents listed above was provided by discussions with District staff

NapaSan owns and maintains a wastewater collection system that serves the City of Napa as well as areas outside of the City. The wastewater collection system includes gravity sewers, service laterals, and pump stations in areas for which gravity flow is not possible due to adverse topography. The District's collection system can be seen on Figure 2.

The majority of the collection system was constructed between 1942 and 2006, but some gravity sewer mains are over 100 years old. The collection system includes approximately 270 miles of gravity sewers (meaning the flow in the sewers is provided by gravity, versus pumped flow, 37,500 wastewater connections (both business and residential), 33,000 street service laterals, and approximately 5,500 sanitary sewer manholes. Gravity sewers range in size from 4-inch to 66-inch diameter. The gravity sewers are constructed of vitrified clay pipe, polyvinyl chloride (plastic) pipe, reinforced concrete pipe, and asbestos cement pipe.

In addition to the gravity sewer components described above, the District's wastewater collection system currently contains three pump stations, one major siphon, and five smaller siphons. The three pump stations include: Stonecrest Pump Station, West Napa Pump Station, and the River Park Pump Station. Nearly all (approximately 97 percent) of NapaSan's wastewater is eventually conveyed to the 66-inch diameter trunk sewer that flows south, parallel to the Napa River, entering the (Influent Pump Station) IPS where flows are then pumped to the WWTP (also referred to as the Soscol Water Recycling Facility). The Soscol Water Recycling Facility (SWRF) is a state-of-the-art wastewater treatment plant that utilizes many complex processes to produce treated wastewater and recycled water. Wastewater undergoes primary treatment, secondary treatment, and disinfection before being released to the Napa River during the winter. Wastewater undergoes additional treatment (tertiary treatment) before being distributed for irrigation as recycled water.

Technical Memorandum, Napa General Plan Update Existing Conditions Report on Utilities (December 20, 2018)

This TM was prepared by West Yost Associates for this GPU. This TM describes the background information and existing conditions for the City's water supply and distribution system, NapaSan's sewer system and WWTP, and the City's stormwater and flood control facilities. This information was incorporated into the GPU Existing Conditions Report (ECR).

Napa Sanitation District Strategic Plan 2021-2025 (Adopted May 5, 2021)

This document is summarized below:

- The purpose of the Strategic Plan is to describe the goals, objectives, and priorities of the District. The strategic planning is an ongoing process that began in 2008 with updates in 2011, 2013, 2015, 2017, 2109, and most recently April 2021.
- Vision Statement: NapaSan will provide reliable service to its customers in its management of Napa's critical water resources, manage risks intelligently and will remain in full compliance with all applicable regulations while anticipating and preparing for the future.
- Mission Statement: The mission of NapaSan is to collect, treat, beneficially reuse and dispose of wastewater in an effective and fiscally responsible manner that respects the environment, maintains the public's health and meets or exceeds all local, state and federal regulations.
- NapaSan accomplishments since the 2019 Strategic Plan are listed below:
  - Recycled water truck filling station
  - Annual rehabilitation of 2 percent of the sewers, **with a focus on reducing Inflow & Infiltration**
  - Completion of the Sewer Service Charge Study, communication and outreach of the proposed rate modifications, and finalizing the Prop 218 process to modify the rates including implementation of a more equitable rate structure
  - Completion of the Collection System Master Plan (discussed below)
  - Began preparation of the Treatment Plant Master Plan
  - Increased recycled water distribution to new customers
  - Construction of the Browns Valley Trunk and West Napa Pump Station projects – The construction of these key projects started in the spring of 2020 and are expected to be completed in the fall of 2021

Goals established for NapaSan in the Strategic Plan are listed below:

- Rehabilitation of the 66-inch Trunk Main: This is a significant project in the 10-year Capital Improvement Program. Construction of the first phase of the project (Kaiser Road to IPS) is expected to be completed in 2021. Staff will continue to evaluate the condition of existing pipe within the second phase of the project (Imola Ave to Kaiser Road) and schedule design and construction when needed.
- Update NapaSan's Sewer Service Charge Rate Study in anticipation of the Prop 218 Hearing and Rate Setting Process in Spring 2026.
- Evaluate current recycled water allocation policy, renew recycled water user agreements, Participate with local and regional partners on long-term opportunities for water reuse.
- Continue efforts to develop non-rate/non-fee revenues through the development of land leases.

The Napa Sanitation District Strategic Plan 2021-2025 demonstrates that NapaSan is 1) planning for and constructing sewer improvements to meet the future capacity requirements, 2) planning for the future wastewater treatment capacity needs, 3) planning for increased recycled water use, and 4) managing their financial condition to ensure sufficient revenues area available to achieve the goals.

DRAFT

Napa Sanitation District Collection System Master Plan (CSMP, February 2021)

The CSMP provides a thorough evaluation of the existing sewer system and identifies the sewer system improvements needed to meet the future development and growth within NapaSan's services area, which includes the City of Napa. Preparation of the CSMP and the GPU were on-going during the same time frame, but the CSMP was completed prior to completion of GPU land use map. Nevertheless, the CSMP was prepared using the GPU Existing Conditions Report (ECR, March 2019). Critical chapters of the CSMP for the GPU are Chapter 5 (including future land uses), Chapter 7 (hydraulic evaluation of future wastewater flows), Chapter 8 (Inflow and Infiltration Reduction, which reduces peak flows), and Chapter 9 (identifies the sewer system improvements needed to increase the sewer system capacity to accommodate the estimated future flows). These relevant sections of these chapters are summarized below. Several key figures from the CSMP are provided in Attachment A.

Chapter 5 – Planning Scenarios

- Chapter 5 Planning Scenarios, Service Area: The sewer service area includes all of the City of Napa
- Chapter 5, Future Conditions: The future land use conditions included 75 development projects in the planning and approval phases, the Downtown Specific Plan and Civic Center Study (covering 30.33 acres),
- Chapter 5, Vacant Parcels (see map in Attachment A): In the CSMP future conditions the vacant parcels were assumed to be developed with current General Plan proposed land uses because the GPU land uses were not available. An area of 144.88 acres of vacant parcels were included in the CSMP. The vacant parcels were identified from the vacant parcels shown on Figure 2-10 of the GPU ECR.
- Chapter 5, Underdeveloped Parcels (see map in Attachment A): In the CSMP future conditions the underdeveloped parcels were assumed to be redeveloped with current General Plan proposed land uses because the GPU land uses were not available. An area of 771.17 acres of underdeveloped parcels were included in the CSMP. The underdeveloped parcels were identified from Figure 2-10 of the GPU ECR.
- Chapter 5, Parcels within the Study Area Not Currently Served: In the CSMP future conditions the parcels not currently served were assumed to be connected to the sewer system and provided sewer service. An area of 809.53 acres was included in the CSMP.
- Chapter 5, Silverado Area and Airport Industrial Area were included in the CSMP.
- Chapter 5, Other Impacts on Development: This section reduced the areas including 1) Areas within 50 feet of water bodies were assumed to be undevelopable (31.32 acres), 2) Areas of steep slopes were assumed to have reduced development or no development (total of 716.44 acres), and 3) areas in the current FEMA 100-year floodplain to only 50 percent of the current General Plan density (63.17 acres). However, the on-going Napa River and Napa Creek Flood Protection Project (NRNCFPP) is estimated to be completed in 2027, so this third reduction of development will become invalid when the NRNCFPP is completed.

Chapter 7 – Future Conditions Wet Weather Flow Capacity Results

The Chapter 7 evaluation is based on a computer model of the NapaSan collection system that includes flow inputs, route flows, and assessment of the collection system capacity. The analysis included a dry weather flow (DWF) analysis and a wet weather flow (WWF) analysis that approximated existing flow

conditions in the sewer system. Key flow components in the model included base wastewater flow (BWF), groundwater infiltration (GWI), and rainfall-derived inflow and infiltration (RDI&I). The DWF and WWF parameters were used to identify capacity deficiencies under existing and future conditions and for sizing future sewers. Conclusions presented in Chapter 7 are summarized below:

- The design storm for the sewer capacity evaluations is the 10-year, 24-hour event, meaning the 10-year event is used to identify what improvements are needed to prevent sanitary sewer overflows (SSOs). SSOs are an event in which wastewater (diluted with storm water from infiltration and inflow) overflows from the sewer system onto the ground surface. However, the 3-year and 5-year design storms were also evaluated to help prioritize the identified improvements.
- No SSOs were predicted for dry weather flows for either existing conditions (existing land uses with some sewer improvement projects that are currently under construction) and for and buildout land uses.
- For existing conditions for the 10-year storm event, the estimated total SSO volume is 3.480 million gallons. The SSOs occur at many locations throughout the City (see Attachment A for Figure 7-2 from the CSMP).
- For future conditions for the 10-year storm event, the SSOs occur at many locations throughout the City (see Attachment A for Figure 7-6 from the CSMP).

In summary, Chapter 7 indicates that for both existing conditions and future conditions, including future growth, SSOs will occur unless sewer system improvements are implemented (see discussions of Chapters 8 and 9, below).

Chapter 8 – Inflow and Infiltration (I&I)

SSOs can be reduced by constructing sewer improvements (generally new, larger sewers and larger pumps) and by reducing the I&I flow that enters the sewers. The CSMP evaluated existing I&I, which is comprised of groundwater infiltration (approximately 430 gpd/acre) and RDI&I (1,953 gpd/acre). For planning future flows, a value of 1,950 gpd/acre was used. Chapter 8 evaluates the benefits and costs of I&I reduction for the NapaSan sewer system.

- NapaSan (through the CSMP) prioritizes I&I reduction projects or sewer improvement projects.
- NapaSan has an on-going I&I reduction program that rehabilitates 2 percent of the District's sewers per year. One key goal of the rehabilitation program is I&I reduction.
- Five approaches were used to identify and prioritize I&I reduction projects.

Chapter 9 – Capital Improvement Program

The CSMP summarizes the 10-Year Capital Improvement Program (CIP). The CIP identifies the projects needed to eliminate all SSOs over a 10-year period and accounts for the future buildout land uses and associated increases in wastewater flows.

- The CIP prioritizes I&I reduction projects over capacity increase projects.
- I&I reduction does not alone eliminate the SSOs for the 10-year design storm, so some capacity improvements are also needed.

