

Exhibit N-7



SB 610 WATER SUPPLY ASSESSMENT UPDATE

Westlake WSA Update for the Parc West Development Project

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1.0 INTRODUCTION AND BACKGROUND

The City of Fresno is conducting an environmental review under the requirements of the California Environmental Quality Act (CEQA) for the proposed Parc West project in the City of Fresno, California. See Section 2.0 for a description of the project. This Water Supply Assessment (WSA) is an update to the previously-approved Westlake Development Project WSA that was adopted by the City of Fresno in 2011. This WSA Update will provide information for use in the CEQA analysis for the proposed Parc West project.

The Updated WSA has been prepared pursuant to the requirements of Senate Bill 610 (Costa; Chapter 643, Stats. 2001) ("SB 610"), which requires public water agencies, parties or purveyors that may supply water to certain proposed development projects to prepare a WSA for use in environmental documentation for such projects, pursuant to CEQA. This Updated WSA contains information from the City of Fresno 2015 Urban Water Management Plan (UWMP) which was adopted by the City of Fresno. A WSA is required for any "project" that is subject to CEQA and proposes, among other things, a residential development of more than 500 dwelling units.

PURPOSE OF UPDATING THE WESTLAKE WSA

The Project Applicant (Granville Homes) for the Westlake project has determined that the Westlake project is no longer viable and is pursuing a "scaled-down" project, known as "Parc West" on a portion of the same site as the Westlake project. Therefore, the "project" for this WSA Update is the abandonment of the Westlake Development project and the construction and operation of the Parc West project. This WSA Update will accommodate the scaled-down Parc West project and will utilize the information in the previous Westlake WSA to the extent practical, but will provide updated information where necessary and applicable. The entire previously-approved Westlake WSA is included as Appendix A.

DISPOSTION OF THE ADOPTED WESTLAKE WSA

This Updated WSA is intended to supersede the previously adopted Westlake WSA. Since the adopted Development Agreement conditions and maps for Westlake Development project are being formally abandoned and replaced by the Parc West project, so will the Westlake WSA. This Updated WSA will serve as a stand-alone document supporting only the Parc West project. Any future development of the remaining acreage of the Westlake Project (which is approximately 300 acres) will be subject to additional CEQA analysis and a subsequent WSA if the requirements for implementation of SB 610 are met if or when remaining acreage is to be developed.

2.0 PROJECT DESCRIPTION

PROJECT LOCATION AND SETTING

The proposed Parc West project will occupy only a portion of the previous Westlake Development project. Specifically, it is a 160-acre portion of the 430-acre Westlake site at the northwest corner of Ashlan Avenue and Grantland Avenue (See Figures 1 through 3). The site is within the City limits of Fresno (annexed in 2015) and occupies Assessor’s Parcel Numbers 512-02-126 and 512-02-150S. The site is zoned RS-5: Single-Family Medium Density Residential and CC: Commercial Community (See Figure 4). The site is currently planted with relatively young almond trees but was previously vacant for several years. Surrounding land uses are as follows:

Surrounding Land Use and Zoning

Location	Existing Land Use	Roadway
North	Rural residential (outside City limits)	None existing. Planned for W. Gettysburg Ave.
South	Agricultural (almonds) – site of original Westlake project	None existing. Planned for W. Ashlan Ave.
West	Agricultural (outside City limits)	None existing. Planned for N. Garfield Ave.
East	Central Unified School District Complex (football stadium,	N. Grantland Ave.

DESCRIPTION OF PROPOSED PROJECT

As previously stated, the “project” for this WSA Update is the abandonment of the Westlake Development project and the construction and operation of the Parc West project. Parc West will include up to 844 single-family residential units and a 1.819-acre park / trail system. The project will be built out in phases, with Phase 1 generating 84 units. The general layout of the project is shown in Figure 3. For purposes of this WSA Update, it is assumed that no units would not be occupied until after 2020.

Although the Parc West project is proposed to occupy 160 acres of the previous Westlake Project, there will be an entirely new layout of the site; as the previously-approved Westlake maps will be abandoned and replaced with the proposed 844-unit Parc West map. Site access will occur

from N. Grantland Avenue and from the proposed W. Ashlan Avenue and N. Garfield Avenue extensions. Preliminary internal road circulation and layout are shown in Figure 3.

The project is proposed to be supported by the City of Fresno's municipal water supply system (pending the approval of this WSA Update) and its wastewater collection system (including the Grantland trunk sewer) and wastewater / treatment disposal facilities. The major service public utility is Pacific Gas and Electric.

In support of the Parc West project, the Applicant is seeking the following entitlements from the City of Fresno:

- General Plan Amendment: Medium Density Residential land use designation (5.0 – 12.0 DU/acre), Traffic Circulation Plan, Parks, Open Space and Trail Network.
- Rezoning: A 10-acre section originally intended for commercial development will be re-zoned RS-5 and will include removal of the previous Westlake Development Project conditions to be replaced with new conditions appropriate for the Parc West Development. The remaining acreage will remain RS-5 and will not require land use designation or zoning changes.
- Tentative Tract Map to create "super-pads" for future subdivisions.
- Community Facilities District for maintenance of the public green spaces.

COMPARISON OF WESTLAKE VS PARC WEST

The previous Westlake Development Project Water Supply Assessment adopted/approved by the City of Fresno included:

- 2,600 residential units on 430 acres
- 295,000 sq. ft. commercial component
- 55-acre man-made lake
- Public landscaping

This WSA Update for the new "scaled-down" project, known as Parc West on a portion of the same site as Westlake includes:

- 844 single-family residential units on 160 acres
- 1.819-acre park and trail system / public landscaping
- No commercial component

Figure 1
Aerial Map

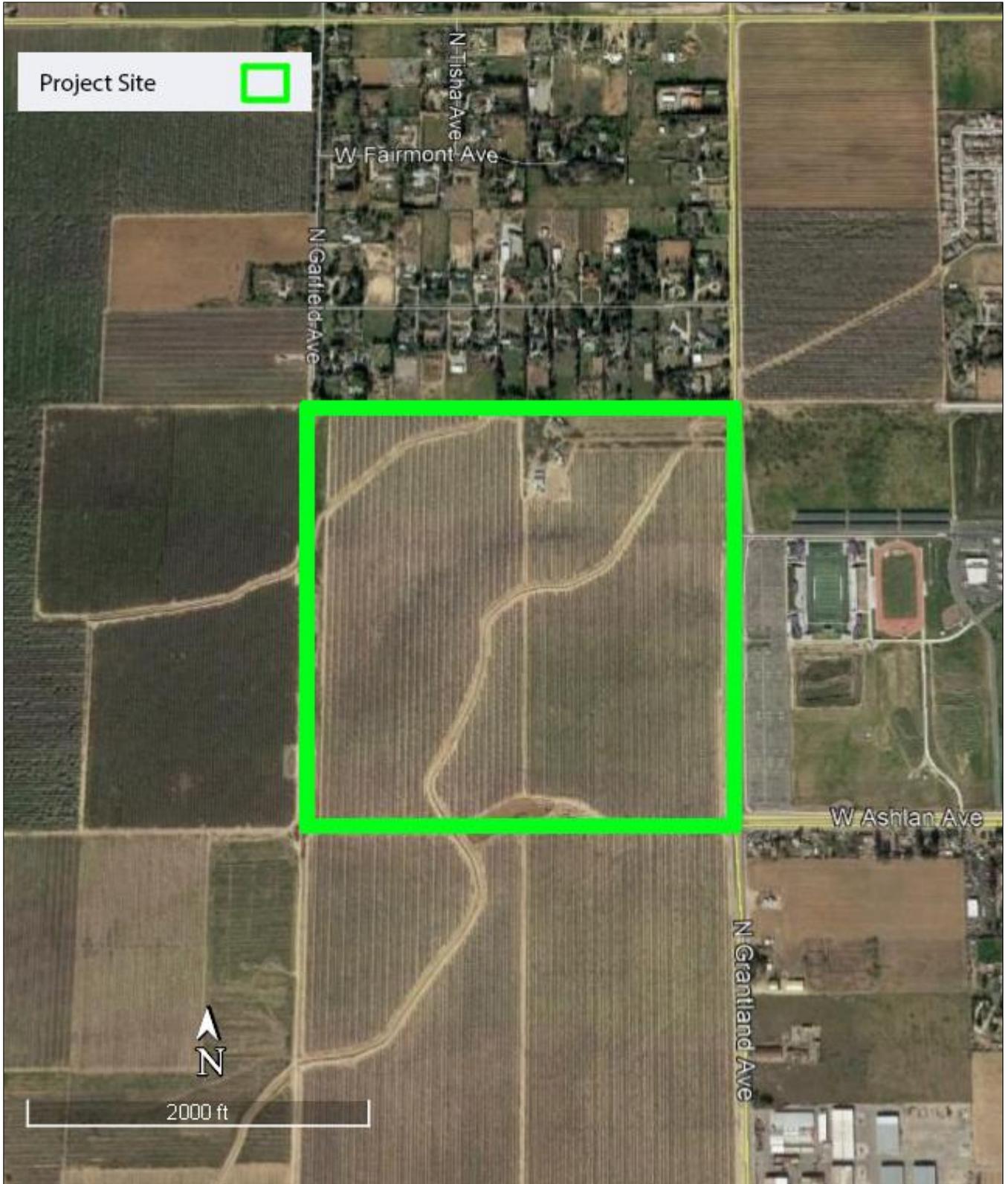


Figure 2
Parc West in Relation to Westlake

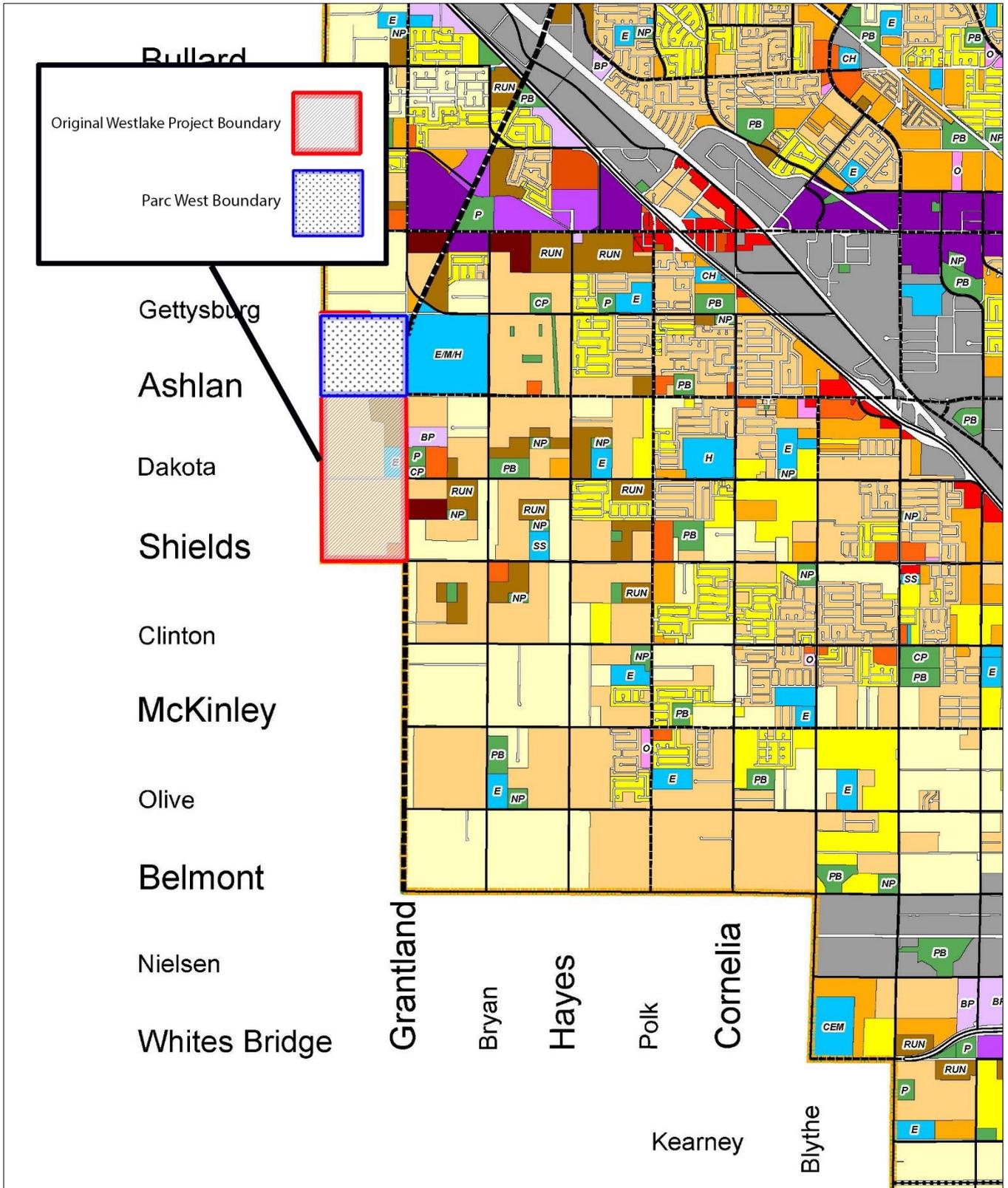
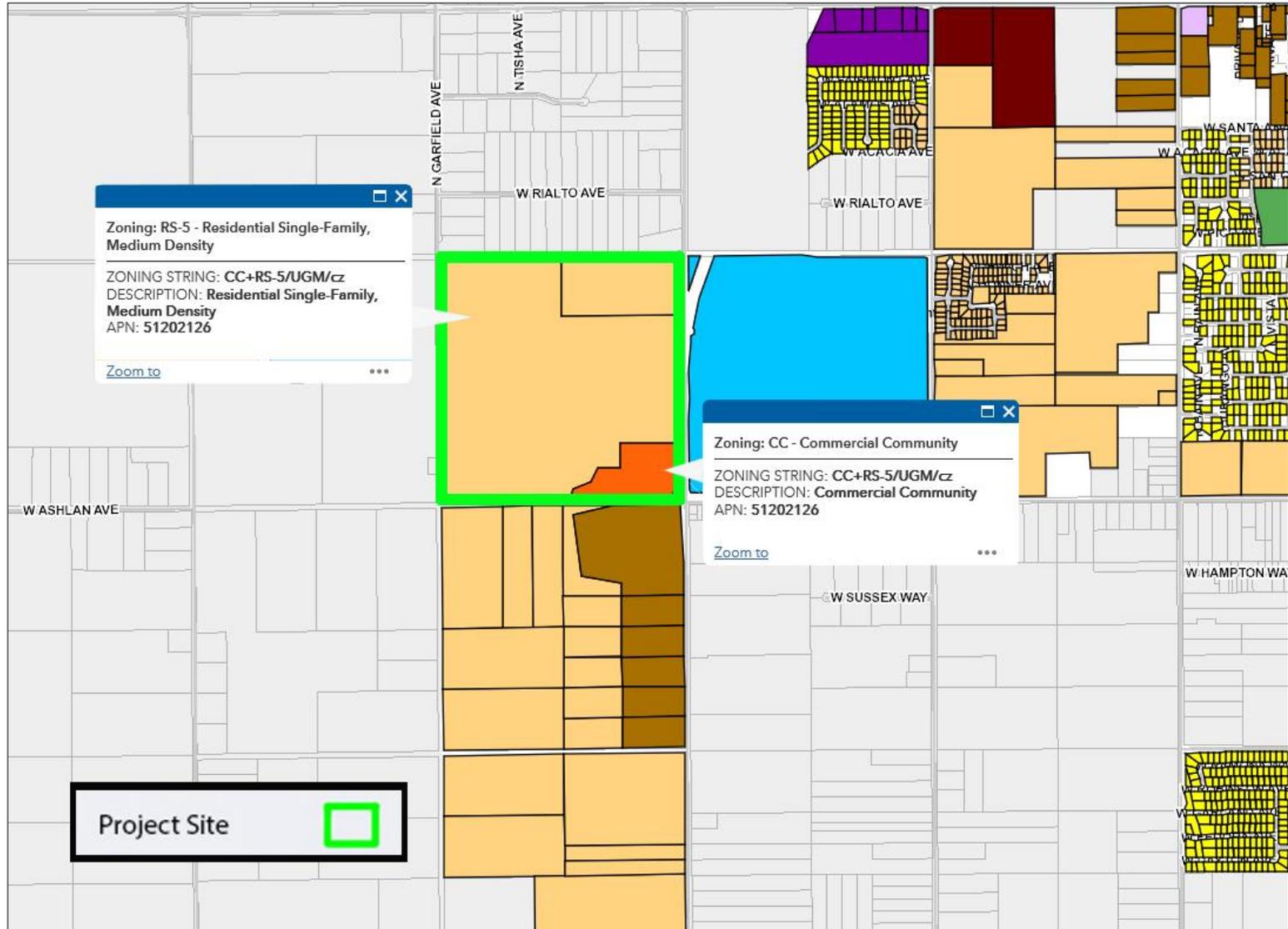


