
Appendix I:

Hydrology and Water Quality Supporting Information

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I.1 - Water Supply Assessment

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CITY OF CLOVIS

WATER SUPPLY ASSESSMENT VISTA RANCH MASTER PLAN

CITY OF CLOVIS

MARCH 2024, **REVISED SEPTEMBER 2025**

PREPARED FOR:

City of Clovis

PREPARED BY:

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ABBREVIATIONS

AF	acre-feet
AFY	acre feet per year
Boswell	Boswell Groundwater Banking Facility
City	City of Clovis
County	Fresno County
CVP	Central Valley Project
CWC.....	California Water Code
FID	Fresno Irrigation District
GP	City of Clovis General Plan
GWD	Garfield Water District
IWD.....	International Water District
LDR	Low Density Residential
MDR.....	Medium Density Residential
MGD	million gallons per day
MHDR	Medium High Density Residential
NKGSA	North Kings Groundwater Sustainability Agency
NKGSP.....	North Kings Groundwater Sustainability Plan
RR	Rural Residential
SFR.....	Single-Family Residential
SOI	Sphere of Influence
SWTP	City of Clovis Surface Water Treatment Plant
UWMP	Urban Water Management Plan
VHDR	Very High Density Residential
Waldron.....	Waldron Banking Facility
WDF.....	Water Demand Factor
WMP.....	City of Clovis, Water Master Plan Update, Phase III
WRF.....	Water Reclamation Facility
WSA.....	Water Supply Assessment
WSCP	Water Shortage Contingency Plan

1 INTRODUCTION

1.1 PURPOSE AND NEED FOR THE WATER SUPPLY ASSESSMENT

California Water Code (CWC) §10912(a) requires preparation of a Water Supply Assessment (WSA) meeting the requirements of CWC §10910 et seq for projects within cities and counties that meet one of several water demand triggers, or the equivalent. These triggers include construction of 500 or more residential units, construction of a shopping center or business establishment having 500,000 square feet of floor space, construction of a commercial office building having more than 250,000 square feet, a proposed hotel or motel having more than 500 rooms, or another project having a water demand equivalent to or greater than the 500-unit development.

This WSA evaluates the adequacy of available water supplies for the proposed Vista Ranch Master Plan development and non-development areas, including a Sphere of Influence (SOI) Expansion Area north of Shepherd Ave, west of Sunnyside Ave located in Fresno County, California. The Master Plan would entail the development of up to 3,286 single family residential lots, more than the “500 residential units” trigger; therefore, a WSA is required. The City of Clovis operates the water system to which the Project proposes to connect. This water system meets the standards for a “Public Water System” as set forth in CWC §10912(c); the City is therefore responsible for preparation of the required WSA in accordance with CWC §10910(b).

This WSA discusses the estimated water demands and water supply for the proposed Project. The Project is located in Fresno County (County), adjacent to the City of Clovis (City) limits; the area will be annexed as part of the Project’s progress and the entire Project will be supplied with water from the City.

1.2 RELIANCE ON A RELATED URBAN WATER MANAGEMENT PLAN

If the Project falls within the boundaries of a current Urban Water Management Plan (UWMP) prepared by the water purveyor, CWC §10910(c)(1) requires that the WSA determines whether projected water demand associated with the Project is included as part of that duly adopted UWMP.

1.3 DOCUMENT ORGANIZATION

This WSA is organized as follows:

- Section 2 describes the Project and its location.
- Section 3 describes the Project’s potable and non-potable water demands in addition to those of other existing and planned uses, and how these vary from the numbers used in the UWMP.
- Section 4 provides an overview of the City’s primary water supplies.
- Section 5 discusses the adequacy of water supplies during normal years.
- Section 6 discusses the adequacy of water supplies during single-dry and multiple-dry years.
- Section 7 discusses operational reliability on a daily basis.
- Section 8 discusses the adequacy of water supplies during normal, dry-year, and multiple-dry years during a 20-year projection.
- Section 9 lists references cited in this WSA.

2 PROJECT DESCRIPTION

2.1 PROJECT LOCATION AND SETTING

The City limits currently encompasses 25.9 square miles. The City's SOI covers 34.9 square miles, while the City's General Plan (GP) encompasses approximately 74.3 square miles. The City's General Plan (Placeworks, 2014) identified three Urban Centers to focus growth, including Loma Vista, the Northwest area, and the Northeast area; this Project lies within the Northeast area, within the villages identified in the Water Master Plan Update, Phase III (WMP) (Provost & Pritchard Consulting Group, 2018) as Northeast Triangle and Northern Rural. **Figure 2-1** identifies the location of the Project in relation to the surrounding Clovis/Fresno region.

The Project includes a total area of 952 acres located between Sunnyside and Fowler Avenues, Shepherd and Behymer Avenues, and the Big Dry Creek Reservoir. Located just outside the city limits and the SOI, according to the 2014 City of Clovis General Plan, the area north and east of the Project is open space, north of the Project is agriculture, west of the Project is rural residential, and south of the Project is low and very low residential uses.

The Project entails two distinct components, which are analyzed jointly in this WSA:

- **Vista Ranch Master Plan:** a proposed master planned community, including approximately 3,286 dwelling units on 507.4 acres with a variety of land uses, including Low Density Residential (LDR), Medium Density Residential (MDR), Medium-High Density Residential (MHDR), Very-High Density Residential (VHDR), Mixed-Use, Neighborhood Commercial, Trails, Open Space, Park, and School.
 - 410.6-acres of this area was included in the WMP and UWMP analyses
 - 96.8-acres of this area was included in the UWMP analysis but not the WMP analysis.
- **Non-Development Area:** adjacent to Vista Ranch, the area northeast and west of the Vista Ranch boundaries, as follows:
 - Northeast area: 57.7-acres, to be evaluated as an Agricultural land use.
 - This area was not included in the City's UWMP analysis and will be discussed further throughout this WSA.
 - West area: 386.9-acres, with a potential to develop as Rural Residential.
 - This area was included in the City's UWMP analysis.

The Project area is currently designated, in the County of Fresno – Zoning, as AE-20, AL-20, and RR, and current land uses are rural residential and open fields. As noted by the VRMP Project proponent/applicant, the current land uses receive water to meet demands through existing domestic or agricultural groundwater wells; the amount of groundwater pumped from those wells is estimated at 10 acre-feet per year (AFY) as described in the memorandum entitled *Vista Ranch Development – Evaluation of Impacts to Groundwater Levels* (Provost & Pritchard Consulting Group, August 2025). The Vista Ranch Master Plan will include the abandonment of these existing onsite wells.

2.2 WATER SUPPLY AND DISTRIBUTION

The project will receive water supply from the City's water distribution system, which relies on both groundwater and surface water supplies. The City's Surface Water Treatment Plant (SWTP) has a current treatment capacity of 22.5 million gallons per day (MGD); expansion to 45 MGD is planned.

In addition to the supply from the SWTP, the City has more than 30 groundwater wells located throughout the City, with the nearest being approximately one mile south of the Project, at Temperance and Nees Avenues, no groundwater wells would be constructed within or in the vicinity of the Project boundary as a part of the Project development. While the City's system is divided into two pressure zones, there are interconnections between the two to balance supply and demand throughout the year in various water demand scenarios.

The Project area is entirely within the water system's Pressure Zone 2, which largely relies on surface water supplies. Water will be delivered to the Project via the City's existing and planned distribution system. The water distribution system is shown in full in the WMP, and in detail for this area on **Figure 2-2**. The master planned 16-inch distribution mains in East Shepherd Avenue west of North Armstrong Avenue and in North Armstrong Avenue running south from East Shepherd Avenue exist. Additionally, master planned 24-inch transmission mains in Sunnyside and Perrin Avenues exist or will exist by the time this Project proceeds. Connectivity in both directions along Shepherd Avenue, Sunnyside Avenue, and/or in Temperance Avenue are required to reliably supply water to the Project.

The master planned mains within the Northeast Triangle, north of Shepherd Avenue, will require modification to accommodate the layout of the Project, as discussed in the Water Infrastructure Investigation, separate from this WSA. The mains in **Figure 2-2** are those currently shown as planned in the WMP, not the updated alignments as the potential new alignments are not approved or confirmed by City staff at the time of preparation of this report.