DRAFT

- The CSMP identifies 28 required sewer system projects, including 17 I&I reduction projects, eight combined I&I reduction and sewer improvement projects, and three sewer improvement only projects. Attachment A includes Figure 9-1 from the CSMP which show the locations of the 28 projects.
- The estimated cost of the projects is $75.6 million.

CSMP Summary

In summary, Chapter 5 indicates that future land uses in the CSMP were partially, but not fully consistent with the City' buildout land uses in the GPU. Chapter 7 indicates that for both existing conditions and future conditions significant SSOs will occur unless sewer system improvements are implemented; and the future growth will increase the quantity of SSOs unless sewer system improvements are implemented. Chapters 8 and 9 identify a CIP (a set of I&I reduction improvements sewer system capacity improvements) that eliminate SSOs for the existing and future condition as defined in the CSMP. The CIP is scheduled to be completed over a 10-year period. However, because of the timing of the preparation of the CSMP and the finalization of the GPU land uses, the future land uses in the CSMP and the GPU are not fully consistent with each other.

Through personal communication with NapaSan staff, on August 20, 2021, NapaSan may prepare updates to the CSMP as development occurs since growth projections established during the GPU are different than those studied by the CSMP. In addition, the CSMP recommends that the 10-year CIP project list be reviewed and potentially reprioritized on an annual or as-needed basis taking into account the various factors that can influence CIP project implementation, such as street paving programs, physical access, I&I reconnaissance results from flow monitoring, and other risk-based evaluations.

Wastewater Treatment Plant Master Plan (April 2011)

NapaSan prepared a Wastewater Treatment Plant (WWTP) Master Plan in April 2011. The Plan included a review of the WWTP performance, process optimization, identification of existing deficiencies, identification on required improvements (with cost estimates) and defined a cost-effective path for a 20-year planning horizon through 2030. Growth projections used for the WWTP Master Plan were based on the City of Napa General Plan (as amended in 2003) and the 1994 Napa County General Plan (as amended) and 2007 update process estimated that the increase in average dry weather flows were project to increase from approximately 6.8 million gallons per day (mgd) to 8.6. mgd. The WWTP Master Plan does not take into consideration the buildout projections of the 2040 GPU.

The 2011 WWTP Master Plan identified the major requirements that would be needed to meet levels of service goals through 2030. These included, meeting the demands for projected growth, upgrading the WWTP for future, potentially more stringent regulations; possibly expanding NapaSan's water recycling program; and rehabilitating and replacing aging facilities and infrastructure.

As discussed above, an update of the 2011 WWTP Master Plan is currently in progress and is anticipated to be completed in January 2022. This update will include the buildout land uses evaluated in the CSMP. The WWTP Master Plan will identify the WWTP improvements needed to treat the increased wastewater flow from anticipated development. Construction of the WWTP improvements will be coordinated with the growth of the GPU thereby preventing impacts from the GPU growth on the WWTP.

RELEVANT GENERAL PLAN GOALS AND POLICIES

The current General Plan (Envision Napa 2020) includes goals and policies relevant to wastewater collection and treatment. The draft GPU (Envision Napa 2040) includes similar goals and policies. The goals and policies relevant to sewer collection and wastewater treatment from the current General Plan and in the GPU are listed below:

GOAL:

- CS-10 To ensure adequate wastewater collection and treatment and the safe disposal of wastes.

POLICIES:

- CS-10.1 The City shall promote reduced wastewater system demand through efficient water use by:
  - a. Requiring water-conserving design and equipment in new construction
  - b. Encouraging retrofitting with water-- conserving devices.
- CS-10.2 The City shall support continued efforts by the Napa Sanitation District to promote the use of reclaimed wastewater.
- CS-10.3 The City shall coordinate development review with the Napa Sanitation District to ensure that adequate wastewater collection, treatment, and disposal facilities can be provided by the District by requiring that all new applicants for development secure a "will-serve" letter from the NSD if the District notifies the City that a critical capacity situation exists. Where a critical capacity situation does exist, the City shall not issue, in the absence of a will-serve letter from the NSD, any building permits or similar ministerial entitlements for proposed structures that would increase net demand on NSD treatment capacity. In addition, when conducting environmental review for proposed development projects requiring General Plan amendments, specific plans, use permits, tentative subdivision maps, or similar discretionary approvals, the City shall include within the environmental document, information assessing whether NSD is likely to have sufficient capacity to serve the proposed development. In approving any such discretionary project, the City shall require, as a mitigation measure and condition of approval, that the applicant(s) shall obtain the necessary will-serve letters from NSD prior to receiving approval of a final subdivision map, or in the absence of a need for a final subdivision map, prior to receiving approval of any required building permits or similar ministerial approvals.

SEWER COLLECTION SYSTEM EVALUATION

Per the CSMP, the collection system has adequate dry weather capacity for existing conditions and future conditions. However, there are deficiencies during peak wet weather events for both existing conditions and future conditions (see Attachment A). The CSMP identifies 28 I&I reduction and capacity improvement projects that eliminate SSOs for both existing and future conditions. However, because of the timing of the preparation of the CSMP and the finalization of the GPU land uses, these future land uses in the CSMP and the GPU are not fully consistent with each other. Thus, the sewer system has not been evaluated for the

DRAFT

GPU planned growth. Until the sewer system is evaluated for the GPU planned growth, there is a potential impact to the sewer system from the GPU. However, this potential impact is less than significant because:

- Compliance with NapaSan's Mission Statement and Vision Statement (above) will result in updating the CSMP and identify the sewer improvements needed to accommodate the GPU growth.
- NapaSan will evaluate the GPU growth and update the CSMP as necessary.
- NapaSan has an on-going I&I reduction program that rehabilitates 2 percent of the sewer per year.
- NapaSan is currently constructing major sewer system improvements to address the critical system deficiencies.
- the City has a policy that prevents it from issuing any building permits or similar ministerial entitlements for proposed structures unless NapaSan has provided a will-serve letter, which NapaSan will not provide if NapaSan cannot provide the needed sewer wastewater treatment service. Alternatively, NapaSan could place conditions on the development that would result in NapaSan having the required capacities.

WASTEWATER TREATMENT PLANT EVALUATION

The District's WWTP treats the wastewater flow generated from the District's service area. Flow is treated at the WWTP and discharged into the Napa River and/or distributed to irrigation customers as recycled water. The Napa River flows into upper San Francisco Bay. The WWTP typically has two seasonal modes of operation: dry-weather reclamation mode and wet-weather discharge mode. The National Pollution Discharge Elimination System (NPDES) discharge permit does not allow discharge to the Napa River from July 1 to September 30 (during the dry weather season). All wastewater flow during the non-discharge period must either be treated for reclamation or stored in one of the four ponds at the WWTP. Current recycled water production is at 6 mgd (average) but is expected to increase with future improvements to meet increasing recycled water demands.

The GPU growth could result in increased ADWFs and pollutant loadings to the WWTP that could exceed the capacity of the WWTP. Similarly, the GPU growth could result in increases peak wet weather flow to the WWTP that could exceed the capacity of the WWTP.

As the GPU growth occurs, increased ADWF and pollutants will reach the WWTP. Because the GPU focuses on increased development and redevelopment within the City's existing City Limits, extension of sewers outside the existing City limits will not be needed. Many of the existing sewers have high I&I rates, so if sewer replacements/enlargements (new sewers) are needed to specifically serve the OAs, the total amount of I&I will be reduced by constructing the new sewers. Peak wet weather flows throughout the collection system are primarily caused by flow entering the system through I&I. It was estimated that I&I makes up about 82 percent of the total existing PWWF for a 10-year, 24-hour design storm. The CSMP includes a CIP that prioritizes I&I reduction programs over capacity increase projects. Thus, the wastewater flows (dry weather flows) to the WWTP may increase as a result of the GPU growth, but peak wet weather flow should not increase as a result of the GPU growth. The resulting total change in both ADWF and PWWF reaching the WWTP for the GPU growth will be quantified through an addendum to the CSMP. Currently it is anticipated that the WWTP Master Plan update will be based on the buildout scenario that was studied in the CSMP. Therefore, to ensure that potential impacts to the WWTP under the GPU buildout scenario are less than significant, the WWTP Master Plan should evaluate the 2040 GPU flows

(or be amended in the future prior the inflows exceeding the rated capacity) so that the WWTP Master Plan improvement projects would adequately accommodate projected GPU growth (consistent with NapaSan's Vision and Mission Statements (above). Consequently, this would reduce potential impacts to the WWTP to less than significant levels.

Recycled Water Facilities

Wastewater from NapaSan's service area is treated by the District at their WWTP and provided for landscape irrigation, agricultural irrigation, and industrial use via three pipelines to the southeast, west, and north of the WWTP. Recycled water is sold to customers both inside and outside the City's drinking water service area. The City and NapaSan have an agreement that permits the District to solicit and provide recycled water within a specified portion of the City's water service area.

In 2005 NapaSan adopted the Strategic Plan for Recycled Water Use through the year 2020. In 2011, NapaSan adopted a Recycled Water Allocation Policy establishing priorities for recycled water users. At the WWTP, major investments were made to expand the treatment process to accommodate increased recycled water demand and distribution in southern Napa County. The sand filter system was expanded, and an equalization basin was constructed to provide a constant flow of water to the filters and increase filter efficiency.

The recycled water pump station was expanded and enhanced to provide different pressures in the system and increase distribution capacity. A dissolved air flotation (DAF) clarifier was built to increase treatment capacity. Together, these projects allowed NapaSan to increase recycled water production from 2,000 acre-feet to 3,700 acre-feet per year.

Construction of the 5-mile Milliken-Sarco-Tulocay (MST) Recycled Water pipeline was completed at the end of 2015 in partnership with NapaSan, Napa County and local landowners. The MST pipeline was built to deliver 700 acre-feet of water per year.

The 9-mile Los Carneros Water District (LCWD) Pipeline was also completed at the end of 2015 in partnership with the Los Carneros Water District. The LCWD Pipeline was built to deliver 450 acre-feet of water.

Currently the maximum quantity of recycled water that NapaSan could produce with expanded facilities and increased future wastewater flows is approximately 4,500 AF in a typical year. In 2015 the total wastewater flow from the City to the WWTP was 7,392 AF. According to the City's UWMP, the WWTP produced and delivered 437 AF of recycled water to the City's service area. This volume of recycled water was purchased by 18 customers that would otherwise have used City drinking water.