Figure 3
Parc West Preliminary Site Layout



Figure 4
Existing Zoning



2.0 PROJECT WATER DEMANDS

ASSUMPTIONS

Project water demand will be determined using the City's adopted 2015 Urban Water Management Plan (UWMP) methodologies and will be calculated on the basis of the following assumptions:

- Residential: 844 single-family units; historic water usages per capita adjusted for City Urban Water Management Plan assumptions regarding water conservation usage effects.
- Park/Trail: 1.819 acres of potentially irrigated public spaces. To be conservative, it is assumed that the entire public space acreage will be irrigated lawn. The previous Westlake WSA assumed irrigated lawn/open space would require 3.0 acre/feet/year of water.
- No units will be occupied until after 2020, therefore this analysis will use the UWMP 2020 target of 247 gallons per capita per day (GPCD), which is 80% of the City's 10-year baseline period (1999-2008) target of 309 GPCD and the confirmed 2020 target.¹
- Average single-family household size according to the City's most recent Housing Element is 3.07 persons per unit. However, the previous Westlake WSA used 3.2 persons per dwelling unit, therefore, this analysis will use 3.2 persons per unit. With 844 units, this equates to approximately 2,700 persons (rounded).

PROJECT WATER DEMANDS

Residential: 844 dwelling units X 3.2 persons per dwelling unit = 2,700 persons X 247 GPCD = 666,900 total gallons per day X 365 days per year = 243,418,500 gallons per year (or ~747 acre/feet/year)

Park/Trail: 1.819 acres X 3.0 acre/feet/year = ~5.5 acre/feet/year

¹ City of Fresno 2015 UWMP, page 5-9.

Total Water Demand: 747 acre/feet/year for Residential
5.5 acre/feet/year for Park/Trail
752.5 acre/feet/year

COMPARISON TO WESTLAKE WATER DEMANDS

Projected water demand from the previous Westlake Project is shown in Table 1.

Table 1 – Previous Westlake Project Water Demand in acre/feet/year

	2013	2020
Residential, Single-Family	1,708	1,626
Residential, Multiple Family	241	229
Commercial	81	81
Lake	168	168
Open Space	39	39
Total	2,237	2,143

Source: Adopted Westlake WSA, page 3-3 (See Appendix A).

As shown in Table 1, the Westlake project was projected to use 2,143 acre/feet/year of water by year 2020. That total included single-family and multi-family residential units, commercial establishments, public open spaces and a 55-acre lake (taking into account lake fill, evaporation and other factors). The Parc West project only includes single-family residential units and parks/open space. Comparing the Westlake project to the proposed Parc West project (752.5 acre/feet/year), the Parc West project will use approximately 1,390.5 acre/feet/year less water than what was approved for the Westlake project.

COMPARISON TO “NO-PROJECT” / EXISTING WATER DEMANDS

The proposed 160-acre Parc West project is currently planted in almond trees. Water use requirements for almond trees can vary depending on location, amount of rainfall, irrigation methods, soil permeability and other factors. Some studies estimate that each acre of almonds uses 3 to 4 acre/feet/year² at full maturity. The Western Farm Press, which uses data collected

² http://www.slate.com/articles/technology/future_tense/2014/05/10_percent_of_california_s_water_goes_to_almond_farming.html
Accessed Sept. 2018.

from growers, estimates that the average water applied is 35.58 acre/inches or 2.97 acre/feet/acre.³ A 2016 UC Davis study that analyzed costs associated with almond trees in the Central Valley estimated that within 5 years of being planted, almond orchards require approximately 52 acre/inches per year of water (this includes in-season rainfall) or 4.33 acre/feet/acre.⁴

For purposes of this WSA, it is assumed that once full maturity is achieved, the existing almonds on the site will require approximately 4 acre/feet/acre/year.

$$160 \text{ acres of almonds} \times 4 \text{ acre/feet/acre/year} = 640 \text{ acre/feet/year}$$

Comparing the 160 acres of almonds (640 acre/feet/year) to the 160 acres of the Parc West project (752.5 acre/feet/year), the Parc West project will use approximately 112.5 acre/feet/year more water than the existing almond orchard.

COMPARISON SUMMARY

- Previously approved 430-acre Westlake WSA: 2,143 acre/feet/year
- Existing 160-acre almond orchard water demand: 640 acre/feet/year
- Estimated 160-acre Parc West water demand: 752.5 acre/feet/year

Although this WSA Update is intended to only address water use demands from the proposed Parc West project, a useful comparison may be to include the balance of the acreage currently planted in almonds (300 acres). Utilizing the estimation of 4 acre/feet/acre/year of water for almonds, if Parc West is built out on 160 acres, and the remaining 300 acres is planted in almonds, the entire site would use approximately 1,953 acre/feet/year (160 acre Parc West = 752.5 acre/feet/year + 300 acres of almonds @ 4 acre/feet/acre/year = 1,200 acre/feet/year). This is approximately 190 acre/feet/year less than the Westlake project when taking into account the entire acreage.

³ <https://www.westernfarmpress.com/tree-nuts/8-facts-about-almonds-agriculture-and-drought>. Accessed Sept. 2018.

⁴ https://coststudyfiles.ucdavis.edu/uploads/cs_public/87/3c/873c1216-f21e-4e3e-8961-8ece2d647329/2016_almondsjv_south_final_10142016.pdf Accessed Sept. 2018.

CITY-WIDE FUTURE ESTIMATED WATER USE

The City’s 2015 UWMP estimated future water demands based on land-use demand factors. The forecast period was based on a review of land-based unit demands factors for 2013 through 2015 and holding the City’s General Plan land use acreages at buildout.⁵ Projected water demands are shown in Table 2. As shown in the Table, overall water demands are projected to increase from 214,500 af/year in 2020 to 262,500 af/year in 2040, an approximately 22% increase. However, the increase in water use from single-family housing is projected to increase at a slower rate of approximately 13% over the same period from 81,200 af/year in 2020 to 92,100 af/year in 2040.

Table 2 – City-Wide Demands for Potable and Raw Water

Use Type	Additional Description (as needed)	Projected Water Use (af)				
		2020	2025	2030	2035	2040
Single Family		81,200	85,700	87,000	91,200	92,100
Multi-Family		23,000	25,100	26,800	28,900	30,400
Commercial	See Note 1	24,800	28,800	32,800	36,800	38,800
Industrial		6,600	6,900	6,400	6,600	6,900
Institutional/Governmental	See Note 1					
Landscape		11,200	11,700	12,200	12,700	13,100
Groundwater recharge/storage/banking	GW recharge	55,800	58,500	61,100	63,800	66,500
Saline water intrusion barrier						
Agricultural irrigation						
Wetlands or wildlife habitat						
Wholesale demand						
Other (define)	Travel Meters	200	200	200	200	200
Losses		11,700	12,700	13,200	14,100	14,500
	Total	214,500	229,600	239,700	254,300	262,500

Notes: 1. Institutional and Governmental water usage is included in Commercial.

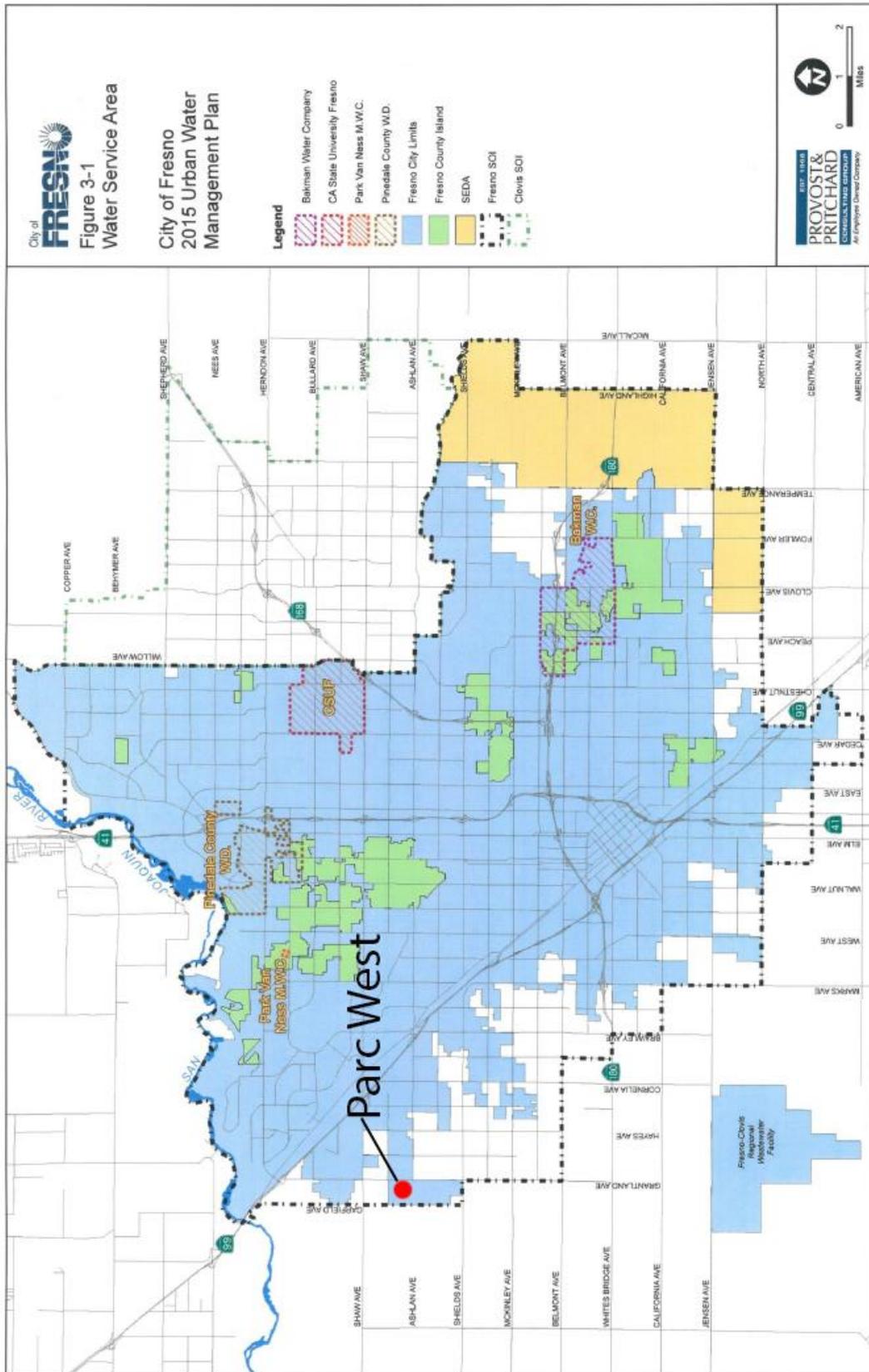
Source: Fresno 2015 UWMP Table 4-4, page 4-6

⁵ City of Fresno 2015 UWMP, page 4-5.

3.0 INCLUSION IN ADOPTED URBAN WATER MANAGEMENT PLAN (Water Code Section 10910(C)(1))

The proposed Parc West project site is included in the land use / population area covered by the City's 2015 Urban Water Management Plan (UWMP). Figure 5 shows the location of the project site in relation to the Water Service Area boundaries covered by the 2015 UWMP. There is no evidence, in consideration of the calculated project water demand, that such demand exceeds that estimated in the UWMP. The adequacy of the water supply for the project will thus be analyzed on the basis of the analysis of the City's water supply in the adopted Urban Water Management Plan.

Figure 5
 Fresno UWMP Boundaries



4.0 DRY YEAR WATER SUPPLY ADEQUACY (Water Code Section 10910(C)(4))

The following dry year water supply adequacy is excerpted from the adopted 2015 UWMP for the City-served area which includes the Parc West project.