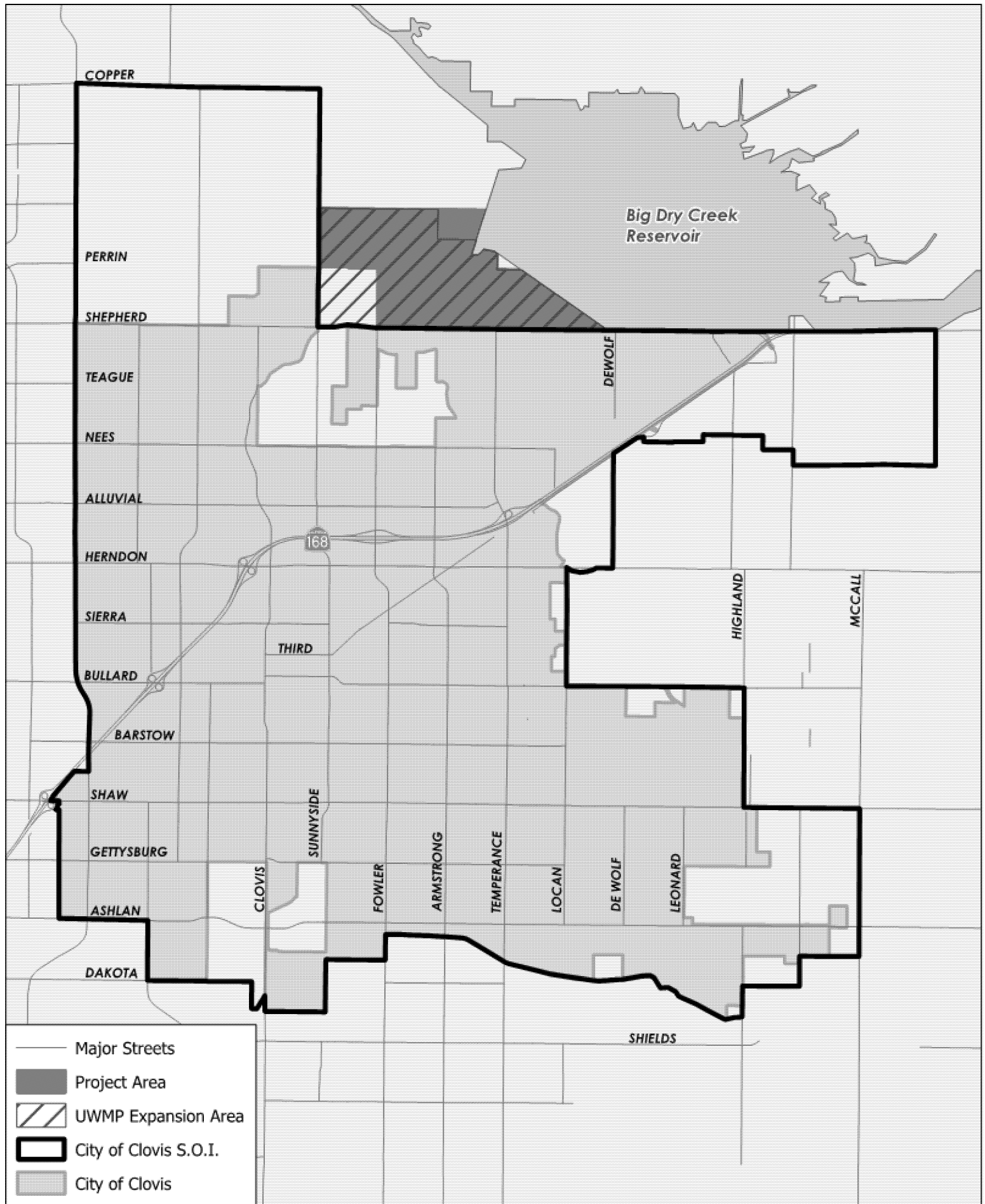
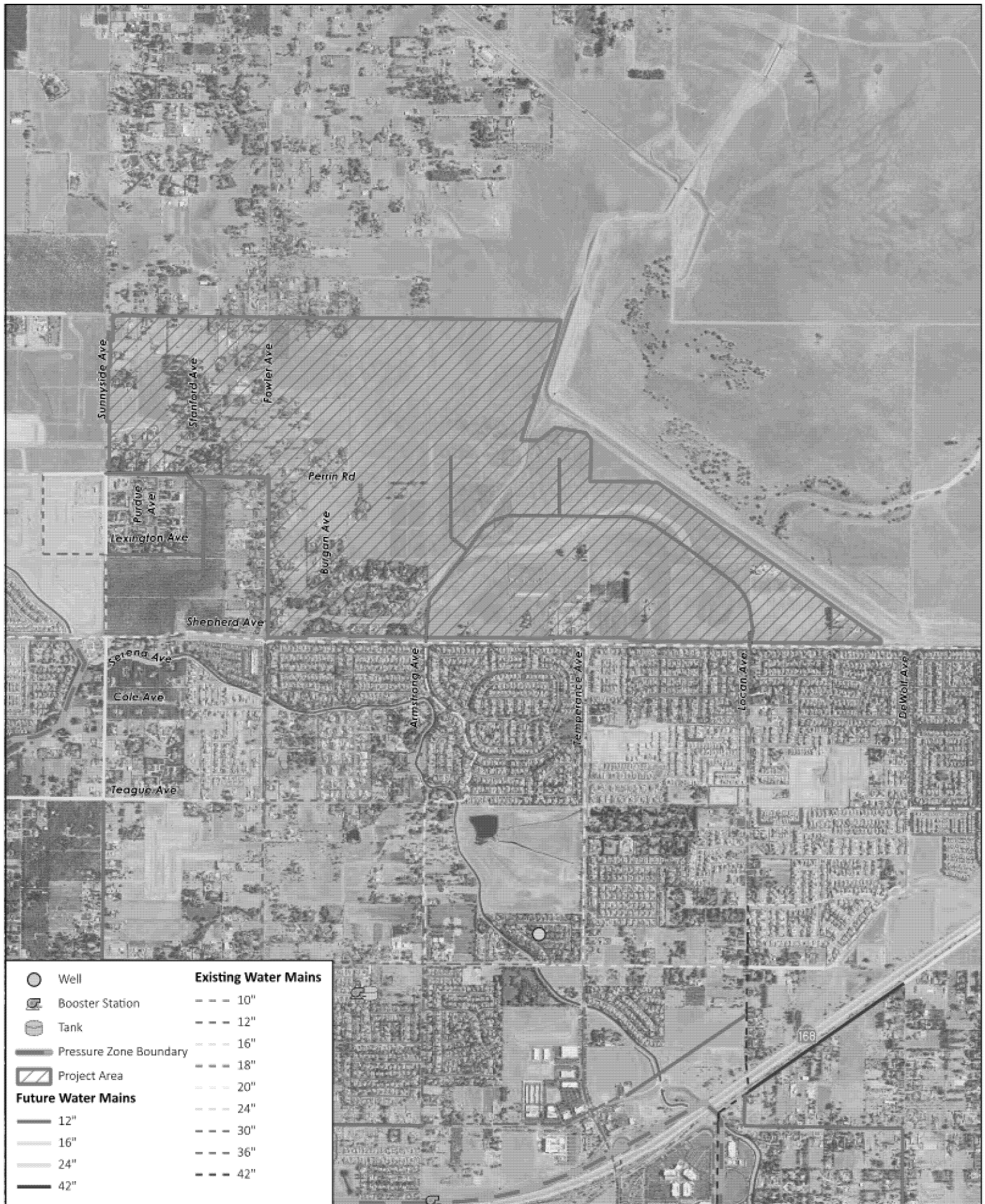


Figure 2-1: Project Location

Water Supply Assessment - Vista Ranch



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Feet

Figure 2-2: Water Infrastructure at Buildout

Water Supply Assessment- Vista Ranch



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3 WATER DEMANDS

This section summarizes projected water demands of the Project, assuming full buildout of the Project by 2035. Water demands were based on Land Use-based Water Demand Factors (WDFs) applied to land uses shown in the City's Adopted General Plan. Proposed Project water demands have been estimated based on the proposed land uses and the WDFs shown in the adopted WMP. This section compares water demand estimates developed as part of this study with the City's existing plans.

3.1 PROJECT DEMANDS

Based on the adopted WDFs stated in the WMP, and the existing GP land use designations (shown in [Figure 3-1](#)), the planned water demands for the Project area within the WMP and the area outside the WMP, shown in AFY, are shown in [Table 3-1](#) below. This table is utilized for comparison of overall water supply portfolio impact of the Project, according to the WMP.

Table 3-1. Planned Demand Estimates

PLANNED DEMAND ESTIMATES			
PLANNED LAND USE DESIGNATION	UNIT FACTOR (AFY/ACRE)	ACREAGE (acres)	DEMAND (AFY)
AREA INCLUDED IN THE WMP ANALYSIS (NORTHEAST TRIANGLE)			
Rural Residential (RR)	0.7	2.0	1.4
Low Density Residential (LDR)	2.5	169.0	422.5
Medium Density Residential (MDR)	2.2	100.0	220.0
Medium-High Density Residential (MHDR)	3.3	24.0	79.2
Mixed Use – Village (MU-V)	5.0	14.0	70.0
Open Space	1.5	39.0	58.5
Park	3.0	22.0	66.0
School	2.8	16.0	44.8
Right-of-way (Road)	0.0	24.6	0.0
Subtotal:		410.6	962.4
AREA NOT INCLUDED IN THE WMP ANALYSIS			
No planned land use ¹	0.0	541.4	0.0
Subtotal		541.4	0.0
Overall Total:		952.0	962.4

Based on the proposed land use designation (see [Figure 3-2](#)), the proposed water demands for the Project area are shown in [Table 3-2](#). The water usage projection for the Project was developed based on the Water Demand Factors in the WMP for the proposed Project land use.

¹ For purposes of the WMP comparison, this area does not have a planned land use demand; however, for purposes of the UWMP comparison, this area is assumed to have a population associated with it per the Rural Residential land use shown in the Fresno County General Plan.

Table 3-2. Proposed Demand Estimates

PROPOSED DEMAND ESTIMATES			
PROPOSED LAND USE DESIGNATION	UNIT FACTOR (AFY/ACRE)	ACREAGE	DEMAND (AFY) [4]
VISTA RANCH MASTER PLAN (AREA WITHIN THE WMP)			
LDR	2.5	34.2	85.5
MDR	2.2	146.4	322.1
MHDR	3.3	71.8	236.9
Very High Density Residential (VHDR)	7.3	15.7	114.6
Community Recreation [1]	5.0	3.1	15.5
Neighborhood Commercial	2.9	12.7	36.8
Industrial (Mini Storage) [2]	--	32.2	0.4
Open (No water use) [3]	0.0	28.3	0.0
Park	3.0	27.1	81.3
School	2.8	19.3	54.0
Road (No water use)	0.0	19.8	0.0
Subtotal:		410.6	947.1
VISTA RANCH MASTER PLAN (AREA NOT WITHIN THE WMP)			
MDR	2.2	71.4	157.1
MHDR	3.3	17.5	57.8
Park	3.0	3.3	9.9
Road	0.0	4.6	0.0
Subtotal:		96.8	224.8
NON-DEVELOPMENT AREAS (AREA NOT WITHIN THE WMP)			
RR	0.7	386.9	270.8
Agriculture (not accounted for in UWMP)	0.0	57.7	0.0
Subtotal:		444.6	270.8
Overall Total:		952	1,442.7
Notes: [1] This proposed land use is equivalent to the <i>Mixed Use – Village</i> land use in the City’s General Plan and WMP. [2] The water demand shown for this area is based on the Approved Fresno County Condition Use Permit for a Mini-Storage Project that is currently under construction. [3] The project applicant has indicated this open space area will not be irrigated. [4] Due to rounding, some totals may not reconcile.			