Although NapaSan's recycled water does not provide a potable water supply, the use of recycled water for irrigation and other practices reduces potable water consumption and increases the City's water supply portfolio. Additionally, production of recycled water can decrease the amount of treated wastewater that must be discharged to the Napa River. Thus, because the recycled water program and facilities already exist, they will not be impacted by the GPU growth, and the GPU growth has no impact on the recycled water system.

INCORPORATION OF COUNTY ISLANDS INTO THE CITY

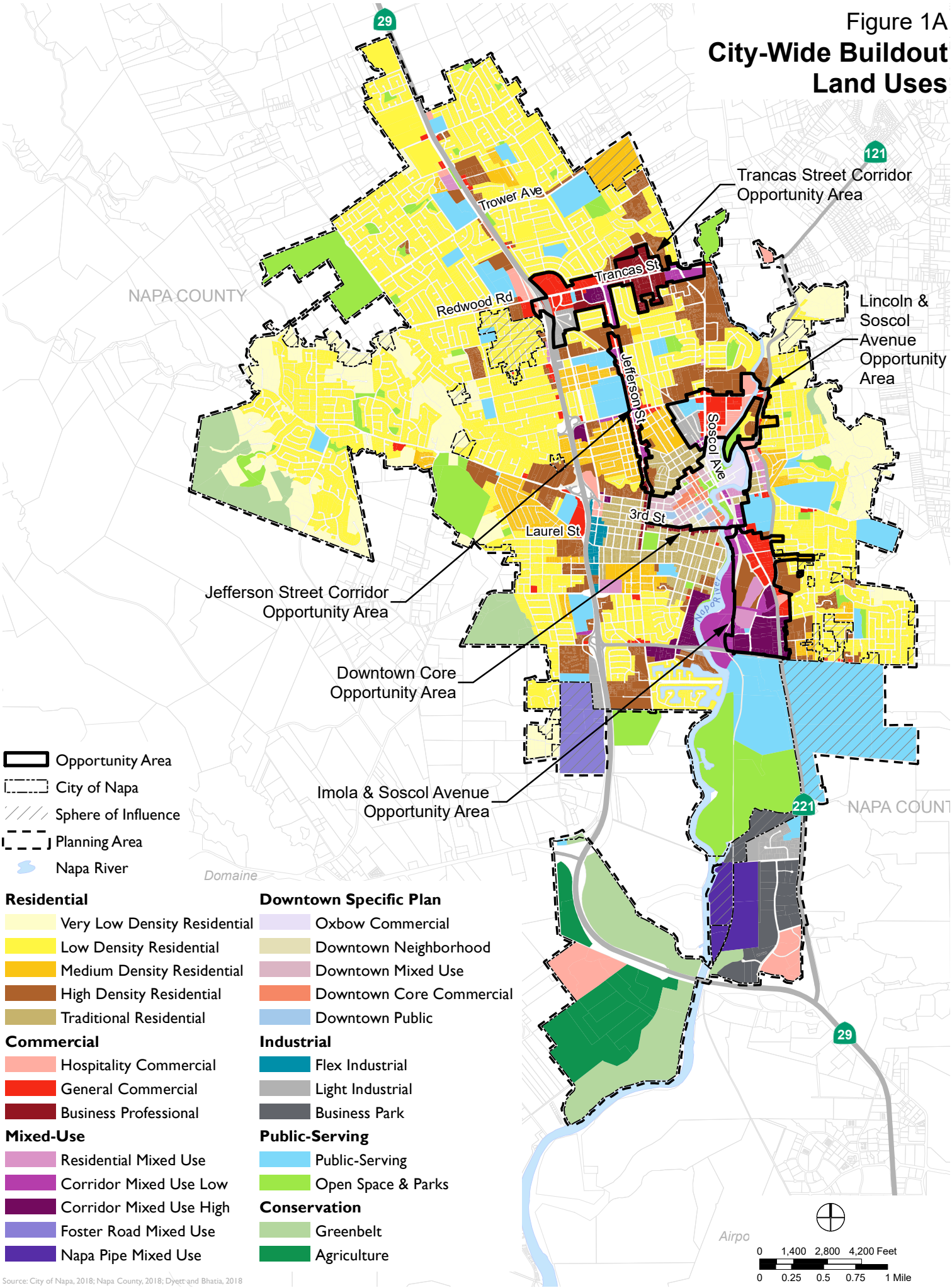
Attachment B shows 18 areas located within the City limits (as of May 2017) that have not been incorporated into the City (called County Islands). Since the figure was prepared, most of Island 5, a small fraction of Island 13, and about half of Island 18 have been incorporated into the City. It is likely that the rest of the County Islands will ultimately be incorporated into the City in the future.

However, these County Island areas are already served by NapaSan and have been accounted for in the CSMP and will be accounted for in the updated WWTP Master Plan. Implementation of the CIP from the CWMP and the CIP that will be developed for the WWTP will ensure the wastewater flow from the County Islands is adequate collected and treated. Thus, there will be no significant impacts from the incorporation of the County Islands into the City.