AVERAGE YEAR

Average year water supplies are for the most part fairly stable for the City of Fresno. For average year conditions the combined surface water supplies from FID and the USBR are suitable to meet the operational needs of surface water treatment facilities (SWTF) and intentional recharge activities. The continuous operation of the SWTFs and the intentional recharge program permit the replenishment of the groundwater supply for a higher level of reliance in drier years. As the availability of supplies varies seasonally, such as surface water from FID, the City is able to meet demands utilizing groundwater supplies. As the City brings new recycled water production and distribution infrastructure online, the reliability of average supplies will become greater. Maintaining intentional recharge activities will ensure the groundwater supply will be very reliable.⁶ Normal Year Supply and Demand is shown in Table 3. As shown in the table, total supply exceeds total demand in a normal year.

Table 3 – Normal Year Supply and Demand Comparison (DWR Table 7-2)

	2020	2025	2030	2035	2040
Supply totals (af) <i>(DWR Table 6-9)</i>	308,700	329,900	342,000	354,100	366,200
Demand totals (af) <i>(DWR Table 4-3)</i>	235,700	264,000	274,100	292,900	301,100
Difference (af)	73,000	65,900	67,900	61,200	65,100
Reported volumes are rounded to the nearest 100.					

Source: Fresno 2015 UWMP Table 7-5, page 7-9

⁶ City of Fresno 2015 UWMP, page 7-4.

SINGLE DRY YEAR

With the 2012-2015 drought, the City of Fresno experienced the largest and most dramatic reduction to surface water supplies than it ever has historically. For the San Joaquin River supply from the CVP-Friant Division, the City received a zero allocation. From the FID agreement the City received an allocation of only 42,935 af. To stretch supplies intentional recharge operations were drastically reduced and exceptional water use restrictions were imposed to reduce water consumption. Through this combined approach of supply optimization and demand reduction the City was able to maintain satisfactory levels of service and did not have to over-pump the groundwater aquifer.

The supplies most susceptible to seasonal vulnerability are the surface water supplies, which for the FID supply is delivered consistent to recorded historic stream flow for the Kings River. The controlling factor for this supply is the daily calculated natural runoff versus the daily entitlement tables used to allocate the water as related to historic predam river flows. This established methodology, especially in dry years, will affect the availability and delivery to the City's facilities. The USBR supply, in years when water is available, has more flexibility in delivery through advanced scheduling with the Bureau.

The groundwater supply is virtually unaffected by seasonal variation and with continued intentional recharge program will remain very reliable supply. As was mentioned for average supplies, as the City adds new recycled water infrastructure to its portfolio it will be better equipped to manage the single dry year condition.⁷ Single Dry Year Supply and Demand is shown in Table 4. As shown in the table, total supply exceeds total demand in a single year.

⁷ City of Fresno 2015 UWMP, page 7-5

Table 4 – Single Dry Year Supply and Demand Comparison (DWR Table 7-3)

	2020	2025	2030	2035	2040
Supply totals ¹ (af)	198,000	216,400	225,800	235,200	244,500
Demand totals ² (af)	179,900	205,400	212,900	229,100	234,500
Difference (af)	18,100	11,000	12,900	6,100	10,000
¹ Supply Totals are derived in Table 7-7 for the Fourth Dry Year. ² Demand Totals are derived in Table 7-8 for the Fourth Dry Year. ³ Reported volumes are rounded to the nearest 100.					

Source: Fresno 2015 UWMP Table 7-6, page 7-9

MULTIPLE DRY YEAR PERIOD

The vulnerability of water supplies to the multiple-dry year condition has changed dramatically with the 2012-2015 drought as compared to past drought occurrences. The most significant vulnerability highlighted by this recent drought is the susceptibility of the San Joaquin River supply to the impacts of the drought beyond the immediate hydrologic region, and influenced by measures being taken to preserve the ecological health of the Delta region. As the State endured several years of dry periods, the lack of sufficient stored water in the northern portion of the state has affected the operations of state and federal projects' pumping water from the Delta. This in turn reduced the flows delivered to the Exchange Contractors causing them to call on their historic water right of San Joaquin River water for the first time in seventy years. The result of this chain reaction was that the USBR CVP-Friant Division contractors received no water allocations for two years (2014 and 2015). This was an unprecedented occurrence and has brought a heightened level of immediacy to completing capital infrastructure projects which will allow the City to fully execute and implement the water supply plan outlined in its MWRMP (2014). The need for the City to diversify its water supply portfolio and remain diligent in managing resources couldn't be made more apparent than it was through this historic drought period. Despite severe reductions of surface water supplies, sufficient good quality water was available to permit the NESWTF to operate. As mentioned in the previous section, there is some seasonal vulnerability with surface water availability in dry years which needs to be closely coordinated with surface water suppliers to minimize impacts to the City's SWTF operations. Groundwater supplies, with intentional recharge augmentation remain reliable in all hydrologic conditions. Multiple Dry Years Supply and Demand is shown in Table 5. As shown in the table, total supply exceeds total demand in multiple dry years. However, this takes into account water use

restrictions and conservation measures that would be implemented under a multi dry year scenario.

Table 5 – Multiple Dry Years Supply and Demand Comparison (DWR Table 7-4), af

		2020	2025	2030	2035	2040
First year	Supply totals	260,900	280,900	291,800	302,700	313,600
	Demand totals	213,800	217,800	229,300	229,100	234,500
	Difference	47,100	63,100	62,500	73,600	79,100
Second year	Supply totals	271,500	291,700	302,800	313,900	325,000
	Demand totals	225,100	229,200	240,900	231,800	241,400
	Difference	46,400	62,500	61,900	82,100	83,600
Third year	Supply totals	219,200	238,600	249,000	259,400	269,700
	Demand totals	179,900	205,400	212,900	229,100	234,500
	Difference	39,300	33,200	36,100	30,300	35,200
Fourth year	Supply totals	198,000	216,400	225,800	235,200	244,500
	Demand totals	179,900	205,400	212,900	229,100	234,500
	Difference	18,100	11,000	12,900	6,100	10,000
Note: Reported volumes are taken from Tables 7-7 & 7-8 and rounded to the nearest 100.						

Source: Fresno 2015 UWMP Table 7-9, page 7-12

REGIONAL SUPPLY RELIABILITY

According to the 2015 UWMP, the City of Fresno is in the midst of constructing significant infrastructure which will permit it to optimize the use of all regional supplies it has access to. A new 54 mgd surface water treatment facility (SESWTF; capable of 80 mgd with finish water filter rerating) is under construction which is slated for completion in FY 2018 and will permit the maximum use of surface water supplies available to the City. Completion of this project will allow the City to fully utilize surface water supplies in average years for both: treatment for direct potable use and replenishment of groundwater via intentional recharge.

The City is also expanding recycled water use and is presently constructing a 5 MGD tertiary wastewater treatment facility and associated transmission and distribution facilities. Also,

budgeted for FY 2018-19 is the design and construction of a 8 MGD satellite tertiary wastewater treatment facility to be located in southeast Fresno. This facility will enable the City to provide direct potable water offset to this region of the City and further stretch the use of pristine supplies for the best and most beneficial uses.

Upon completion of the projects presently under construction, and those already existing, the City will have transitioned from a system that relied 100% on groundwater to meet potable water demands in the Year 2000, to one that will be comprised of about 46% groundwater, 50% surface water, and 4% recycled water in the Year 2020. This transition demonstrates regional leadership in an area where water purveyors have relied almost entirely on groundwater for a century. The reversal away from the strict reliance on groundwater will permit the sustainable utilization of the groundwater system through preservation, replenishment, and sound resource management.⁸

⁸ City of Fresno 2015 UWMP, page 7-12

5.0 WATER SUPPLY RIGHTS AND ENTITLEMENTS; HISTORIC WATER USAGE (Water Code Section 10910(A)(1) and 10910(D)(2))

The City of Fresno uses a combination of groundwater, surface water, storm water, wastewater/recycled water to meet current and future water demands. The following pages are extracted directly from the adopted 2015 UWMP (Pages 6-1 through 6-34) in satisfaction of these Code sections. This information is applicable to the entire City of Fresno municipal water service area, including the Parc West project site.

6 System Supplies

This chapter provides a description and quantification of each water supply used by the City. This discussion will address quantities available under normal water year conditions, water quality, and projects to meet future demands.

6.1 Groundwater

Groundwater has come to the forefront of the State's water supply concerns due to rapidly declining groundwater levels and storage, land subsidence, seawater intrusion, and degradation of groundwater quality. The severity of the issue ultimately led to legislature drafting three bills which were signed by the Governor on September 16, 2014, and laid the foundation of the Sustainable Groundwater Management Act (SGMA). As required by SGMA, each groundwater basin is to develop a Groundwater Sustainability Agency(ies) (GSA), and a Groundwater Sustainability Plan (GSP), and attain sustainability within twenty years. The statewide use of groundwater supplies will inevitably change over the next few years, as GSP guidelines are developed and GSA's create plans to fit their unique circumstances. The information provided in this 2015 UWMP is provided as the best available information known at the time of this plan preparation. It is acknowledged however, more refined information will be accumulated through monitoring and reporting for each GSA. As the GSA's incorporate and assimilate gathered data, they will employ adaptive management measures based on measured objectives. This process will be a continual one permitting the refinement of each agency's understanding of how their actions influence the groundwater basin. The City of Fresno is committed to the success of the SGMA, and anticipates new information will be forthcoming which may influence the values presented in this plan. The City reserves the right to make changes to the presented values in this plan and will do so through the submittal of an amendment to the DWR should changes in values be sufficient to warrant such a plan amendment.

6.1.1 Basin Description

Legal Requirements:

CWC 10631

(b) If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information shall be included in the plan:

(2) A description of any groundwater basin or basins from which the urban water supplier pumps groundwater.

The California Department of Water Resources (DWR) has partitioned the State into ten major hydrologic regions (also referred to as “basins”) and then further divided each basin into subbasins. In this manner DWR is better able to specifically address the individual basins and account for their unique characteristics in various reports prepared by them. As shown in the California Water Plan Update 2013¹¹ (2013 CWP), the City of Fresno is located in the Kings Subbasin (DWR Subbasin 5-22.08) which is in the greater Tulare Lake hydrologic region (DWR Basin 5.22), and also within the larger San Joaquin Valley Groundwater Basin. The Kings Subbasin covers approximately 1,530 square miles.

6.1.1.1 Basin Location

The Kings Subbasin, as depicted in the 2013 CWP, is generally bounded: on the north by the San Joaquin River; on the west by the Fresno Slough; on the south by the Kings River and Cottonwood Creek; and on the east by the Sierra foothills. DWR classified the Kings Basin as being in a state of critical overdraft in its Bulletin 118-80. Figure 6-1 shows the City’s location relative to the Kings Subbasin boundaries.

6.1.1.2 Area Geology

The upper several hundred feet within the Kings Subbasin generally consists of highly permeable, coarse-grained deposits, which are termed older alluvium. Coarse-grained stream channel deposits, associated with deposits by the ancestral San Joaquin and Kings Rivers, underlie much of the northwest portions of the City. Additionally, a recent study completed in 2004 indicated the presence of a laterally extensive clay layer, at an average depth of approximately 250 feet below the ground surface, beneath most of the south and southeastern portions of the City.

Below the older alluvium to depths ranging from about 600 to 1,200 feet below ground surface, the finer-grained sediments of the Tertiary-Quaternary continental deposits are typically encountered. Substantial groundwater has been produced and utilized from these depths by the City; however, deeper deposits located in the southeastern and northern portions of the City have produced less groundwater.

There are also reduced deposits in the northern and eastern portions of the City, at depths generally below 700 or 800 feet, which are associated with high concentrations of iron, manganese, arsenic, hydrogen sulfide, and methane gas. Groundwater at these depths does not generally provide a significant source for municipal supply wells.

¹¹ California Water Plan Update 2013, Bulletin 160-13, Investing in Innovation & Infrastructure, Volume 1, Chapter 3, Pages 15 & 16, Department of Water Resources, 2013.

Figure 6-2 presents an idealized geologic cross-section that illustrates the general depth of various lithologic features within the Kings Subbasin near the City.

6.1.1.3 Aquifer Characteristics

Transmissivity indicates the ability of an aquifer to transmit groundwater, while the specific capacity indicates the ability of a particular well to produce that water; hence, any future groundwater wells should be located in areas of higher transmissivity. As part of the City’s recent Metro Plan Update, aquifer test data (pump tests) were reviewed to evaluate available transmissivity and specific capacity data.

Table 6-1 summarizes the pump test data by general geographic location within the City (i.e., North, South, East, and West Fresno). As shown in Table 6-1, the northwestern and southwestern portions of the City have wells with higher transmissivities and higher specific capacities.

Table 6-1: Summary of Groundwater Pump Tests within the City of Fresno

Area of City	Date Range	Range of Pumping Rates, gpm	Range of Transmissivities, gpm/ft	Range of Specific Capacities, gpm/ft
North Fresno	1979 to 2005	500 to 2,450	10,000 to 179,000	6 to 57
Northwest Fresno	1969 to 1995	570 to 2,735	66,000 to 298,000	43 to 134
Southwest Fresno	1995 to 2006	1,510 to 2,515	57,000 to 369,000	26 to 92
Southeast Fresno	1987 to 2005	340 to 1,790	15,000 to 135,000	4 to 54
East Fresno	1987 to 2005	450 to 1,740	3,500 to 109,000	2 to 38

¹ All data from Kenneth D. Schmidt & Associates.

6.1.2 Groundwater Management

Legal Requirements:

CWC 10631

(b)...If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information shall be included in the plan:

(1) A copy of any groundwater management plan adopted by the urban water supplier...or any other specific authorization for groundwater management.

(2)...For basins that a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the urban water supplier has the legal right to pump under the order or decree.

As part of a partnership of local municipal water purveyors, irrigation districts, a flood control district, and the overlying county, the Fresno Area Regional Groundwater Management Plan (FARGMP) was prepared in conformance with AB3030 and SB 1938. The City of Fresno and the other participating agencies subsequently adopted the groundwater management plan in 2006 as detailed in Table 6-2.

Table 6-2: Fresno Area Regional Groundwater Management Plan Adopting Agencies

Agency	Adoption Date
Fresno Irrigation District	01/25/2006
Fresno Metropolitan Flood Control District	02/08/2006
City of Clovis	02/13/2006
Malaga County Water District	02/14/2006
City of Kerman	03/01/2006
Bakman Water Company	03/13/2006
City of Fresno	04/18/2006
County of Fresno	07/18/2006
Pinedale County Water District	09/20/2006
Garfield Water District	11/01/2006

The FARGMP boundaries generally coincide with the Fresno Irrigation District (FID), but also include a small area northeast of FID. The objectives of the FARGMP have been developed to monitor, protect, and sustain groundwater within the region. Specific objectives include the following:

- Preserve and enhance the existing quality of the area’s groundwater;
- Correct the overdraft and stabilize groundwater levels at the highest practical beneficial levels;
- Preserve untreated groundwater as the primary source of domestic water;
- Maximize the available water supply, including conjunctive use of surface water and groundwater;
- Conserve the water resource for long-term beneficial use and assure an adequate supply for the future;
- Manage groundwater resources to the extent necessary to ensure reasonable, beneficial, and continued use of the resource;
- Monitor groundwater quality and quantity to provide the requisite information for establishing groundwater policies, goals, and recommended actions; and
- Improve coordination and consistency among agencies responsible for the monitoring and management of groundwater in the Plan Area.