To evaluate the overall water supply portfolio impact to the City’s water supply portfolio, the additional water supply needed for the project includes the demands associated the Non-Development Areas not previously accounted for in the WMP plus the increased density above that which was accounted for in the WMP. The impact of the Project to the City’s water supply portfolio shown in the WMP is as follows:

- Changed density within the area shown in the WMP:
 - Planned: 962.4 AFY
 - Proposed: 947.1 AFY
 - Difference: -15.3 AFY
- Area outside WMP:
 - Planned: 0.0 AFY
 - Proposed: 495.6 AFY
 - Difference: 495.6 AFY

Total Impact to Water Supply: 480.3 AFY

For purposes of understanding the difference between planned and proposed demands on a per capita basis, as documented in the UWMP, the “Area Not Included in WMP Analysis” would have had an assumed demand associated with rural residential (541.4 acres * 0.7 AFY/acre = 379 AFY) and the impact of the Project would be associated with the increased density. This total impact is calculated as follows:

- Increased density within the area shown in the UWMP:
 - Planned: 1,341.4 AFY (962.4 AFY + 379.0 AFY)
 - Proposed: 1,442.7 AFY
 - Difference: 101.4 AFY

Total Impact to Water Supply: 101.4 AFY

Comparison between the projected water demands and the demands anticipated in the UWMP evaluates the overall availability of water supply to meet the City’s per capita demand scenarios described later in the WSA.

3.1.1 INCREMENTAL PROPOSED WATER DEMANDS

Project water demands were calculated in 5-year increments, as shown in [Table 3-3](#). This table is based upon the understanding that the Project will be entirely constructed by 2035².

Table 3-3. Proposed Demands in 5-Year Increments

PROPOSED DEMANDS IN 5-YEAR INCREMENTS				
CRITERIA	2025	2030	2035	TOTAL ³
Estimated Demand (AFY)	0.4	721.2	721.2	1,442.7

3.2 DEMANDS OF OTHER EXISTING AND PLANNED DEVELOPMENT

The UWMP reports the planned demands for similar types of uses proposed with this Project within the City, referred to collectively as Single-Family Residential uses (SFR), Multi-Family Residential uses, and Commercial uses. These demands are summarized in UWMP Table 4-5, which is reproduced, in part, below.

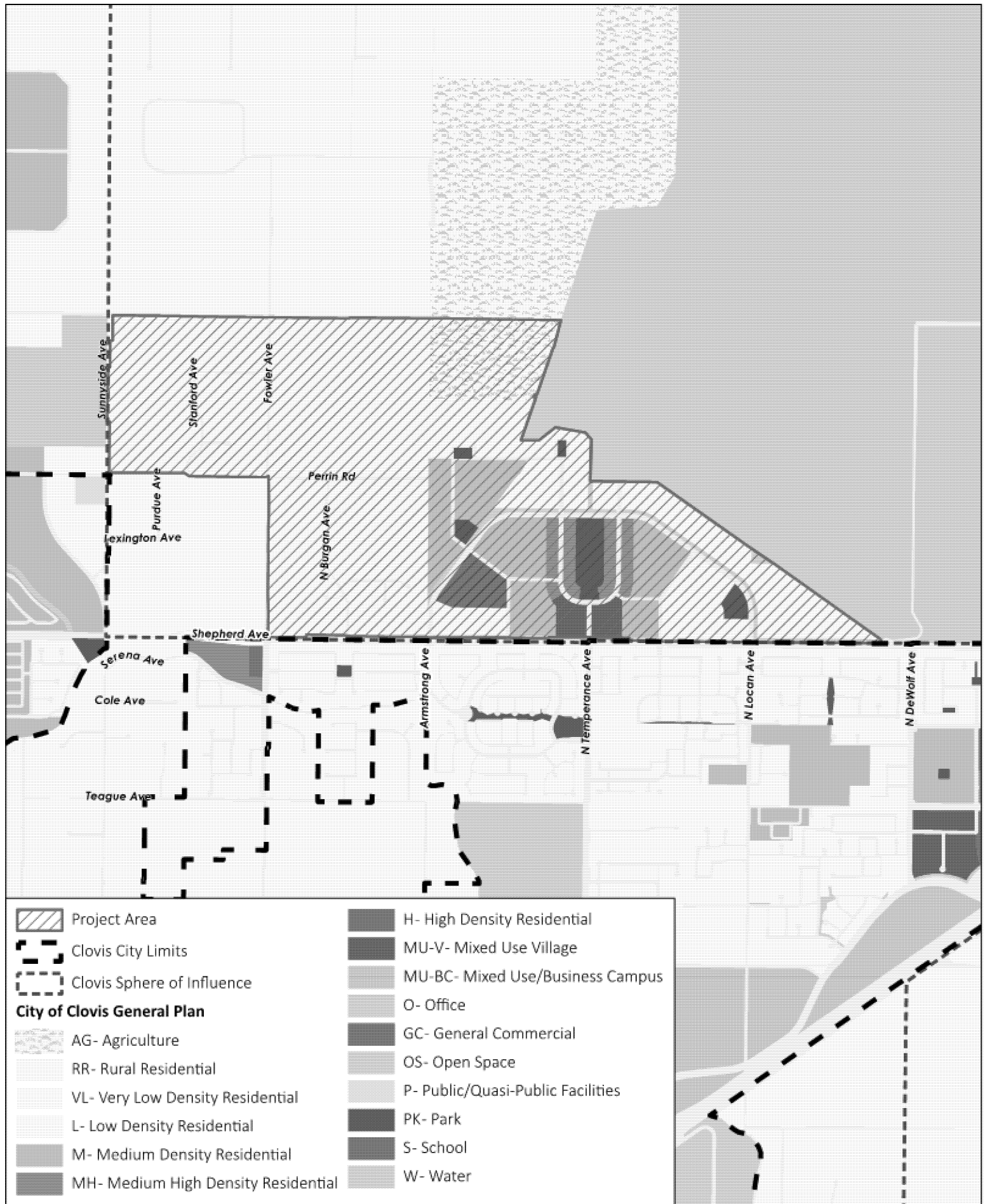
² The anticipated demands timing is an estimate and development of the Project will be determined by the Project Applicant. This WSA does not govern the development timeline.

³ Due to rounding, some totals may not reconcile.

Table 3-4. UWMP Planned Water Demands by Use Type (UWMP Table 4-5)

UWMP PLANNED WATER DEMANDS BY USE TYPE (As shown in UWMP Table 4-5)			
USE TYPE	UWMP PROJECTED DEMANDS IN 2035 (AFY)	PROPOSED PROJECT DEMANDS IN 2035	
		PROJECTED PROJECT DEMANDS (AFY)	% OF UWMP DEMANDS
Residential	23,331	1,252.6	5.4%
Commercial (includes schools)	3,670	99.0	2.7%
Landscape (includes open space and parks)	1,336	91.2	6.8%
Totals	28,337	1,442.7	5.1%

Comparing the total proposed Project water demands in [Table 3-2](#) with the total water demand area analyzed in the UWMP and shown in [Table 3-4](#), the Project makes up a small portion of the overall water anticipated to be delivered by the City to similar types of uses.



0 1,000 2,000
Feet

Figure 3-1: General Plan Land Use in Project Area

Water Supply Assessment- Vista Ranch



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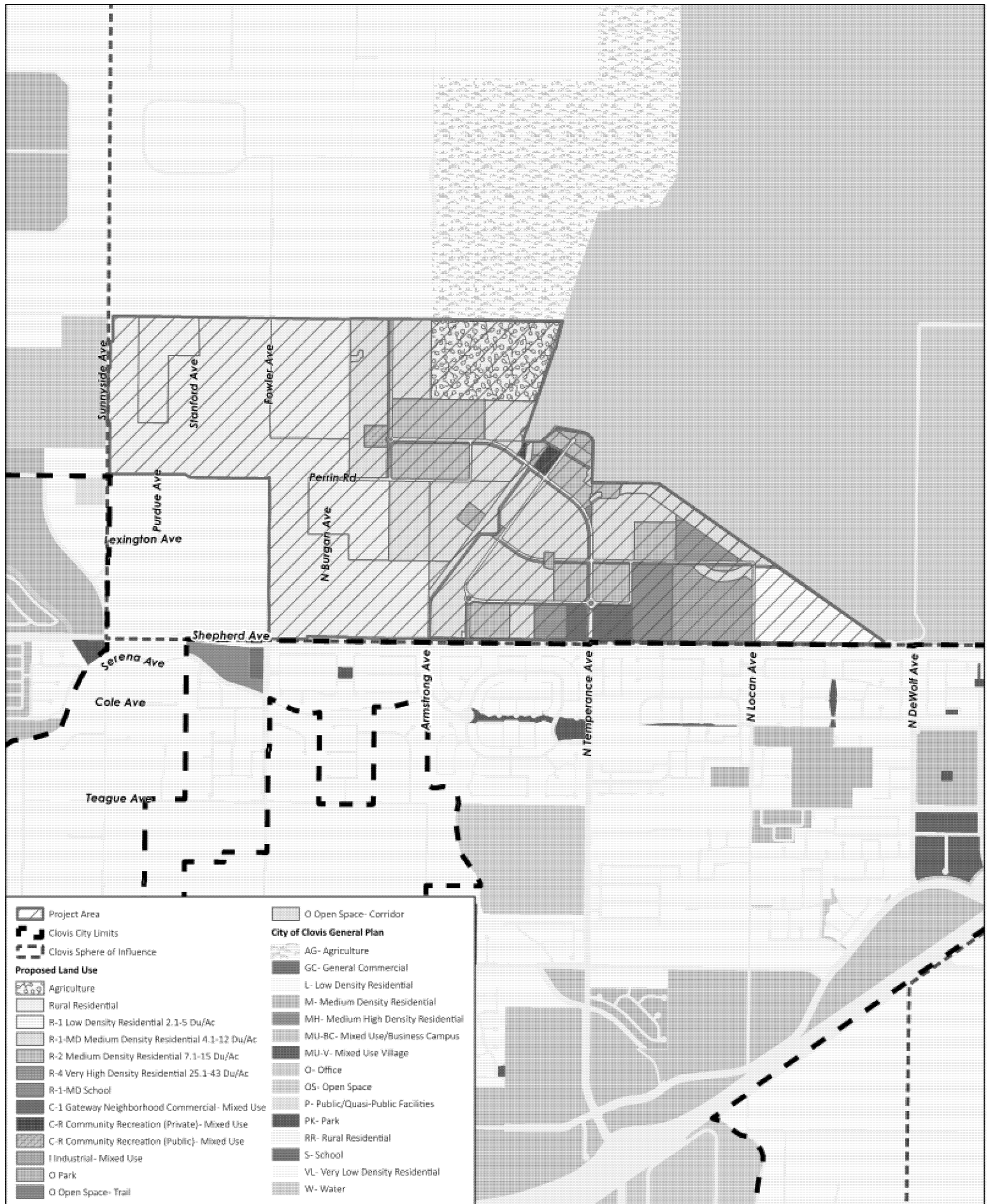