DRAFT

Figure 1A

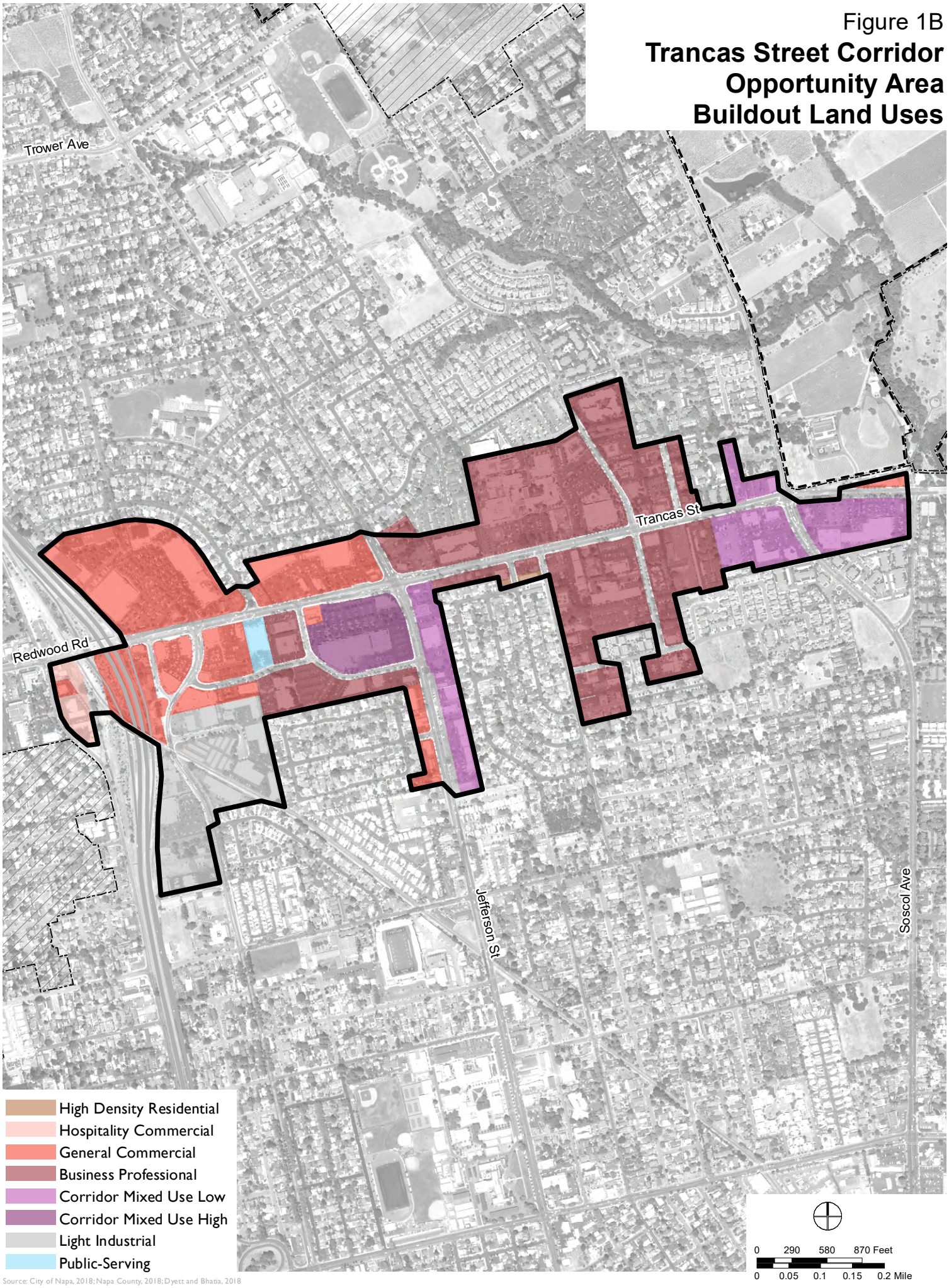
City-Wide Buildout Land Uses



Source: City of Napa, 2018; Napa County, 2018; Dyett and Bhatia, 2018

Figure 1B

Trancas Street Corridor Opportunity Area Buildout Land Uses



Source: City of Napa, 2018; Napa County, 2018; Dyett and Bhatia, 2018

Figure 1C

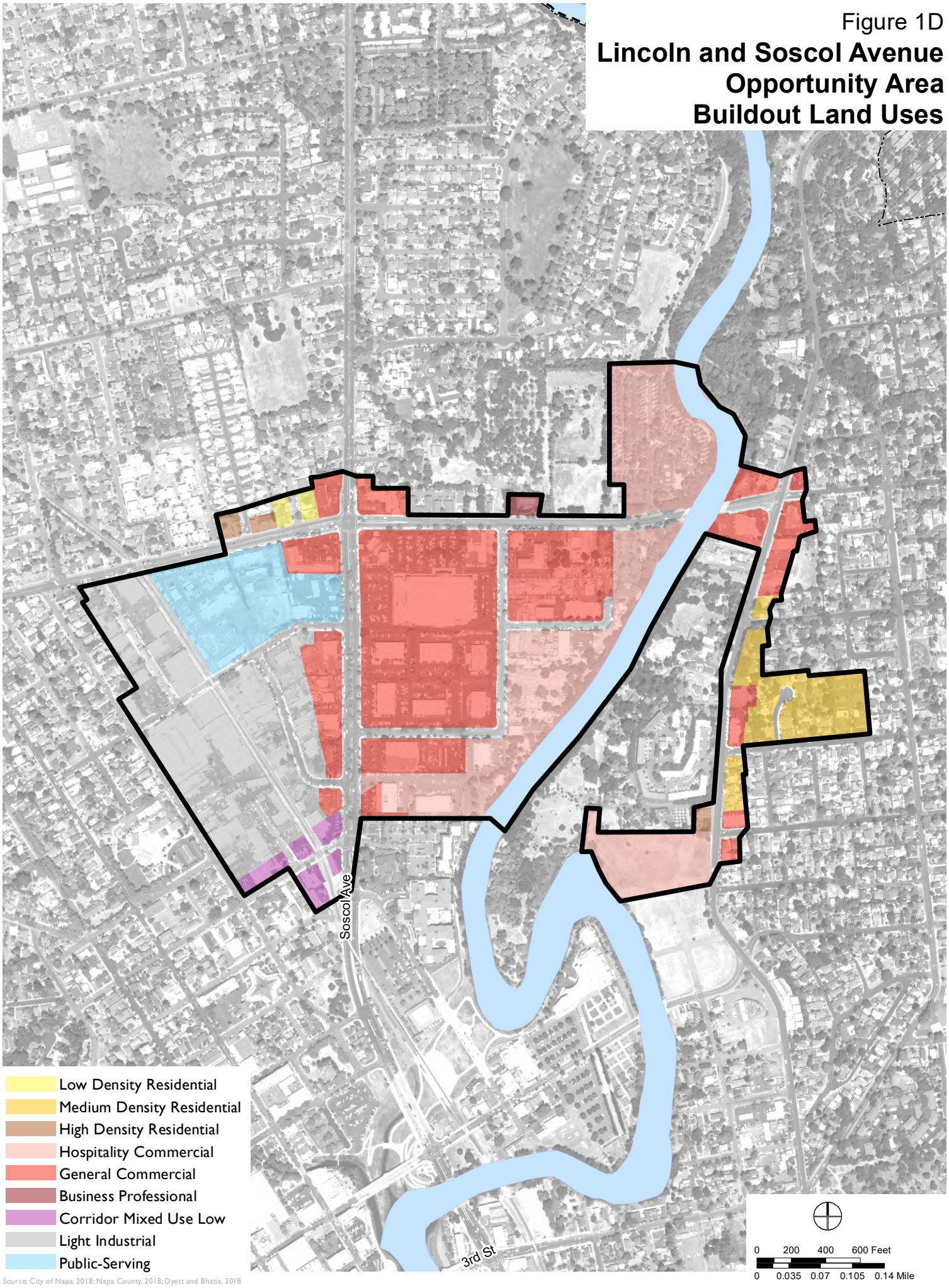
Jefferson Street Corridor Opportunity Area Buildout Land Uses



Source: City of Napa, 2018; Napa County, 2018; Dyett and Bhatia, 2018

Figure 1D

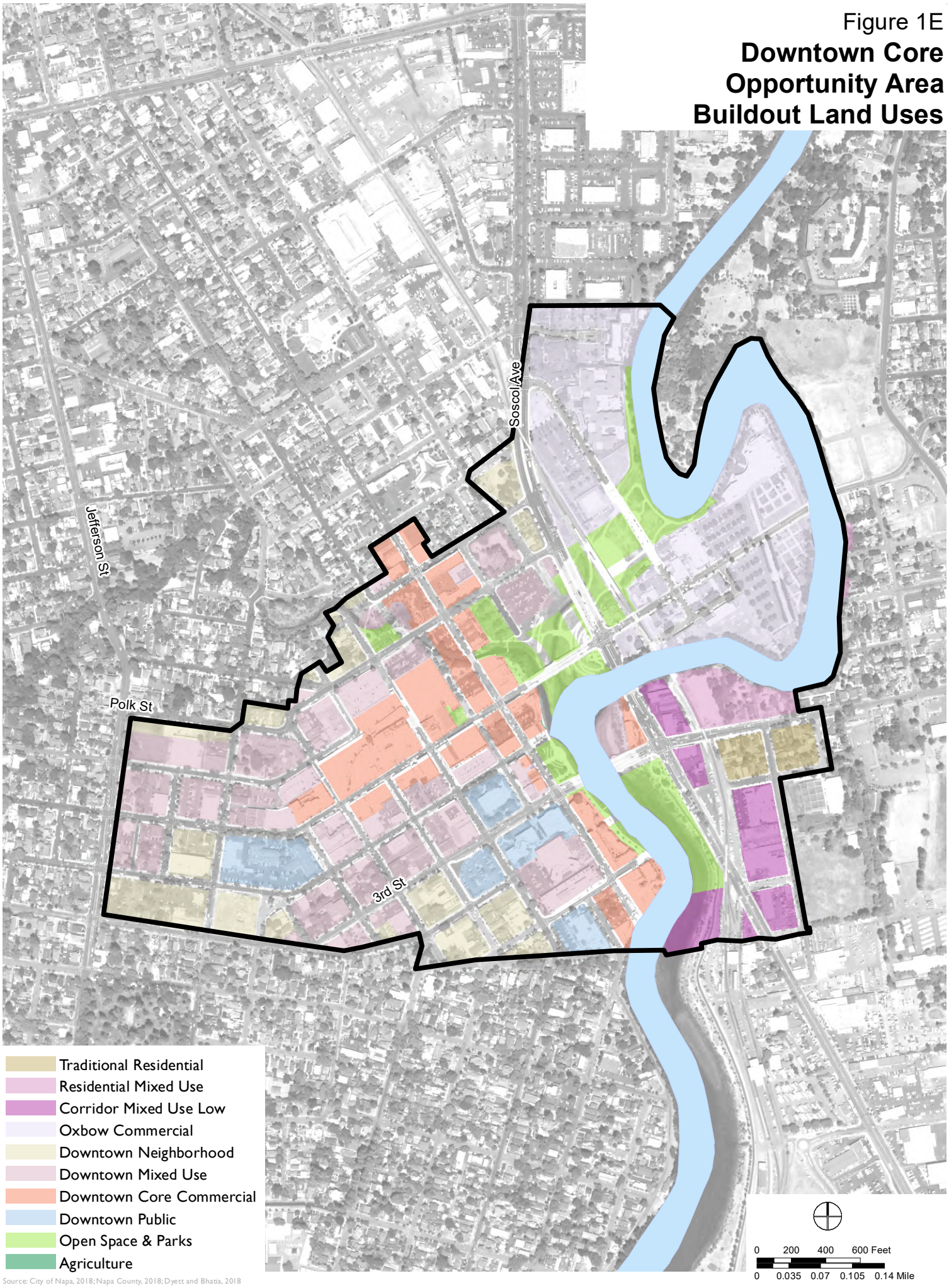
Lincoln and Soscol Avenue Opportunity Area Buildout Land Uses



Source: City of Napa, 2018; Napa County, 2018; Dyett and Bhatia, 2018

Figure 1E

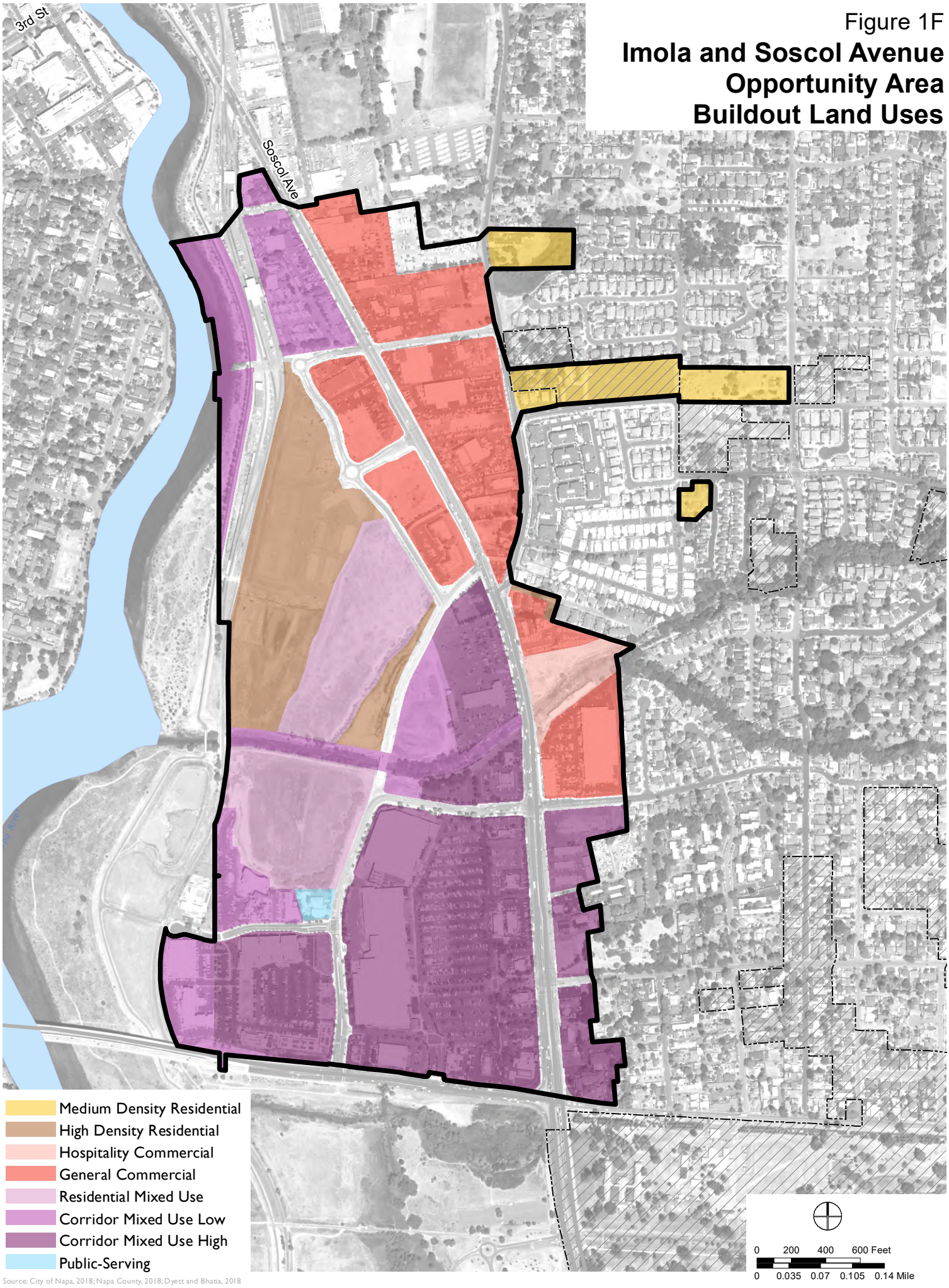
Downtown Core Opportunity Area Buildout Land Uses