Although FID led the development of the FARGMP, the October 2005 Memorandum of

Understanding between the participating agencies makes it clear that each participating agency retains authority and responsibility for groundwater management within its own jurisdiction. A copy of the FARGMP is provided in Appendix H of this UWMP.

6.1.3 Overdraft Conditions

Legal Requirements:

CWC 10608.12

(b)(2) For basins that have not been adjudicated, (provide) information as to whether the department has identified the basin or basins as over drafted or has projected that the basin will become over drafted if present management conditions continue, in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to eliminate the long-term overdraft condition.

The Kings Sub-basin groundwater aquifer supplies the City, other municipalities, agriculture, and rural residential areas with a consistent source of water. According to the DWR 118-80 Bulletin, this sub-basin however has been classified as ‘critically overdrafted’ and the future of the groundwater basin has been projected to see continued overdraft conditions. Like much of the Kings Subbasin, groundwater levels beneath the City were relatively shallow at 25 feet below ground surface (ft bgs) in 1940¹² for example, prior to the start of World War II. After the war, the State, including the City, began growing at a rapid rate. For the period from 1959 to 1968 it was reported groundwater levels declined at a rate of 2.8 ft/yr (feet per year)¹³. The water supply utilized to meet the demands from this growth was groundwater which was readily available from the underlying seemingly abundant and productive aquifer. The City continued to rely on the groundwater aquifer for decades, monitoring groundwater levels continuously. Groundwater levels since 1990 have declined from less than 0.5 ft/yr in the southwest portion of the downtown area, to a rate of 1.5 ft/yr for northern and southern areas of town, to a maximum of 3 ft/yr in the northeastern area, adjacent to the City of Clovis. Figure 6-3 provides a depiction of the City’s average depth to groundwater from 1980 through 2015.

The City is limited with its current surface water treatment capacities. Therefore, one of the primary objectives for the City is to maximize the use of available surface water treatment supplies to reduce overall reliance on groundwater and bring its use into balance by the year 2025. As has been mentioned earlier in the report, the City began operations of its first surface water treatment facility in 2004. Of noteworthy importance of trends shown in Figure 6-3 is the reduction to the rate of groundwater decline since

¹² Average groundwater depth for City wells as recorded on log entitled: Well Data Summary Sheet, Engineering Dept, Fresno City Water, 1940.

¹³ Report on Water Resources City of Fresno, page 6-17, John Carollo Engineers, 1969.

2004 when the NESWTF came online and when renewed focus on intentional groundwater recharge operations regained momentum. Figure 6-3 shows that around the 2004 timeframe groundwater levels stabilized and have since then generally held level over the last ten years.

Figure 6-3 also shows the monumental reduction seen in 2015 which is at a level that hasn't been seen since before 1984. To facilitate the further reduction of its reliance on groundwater the City has started construction on a new 80 mgd SWTF in southeast Fresno (SESWTF). The combination the NESWTF and SESWTF will maximize the use of available surface water and afford the City with greater water supply reliability, increase operational flexibility, and decrease the City's dependency on groundwater supplies.

6.1.4 Groundwater Quality

Groundwater within the Kings Subbasin generally meets primary and secondary drinking water standards for municipal water use, and is described as being a bicarbonate-type water, including calcium, magnesium, and sodium as the dominant ions. Generally, total dissolved solids (TDS) concentrations rarely exceed 600 mg/L, and typically range from 200 to 700 mg/L. However, the groundwater basin is threatened by chemical contaminants that affect the City's ability to fully use the groundwater basin resources without some type of wellhead treatment in certain areas. Many different types of chemical pollutants have contaminated portions of the Kings Subbasin underlying the City's water service area. Some of the major contaminant plumes include 1,2-Dibromo-3-Chloropropane (DBCP), ethylene dibromide (EDB), trichloropropane (TCP), other volatile organic compounds (VOCs) such as trichloroethylene (TCE) and tetrachloroethylene (PCE), methyl tertiary butyl ether (MTBE), nitrate, manganese, radon, chloride, and iron. The City has received settlements in a number of lawsuits related to these contaminants and has constructed wellhead treatment systems and implemented blending plans for a number of wells.

6.1.5 Estimated Groundwater Yield

As part of the preparation of a hydrologic groundwater and surface water model that was prepared for the Upper Kings Basin Integrated Regional Water Management Authority, the City contributed additional funding to the effort so the model would be more refined for its service area, and capable of assisting in the development of the City's 50-year water supply plan. The Kings Basin Integrated Groundwater and Surface Water Model¹⁴ (IGSM) was completed in 2007 and provided outputs specific to the City

¹⁴ The Integrated Groundwater and Surface Water Model prepared for the Kings Basin Integrated Regional Water Management Authority was developed by WRIME, 2007.

Sphere of Influence (SOI). The IGSM was developed and calibrated utilizing data for the period of 1964-2004. Building-off the calibrated IGSM, additional modeling was conducted in 2008 to evaluate the City's proposed water supply plan and its ability to attain the balanced use of groundwater by the year 2025. Based on the modeling efforts values were developed for the various natural elements of the underlying aquifer and enabled the estimation of the anticipated yield of the groundwater system within the City's SOI.

6.1.5.1 Natural Recharge

As a result of the IGSM effort, the long-term average deep percolation from rainfall and irrigation applied water for the period of 1964-2004 was found to be 42,700¹⁵ af/yr for the entire SOI. The City's Metropolitan Water Resources Management Plan (MPWRMP) Phase 1 Report¹⁶ states that as urbanization continues within the SOI the amount of deep percolation will decline. For 2005 it was estimated deep percolation would be about 37,000 af/yr, and will reduce annually ultimately declining to and remaining at 27,000 af/yr by 2025 and beyond. It should be noted that the ultimate 2025 value was based on the previous projected point for which the prior General Plan forecasted the SOI buildout. The new General Plan now anticipates SOI buildout will occur in 2056. Holding the 2005 value of 37,000 af/yr and extending the 27,000 af/yr to 2056, intermediate values were straight-line interpolated. Additionally, as cited in Chapter 3, the City currently covers 72,244 acres of the 100,249 acres within its SOI, representing 72% urbanization of the SOI, which would approximate the City's water system service area. However, to better account for the other water purveyors providing water service to small portions of City areas and County island areas within the SOI, a more detailed analysis was performed. Using GIS information, the total annexed City area was determined, excluding Bakman Water Company, Pinedale County Water District, and CSU Fresno, and then added in the County islands serviced by the City. This area compared to the overall SOI area yielded 71.5% coverage for the City's water service area of the SOI. The two values for all practical purposes are equal, warranting the 72% value used for calculating the proportionate coverage. Table 6-3 shows estimated deep percolation out through 2040.

6.1.5.2 Net Subsurface Inflow

Again utilizing information developed from the IGSM, average net subsurface inflow into the SOI was characterized as being 64,800 af annually for the period of 1964-2004. Applying the previously described 72% proportioning factor, developed SOI area to

¹⁵ City of Fresno Metropolitan Water Resources Management Plan, Phase 1 Report, pg. 7-9, West Yost Associates, 2007. Adopted by City Council in 2014.

¹⁶ City of Fresno Metropolitan Water Resources Management Plan, Phase 1 Report, pg. 7-9, West Yost Associates, 2007. Adopted by City Council in 2014.

overall SOI area, approximately 46,700 af/yr would be attributed to the City’s water service area. This value will increase in future years until the SOI is builtout, excluding areas associated to Bakman Water Company, Pinedale County Water District, and CSUF. Table 6-3 shows the estimated subsurface inflows for future years. The City has historically benefitted from the net subsurface inflows and requires these flows in perpetuity for replenishment necessary to maintain the safe and sustainable yield of the groundwater aquifer system.

6.1.5.3 Intentional Groundwater Recharge

The City has long made efforts towards offsetting the decline of groundwater levels and minimizing overdraft conditions through an active intentional recharge program that started in 1971¹⁷. Through cooperative agreements with the FMFCD and FID, the City has access to not only City owned basins, but also those of these two agencies. Utilizing available surface water supplies the City has typically been able to recharge approximately 50,000 af/yr for the period of 2000-2013; however, with the reduction in available surface water supplies intentional recharge declined to 34,700 af in 2014 and 19,800 af in 2015. The maximum annual recharge attained during this period was 62,000¹⁸ af/yr in 2003. The City’s MPWRMP (2014) outlined developing additional intentional recharge activities to attain a total of 75,100 af/yr. By attaining this level of intentional recharge the City would optimize the use of available supplies, and further improve groundwater conditions as declines in natural recharge are anticipated to occur within the SOI due to urbanization, as described earlier. The goal is to attain the additional new recharge at the time of SOI buildout as reflected in Table 6-3.

Table 6-3: Components to Groundwater Yield for Normal Years

Groundwater Component	Quantity (af/yr)					
	2015	2020	2025	2030	2035	2040
Natural Recharge	25,400	25,700	25,900	26,000	26,100	26,200
Net Subsurface Inflow	47,100	48,900	50,700	52,600	54,400	56,200
Safe Yield	72,500	74,600	76,600	78,600	80,500	82,400
Intentional Recharge	53,100	55,800	58,500	61,100	63,800	66,500
Total Estimated Groundwater Yield	125,600	130,400	135,100	139,700	144,300	148,900

Attainment of the projected additional recharge capacity will require new facilities which may be through either the individual efforts of the City or through the development of cooperative projects with agencies such as FMFCD and FID. A prime example of a

¹⁷ City of Fresno Metropolitan Water Resources Management Plan, Phase 1 Report, Volume II of II, Appendix B Hydrogeologic Conditions in the FCMA, pg. 22. CH2MHill, January 1992.

¹⁸ City of Fresno Recharge records spreadsheet “TotalFresnoRchge2000-2015a.xlsx.”

cooperative project is the joint use of new storm water basins that are constructed to serve new city areas that are developed.

6.1.6 Historical Groundwater Pumping

Legal Requirements:

CWC 10631

(b)...If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information shall be included in the plan:

(3) A detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

The City of Fresno currently relies on a combination of surface water and groundwater supplies to meet the demands of its citizens and businesses within its service area. For many years, the needs of the community were solely met through the use of groundwater, but as time has passed the City has recognized the importance of preserving and maximizing groundwater supplies within the boundary of its SOI. A cone of depression has developed within the City and groundwater replenishment efforts have yet been able to offset the effect of groundwater extraction. The falling groundwater levels are evidence of overdraft. The volume of groundwater pumped by the City can be seen below in Table 6-4.

Table 6-4: Groundwater Volume Pumped (DWR Table 6-1)

Groundwater Type	Location or Basin Name	Groundwater – Volume Pumped (af/yr)				
		2011	2012	2013	2014	2015
Alluvial Basin	San Joaquin Groundwater Basin: Kings Subbasin	119,813	115,615	128,510	110,313	83,360
Total		119,813	115,615	128,510	110,313	83,360

As can be seen in the above table, the overall reliance on groundwater as a principle source of water has decreased over the years and is now supplemented with surface water. The substantial reductions in 2014 and 2015 are attributed to mandatory water reductions imposed by the State to protect limited supplies as the severe drought has continued. The shift in reliance away from groundwater supplies has allowed intentional recharge programs to be more effective and has reduced groundwater overdraft conditions that the City has historically experienced. To put this into perspective, the City had a high in groundwater pumping of 165,540 af in 2002, prior to the NESWTF

going online in 2004. Comparatively, groundwater production in 2015 has dropped to one-half of this value.

6.2 Surface Water

The City of Fresno has contracts for surface water supplies. Contracts for surface water supplies include the following:

- FID Agreement for Kings River water;
- USBR CVP – Friant Division Contract for San Joaquin River water.

The cumulative supply these contracts bring to the City provide the opportunity to construct surface water treatment facilities and optimize the use of these supplies. This conjunctive use approach continues the process of allowing the groundwater system to recover. Each of the surface water supplies is summarized in the following paragraphs.

6.2.1 Surface Water Supplies through FID Agreement

The Fresno Irrigation District is one of 28 agencies that receive an entitlement of water from the Kings River through the Kings River Water Association (KRWA). Water entitlements for KRWA contract members is determined based on a methodology that was initially developed in 1917-1919 to established entitlements for early claimed right's holders. The methodology was based on historic mean daily natural flow conditions at Piedra, which is approximately 3 miles downstream from the then yet to be build Pine Flat Dam, and "at the heart of Kings River uses, regulation, and stream control and storage."¹⁹

In May of 1976 the City of Fresno and FID executed an agreement that stipulated that as land is annexed to the City, the City will receive a pro rata share of FID's Kings River entitlement. The agreement was specific that FID's USBR Class 2 water was excluded and that the City could not store allocated water behind Pine Flat Dam. The pro rata share is based on the area annexed to the City, and within FID's boundaries, as compared to the total area of FID's water service area. The agreement stipulates the allocation amount will be reviewed each year by the two agencies to address new annexations to the City. So, as the City annexes new areas the allocation will increase. Utilizing GIS, there will be approximately 71,925 acres of land within the SOI and within FID's water service boundaries at SOI buildout, excluding Bakman Water Company, Pinedale County Water District, CSU Fresno, and County islands. Projected future percentages of water allocations available to the City are shown in Table 6-5 below.

¹⁹ The Kings River Handbook, pg. 7, Kings River Water Association and Kings River Conservation District, Fourth Printing, June 2003.

Kings River Water made available through the agreement with FID is of extremely good quality as it originates as snowmelt from the high sierras and has not been detrimentally impacted.