Figure 3-2: Proposed Land Use in Project Area

Water Supply Assessment- Vista Ranch



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4 OVERVIEW OF WATER SUPPLIES

CWC §10910(c)(2) allows reliance on the City's UWMP to determine overall water supply reliability if the Project's planned water demand was included in the UWMP. All of the Project demand was included in the City's UWMP calculations and, while only a portion of the demand of this entire area was included in the WMP, the calculations and analysis from the UWMP are utilized as a current baseline for the City's supply and demand comparison. The Project's demands are greater than those contemplated in the UWMP, as discussed in [Section 3](#) and later in this WSA.

CWC §10910(d) requires that a WSA identify any existing water supply entitlements, water rights, or water service contracts relevant to the identified water supply for the proposed project, including any such existing entitlements, rights, or contracts held by the public water system or city or county preparing the WSA. These descriptions appear in detail in Chapter 6 of the UWMP and are summarized below.

4.1 SURFACE WATER

The City's surface water supply is provided through agreements with Fresno Irrigation District (FID), which allows the City to receive a share of FID's King's River and Friant Central Valley Project (CVP) entitlements. Garfield Water District (GWD) and International Water District (IWD) are located within the City's General Plan boundaries. As the districts' service areas are urbanized over time, surface supplies available to the two districts will be added to the City's surface water supply. As those supplies are added to the City's water supply portfolio, they will be available throughout the City's service area as part of the general water supply. Currently, all surface water available to the City comes from the FID contract. The overall boundaries of each of the districts are shown on [Figure 4-1](#).

A portion of the surface water supply (Firm Supply) is related to the 2019 *Firm Surface Water Supply and Purchase Agreement* between FID and the City, which provides for up to 7,000 AFY of surface water usable, available for use "anywhere the City delivers water by means of the City Water System". This water supply becomes available to the City on an incremental basis, beginning in September 2020 with 1,000 AFY and increasing through 2030 by 300 AFY and thereafter by 200 AFY through September 2045 for a total of 7,000 AFY. A summary of the availability of the Firm Supply is provided in [Section 8](#).

4.1.1 KINGS RIVER

FID obtains much of its surface water from the Kings River. FID is a member of the Kings River Water Association, which holds water rights licenses for all the Kings River and storage rights licenses on Kings River reservoirs. FID is entitled to water based upon a prorated monthly schedule determined by the natural flow of the Kings River as it would occur without reservoir storage above the historic Piedra gauging station. FID is entitled to water from the Kings River at all flows, but the percentage is higher at relatively low Kings River flows. If the snowmelt is slow, the District receives greater entitlement. FID's average gross annual entitlement is 452,541 acre-feet (AF). Within the last fifty years, the smallest entitlement received was 158,109 AF, which occurred in 2015.

The City's allocation from the Kings River is proportional to the total acreage of the City's included area to the total FID area receiving water; the total amounts available to the City are discussed in greater detail in [Section 6](#).

4.1.2 CENTRAL VALLEY PROJECT WATER ALLOCATION: FRIANT DIVISION

The water obtained from the CVP comes from the diversion and storage of water from the San Joaquin River behind Friant Dam. The total available water on the San Joaquin River has been estimated at 2,200,000 AF. Of that, 800,000 AF have been designated as Class I supply (Bureau of Reclamation, 2005). Class I supply is considered to be dependable in most years with shortages only in very dry years. Class II

water is in excess of Class I and is therefore much less dependable. FID has a contract with the United States Bureau of Reclamation for 75,000 AF of Class II water from this source (Bureau of Reclamation, 2005). The agreement between the City and FID requires the District to make available to the City a proportional share of all surface water available to the District although it does not allow the City to directly receive FID's CVP supplies. Therefore, FID is required to make a like amount of Kings River (or any other surface) water available to the City for its proportional share of Class II CVP supplies. FID's Class II contract has received an average 13,577 AFY with the actual number ranging from zero to the full 75,000 AF depending upon the nature of each water year over that period. **Table 4-1** lists the projected surface water volume through 2040.

4.1.3 GARFIELD WATER DISTRICT

GWD is located north of the City with a portion of the District in the City's SOI. The GWD holds a Class I CVP contract for 3,500 AFY. With half of GWD within the City's SOI, an estimated 1,750 AFY is expected to be added to the City's supply upon development. As noted in the UWMP, the first portion of GWD supplies is not anticipated to be available to the City until 2025, with the total 1,750 AFY not accounted for in the supply totals until 2040.

4.1.4 INTERNATIONAL WATER DISTRICT

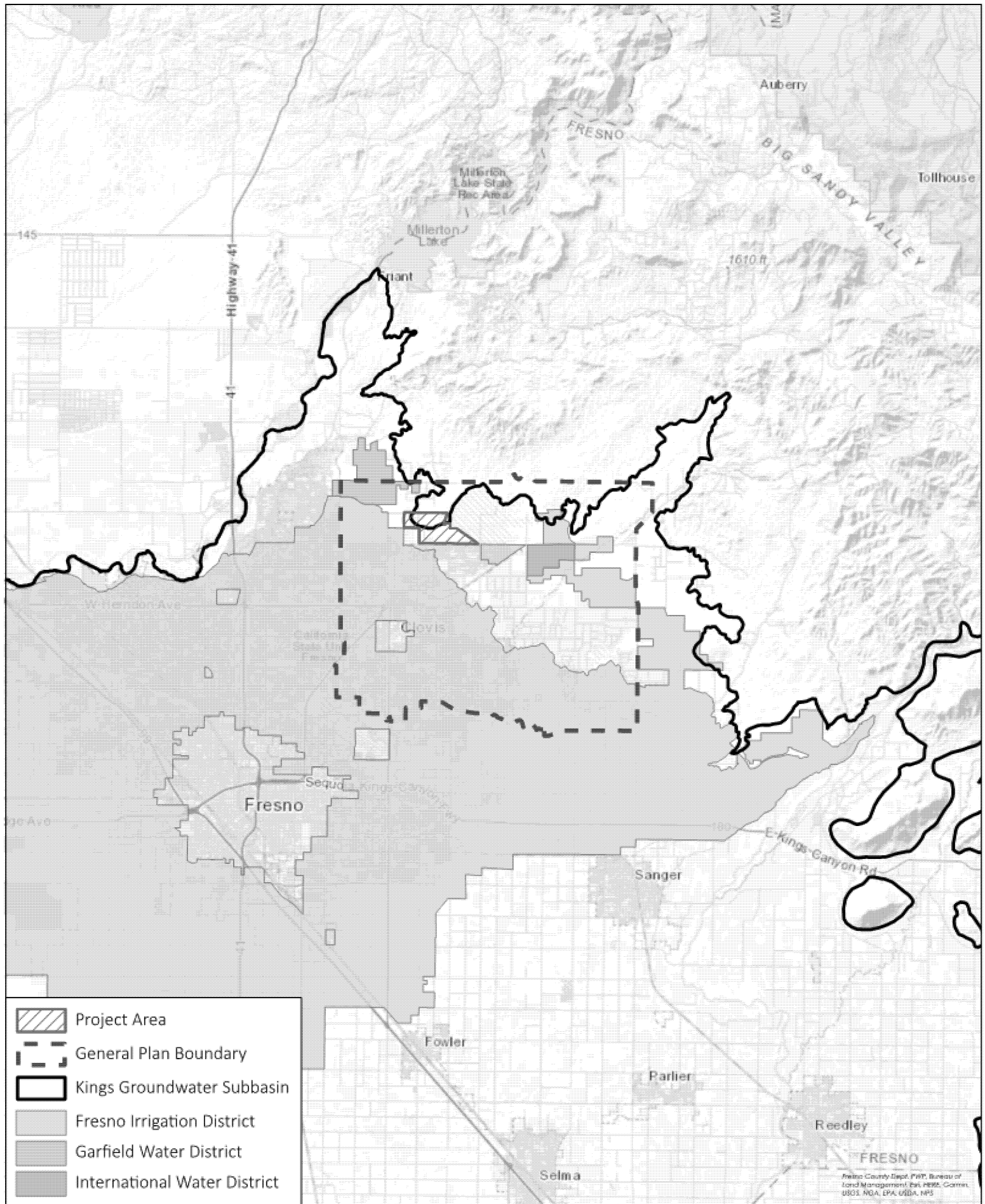
IWD is located east of the City's SOI within the general plan's boundary. The IWD holds a Class I CVP contract for 1,200 AFY. The City's General Plan designates a portion of the District's area as industrial and residential use. At build-out it is estimated that the entire 1,200 AFY supply will be added to the City's supply. As noted in the UWMP, the first portion of IWD supplies is not anticipated to be available to the City until 2030, with the total 1,200 AFY not accounted for in the supply totals until 2040.