Source: City of Napa, 2018; Napa County, 2018; Dyett and Bhatia, 2018

Figure 1F

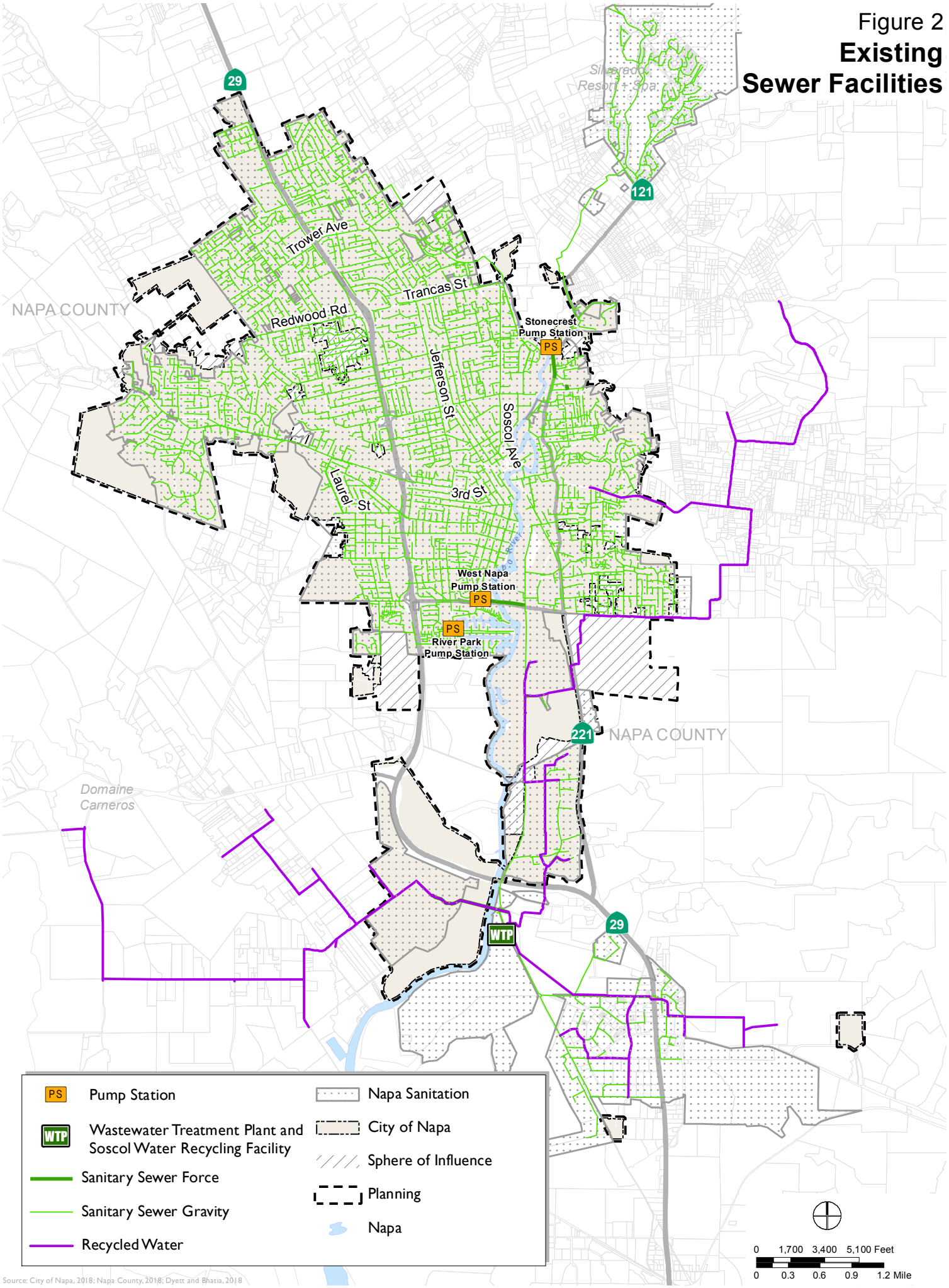
Imola and Soscol Avenue Opportunity Area Buildout Land Uses



Source: City of Napa, 2018; Napa County, 2018; Dyett and Bhatia, 2018

Figure 2

Existing Sewer Facilities



Source: City of Napa, 2018; Napa County, 2018; Dyett and Bhatia, 2018

Attachment A

Collection System Master Plan Figures

DRAFT

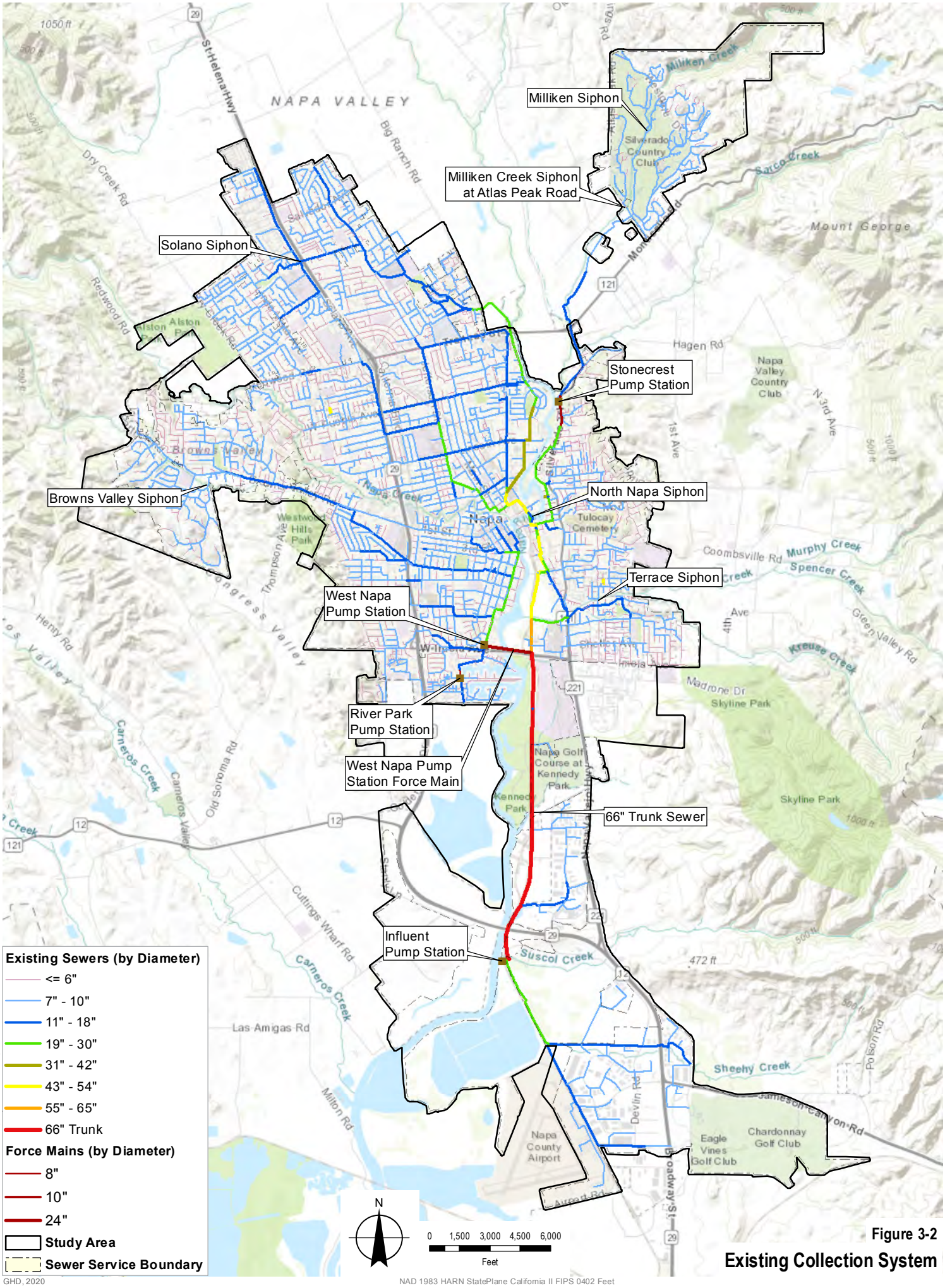
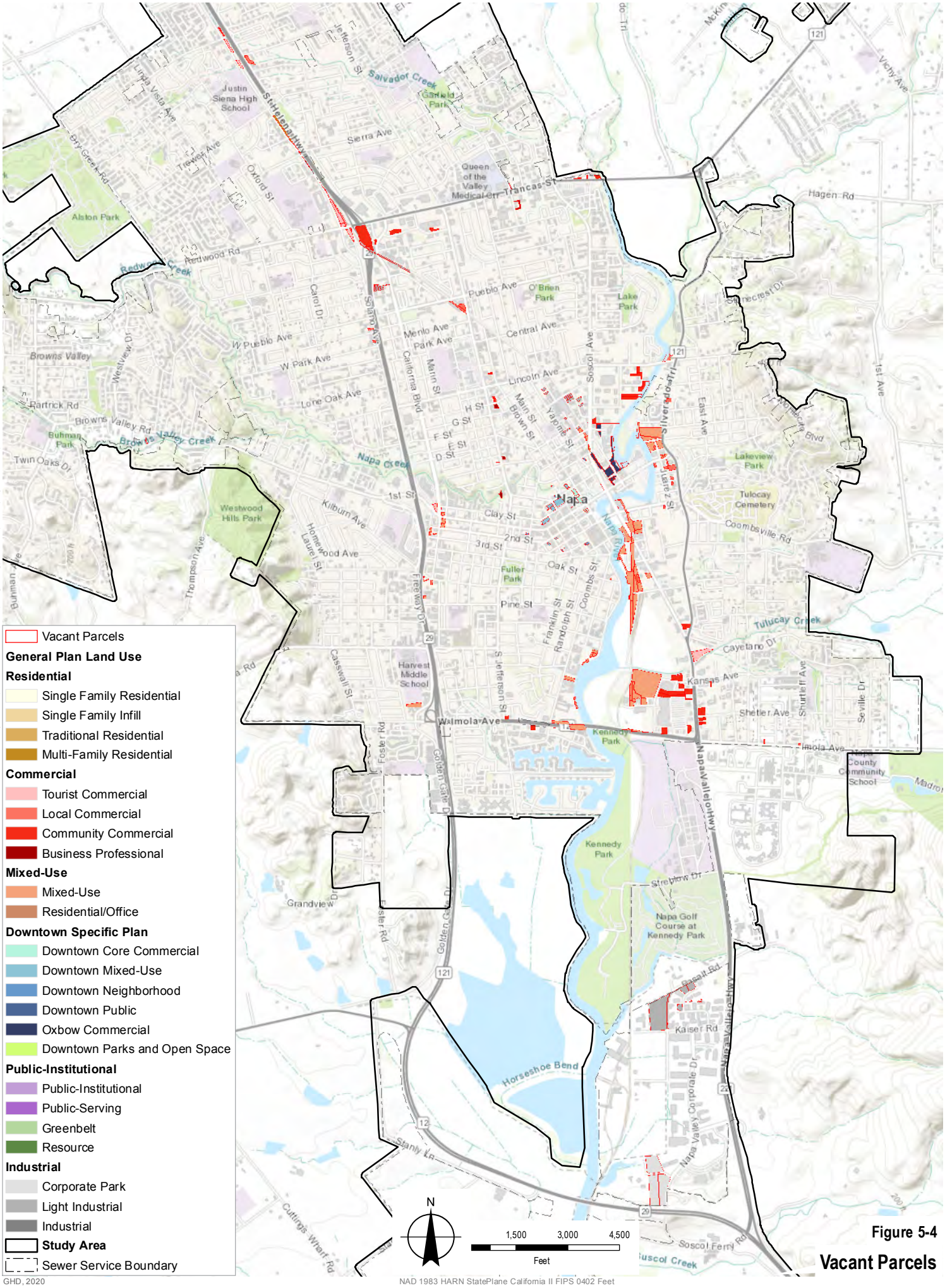