Table 6-5: Projected Allocation of FID’s Kings River Water for City of Fresno in Normal Years

Year	2010 ¹	2015 ¹	2020	2025	2030	2035	2040
Projected City Allocation, %	25.41%	25.94%	27.23%	28.51%	29.80%	31.09%	32.37%
Projected Water Quantity to City in Normal Year, af/yr	108,200	110,500	116,000	121,500	126,900	132,400	137,900
Actual Allocation for City, af	125,543	42,935	-	-	-	-	-
<p>(1) Allocations for 2010 and 2015 were provided by FID. Allocation for all other years is based on interpolation between 2015 and SOI buildout at 2056. With General Plan Update SOI buildout has shifted from 2025 to 2056 as reflected here.</p> <p>(2) Projected City Allocation (%) x 426,000 af/yr (estimated normal year diversion by FID, see discussion in Chapter 7).</p>							

6.2.2 Surface Water Supplies through USBR Contract

The City, through an agreement originally executed in January of 1961, secured a surface water supply from USBR CVP - Friant Division. This agreement, for an annual water supply of 60,000 af of Class 1 water, was last renewed in 2010 as a Section 9(d) Contract that provides water from the San Joaquin River in perpetuity. A copy of the renewed contract is provided in Appendix I of this UWMP. The USBR CVP - Friant Division facilities generally include: Friant Dam (Millerton Reservoir); the Friant-Kern Canal; and the Madera Canal. The Friant-Kern Canal is maintained and operated by the Friant Water Authority. The USBR water supply is a wholesale supply.

Construction of Friant Dam was completed in 1947 and began making diversions to the Friant-Kern Canal in 1949. Full operations of the CVP - Friant Division didn't commence until the Madera Canal was completed in 1951. Class 1 water was intended to be a supply that would be dependable in practically every year, regardless of the type of hydrologic water year. Class 2 water is essentially excess water available as determined by USBR and less reliable than Class 1 water. Class 1 water has historically been very reliable until the San Joaquin River Restoration Settlement and more recently by the restrictions on diversions from the Delta due to concerns over the declining health of Delta ecosystem. Restrictions on exports from the Delta have hindered the USBR from making deliveries to the Exchange Contractors²⁰ via the Delta-Mendota Canal. As a result of the reduced deliveries from the Delta, the Exchange Contractor's have called on their historic claim of water from the San Joaquin River, which was exchanged for the Delta-Mendota supply and enabled the CVP - Friant Division projects to be developed. As a subsequent result of the Exchange Contractor's

²⁰ The Exchange Contractors are the benefactors of the historic pre-1914 water rights established by Miller and Lux. These contracts include: Central California Irrigation District; San Luis Canal Company; Firebaugh Canal Water District; and Columbia Canal Company, per website <http://www.sjrecwa.net/history.html> on April 6, 2016.

calling on their historic right water supply, the CVP - Friant Division contractors have been faced with zero allocations of Class 1 water for the last two years. The impacts of these recent events on availability and reliability are discussed further in Chapter 7.

In addition to the Class 1 water available to the City, the USBR contract also makes available to the City water classified as: Recovered Water Account water; Section 215 water; unreleased restoration flows, unreleased recirculation flows, and uncontrolled season flows. The complexities of each water type are beyond the scope of this report, but are mentioned here to reflect the other water acquisition opportunities afforded the City through this contract.

The San Joaquin River water supply has excellent water quality as it originates from snowmelt from the high Sierras and has not been detrimentally impacted.

6.3 Storm Water

The Fresno-Clovis Metropolitan Area and surrounding rural environs are covered by the boundaries of the FMFCD which has primary responsibility for managing the local storm water flows. Most storm water in the City drains to urban storm water basins where the water is retained for the purpose of recharge, or pumped to local irrigation canals for conveyance away from the municipal areas. FMFCD's operation of storm water basins is predicated on maintaining storage capacity for rain events which limits the amount of storm water that is recharged during the rainy season. FMFCD estimates the amount of storm water that is recharged each wet season; however, recharge attained with the FMFCD basins largely occurs in May through October when limited storage capacity is required. Dry-season recharge is accomplished by diverting surface waters, from the Kings River and Millerton Reservoir, using City-allocated surface water. FMFCD estimates that storm water recharge in urban basins during the winter months may be from 7,800 af/yr to 22,200 af/yr²¹. It is difficult to verify these values however, as there is no physical measurement of storm water flows into the basins, and infiltration rates can vary with water elevation and degree of siltation in the basin. Historically, this infiltration has not been accounted for separately as it is considered an integral component of the cumulative elements that make up natural recharge as previously discussed in Section 6.1.5.1.

²¹ Email correspondence from Brent Sunamoto on March 30, 2016, provided graphical representation of estimated storm water infiltration quantities for 2006-2014.

6.4 Wastewater and Recycled Water

Excerpt from recent City of Fresno City Council Agenda Item²²:

“In 2009, the State of California adopted a recycled water policy establishing a mandate to increase the use of recycled water in California by 200,000 acre-feet per year by 2020 and by an additional 300,000 acre-feet per year by 2030. The Recycled Water Master Plan prepared by the Department of Public Utilities’ Wastewater Management Division identifies opportunities to assist with compliance of this law by reducing groundwater pumping and replacing groundwater with recycled water for non-potable purposes (i.e. outdoor irrigation, dust control, fountains, etc.). The Division’s long-term goal is to produce and deliver 25,000 acre-feet of recycled water to the City’s service area to reduce groundwater over drafting. On April 11, 2013, the City Council adopted the Recycled Water Master Plan and associated environmental documents.”

6.4.1 Recycled Water Coordination

Legal Requirements:

CWC 10633

The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier’s service area.

As the State grapples with the current prolonged drought and dwindling water supplies, many water purveyors are dealing with the realization new supplies need to be developed. In June of 2014, the Fresno’s City Council adopted the City’s Metropolitan Water Resources Management Plan (MWRMP) that outlined the required infrastructure for the immediate-term, near-term, and long-term, which is needed to meet projected water demands. An instrumental component of this plan is the development of 25,000 af/yr of recycled water by the year 2025.

While the MWRMP was being prepared, the Wastewater Division began efforts on the development of the Recycle Water Master Plan (RWMP), which was adopted by the City Council in April of 2013. This plan outlines the development of projects to optimize the use of recycled water, which will be discussed later in this chapter.

The coordination with other water agencies and potential consumers within the planning area is inherently within the purview of the City’s Department of Public Utilities (DPU) as this department provides both water and wastewater services. DPU has been on the forefront of numerous water supply preservation, enhancement, and development

²² Report to the City Council, *Action Pertaining to the Recycled Water Transmission Main, Southwest Quadrant, Project SW1A*; City of Fresno, September 10, 2015.

projects and programs for decades. The concept of multiagency coordination is fully embraced by the department as is evident with the previously discussed joint agency agreements and the commitment to constructing new infrastructure to further develop new resources. The endeavor to develop recycled water as a resource was actually a requirement of a development in north Fresno, where the developer was conditioned to have a net zero impact on water resources. The fundamental component of this development was the construction and dedication of the North Fresno Wastewater Reclamation Facility to the City.

There are only a few agencies, besides the City, that have wastewater collection and treatment facilities within and immediately adjacent to the plan area. These agencies are as follows:

- City of Clovis
- Malaga County Water District
- Pinedale County Water District
- Pinedale Public Utility District

6.4.1.1 City of Clovis

The Fresno/Clovis Regional Wastewater Reclamation Facility (RWRF) was developed under a joint powers authority agreement executed in 1977 between the City of Fresno the City of Clovis, and the County of Fresno. Both of the cities contribute to the cost of operations and maintenances and capital expenditures for the RWRF based on formulas in the agreement. This facility provides service for most of Clovis' sewer flows.

The City of Clovis has recently constructed its own wastewater treatment facility that produces tertiary level effluent which is distributed in a dedicated purple pipe system within portions of its service area.

6.4.1.2 County of Fresno

The County of Fresno, like the City of Clovis, is a party to the Joint Power Authority for the RWRF, which provides treatment for flows from unincorporated areas encompassed by the City's service area.

6.4.1.3 Malaga County Water District

Malaga County Water District provides water and sewer service to an unincorporated county area of about 2.25 square miles, which covers a small portion of the City's SOI. The district provides wastewater collection and treatment for residential and non-residential customers.

6.4.1.4 Pinedale County Water District

Pinedale County Water District provides water, sewer, and solid waste service to an area of about 2 square miles, which service area covers an unincorporated county island and a portion of the City. The district provides wastewater collection to an area of

about 699 acres and diverts the flow to the City's collection system for treatment at the RWRF.

6.4.1.5 Pinedale Public Utility District

Pinedale Public Utility District provides wastewater, street lighting, street sweeping, and landscape maintenance. The district services an area of approximately 362 acres in the northern portion of the City, serving both an unincorporated county island and portions of the City. The collected wastewater is discharged to the City's collection system for treatment at the RWRF.

As the City is the primary responsible agency for wastewater collection and treatment for its annexed areas and certain County islands, it has taken the lead role of developing and implementing recycled water facilities to serve the same area.

6.4.2 Wastewater Collection, Treatment, and Disposal

Legal Requirements:

CWC 10633

- (a) *(Describe) the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.*

CWC 10633

- (b) *(Describe) the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.*

6.4.2.1 Wastewater Collected Within Service Area

The City of Fresno's wastewater collection system was originally developed in 1891 with the installation of a 24-inch outfall sewer that discharged to a 40 acre sewer farm located southwest of town. The amount of land and facilities at this location continued to be expanded as the City grew over the years. Today, the City's wastewater collection system consists of about 1,500 miles of pipes ranging in size from 4-inches in diameter to 84-inches in diameter. This collection system also utilizes 15 lift stations throughout the City, ranging in pumping capacity from 0.25 mgd to 2.2 mgd.

6.4.2.2 Wastewater Treatment and Discharge Within Service Area

The City is served by two wastewater treatment plants. Each of these facilities is briefly described in the following sections.

6.4.2.2.1 Fresno/Clovis Regional Wastewater Reclamation Facility

As mentioned above, the Fresno/Clovis RWRF has developed from what was once a sewer farm to what is now a state-of-the-art 80 mgd wastewater treatment facility. In

1966 the City of Fresno was appointed the sewerage agency for the local metropolitan region and shortly after began long-range planning and construction of new facilities to handle increasing flows and regulatory requirements. The RWRf treats flows from not only the City, but also sewerage County areas (some county areas remain unsewered), the City of Clovis, Pinedale County Water District, and Pinedale Public Utility District. Flows received at this facility range from a high of 80,800 af in 2006 to a recent low of 62,600 af in 2015. The RWRf was last expanded in 1998 and currently is rated at 80 mgd and treats received flows to secondary undisinfected levels. The effluent is discharged to percolation ponds, with some flow also being directed to irrigation of non-food crops. The discharged effluent is within the City boundaries and located just southwest of the metropolitan area. The treated effluent percolation ponds are within the City's SOI and hydrologic sphere that benefit the City's overall regional water budget. See Figure 6-1 for a depiction of the facility's location relative to the metropolitan area. The 2015 treated quantity from this facility is noted in Tables 6-6 and 6-7.

6.4.2.2.2 North Fresno Wastewater Reclamation Facility

The North Fresno Wastewater Reclamation Facility (NFWRF) was constructed as part of a residential, commercial, and golf course master planned development located in the northern portion of the City. As a condition of the planned community, the developer was required to construct a wastewater treatment facility that would produce tertiary level effluent that would be used within the development to ensure the overall project had a net zero impact on water resources. This facility is presently rated at 0.71 mgd (average monthly flow) and 1.07 mgd (maximum daily flow). This facility is expandable to 1.25 mgd (average monthly flow). The disinfected tertiary effluent from the plant is largely used to irrigate the Copper River Ranch Golf Course. Of the 203 af of wastewater treated in 2015, 62 af was used for irrigation of turf. The treated flows are noted in Tables 6-6 and 6-7.

Table 6-6: Wastewater Collected Within Service Area in 2015 (DWR Table 6-2)

Percentage of 2015 service area covered by wastewater collection system (optional)		Recipient of Collected Wastewater				
Percentage of 2015 service area population covered by wastewater collection system (optional)		Wastewater Collection				
Name of Wastewater Collection Agency	Wastewater Volume Metered or Estimated?	Volume of Wastewater Collected in 2015 (af)	Name of Wastewater Treatment Agency Receiving Collected Wastewater	Treatment Plant Name	Is WWTP Located Within UWMP Area?	Is WWTP Operation Contracted to a Third Party?
100						
100						
<i>Add additional rows as needed</i>						
City of Fresno	Metered	62,552	City of Fresno	RWRF	Yes	No
City of Fresno	Metered	203	City of Fresno	NFWRF	Yes	No
Total Wastewater Collected from Service Area in 2015 (af):		62,755				
NOTES:						

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Table 6-7: Wastewater Treatment and Discharge Within Service Area in 2015 (DWR Table 6-3)

Wastewater Treatment Plant Name	Discharge Location Name or Identifier	Discharge Location Description	Wastewater Discharge ID Number (optional)	Method of Disposal	Does This Plant Treat Wastewater Generated Outside the Service Area?	Treatment Level	2015 volumes (af)			
							Wastewater Treated	Discharged Treated Wastewater	Recycled Within Service Area	Recycled Outside of Service Area
<i>Add additional rows as needed</i>										
RWRF	Treatment site	Onsite Percolation ponds		Percolation Ponds; irrigation of non-edible crops	Yes	Secondary, undisinfected	62,552	53,864	8,688	22,602
NFWRF	Treatment site	Onsite pond		Turf irrigation	No	Tertiary, disinfected	203	141	62	0
Total							62,755	54,005	8,750	22,602

NOTES:

6.4.3 Recycled Water System

Legal Requirements:

CWC 10633

(c) (Describe) the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.

6.4.3.1 Fresno/Clovis Wastewater Reclamation Facility

6.4.3.1.1 Undisinfected Secondary Level Recycled Water

As mentioned earlier in Section 6.4.2.2.1, the City's RWRf diverts a portion of the undisinfected secondary effluent to irrigate non-food crops grown adjacent to this facility. The practice of using the secondary effluent to irrigate non-food crops has been carried-out for decades and is expected to continue for the foreseeable future. The City owns nearly 3,300 acres of land for and around the RWRf, consisting of percolation ponds (1,750 acres) and other land available to farm non-food crops. The agricultural land directly receives the undisinfected secondary effluent and is applied to these crops. Table 6-8 provides the annual quantities of recycled water applied to these crops for the period from 2010-2015.