4.2 SUPPLY FROM STORAGE

Since 2004, the City has been storing water in the aquifer to create a stable source of supply over the years, as explained in the UWMP. The City has been working with FID to recharge surface water, using the City's contracted shares of capacity in FID's Waldron Banking Facility and Boswell Groundwater Banking Facility, to build up credit in those facilities which allows for annual water withdrawals, on an as-needed or as-requested basis. The surface water banked includes portions of FID's Kings and CVP supplies and may in the future also include other surface water supplies that FID is able to secure on the spot market. Recharged water is purchased under separate agreements with FID and is not included in the surface water totals in the previous section, so this is truly a separate water supply.

Two banking facilities, the Waldron Banking Facility (Waldron) and Boswell Groundwater Banking Facility (Boswell), have been constructed in central Fresno County. The City entered into an agreement with FID to participate in the financing of the construction of a dedicated water banking facility called the Waldron Banking Facilities. The City is entitled to receive up to ninety percent (9,000 AF) of the annual yield. The City and FID have entered into a similar agreement regarding the Boswell Groundwater Banking Facility whereby the City will have access to up to 4,500 AFY of additional surface water supplies. The recharged water will be "banked" for future recovery during dry periods or to accommodate planned growth.

The City has created a recharge plan accounting for historic variations in surface water supplies that will allow it to withdraw an annual 13,500 AF, the maximum withdrawal allowed under the City's agreements with FID. This is considered a firm supply because the contract allows for the City to purchase water at market cost should there be no yield in a given year. The 13,500 AF maximum annual withdrawal is built into the water supply projections in the UWMP for each year over the planning horizon.



4.3 GROUNDWATER

The City is located within the Kings Groundwater sub-basin, a part of the Tulare Lake Hydrogeologic Basin as described in the Department of Water Resources Bulletin 118 (Department of Water Resources, 2003). The groundwater basin is in overdraft and has been for many years. However, it has not been adjudicated.

Chapter 6 of the UWMP discusses a sustainable groundwater yield for the service area and concludes the sustainable yield to be 9,400 AFY, as discussed in greater detail in the WMP. While the North Kings Groundwater Sustainability Plan (NKGSP) has been written and adopted, it does not yet include a firmer approximation of sustainable yield, although development of one is anticipated. The sustainable yield from the UWMP and WMP has been used for this assessment.

The impacts of the Project to the groundwater aquifer are further discussed in the memorandum entitled *Vista Ranch Development – Evaluation of Impacts to Groundwater Levels* (Provost & Pritchard Consulting Group, August 2025).

4.4 RECYCLED WATER

Most of the City's wastewater flow is treated at the Regional Water Reclamation Facility, located southwest of the City of Fresno on Jensen Avenue. In 2009, the City of Clovis completed a new Water Reclamation Facility (WRF). In 2020, the WRF produced approximately 2,496 AFY. Of that total, 28 percent was recycled for mostly landscape and agricultural irrigation, with the remainder being discharged to FID's Fancher Creek for agricultural irrigation.

Ultimately the WRF will be expanded to be able to treat 8.4 MGD, or 9,400 AFY, and will make a substantial contribution to the City's overall water resources. According to the 2020 UWMP, recycled water is used for irrigation of public and private landscape within the service area. Areas receiving or planned to receive recycled water include the Freeway 168 corridor between Shepherd and Sierra Avenues, the existing Clovis Community Medical Center campus, and multiple City parks and landscape areas.

Landscape irrigation will continue to be the main use of recycled water in the future. All public landscape areas within three-quarters of a mile of the distribution system are considered potential recycled water use areas. Clovis Unified School District is evaluating the use of recycled water for its landscape areas. Caltrans has expanded their use of recycled water along State Route 168 from Armstrong Avenue west to Sierra Avenue. Concurrent with the Project's development, the City will expand its use of recycled water and broaden its range of beneficial uses to potentially include irrigating the public landscape space to be developed with the Project.

To affect that increase in use, the City now requires all new development of public landscape near recycled water transmission lines to use recycled water. Additional actions include extending the recycled water distribution system to discharge at groundwater recharge facilities and reducing the cost of recycled water. The UWMP indicates planned use of recycled water supply will be 9,400 AFY by 2040 (UWMP Table 6-13). A 30-inch recycled water transmission main exists in North Temperance Avenue which bisects the proposed Project area. With a planned⁴ recycled water transmission main in East Shepherd Ave, it is possible this Project may use recycled water for landscape irrigation, but the City will make final determination of that at a later date. Additionally, there are planned 6-inch and 8-inch recycled water transmission mains within the Project area.

⁴ As noted in the City's 2018 Recycled Water Master Plan

4.5 EXCHANGES

Water exchanges, transfers, and water banking allow purveyors to manage demand and supply variability by ensuring water will be available for the near future. A portion of the City’s wastewater is treated at the RWRF. Under an agreement with FID, the City of Fresno receives 0.92 AF of Kings River surface water in exchange for each two AF of reclaimed water produced by RWRF (46 percent exchange). Clovis is in discussions with FID and the City of Fresno, to appropriately allocate Clovis’ pro-rata share of the treated water.

4.6 WATER SUPPLY SUMMARY

The five sources discussed above make up the City’s water resources. These are tabulated overall for 2025 and for each subsequent 5-year period through 2040 in [Table 4-1](#).

The City’s overall water resources are projected to increase from 50,739 AFY in 2025 to 74,650 AFY in 2040. Nearly all this increase will come from increasing surface water resources from 18,039 AFY in 2020 to 39,400 AFY in 2040. The mix of water supplies the City plans to use to meet these demands is changing over time and, while the surface water supplies will be the primary source, a mixture of groundwater and supply from storage will be used to meet demands.

Table 4-1. Water Supplies – Normal Year (UWMP Tables 6-12 and 6-13)

WATER SUPPLIES – NORMAL YEAR (As shown in UWMP Tables 6-12 and 6-13)				
WATER SUPPLY	PROJECTED WATER SUPPLY (AF)			
	2025	2030	2035	2040
Groundwater [1]	11,429	10,753	10,076	9,400
Surface Water [2,3]	22,160	27,584	32,508	39,400
Supply from Storage (Waldron and Boswell facilities)	13,500	13,500	13,500	13,500
Recycled Water	3,100	5,500	6,300	9,400
Transfers (GWD and IWD)	550	1,600	2,650	2,950
Total:	50,739	58,937	65,034	74,650
Notes: [1] Reasonably available volume shows a steady reduction in reliance on groundwater supply, as planned, to the sustainable yield volume in 2040; discussed in greater detail in the UWMP. [2] Surface water quantities shown in greater detail in the UWMP. [3] As noted in the UWMP and above, the Surface Water supply includes up to 7,000 AFY of Firm Water. As of 2025, 2,500 AFY of the Firm Water Supply is available to the City, with that quantity increasing annually by 300 AFY. As noted in Table 3-3, the Project is anticipated to be fully constructed by 2035, at which time the City will have access to 5,000 AFY of their Firm Water Supply. This incremental increase is reflected in the Projected Water Supply values from the UWMP.				

5 NORMAL YEAR WATER OPERATIONS

This section evaluates the ability of the City to meet the overall water demands during normal water years. A normal year is a year, or average range of years, that most closely represents the average water supply available to the City. In this case, the normal year reflects the overall water supply summary discussed in [Section 4](#).

This Chapter relies on information taken from Sections 6 and 7 of the UWMP. [Table 5-1](#) compares the City's water demands and compares them with the normal year water supplies (see [Table 4-1](#)) for the 5-year increments the Project is anticipated to be constructed, and through 2040, as shown in the UWMP. As shown, total supplies would exceed total demands. Adequate supplies are available to serve the City and its water customers in normal rainfall years such as those discussed in this section. The excess water supply is adequate to meet the estimated Project water demands.

Table 5-1. Comparison of Normal Year Supplies and Demands

COMPARISON OF NORMAL YEAR SUPPLIES AND DEMANDS				
CONDITION	WATER SUPPLY (AFY)			
	2025	2030	2035	2040
Water Demand	39,737	42,824	46,422	52,598
Water Supply	50,739	58,937	65,034	74,650
Excess/ Shortage	11,002	16,113	18,612	22,052

6 SINGLE-DRY AND MULTIPLE-DRY YEAR WATER SUPPLIES

This section evaluates the availability of City water supplies during single-dry and multiple-dry water years, based on Project buildout in 2035. Numerous factors will work to change the relative quantities of water the City receives from its several water sources. Since each of these has a different reliability in dry years, the overall water supply reliability will change over time. The following sections discuss how this will occur.

During a single-dry year, surface water allotments are anticipated to be reduced by as much as 66 percent for Kings River surface water supplies, and CVP Class II supplies are eliminated completely in dry years. In the future, as the City becomes more reliant on surface water supplies, the impact of surface water reductions in dry years will be more significant.