Figure 3-2

Existing Collection System

GHD, 2020

NAD 1983 HARN StatePlane California II FIPS 0402 Feet



GHD, 2020

NAD 1983 HARN StatePlane California II FIPS 0402 Feet

Figure 5-4

Vacant Parcels

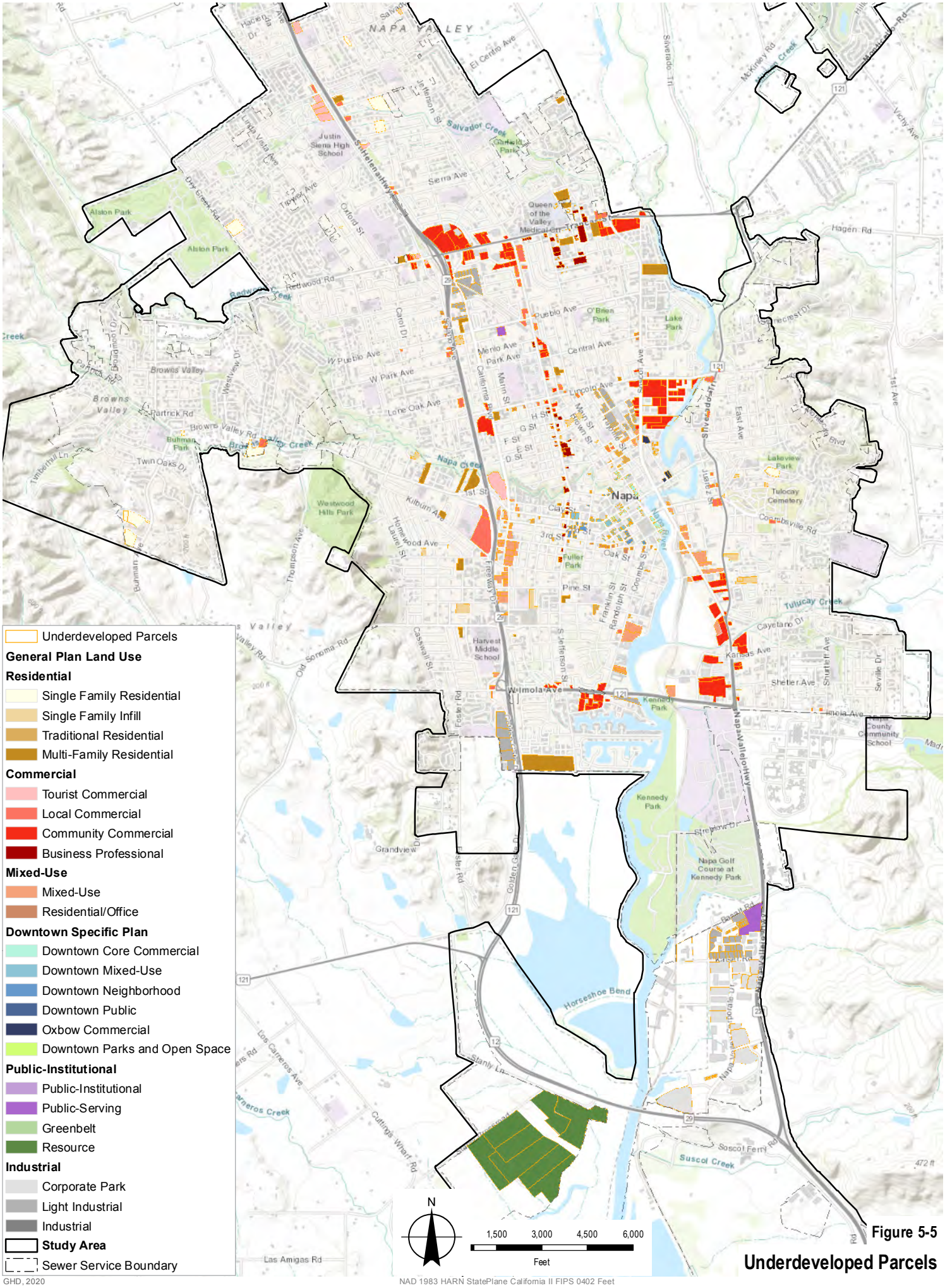


Figure 5-5

Underdeveloped Parcels

GHD, 2020

NAD 1983 HARN StatePlane California II FIPS 0402 Feet

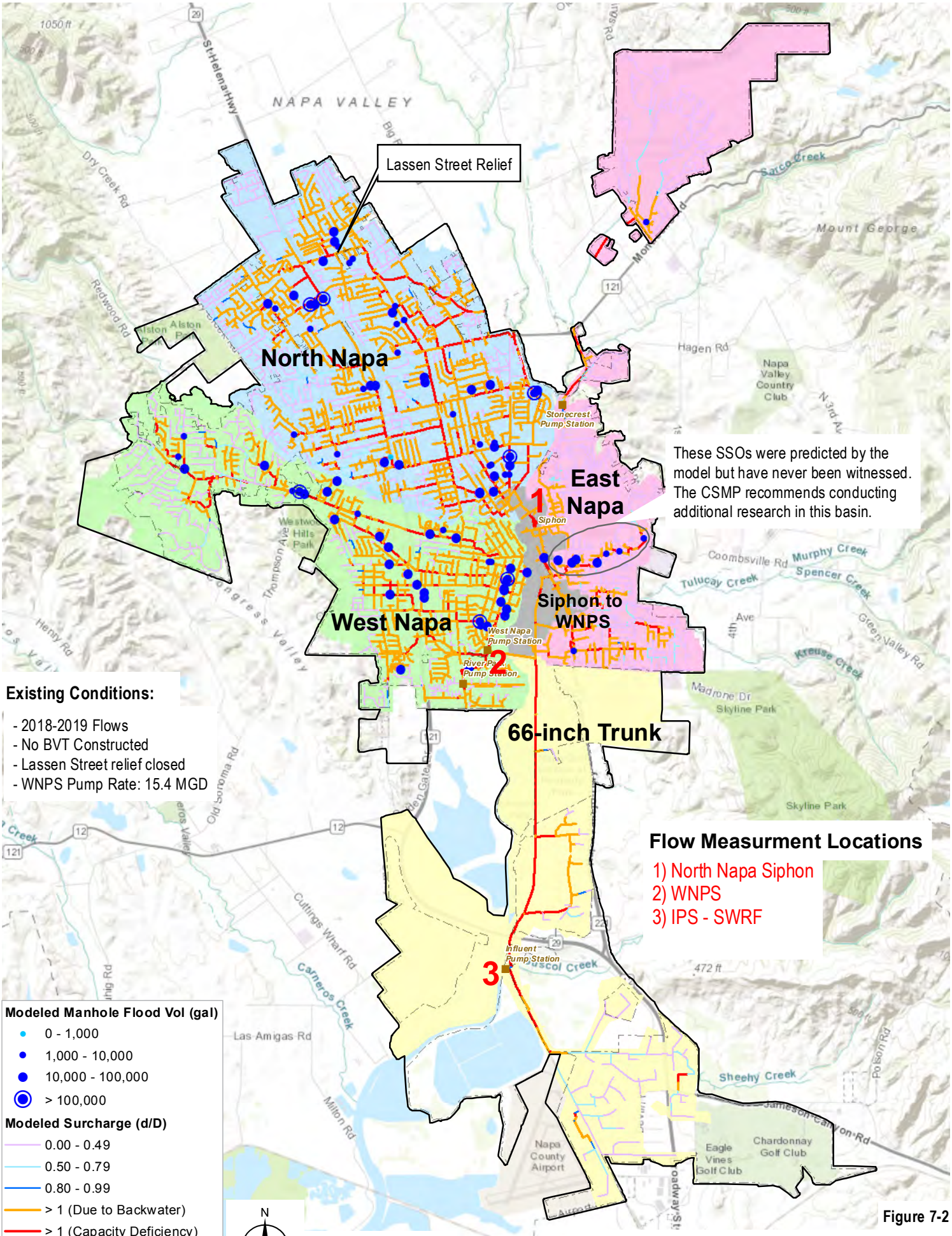


Figure 7-2

Existing Conditions
Modeled Hydraulic Results: 10 yr Design Storm

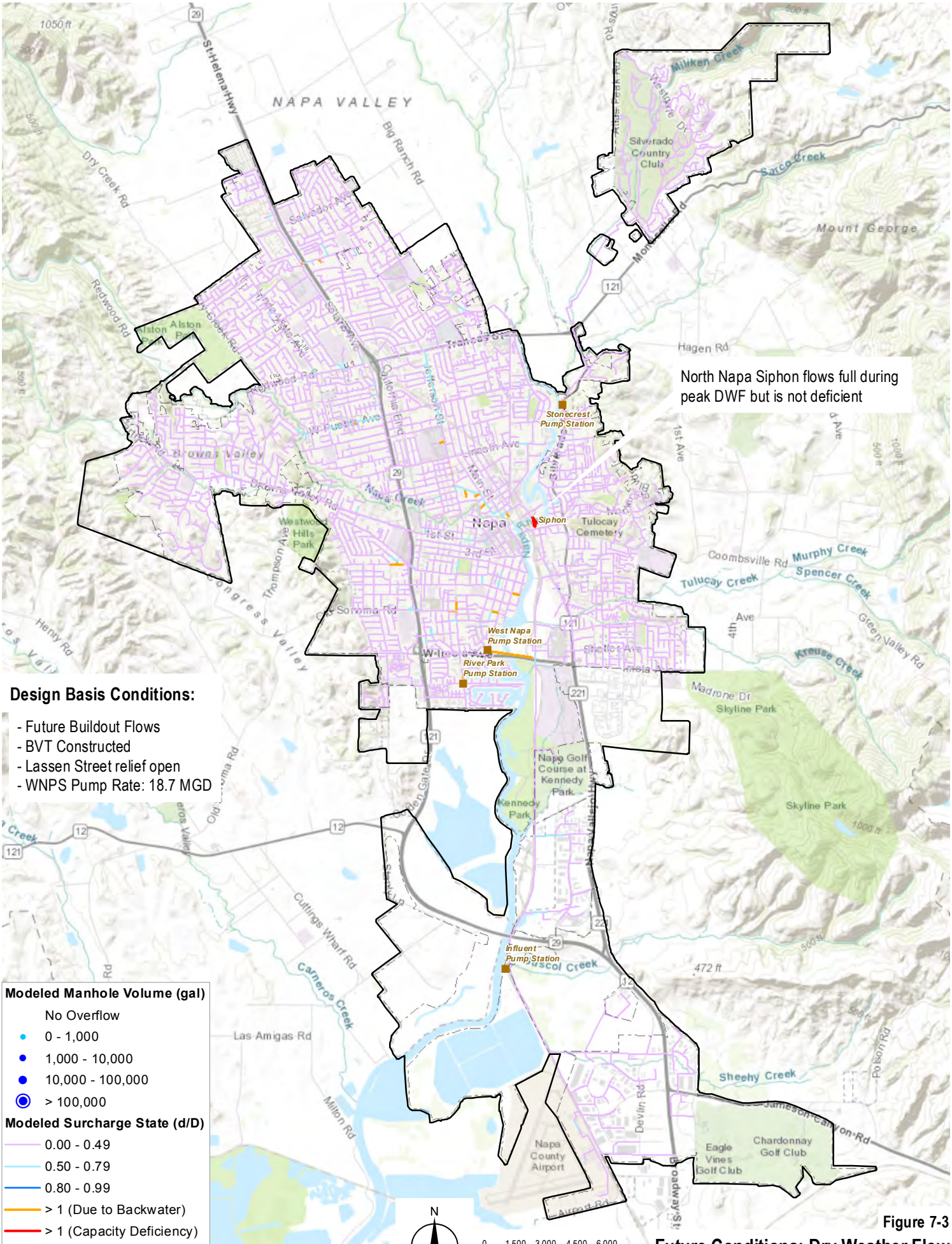


Figure 7-3

Future Conditions: Dry Weather Flow Modeled Hydraulic Results