6.4.3.1.2 Soil Aquifer Treated Recycled Water

Located at the Fresno/Clovis RWRf is a series of 15 groundwater wells which are used to extract previously percolated effluent groundwater from beneath this facility. The extracted groundwater has the potential to be used for higher beneficial use if it can be demonstrated this water has attained a level of treatment satisfactory to meet disinfected tertiary levels. To substantiate to State regulatory agencies this was in fact the case for the operations at the City's RWRf, the City embarked on a joint project with the WaterReuse Research Foundation. The culmination of this study is presented in a final report entitled "Demonstration of Filtration and Disinfection Compliance Through Soil-Aquifer Treatment"²³ which was completed in 2013. This study concluded, based on the documented sampled water quality data, that the extracted groundwater did in fact meet requirements for classification as disinfected tertiary level recycled water. The City has received preliminary acknowledgement from the SWRCB Division of Drinking Water the water meets the stated classification and the City is making plans for its use as part of its recycled water production and distribution system. The combined rated production yield of the fifteen wells, if run year-round, would be approximately 32,000 af/yr. The City plans to blend the recycled extraction well water with the disinfected tertiary level recycled water produced from the new 5 mgd wastewater reclamation to feed the new recycled water distribution system located in southwest Fresno. As new sales grow for the recycled water, additional recycled extraction well water will be utilized to feed this southwest recycled water system. It is anticipated soil aquifer treated recycled water wells will be incorporated into the recycled water system at a rate

²³ WaterReuse Research Foundation, ISBN: 978-934183-92-2, 2013.

of two wells per five-year increment to align with future sales projections and demands for this water.

6.4.3.2 North Fresno Wastewater Reclamation Facility

As described earlier in Section 6.4.2.2.2, the City has an existing recycled water plant in the northern portion of the City that receives and treats sewer from the residential, commercial, and golf course planned community. The NFWRF was constructed in 2008 but wasn't fully operational until 2009 due to the inability to properly run at extremely low flow conditions. Subsequent modifications were made to the plant permitting it to run on a regular basis in 2010, with further modifications in 2014 for UV approval. This explains why there were no recorded flows in Table 6-8 for this facility. The disinfected tertiary effluent is conveyed in a dedicated pipeline to an adjacent golf course for irrigation purposes. The quantities used for irrigation purposes are shown in Table 6-8 for the period from 2010-2015.

Table 6-8: Recycled Water Used Within Service Area

Recycle Water Facility	Quantity (af/yr)					
	2010	2011	2012	2013	2014	2015
NFWRF	25	57	58	46	0	62
RWRF	9,591	10,072	8,655	9,406	10,245	8,688
Total	9,616	10,129	8,713	9,452	10,245	8,750

6.4.4 Recycled Water Beneficial Uses

Legal Requirements:

CWC 10633

(d) *(Describe and quantify) the potential uses of recycled water, including but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement. Wetlands, industrial reuse, groundwater recharge, indirect potable reuse, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.*

CWC 10633

(e) *(Describe) the projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years and a description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision.*

In the development of the City's Recycled Water Master Plan (RWMP), an exhaustive analysis was performed to identify specific uses and customers for recycled water. The following sections review existing and future opportunities for the use of recycled water.

6.4.4.1 Current and Planned Uses of Recycled Water

At present, the City provides recycled water for the irrigation of non-food crops to land farmed immediately adjacent to the RWRF, and to a golf course adjacent to the

NFWRF. Recognizing the opportunity to expand uses and the market for recycled water, the City has proactively developed a RWMP to identify potential uses and users and analyze the most cost-effective production and distribution system to optimize this presently untapped market opportunity. Implementation of such a program would provide a direct potable water offset, and would stretch pristine groundwater and raw surface water resources for highest and most beneficial uses.

As outlined in the City's RWMP, the recommended planned major users considered in the selection of distribution system alignments include:

- Airport (Chandler),
- Artificial Lakes, make-up water
- Baseball Stadium, turf irrigation
- Cemeteries, turf irrigation
- City Hall & County Court House, turf irrigation
- Fairgrounds, turf irrigation
- Golf Courses, turf irrigation
- Highways, landscape irrigation
- Hospital, cooling and turf irrigation
- Industries, irrigation, boiler, cooling, wash water, process, toilet flushing
- Laundries, laundry washing
- Parks, turf irrigation
- Schools, turf irrigation
- Universities (public & private), turf irrigation

The cumulative demand from the identified existing water users amount to 9,780 af/yr and requires approximately 91 miles of transmission and distribution pipeline. The City has already started construction of conveyance pipeline and a 5 mgd tertiary treatment facility at the RWRf which should be complete by June of this year. Table 6-9 shows current and planned beneficial uses for recycled water.

In addition to the above noted urban orientated beneficial uses, the RWMP also considered groundwater recharge projects as another prime opportunity. The utilization of recycled water is slowly becoming more accepted by the public and regulatory agencies, and provides communities the opportunity to enhance groundwater replenishment with an essentially drought-proof source. There are conditions on the use of recycled water that need to be addressed, such as, blending requirements depending on the level of treatment of the recycled water, and demonstrating that travel time of the percolated recycled water is six months to the nearest drinking water well. The incorporation of groundwater recharge would provide the ability to utilize recycled water in the winter months when landscape irrigation demands are nearly diminished.

Recognizing the value of this opportunity, the City has budgeted funding to carry-out engineering and hydrogeologic studies for siting, permitting, and constructing a dedicated recharge basin for this purpose. Preliminarily, a recharge basin that had been designed for intentional recharge purposes is being considered to be repurposed for the use of recycled water recharge. Projected recharge utilization is shown in Table 6-9.

Lastly, another use for recycled water is the expansion of agricultural irrigation. The City already provides secondary effluent for restricted agricultural irrigation and could expand this market by increasing deliveries of secondary effluent and the newly reclassified tertiary equivalent water from the onsite extraction wells for irrigation purposes. Expanded agricultural irrigation is reflected in Table 6-9.

6.4.4.2 Planned Versus Actual Use of Recycled Water

Legal Requirements:

CWC 10633

(e) (Provide) a description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision.

As previously reported in the 2010 UWMP, it was anticipated that 750 af/yr of recycled water would be produced and utilized from the NFWRF; however, as shown in Table 6-8 above, only 25 af/yr to 62 af/yr has been used. Infrastructure in this area is being considered for extension and in the future will allow for a higher use of the recycled water available from this facility.

Recycled water utilized adjacent to the RWRf was not previously included in the 2010 UWMP. It is anticipated that historic use of undisinfected secondary effluent for irrigation of non-food crops will continue for the foreseeable future.

Reported in Table 6-10 are the projected and actual quantities used for 2015.

Chapter Six: System Supplies
City of Fresno - 2015 UWMP

Name of Agency Producing (Treating) the Recycled Water:		City of Fresno									
Name of Agency Operating the Recycled Water Distribution System:		City of Fresno									
Supplemental Water Added in 2015		0									
Source of 2015 Supplemental Water		N/A									
Beneficial Use Type	General Description of 2015 Uses	Level of Treatment	2015	2020	2025	2030	2035	2040 (opt)			
Agricultural irrigation ¹ (af)	Irrigate non-food crops	secondary	8,700	10,000	10,000	10,000	10,000	10,000	10,000	10,000	
Agricultural irrigation ² (af)	Irrigate limited food crops	tertiary equivalent		4,200	8,400	8,400	12,600	12,600	12,600	12,600	
Landscape irrigation ³ (af)	Schools, cemeteries, parks	tertiary	62	4,300	7,200	7,200	7,200	7,200	7,200	7,200	
Commercial use (af)	-	-	-	-	-	-	-	-	-	-	
Industrial use ⁴ (af)	Laundries, boilers, cooling	tertiary		1,400	2,600	2,600	2,600	2,600	2,600	2,600	
Recreational impoundment (af)	-	-	-	-	-	-	-	-	-	-	
Groundwater recharge (IPR) ⁵ (af)		tertiary		1,300	6,200	6,200	6,200	6,200	6,200	6,200	
Surface water augmentation (IPR) (af)	-	-	-	-	-	-	-	-	-	-	
Direct potable reuse (af)	-	-	-	-	-	-	-	-	-	-	
Other (af)	Type of Use	-	-	-	-	-	-	-	-	-	
IPR - Indirect Potable Reuse		Total (af)	8,762	21,200	34,400	34,400	38,600	38,600	38,600	38,600	
<p>(1) Applied recycled water is representative of long-term use of undisinfected secondary effluent from RWRf for irrigation of non-food crops adjacent to said facility. (2) Recycled water is from recently reclassified extraction wells at RWRf (reclassified as tertiary equivalent) and will be applied to nearby limited food crops. (3) Recycled water will be distributed to and applied to large landscaped turf areas as identified in the City of Fresno Recycled Water Master Plan. (4) Recycled water will be distributed to and delivered to various industries as identified in the City of Fresno Recycled Water Master Plan. (5) Recycled water will be delivered to permit approved facilities for blending with other sources and incorporated as part of the City's intentional groundwater recharge program.</p>											

Table 6-9: Current and Projected Recycled Water Direct Beneficial Uses Within Service Area (DWR Table 6-4)

Table 6-10: 2010 UWMP Recycled Water Use Projection Compared to 2015 Actual (DWR Table 6-5)

Use Type		2010 Projection for 2015 (af)	2015 actual use (af)
Agricultural irrigation		-	8,700
Landscape irrigation (excludes golf courses)			
Golf course irrigation		750	62
Commercial use			
Industrial use			
Recreational impoundment			
Groundwater recharge (IPR)			
Surface water augmentation (IPR)			
Direct potable reuse			
Other	Required for this use		
Total		750	8,762

6.4.5 Actions to Encourage and Optimize Future Recycled Water Use

Legal Requirements:

CWC 10633

(f) (Describe the)actions, including financial incentives, which may be taken to encourage the use of recycled water, and the projected results of these actions in terms of acre-feet of recycled water used per year.

CWC 10633

(g) (Provide a) plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.

As identified in the RWMP, it is imperative that the City adopt an ordinance to establish recycled water policy and criteria for its use within the City's SOI. The focus of the ordinance would be to accomplish the following:

- Establish Administrative Authority
- Establish approved uses of recycled water
- Define areas of potential eligibility for recycled water service
- Specify mandatory and voluntary uses of recycled water, depending on user classifications
- Require installation of transmission and distribution infrastructure
- Encourage the use of voluntary retrofits for existing users that may not be addressed in the ordinance

- Require the City of Fresno to prepare Rules and Regulations
- Provide enforcement and severability clauses

On July 14, 2014, the Recycled Water Ordinance was adopted by the City Council laying the foundation for the expanded use of recycled water within the City.

Efforts to further the use of recycled water include the requirement that new developments within planned major recycled water distribution mains to install purple pipe. Then, as the City’s capital projects construct distribution infrastructure, these segments will be in-place to facilitate connections to new customers and reduce program costs by avoiding digging up new street improvements and disruption to vehicular traffic.

The initial leg of the recycled water distribution system from the RWRP is presently under construction and will pass in proximity to CalTrans highway irrigation infrastructure. City staff has had conversations with CalTrans and they have expressed interest in utilizing recycled water for landscape irrigation purposes. The City is continuing to coordinate with CalTrans to identify connection points and flow requirements to meet highway irrigation demands.

Table 6-11: Methods to Expand Future Recycled Water Use (DWR Table 6-6)

Name of Action	Description	Planned Implementation Year	Expected Increase in Recycled Water Use (af)
Build Infrastructure	RWRP Tertiary Plant	FY16	5,600
Build Infrastructure	Satellite Plant near FYI ¹	FY18-FY19	9,000
Total			14,600
¹ FYI – Fresno Yosemite International Airport			

6.5 Desalinated Water Opportunities

Legal Requirements:

CWC 10631

(h) Describe the opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply.

As the City is located in the central San Joaquin Valley, seawater desalination is not applicable to the City. Additionally, the groundwater that exists within the immediate area of the City is not brackish in nature and does not require desalination treatment. As long-range planning efforts continue to ensure an adequate water supply is available for existing and new demands, the City will explore options that may include some sort

of cost sharing arrangement with another agency that would yield a pro rata beneficial exchange supply for the City. It is possible that such an arrangement may occur should the need arise.

6.6 Exchanges or Transfers

Legal Requirements:

CWC 10631

(a) Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.

6.6.1 Exchange and Transfer Opportunities

The City has an existing exchange agreement with FID that allows the City to pump groundwater, which was developed through the percolation of treated wastewater, into FID's canals. This water is transported through the FID canals and is delivered to downstream customers. In exchange, FID will apply surface water from its Kings River entitlement or its Class 2 USBR water to agricultural areas east of the metropolitan area. The agreement is structured such that FID will provide 0.46 af for every 1 af of groundwater that the City pumps into FID's delivery canals. As a future opportunity for an exchange, the City could renegotiate the terms of this arrangement and receive the exchange water directly for use at the surface water treatment facilities or for recharge purposes.

The City has in the past been a recipient party to water transfers which permitted new services to be provided for areas outside the City's service area. The transferred surface water supply in this case was from a party located in the nearby Garfield Water District whose well was going dry. The transfer of a like amount of water to be supplied to the new service was a crucial element to ensure existing rate payers were not burdened with negative supply impacts due to the new connection. This approach will be followed as the City's water system is extended to serve Disadvantaged Communities.

6.6.2 Emergency Interties

The Cities of Fresno and Clovis have entered in to an agreement for a joint project to construct an intertie pipeline between their two systems, which will permit the conveyance of water supplies from one system to another. The intertie is composed of a dedicated 1.5 mile long 16-inch diameter pipeline that starts at the southern edge of the City of Clovis, at the Gould Canal and Leonard Avenue, and then runs south to East Shields Avenue, and then west towards the City to North Locan Avenue, connecting to

a booster pump and valve station. Under normal operating system pressures flow from the City of Clovis can be conveyed to the City of Fresno without a booster pump and simply controlled by automated valves. The intertie is also capable of conveying water from Fresno to Clovis with the use of a booster pump, which is needed due to the elevation difference between the two systems. The 16-inch diameter pipeline was sized to permit transferring water at a rate up to 3,500 gpm. Construction of the intertie was just recently completed with equipment programming underway. The intertie is anticipated to be operational by June 2016.

6.7 Future Water Projects

Legal Requirements:

CWC 10631

(g) ...The urban water supplier shall include a detailed description of expected future water projects and programs...that the urban water supplier may implement to increase the amount of the water supply available to the urban water supplier in average, single-dry, and multiple-dry water years. The description shall identify specific projects and include a description of the increase in water supply that is expected to be available from each project. The description shall include an estimate with regard to the implementation timeline for each project or program.

At this time the City is in the midst of carrying-out one of the largest and most ambitious capital improvement programs in its history. As outlined in its MWRMP (2014), and reported in the 2010 UWMP, the City's future for a safe, reliable, and sustainable water supply was envisioned to consist of expanded water conservation, expanded surface water treatment, expanded recycled water treatment, and expanded groundwater recharge.