A multiple-dry year period represents the lowest average supply available to the Project for a consecutive five-year period. This analysis is referred to as a “multi-dry” condition in the UWMP. The WSA analysis is based on the five consecutive driest years of record for the Project’s surface water supplies, which were water years 2011/12 through 2015/16.

6.1 WATER YEAR EFFECTS ON WATER SOURCES

6.1.1 KINGS RIVER SURFACE WATER

Both the single-dry and multiple-dry analyses are most affected by the variations in Kings River entitlement in dry years. FID’s entitlement does not vary directly in proportion to overall annual runoff; rather it favors FID versus all the other Kings River diverters. When river flows are low due to slow runoff, low annual precipitation or both, FID’s share of the daily river flow increases.

The effect of this is that FID’s entitlement, as a percentage of its average entitlement, is higher than the overall water year percentage flow, for virtually any below-average water year. As noted in the UWMP, the anticipated share of Kings River water is shown as 32,100 AFY (UWMP Table 6-4) in 2040 for an average water year. As discussed in the UWMP, the City executed a contract with FID in 2019 for development of a new firm water supply starting at 1,000 AFY in 2020 and increasing to a maximum of 7,000 AFY by 2045 and thereafter. This new supply will not have the variability of the existing supply based on water year type.

6.1.2 FRIANT CVP SURFACE WATER

Over the period of 1986 through 2016, the average Class II allocation has been 38 percent of the contracted amount. However, Class II supplies are particularly subject to the water year type. However, these supplies are relatively small and would not have a significant impact on the total supply. While Class I entitlements do not currently affect the City’s FID supplies, they will affect the future-year GWD and IWD entitlements. Class I allocations in the five multiple-dry years were 0 percent of the contracted amount for all five years.

6.1.3 SUPPLY FROM STORAGE

The contract for the Waldron facility allows annual withdrawals of up to approximately 9,000 AFY, while the Boswell Facility allows up to 4,500 AFY. According to the UWMP, the combined withdrawal limit from the two facilities is 13,500 AFY. In any year where surface water deliveries are substantially limited, the City would want to use these resources to the limit.

A related matter is how contributions are made to supply storage. Whereas in normal years the City is making deposits to both facilities, in a drier year those contributions would be reduced or halted since the surface supplies necessary for the deposits would not be available. Since the deposits come from surface

water resources not counted in the City's water balance, being acquired under separate FID agreements, the curtailment of deposits does not reduce the City's water demand.

6.1.4 GROUNDWATER

As of the preparation of the 2020 UWMP, the City of Clovis obtains groundwater from more than 30 wells, located throughout the service area. The total well production is estimated at 37,290 gallons per minute.

According to the UWMP, the City aims to reduce its direct groundwater consumption whenever possible. Most of the City's water demands will be met by a combination of surface water and supplies from storage, in water years when those two resources are sufficient to meet demands. In drier years, when surface water supplies are limited, the City will pump groundwater, potentially beyond the 9,400 AFY accounted for in a normal year, to make up the shortfall but not to an unsustainable level as discussed in the NKGSP. The City will also recharge surface waters when available to allow for additional groundwater pumping when needed.

Planning to make that objective possible is very important, as Chapter 6 of the UWMP states that the sustainable groundwater supply in the City service area is 9,400 AFY, for normal, dry, and multi-dry years. For the time being, there is no restriction against pumping groundwater above the sustainable aquifer yield; however, the NKGSP indicates the City must sustainably use groundwater.

This WSA uses 9,400 AFY as the sustainable groundwater pumping amount, as stated in the UWMP. Due to the very large size of the aquifer underlying the City, available groundwater is not quickly affected by the type of water year. Anticipating a mix of wet and dry years similar to what has been historically seen, this WSA does not reduce available groundwater in dry or multiple-dry years; however, the City will be prioritizing use of other supplies over groundwater when possible.

6.1.5 RECYCLED WATER

Recycled water production, being tied directly to indoor water use, does not vary significantly with the water year type, and is not adjusted from normal for this analysis.

6.2 CHANGES IN WATER SOURCE RELIABILITY OVER THE PLANNING HORIZON

In 2020, surface water made up 58 percent of the City's direct water supply. In 2035, the surface water supply is planned to be 53 percent of the total while the supply from storage will have increased to 18 percent in a normal year. Groundwater will remain an important, but decreasing, component of the water supply in the near future.

This means the City's reliance on surface water supplies, either directly used or pumped from subsurface storage, will have increased to 71 percent of the total. While there is a margin of normal year supply available over planned demand over the entire planning horizon, some provisions may have to be made for additional reliable storage to account for such a large portion of surface water being subject to water year variability. See the reliability analysis in [Section 6.3](#) following.

6.3 SUMMARY OF SINGLE-DRY AND MULTIPLE-DRY YEAR RELIABILITY OVER THE PLANNING HORIZON

Supply for dry years would be drawn from a combination of Kings River surface water, supply from storage, groundwater, and recycled water. As shown in the UWMP, it is anticipated that surface water supplies from the FID Firm Water Agreement would still be available during drought years. Other firm water supply sources are groundwater, banked water, and recycled water, all of which are considered

resilient against drought compared to surface water supplies while still being able to use previously banked groundwater supplies from the Waldron and Boswell facilities. Project demand was assumed to be constant across all water years.

The supplies that would be available during single-dry and multiple-dry years in 2035 (at assumed Project buildout) are summarized in **Table 6-1**; this is a reproduction of the data from the UWMP for reference, see **Table 8-1** for a comparison including the Project demands.

The supply varies based on the percentages shown in UWMP Table 7-1, as follows, and is based on the actual data from the 2012-2016 drought period:

- Single-Dry Year: 66%
- Multiple-Dry Year:
 - Year 1: 89%
 - Year 2: 85%
 - Year 3: 77%
 - Year 4: 66%
 - Year 5: 98%

The City has a Water Shortage Contingency Plan (WSCP) (Provost & Pritchard Consulting Group 2021) in place that could be partially or fully implemented if needed or mandated. The “Demands with Conservation” noted below vary with the availability of water supply and the stage of the WSCP being implemented to reduce demands. As Year 5 has nearly normal water supply availability, the conservation requirements are set at lower levels according to the WSCP and the demands increase accordingly, as discussed in the UWMP.

Table 6-1. Dry Year Supply and Demand Comparison in 2035 (UWMP Tables 7-2, 7-3, and 7-4)

DRY YEAR SUPPLY AND DEMAND COMPARISON IN 2035 (As shown in UWMP Tables 7-2, 7-3, and 7-4)						
SCENARIO	SINGLE-DRY YEAR	MULTIPLE-DRY YEAR				
		YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Baseline demand	46,422	46,422	46,422	46,422	46,422	46,422
Demand with Conservation	40,957	42,840	40,200	37,028	33,353	44,176
Total Supply	47,233	60,330	57,958	52,625	47,233	64,141
Excess/<Deficit> in Supply	811	13,908	11,536	6,203	811	17,719
Excess/<Deficit> in Supply with Conservation	6,276	17,490	17,758	15,597	13,880	19,965
Note: Refer to the 2020 UWMP, Section 7.2, for additional discussion regarding calculation methodology. Units: AFY						

6.4 CLIMATE-BASED RELIABILITY FACTORS

The following is an excerpt from the UWMP regarding climate change:

“The most probable water supply in the City’s portfolio to be impacted by climate change is their surface water supply. The NKGSP examined the reliability of the Kings River supply and concluded that the agencies reliant on the Kings Subbasin could continue to plan on those supplies with climate change factored in, stating specifically, “Kings River water supplies available to the Kings

Subbasin will be managed in the future to maintain historical levels of water supplies.” Evaluation of the Kings River supplies into the future, considering climate change impacts of warmer temperatures, showed more precipitation occurring as rainfall and less as snowfall and that the snowfall (snowpack) will have a tendency to melt sooner in the season. The biggest impact this shift will have is water management, including additional reservoir storage and increased recharge during low-use periods. The GSP further states that “climate change will have no significant impact on Kings River diversions.”

This WSA defers to the UWMP for additional discussion of the overall effects of climate change upon supply reliability. Climate change has been considered in the preparation of the UWMP in Sections 3.3.1, 4.1, and 7.1.4.

7 OPERATIONAL RELIABILITY

The City's surface water entitlement does not accrue all at once during a given water year. Rather, the Kings River entitlement accrues daily throughout the year based on actual river runoff and the Kings River Water Association (KRWA) entitlement schedule. The daily nature of the Kings River supply is especially important early in the water year, which begins October 1. The very low river flows in October and November mean that supply is low, and the City must rely on other water supplies during those months. The relatively large supplies available from storage help mitigate the seasonal nature of the surface water supply, and these are further backed up by groundwater supplies equivalent to almost half the City's total annual demand. Additionally, the 2019 Cooperative Agreement allows for up to an additional 5,000 AFY of carryover, when available, which can help with seasonal supply.

The City has not had any issue with temporary water shortages to date. The City's WMP and UWMP indicate a need to increase their surface water and groundwater supplies to meet future demands and provide details on how much of each supply is needed compared to the existing supplies. The WMP also includes a Capital Improvements Program identifying capital projects that are necessary to acquire and facilitate the movement of current and future water supplies throughout the City's system in a reliable manner the City's adherence to their planning documents and consistent development of these water supplies and infrastructure is critical for the City's continued growth and development and will provide operational reliability into the future.

8 CONCLUSIONS

As summarized in [Table 8-2](#), the City has adequate supplies to meet the needs of all the City's water customers including the Project, in normal water years, over the 20-years planning horizon. However, the 480 AFY of water supply used for this project above the supply planned for this area will need to be replaced to support full buildout of the GP.