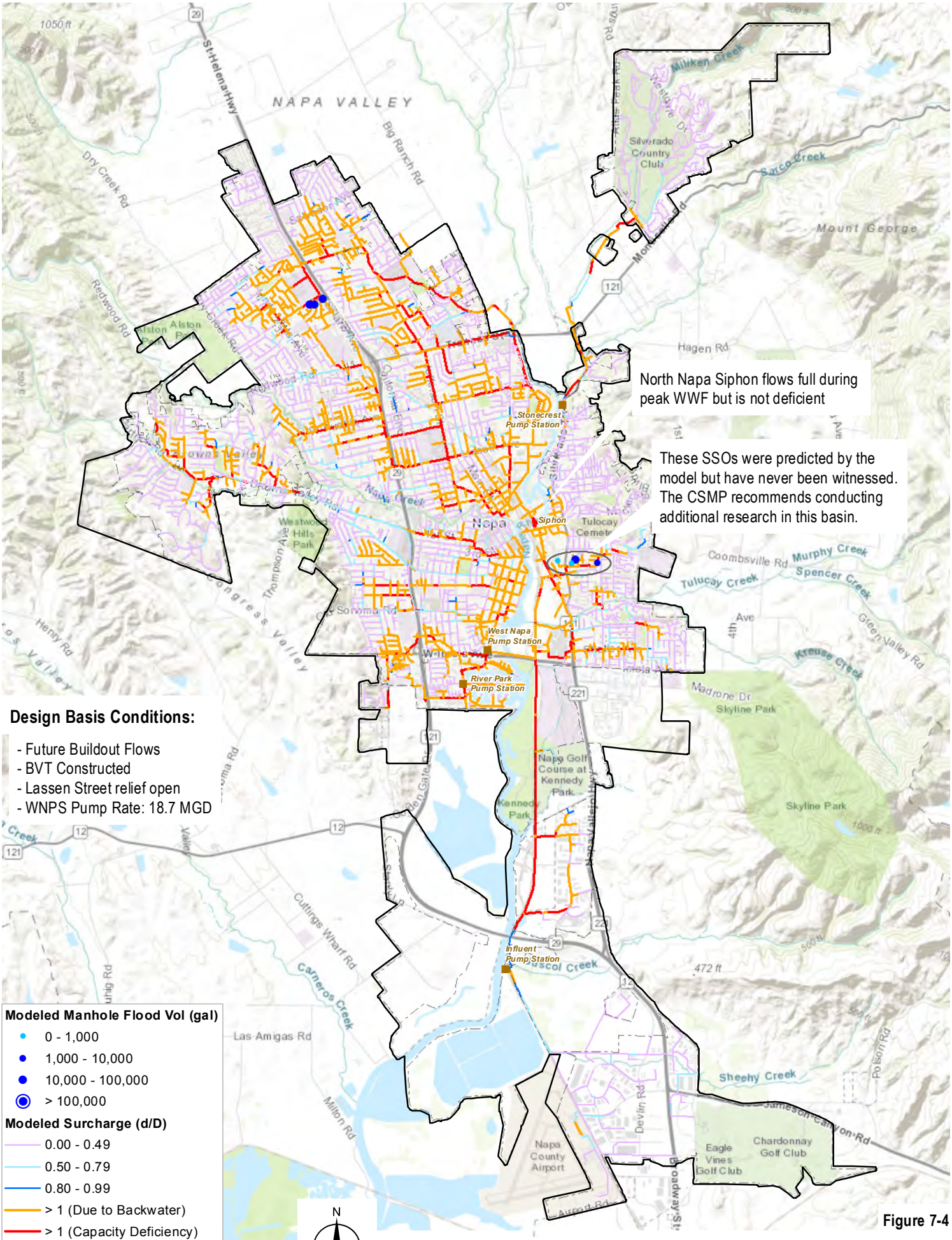


Figure 7-4

Future Condition
Modeled Hydraulic Results: 3 yr Design Storm

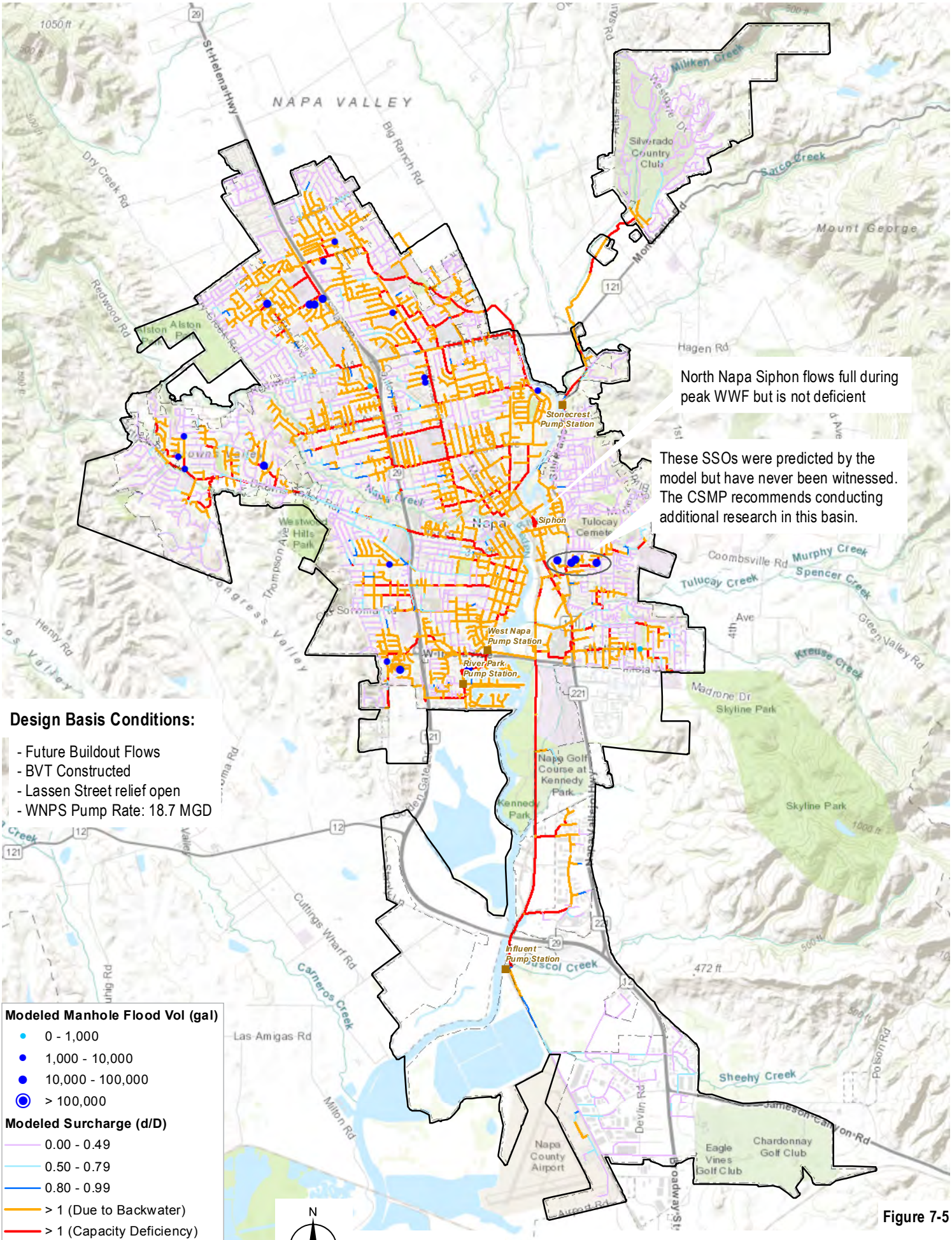


Figure 7-5

Future Condition
Modeled Hydraulic Results: 5 yr Design Storm

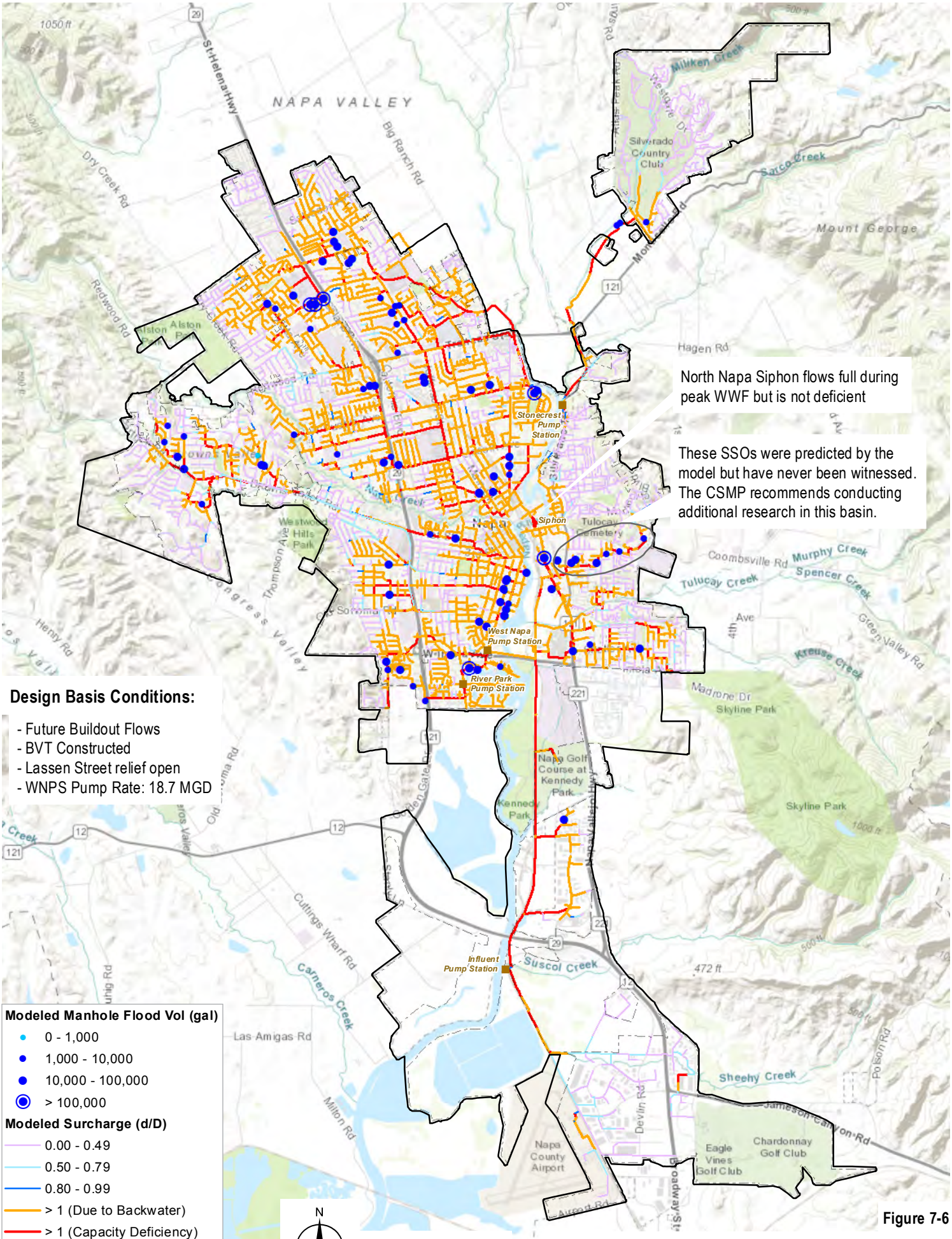


Figure 7-6

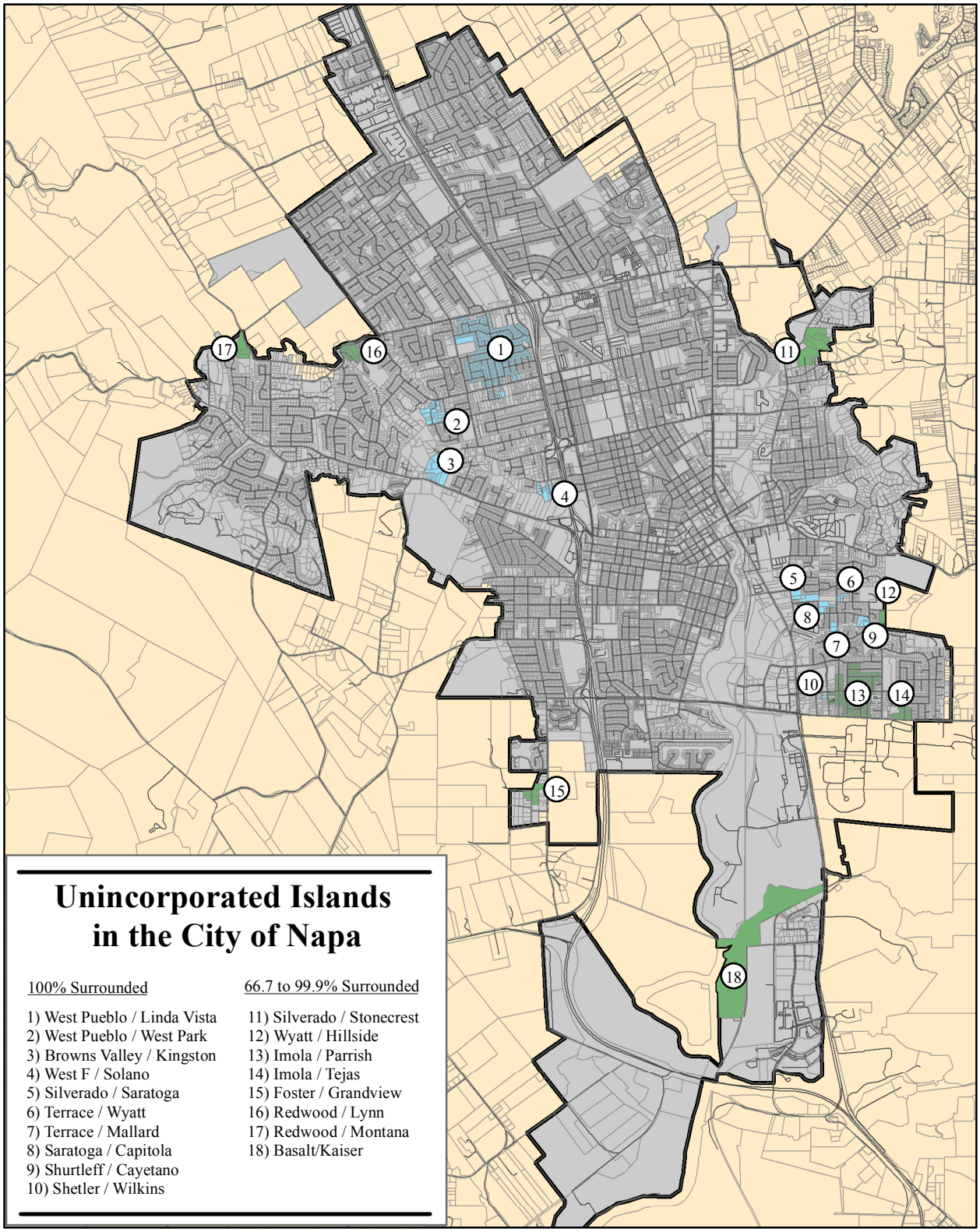
Future Condition
Modeled Hydraulic Results: 10 yr Design Storm

Attachment B

County Island Map

DRAFT

City of Napa
Unincorporated Islands



Unincorporated Islands in the City of Napa

100% Surrounded

1) West Pueblo / Linda Vista
2) West Pueblo / West Park
3) Browns Valley / Kingston
4) West F / Solano
5) Silverado / Saratoga
6) Terrace / Wyatt
7) Terrace / Mallard
8) Saratoga / Capitola
9) Shurtleff / Cayetano
10) Shetler / Wilkins

66.7 to 99.9% Surrounded

11) Silverado / Stonecrest
12) Wyatt / Hillside
13) Imola / Parrish
14) Imola / Tejas
15) Foster / Grandview
16) Redwood / Lynn
17) Redwood / Montana
18) Basalt/Kaiser

City of Napa
Napa SOI
Unincorporated Napa County
100% Surrounded
66.7 to 99.9% Surrounded



N

Not to Scale
May 25, 2017
Prepared by BF

LAFCO of Napa County
1030 Seminary Street, Suite B
Napa, California 94559
http://www.napa.lafco.ca.gov