6.7.1 Expand Water Conservation Program

As of January 2013, the City completed the installation of nearly 110,000 single-family residential water meters. Completion of this project has seen the benefit of reduced demands from this sector of water users. Efforts will continue with tracking water use and working with residents to address excessive water utilization and to encourage reduced water use. Completion of the meter installation project has seen marked improvement in reduced water consumption. Education, outreach, and enforcement remain a significant focus for current and future efforts.

6.7.2 Expand Surface Water Treatment Capacity

A key component to the success of the City's ability to reverse the long time overreliance on groundwater is to construct additional surface water treatment facilities which will allow it to optimize the use of available surface water supplies. In

conformance with the objectives and timeline established in the MWRMP (2014), the City has purchased land, designed the facility and associated large diameter transmission pipelines, and has recently awarded a contract for the construction of the 80 mgd SESWTF. Initially this facility will operate at a permitted capacity of 54 mgd, but with the subsequent rerating of the finish filters will be capable of operating at a rated capacity of 80 mgd. This project, including the construction of the transmission pipelines, is slated for completion in Fiscal Year 2018.

The NESWTF is presently sized at a 30 mgd capacity. As growth within the City increases demands, this facility will be expanded by another 30 mgd for a total capacity of 60 mgd. The timing for this expansion is anticipated to occur by approximately 2035; however, the City will monitor system demands and adjust the schedule for this project as is required to meet projected water system demands and maintain the sustainable use of available water resources.

6.7.3 Expand Recycled Water Treatment Capacity

Another key component of the MWRMP (2014) was the incorporation of 25,000 af of recycled water into the City's water portfolio by the year 2025. The attainment of such a lofty goal requires the initiation of planning, designing, and construction of substantial infrastructure. To that end, the City has completed the development of the recycled water master plan, the adoption of a recycled water ordinance, designed, and initiated construction of a second tertiary level wastewater treatment facility capable of producing 5 mgd. This effort is budgeted for further expansion with the design of another tertiary level reclamation facility to be constructed in the FY18-FY19 timeframe.

6.7.4 Expand Groundwater Recharge Capacity

Lastly, with the acknowledgement the groundwater aquifer is and will remain an integral resource for the City, it will be working on the development of either new dedicated intentional recharge facilities and/or joint projects for basins with the FMFCD, and potentially the FID. Land has already been acquired for a new recharge facility in west Fresno, and design is substantially complete. It is anticipated this facility will be constructed by the end of FY17 and will be capable of recharging approximately 1,200 af/yr. The target for recharge expansion is to ultimately attain an annual rate of 75,100 af/yr, which would optimize use of available surface water supplies in normal years.

Table 6-12: Expected Future Water Supply Projects or Programs (DWR Table 6-7)

Name of Future Projects or Programs	Joint Project with other agencies?		Description (if needed)	Planned Implementation Year	Planned for Use in Year Type	Expected Increase in Water Supply to Agency (af)
	Yes or No	Agency Name				
Expansion of Tertiary Recycled Water Treatment Capacity	No	n/a	-	2016 & 2021	Average Year Single Dry Year Multi-Dry Year	14,600
Expansion of Surface Water Treatment Capacity	No	n/a	-	2018 & 2035	Average Year Single Dry Year Multi-Dry Year	103,000 ¹
Expansion of Groundwater Recharge Program	No	n/a	-	Ongoing	Average Year Single Dry Year	See Note 2.

(1) Expansion of surface water treatment capacity does not directly provide a new supply, but allows the City to utilize the supply for direct use rather than just for groundwater recharge purposes.
 (2) Expansion of groundwater recharge program does not directly provide a new supply, but allows the City to utilize the surface water supplies to make groundwater use sustainable.

6.8 Summary of Existing and Planned Sources of Water

Legal Requirements:

CWC 10631

- (b) *Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision 10631(a).*
- (4) *(Provide a) detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the urban water supplier. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.*

A summary of the above discussed existing and planned sources of water are provided in Tables 6-13 and 6-14 below.

Table 6-13: Water Supplies – Actual (DWR Table 6-8)

Water Supply	Additional Detail on Water Supply	2015		
		Actual Volume (af)	Water Quality	Total Right or Safe Yield (af)
Groundwater		83,360	Drinking Water	72,500 ¹
Surface Water – USBR CVP		0	Raw Water	60,000
Surface Water – FID Contract		41,525	Raw Water	101,200
NFWRF ²		203	Recycled Water	203
Purchased ³		3,000	Raw Water	0
Total		128,088		233,903

¹ Provided value is the Safe Yield. Higher pumping volumes are permissible by accounting for intentional recharge volumes.

² This volume is dependent on facility operation and subsequent expansion.

³ This water is a onetime purchase and has no associated right.

Table 6-14: Water Supplies – Projected (DWR Table 6-9)

Water Supply	Additional Detail on Water Supply	Projected Water Supply (af)											
		2020		2025		2030		2035		2040 (opt)			
		Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)		
Groundwater ¹	Kings Subbasin	130,400		135,100		139,700		144,300		148,900			
Surface Water ²	FID – Agmt.	106,200		111,200		116,200		121,200		126,200			
Surface Water ³	USBR - CVP	52,600		52,600		52,600		52,600		52,600			
Recycled ⁴	Tertiary, disinfected	7,000		16,000		16,000		16,000		16,000			
Recycled ⁵	Secondary, undisinfected	10,000		10,000		10,000		10,000		10,000			
Recycled ⁶	Tertiary, disinfected	2,500		5,000		7,500		10,000		12,500			
	Total	308,700	0	329,900	0	342,000	0	354,100	0	366,200	0	0	0

(1) The value for “Reasonably Available Volume” includes the Safe Yield which increases as the City’s SOI expands as discussed in Sections 6.1.5.1 & 6.1.5.2 and in Table 6-3. Additionally, this value includes water from prior year(s) operation of intentional recharge as shown in Table 6-3 for the same year.

(2) The City’s surface water supply from FID grows as the City’s annexed city limits expand as discussed in Section 6.2.1.

(3) The City’s USBR CVP Friant Division contract is for 60,000 af of Class 1 water. The 52,600 af/yr value is the historic average allocated value for the City per Figure 7-2 (rounded to nearest 100).

(4) The 2020 value of 7,000 af/yr is based on the RWRF’s 5 mgd facility; the subsequent increase to 16,000 af/yr reflects the satellite WRF (8 mgd) being constructed and operational shortly after 2025.

(5) The annual 10,000 af is the current amount presently directed to farm irrigation of non-food crops adjacent to the RWRF.

(6) The City recently had extraction wells at the RWRF reclassified as providing “soil aquifer treated” recycled water. The projected values reflect the incorporation of this water into the flows returned to the metropolitan area and used for purposes as shown in Table 6-9.