In the buildout year, if demand is as projected, the City will have sufficient water to meet dry year demands of all dry year types. Conservation measures, detailed in the Water Shortage Contingency Plan, have been developed that would mitigate possible shortfalls by reducing demand by approximately 15 percent. Evidence from the 2013 to 2015 drought suggests that those results, and more, are achievable. Additionally, as the City has surplus water supplies in normal years, short-term additional groundwater extraction in the single-dry and multiple-dry years is also planned as part of their water portfolio.

As discussed in Section 7, the City is implementing plans to continue to acquire water supplies and construct infrastructure to supply current and future water users. Therefore, we conclude the City of Clovis has adequate water supplies to meet the needs of the City in normal, and multi-dry years given the previously discussed potential demand reductions and supply augmentations.

As discussed in Section 2, the existing groundwater wells on the properties proposed for development with the Project will be abandoned and destroyed, and no new City-owned groundwater wells will be constructed in the vicinity of or within the Project boundary as a part of this Project.

As discussed in [Sections 4.3, 6.1 and 6.3](#), the City is an active participant in the North Kings Groundwater Sustainability Agency (NKGSA). The City's water system planning and development, and water supply management is consistent with the recommendations and actions discussed in the North Kings Groundwater Sustainability Plan that will allow the City and other NKGSA members to reach sustainability by 2040, as required by the Sustainable Groundwater Management Act. As the Project will be served by the City's water system, it is understood the City will condition the Project to be constructed consistent with the North Kings Groundwater Sustainability Plan and the Sustainable Groundwater Management Act requirements, as applicable.

8.1 CONCLUSIONS INCLUDING ADDITIONAL WSAs

Since the 2020 UWMP was adopted, four WSAs have been prepared for the City, including this one. It is important to understand the cumulative impact of the additional demands associated with WSAs over and beyond the demands analyzed in the 2020 UWMP.

As noted above, the City has a surface water supply that is able to be used north and east of the FID place of use boundary and that supply is increasing annually through 2045. While the City shares water supplies across both pressure zones, it is understood Pressure Zone 2 relies largely on the SWTP. The area outside the FID place of use boundary will rely, at least in part, on the Firm Water Supply; therefore, the following comparison of projects that have been approved outside the FID place of use boundary and their entire water demand is shown below, including anticipated year of build out (if known), alongside a comparison of the quantity of Firm Water Supply the City will have access to at that time.

Table 8-1. Summary of Demands Compared to the Firm Water Supply

SUMMARY OF DEMANDS COMPARED TO THE FIRM WATER SUPPLY NORTH/EAST OF ENTERPRISE CANAL		
PROJECT NAME	TOTAL PROJECT DEMAND (AFY)	ANTICIPATED BUILD OUT YEAR
Tract 6200	288	Unknown
Tract 6343	236	2030
Trace 6205	256	2030
Vista Ranch	1,443	2035
Project Demand Totals	2,223	
Firm Water Supply (2030)	4,000	
Firm Water Supply (2035)	5,000	

As the table shows, the Firm Water Supply is sufficient in 2035 to meet the demands of all projects currently in process or anticipated to begin in the near-term (as indicated by City staff) outside the FID place of use boundary, including Vista Ranch.

The demands in [Table 8-2](#) include those demands noted in the UWMP (see [Table 6-1](#) above), and the additional demands (above the UWMP) associated with the Project evaluated in this WSA, as discussed in [Section 2.2](#). Only the “additional demand” is noted in the table below, as the rest of the demand was already accounted for in the UWMP. Similarly, the noted Excess/Deficit reflects the difference between these summated demands and the total supply noted in the UWMP and in [Table 5-1](#), above. This approach accounts for the additional demands associated with the proposed land use type above the demands associated with the originally planned land use type. The analysis of this report results in two impacts of the Project:

- Near-term: there is an excess of supply in all conditions, even with the additional demands.
- Long-term: the WMP evaluated the City’s build-out of the General Plan based on assumed land use densities. The Project increases the density of those areas with calculated demands documented in the WMP and develops into an area without water demands associated with it in the WMP. The impact of those increases equates to an additional water supply needed for the Project of 480 AFY.

Table 8-2. Summary of Project Water Supplies and Demands

SUMMARY OF PROJECT WATER SUPPLIES AND DEMANDS							
2020 UWMP SUPPLY AND DEMAND COMPARISON RESULTS	NORMAL YEAR (2035)	SINGLE- DRY YEAR	MULTIPLE-DRY YEAR				
			YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Excess/<Deficit> in Supply [1]	18,612	811	13,908	11,536	6,203	811	17,719
Excess/<Deficit> in Supply with Conservation [1]	--	6,276	17,490	17,758	15,597	13,880	19,965
ADDITIONAL DEMANDS ASSOCIATED WITH WSAs PREPARED SINCE 2020 UWMP							
Home Place Master Plan (Approved March 2021)	No Additional Demand Associated with WSA						
Tract 6205 SOI Expansion (Approved 2022)	256	256	256	256	256	256	256
Tract 6343 (Approved 2022)	79	79	79	79	79	79	79
Vista Ranch Master Plan (Approval Anticipated by Spring 2026)	101	101	101	101	101	101	101
Excess/(Deficit) in Supply including Additional Demands from Approved WSAs	18,176	375	13,472	11,100	5,767	375	17,283
Excess/(Deficit) in Supply with Conservation including Additional Demands Approved WSAs [2]	--	5,905	17,119	17,387	15,226	13,509	19,594
Units: AFY							
[1] See Section 6.3 for additional discussion on the values shown in the table.							
[2] Per the UWMP, conservation efforts will reduce the demands by an estimated 15%, which is reflected in the values in the table.							

9 REFERENCES

Provost & Pritchard Consulting Group (2021). City of Clovis, 2020 Urban Water Management Plan Update. Clovis.

Placeworks. (2014). General Plan, City of Clovis. Clovis.

Department of Water Resources. (2003). Bulletin 118 - California's Groundwater. Sacramento.

Provost & Pritchard Consulting Group. (2018). City of Clovis, Water Master Plan Update, Phase III. Clovis.

Provost & Pritchard Consulting Group (2021). City of Clovis 2021 Water Shortage Contingency Plan. Clovis.

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I.2 - Groundwater Levels Evaluation

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MEMORANDUM

To: City of Clovis

From: Owen Kubit, PE, PG, CHG, CFM

Subject: Vista Ranch Development – Evaluation of Impacts to Groundwater Levels

Date: September 18, 2025

Introduction

This memorandum documents an analysis of impacts to groundwater levels in private wells adjacent to the Vista Ranch development, especially properties just west of the project. The analysis considers the impacts from an increase in impervious surfaces (roads, sidewalks, roofs, etc.) and other new factors that will impact groundwater replenishment. Some of the analyses are based on documented water budget methods found in the 2022 North Kings Groundwater Sustainability Plan (Provost & Pritchard, June 2022) (GSP), which covers the project area. The GSP, and the water budgets within the GSP, were adopted by the City of Clovis and the North Kings Groundwater Sustainability Agency and approved by the California Department of Water Resources. The analysis concludes that the reduction in groundwater replenishment due to new impervious surface will be offset with new sources of recharge and a reduction in current groundwater pumping.

Background Information on Vista Ranch Master Plan

Vista Ranch is a proposed master-planned community, including approximately 3,286 dwelling units. The project covers 952 acres, including 507 acres of proposed master plan development, and 445 acres of non-development areas of rural residential housing (hereafter called Non Development Areas). The project is in Fresno County just outside of the Clovis City limits. The project is located north of Shepherd Avenue, west of Big Dry Creek Dam, east of Sunnyside Avenue, and south of open space and rural residential areas (see **Figure 1**). Currently, the project site is largely open space and rural residential homes, limited agriculture and an abandoned nursery. The development will include a variety of land uses, including Low Density Residential, Medium Density Residential, Medium-High Density Residential, Very-High Density Residential, Community Recreation, Light Industrial (existing mini-storage), Neighborhood Commercial, Trails, Open Space, Park, and School. Total estimated water demands are 1,443 acre-feet/year, based on the revised Vista Ranch Water Supply Assessment (Provost & Pritchard, September 2025). These demands include 1,172 AF/yr for the new development and 271 AF/year for the Non-Development Areas.

Precipitation Recharge

Some portion of the local precipitation recharges the groundwater supply over the project site. This is called deep percolation of precipitation, or simply precipitation recharge. With construction of impervious surfaces, namely roofs, roads, sidewalks, driveways and parking lots, this precipitation will no longer contribute to the groundwater but instead be sent to off-site stormwater basins. The Non Development Areas cover 445 acres but will remain in rural residential housing/agricultural uses. Even if more rural residential homes are constructed in this area, the impact to precipitation recharge would be minimal since the impervious area would be small, and more importantly, without a stormwater collection system the rainfall will collect and percolate on the local properties. The Master Plan area will cover 507 acres and will

[https://us-partner-integrations.egnyte.com/msoffice/wopi/files/fdba25b2-a321-4540-a996-702175c31026/WOPIServiceld_TP_EGNYTE_PLUS/WOPIDUserld_72.ppeng.egnyte.com/2025.09.18 Vista Ranch GW Evaluation Memo_C.docx](https://us-partner-integrations.egnyte.com/msoffice/wopi/files/fdba25b2-a321-4540-a996-702175c31026/WOPIServiceld_TP_EGNYTE_PLUS/WOPIDUserld_72.ppeng.egnyte.com/2025.09.18%20Vista%20Ranch%20GW%20Evaluation%20Memo_C.docx)

have an impact on precipitation recharge. This area will also includes 59 acres of open space, so the reduction in precipitation recharge will occur over $507 - 59 = 448$ acres.

In general, precipitation recharge is low in the San Joaquin Valley, due to low precipitation and lack of large rainfall events that saturate the soils. Much of the precipitation merely wets the surface soil or satisfies the demand of local crops, landscaping or native vegetation. While small, this value is still large enough for inclusion in a water budget analysis. Below is an analysis of how much natural recharge from precipitation will be reduced due to the proposed project.

In the 2022 GSP (page 3-93), precipitation recharge was estimated based on the following empirical formula developed by the United State Geologic Survey:

$$DP = 0.64 \times P - 6.2$$

Where:

DP = Deep percolation (inches)

P = Annual precipitation (inches)

Source: Ground-water Flow in the Central Valley (USGS Professional Paper 1401-D 1989)

This empirical equation was developed for rural areas in the San Joaquin Valley by estimating soil moisture budgets over a 50-year period. In the 2022 GSP, precipitation recharge was estimated over the entire GSA over an extended period. The long-term average precipitation was estimated to be 11.79 inches/yr, and 11.4% of the precipitation was estimated to percolate to groundwater based on the formula above. This was conservatively rounded up to 15% in the 2022 GSP, resulting in total precipitation recharge of $11.79 \text{ inches} \times 1 \text{ ft}/12 \text{ inches} \times 15\% \times 448 \text{ acres} = 66 \text{ AF/year}$ in project area.

Based on these results, precipitation is not considered a major source of groundwater replenishment on the project site. Local recharge also occurs from dam seepage, Big Dry Creek seepage, and deep percolation of outdoor applied water.

Reduction in Groundwater Pumping

Development of the project will eliminate the current groundwater pumping occurring within the 507 acres proposed for development. The current water usage in this area has not previously been measured or estimated. An examination of aerial photographs and site visit in July 2025 identified seven rural residential homes that will be removed for the new development. Most of the agriculture appears to be rainfed and with evapotranspiration occurring in the winter. Some limited, scattered irrigated agriculture was observed, but is minor and not included in the water demand estimate. The nursery within the project site appears to be abandoned so no demands were included for it.

Based on an evaluation of indoor usage and typical landscaped areas in the north Kings GSA, rural residential water demands were estimated to be 0.49 AF/acre in the NKGSA GSP (pg 3-96). According to the US Census, Clovis has 2.97 people per household. Using this value results in rural residential demand of $7 \text{ houses} \times 2.97 \text{ people/house} \times 0.49 \text{ AF/person/year} = 10.2 \text{ AF/year}$, rounded to 10 AF/year.

System Losses

Water will be imported to the area through the Clovis water system and distributed via a network of water mains and lateral pipelines. Since the water system will be pressurized, some system losses (leakage) are expected. This leakage will enter the soil vadose zone and eventually seep down to the groundwater table.

The City of Clovis prepares AWWA Water Loss Audit Reports that determine leakage from their system. From 2020-2023, real losses (leakage) averaged 0.8% of total water use. Applying this to the proposed development area of the project, pipeline leakage would be $0.8\% \times 1,172 \text{ AF/yr} = 9 \text{ AF/year}$.

Deep Percolation of Landscape Percolation

Water will be imported to Vista Ranch for outdoor water use, including swimming pools, outdoor washing, and principally landscape irrigation. Some portion of this water will percolate past the landscaping and surface soils and recharge the groundwater. This situation was evaluated in the 2022 GSP (pg 3-93), which concluded that 15% of outdoor water use (or about 10% of the total urban water use) will percolate to the groundwater. Evaluating the development area of the project, this would equate to $10\% \times 1,172 \text{ AF} = 117 \text{ AF/year}$, which exceeds the 66 AF/year loss in natural precipitation recharge.

Stormwater Basins

Rainfall from the proposed development that does not percolate or evaporate will be diverted to storm drains and sent to off-site stormwater basins. No new stormwater basins will be constructed within the project areas. The two stormwater basins nearest to the project are shown on **Figure 1**. One basin is located about ½-mile south of the project site, and one is just west of the Non Development Areas. The fate of the water will vary based on rainfall trends and stormwater basin operations, but some will evaporate, some will percolate, and some may be sent to the San Joaquin River if storage space is needed. Hence, while this water will not percolate on site, most of it will percolate in the area and benefit the regional groundwater supplies.

Water Supplies

The project will receive water supply from the City's water distribution system, which relies on both groundwater and surface water. No new wells will be installed near Vista Ranch, and no new wells are expected to be needed elsewhere in Clovis to help meet project demands. Instead, demands will be met through a combination of existing supplies and expansion of surface water usage throughout the City. A recycled water system will also be installed in Vista Ranch to use tertiary-treated wastewater for large landscape areas.

The Clovis 2020 UWMP shows that projected supplies, after 2025, will not be met with increased groundwater pumping, but will instead be met with increased surface water use and recycled water (2020 UWMP, page 6-18, Table 6-13). In addition, the project area is entirely within the water system's Pressure Zone 2, which largely relies on surface water supplies.

The closest Clovis wells to the project include Well W-33 (about 0.9 miles south, 400 gpm), and Well W-30 (about 1.25 miles southwest, 600 gpm). These wells are already operational. With their distance of about 1-mile from the project, they are not believed to have any significant impacts on groundwater levels near the project. These wells have low production yields compared to other Clovis wells, which have average capacities of 1,035 gpm (Clovis Urban Water Management Plan, 2021, pg 6-1).

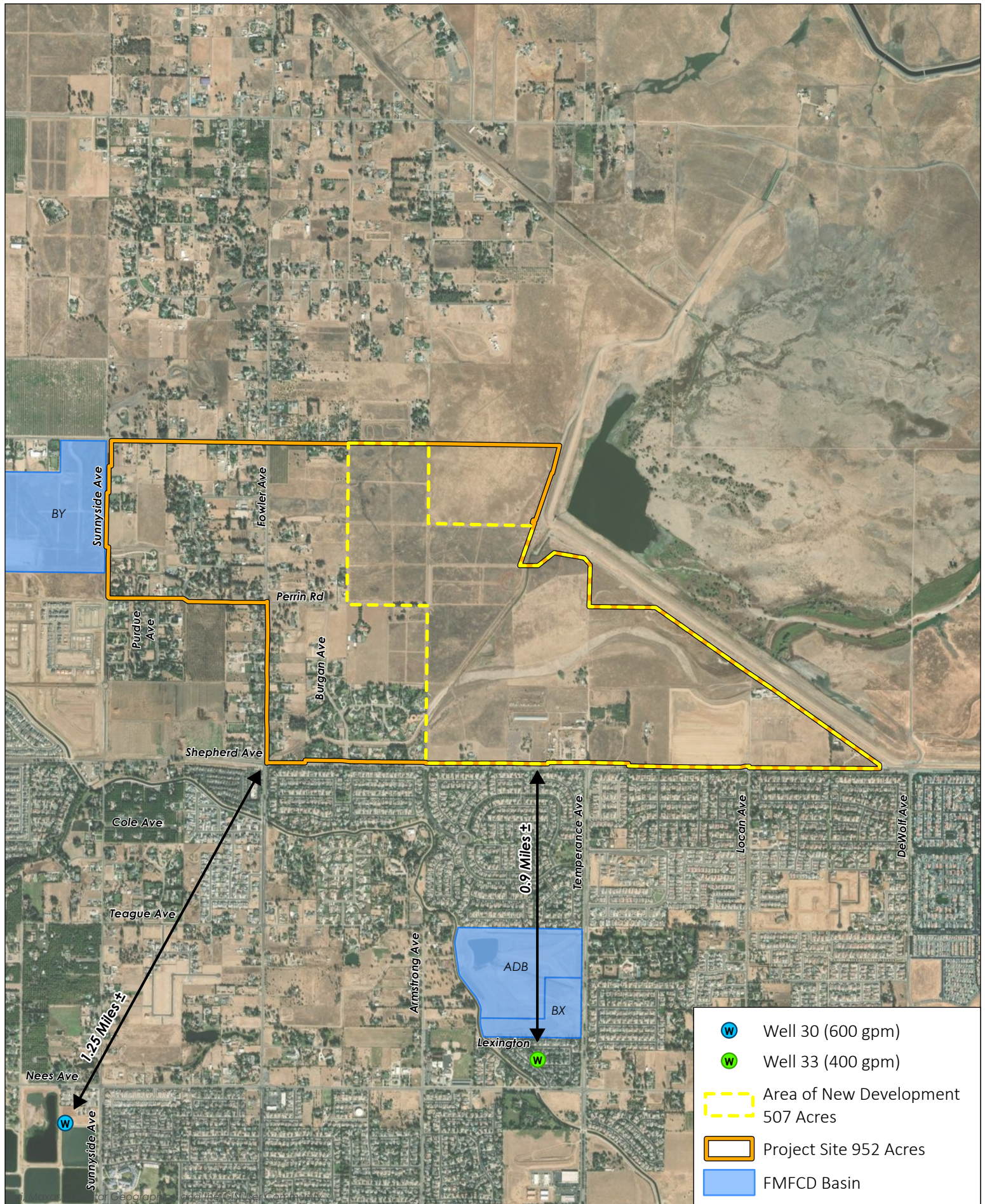
Impacts to Groundwater Replenishment

The project will reduce precipitation recharge due to construction of new impervious surfaces (roads, roofs, etc.), however, on-site groundwater pumping will be eliminated and new sources of local recharge will be created with the project. An overall analysis of the impact to local groundwater supplies is presented in the table below.

Table 1 – Impacts to Groundwater Replenishment

Description	Impact to Groundwater Replenishment
Reduction in Precipitation Recharge	-66 AF
Reduction in Local Groundwater Pumping	+10 AF
Local Pipeline Seepage	+9 AF
Local Deep Percolation of Irrigation Water	+117 AF
Total	+70 AF

In summary, the local domestic wells are not expected to be impacted by the project based on the accounting of groundwater replenishment shown in Table 1. In addition, according to their 2025 UWMP, the City of Clovis will obtain new water supplies from surface water or recycled water going forward, so further impacts to regional groundwater levels are not expected.



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Vista Ranch Development



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