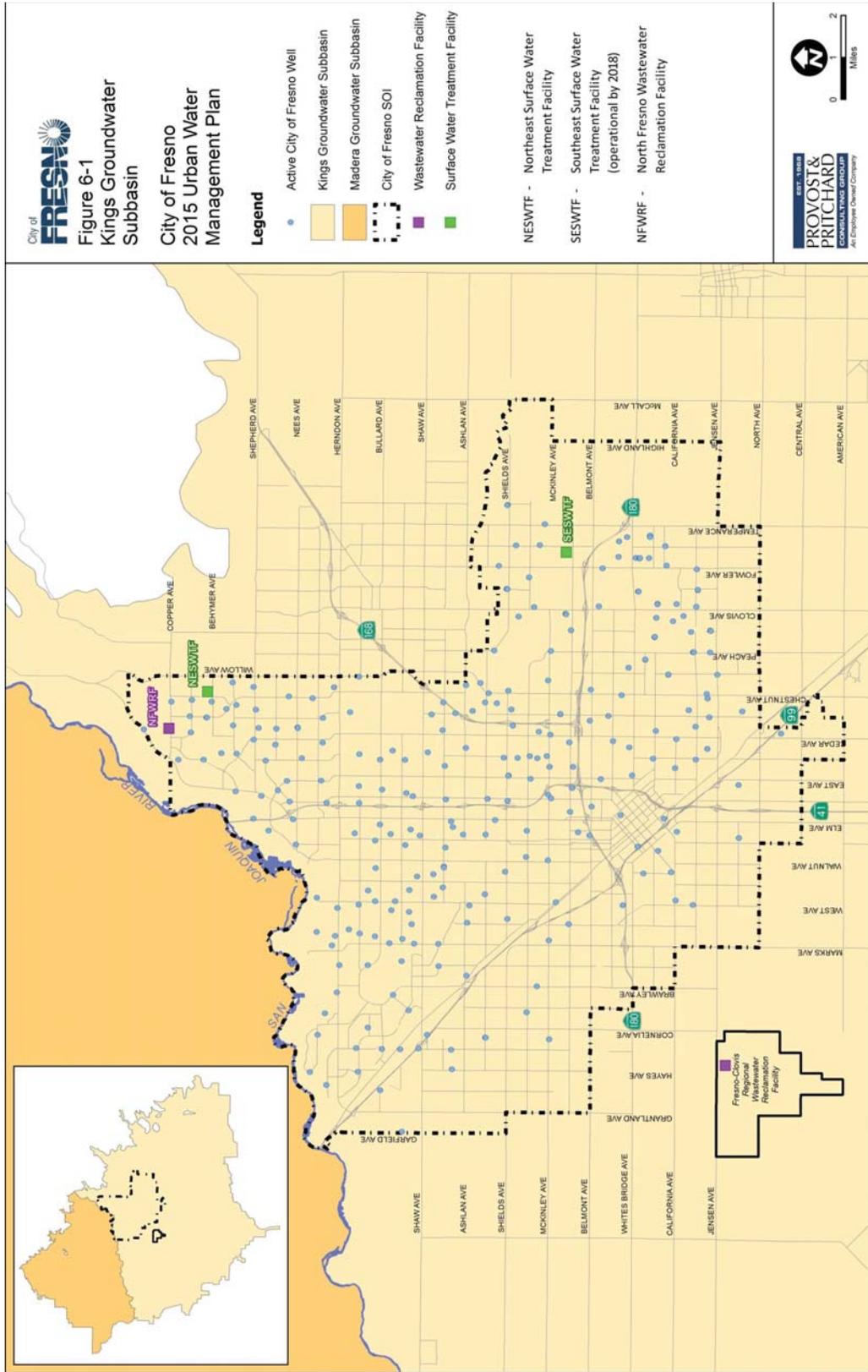


Figure 6-1: Kings Groundwater Subbasin

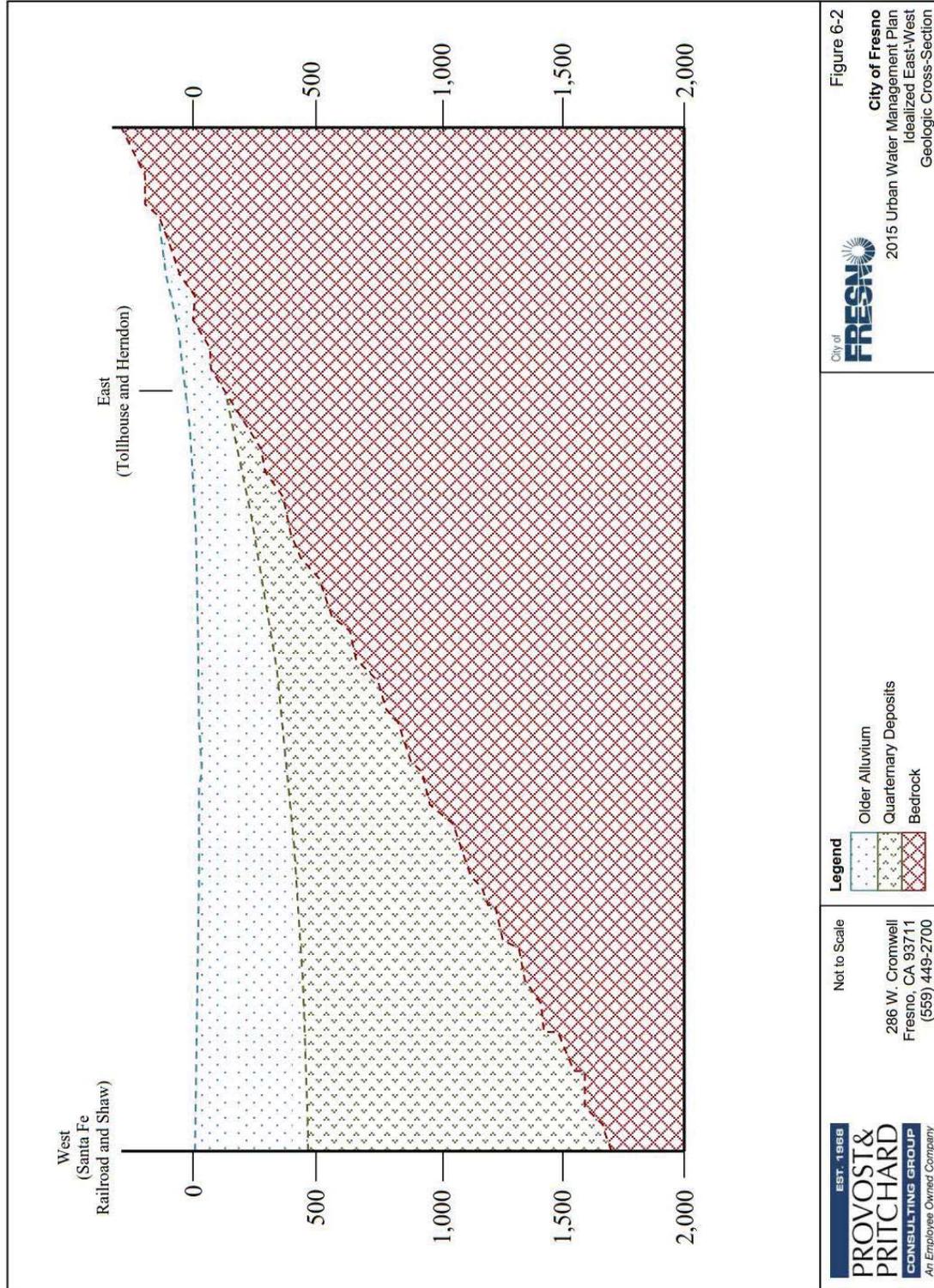


Figure 6-2: Idealized East-West Geologic Cross-Section

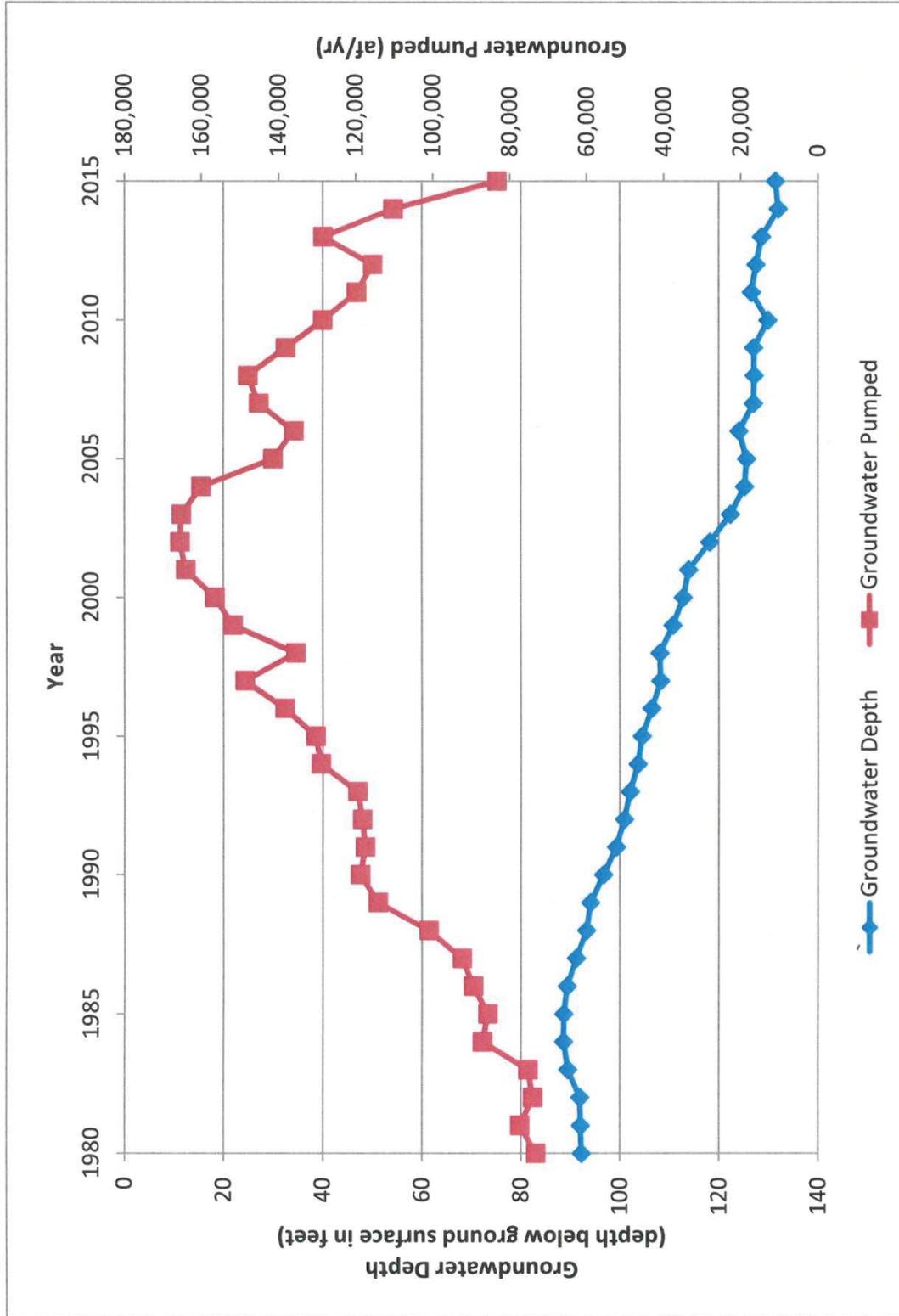


Figure 6-3: Historic Average Groundwater Depth and Groundwater Pumped

6.0 CONTINGENCY ANALYSIS APPLICABILITY (Government Code Section 66473.7 (2)(b))

The City's adopted 2015 Urban Water Management Plan provides a full spectrum of Water Shortage Contingency Plan measures (Chapter 8, pages 8-1 through 8-14). These measures, applicable to the entire City of Fresno municipal water service area, are fully applicable to the project and protective of the adequacy of the project's water supply.

8 Water Shortage Contingency Planning

Water purveyor planning for possible water supply shortages has become an increasingly important subject in light of the drought conditions over the last several years. The City of Fresno has had a Water Shortage Contingency Plan (WSCP) in place for many years; the following discussion modifies the WSCP to allow for a more streamlined approach in the eventuality of more drought conditions in the coming years.

This chapter includes a discussion regarding measures that may be taken during water shortage conditions. The WSCP is the primary focus of the chapter; however, discussion is also presented concerning minimum water supplies needed for the City.

The City initially developed a WSCP in 1993, which was adopted in 1994, in response to the 1991 Assembly Bill 11X, which mandated all water purveyors with more than 3,000 connections develop a WSCP. The WSCP was revised as part of the 2005 UWMP Update and adopted by the City in 2008.

The WSCP is being further refined in this 2015 UWMP, but is still based on the original 1994 plan. The revisions are intended to streamline the plan's usefulness and enable the City to manage the necessary conservation measures to be enacted if a water shortage condition exists. The updated WSCP will be reviewed and adopted in conjunction with this 2015 UWMP.

The WSCP consists of four stages allowing the City to ultimately reduce its water demand to a level commensurate with the water supplies available to a maximum reduction of 50 percent. Financial impacts of a water shortage will also be discussed at the end of the chapter.

8.1 Stages of Action

Legal Requirements:

CWC 10632 (a)(1) *Stages of action to be undertaken by the urban water supplier in response to water supply shortages, including up to a 50 percent reduction in water supply, and an outline of specific water supply conditions which are applicable to each stage.*

The City's WSCP includes a staged plan to reduce water demands based on the type of water shortage the City is experiencing. Any water shortage, whether long or short term may trigger any stage of the plan to enable the City to manage its water supply responsibly and provide, at a minimum, for the health and safety of its residents.

The stages are constructed to provide for a range of water shortages from 10 to 50 percent. Stage 1 is triggered at a 10 percent reduction in water supply, Stage 2 at 10-25 percent, Stage 3 at 25-35 percent, and Stage 4 is triggered at a 35-50 percent reduction in supply. The stages and specific conditions effecting water supply are discussed in more detail in Table 8-1.

Any stage listed within the WSCP may be enacted by the City Manager as deemed appropriate based on water shortage conditions.

Table 8-1: Stages of Water Shortage Contingency Plan

Stage	Percent Supply Reduction	Water Supply Condition
1	10%	<p>Stage 1 of the Water Shortage Contingency Plan may be triggered by any of the following conditions:</p> <ul style="list-style-type: none"> In the second of two consecutive years, the volume of surface water available to the City through USBR and FID is projected to be less than the long-term average and the reduction in supply, averaged over the consecutive years, is equal to 10% or greater, or Groundwater contamination conditions exists (DDW required the City to shut down wells) or a large-scale infrastructure failure occurs that results in a 10% loss in water production capacity, or Localized groundwater cones of depression develop exceeding historic low water levels and, to avoid possible litigation with responsible parties of point source contaminant plumes, the City must shut down existing wells that result in a 10% loss in groundwater production capacity, or A combination of the above mentioned circumstances or a disaster reduced the City's overall water supply or production capabilities by 10% or more. After having been in a Stage 2 classification, the following water year results in a declaration by the jurisdictional authority in determining entitlements for the respective surface water supply of normal or above normal water deliveries; or the original trigger for a previous higher stage classification has been rectified to a point that is consistent with the above conditions for this stage.
2	10 - 25%	<p>Stage 2 of the Water Shortage Contingency Plan may be triggered by any of the following conditions:</p> <ul style="list-style-type: none"> In the third of three consecutive years, the projected volume of surface water available to the City through USBR or FID is less than the long term average and the reduction in supply, averaged over the three consecutive years equals 10% or greater, or The volume of surface water available to the City through FID is reduced by 25% of the long-term average, or The volume of surface water available to the City through USBR is reduced by 25% of the long-term average, or One-year change in average groundwater level in 30 key City wells exceeds 3 feet or two-year change in average groundwater level in 30 key City wells exceeds 6 feet and exceeds historic low groundwater levels, or Groundwater contamination condition exists (DDW requires the City to shut down wells) or a large-scale infrastructure failure occurs that results in a 25% loss in water production capacity, or A combination of the above mentioned circumstances or disaster reduces the City's overall water supply or production capabilities by 25% or more. After having been in a Stage 3 classification, the following water year results in a declaration by the jurisdictional authority in determining entitlements for the respective surface water supply of normal or above normal water deliveries on the Friant-Kern system; or the original trigger for a previous higher stage classification has been rectified to a point that is consistent with the above conditions for this stage.
3	25 to 35%	<p>Stage 3 of the Water Shortage Contingency Plan may be triggered by any of the following conditions:</p> <ul style="list-style-type: none"> In the fourth of four consecutive years, the projected volume of surface water available to the City through USBR or FID is less than the long term average and the reduction in supply, averaged over the four consecutive years equals 10% or greater, or The volume of surface water available to the City through FID is reduced by 35% of the long-term average, or The volume of surface water available to the City through USBR is reduced by 35% of the long-term average, or One-year change in average groundwater level in 30 key City wells exceeds 5 feet or two-year change in average groundwater level in 30 key City wells exceeds 10 feet and exceeds historic low groundwater levels, or Groundwater contamination condition exists (DDW requires the City to shut down wells) or a large-scale infrastructure failure occurs that results in a 35% loss in water production capacity, or A combination of the above mentioned circumstances or disaster reduces the City's overall water supply or production capabilities by 35% or more. After having been in a Stage 4 classification, the following water year results in a declaration by the jurisdictional authority in determining entitlements for the respective surface water supply of normal or above normal water deliveries on the Friant-Kern system; or the original trigger for a previous higher stage classification has been rectified to a point that is consistent with the above conditions for this stage.
4	35 - 50%	<p>Stage 4 of the Water Shortage Contingency Plan may be triggered by any of the following conditions:</p> <ul style="list-style-type: none"> In the fifth of five consecutive years, the projected volume of surface water available to the City through USBR or FID is less than the long term average and the reduction in supply, averaged over the five consecutive years equals 10% or greater, or The volume of surface water available to the City through FID is reduced by 50% of the long-term average, or The volume of surface water available to the City through USBR is reduced by 50% of the long-term average, or One-year change in average groundwater level in 30 key wells exceeds 7.5 feet or two-year change in average groundwater level in 30 key City wells exceeds 12 feet and exceeds historic low groundwater levels, or Groundwater contamination condition exists (DDW requires the City to shut down wells) or a large-scale infrastructure failure occurs that results in a 50% loss in water production capacity, or A combination of the above mentioned circumstances or disaster reduces the City's overall water supply or production capabilities by 50% or more.

8.2 Prohibitions on End Uses

Legal Requirements:

CWC 10632 (a)(4) *Additional, mandatory prohibitions against specific water use practices during water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning.*

(5) Consumption reduction methods in the most restrictive stages. Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply.

CWC 10632 (b) *Commencing with the urban water management plan update due July 1, 2016, for purposes of developing the water shortage contingency analysis pursuant to subdivision (a), the urban water supplier shall analyze and define water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, separately from swimming pools and spas, as defined in subdivision (a) of Section 115921 of the Health and Safety Code.*

Health and Safety Code Section 115921

As used in this article the following terms have the following meanings:

- (a) "Swimming Pool" or "Pool" means any structure intended for swimming or recreational bathing that contains water over 18 inches deep. "Swimming Pool" includes in-ground and aboveground structures and includes, but is not limited to, hot tubs, spas, portable spas, and non-portable wading pools.*

The City of Fresno has adopted a set of restrictions on water usage that help promote water conservation and overall water usage reduction. The City Municipal Code contains sections on water and wastewater conservation that are to take place under normal water supply conditions. These water conservation measures will be discussed below and can be seen in Table 8-2.

Regulations in place under normal water supply conditions encourage smart water use and help the City manage their water supply. Some of those regulations include year round outdoor water schedule, turf type restrictions, turf irrigation methods, willful or negligent water wasting, flood irrigating, washing hardscape with potable water, and frequent draining of pools. Additional details of these regulations can be found in Section 6-520(a) of the City's Municipal Code.

All of the above restrictions are mandated year round by the City and must be observed. In addition to the restrictions on water usage that are mandated by the City year round, an additional list has been created that has extended the prohibitions that exist during a period of water shortage. These prohibitions correlate with the different stages of water reduction that were discussed in the preceding section. The stage that each of the prohibitions is associated with is referenced on the left hand side of Table 8-2. It should be noted that all prohibitions listed for Stage 1 will apply to Stage 2, likewise, all restrictions that apply to Stages 1-3 will also be applied to Stage 4.

One other mechanism that is used to reduce overall water loss is to reduce the overall system pressure by approximately 5 psi. Reducing the overall water pressure helps minimize leaks and any water waste that may occur. The SCADA system that the City has adopted can be used to change the zone pressure settings.

Table 8-2 lists all of the restrictions that are applicable to the Water Use Reduction Plan and the consequences associated with not complying with these restrictions can be seen as well.

Table 8-2: Restrictions and Prohibitions on End Uses

Stage	Restrictions and Prohibitions	Additional Explanation or Reference	Penalty, Charge or Other Enforcement
1-3	Landscape - Limit landscape irrigation to specific times	Stage 1: Summer – 3 days/wk; Winter – 1 day/wk Stage 2: Summer – 2 days/wk; Winter – 1 day/wk Stage 3: Summer – 1 days/wk; Winter – 1 day/wk	Yes See Section 8.3
1-3	Other	Prohibit car washing except with a bucket only (a hose equipped with a shut off nozzle may be used for a quick rinse)	Yes See Section 8.3
1-4	Other - Prohibit use of potable water for washing hard surfaces	Prohibit use of potable water to wash sidewalks, walkways, driveways, parking lots, open ground or other hard surfaced areas except where necessary for public health or safety.	Yes See Section 8.3
4	Landscape - Prohibit certain types of landscape irrigation	Prohibit outdoor irrigation year-round	Yes See Section 8.3
4	Other	Prohibit car washing	Yes See Section 8.3
4	CII - Restaurants may only serve water upon request	No restaurant, hotel, café, cafeteria, or other public place where food is sold is served or offered for sale, shall serve drinking water to any customer unless expressly requested.	No
4	Water Features - Restrict water use for decorative water features, such as fountains	Prohibit use of potable water to clean, fill or maintain decorative fountains, lakes, or ponds unless such water is reclaimed.	Yes See Section 8.3
4	Other - Prohibit use of potable water for construction and dust control	Prohibit use of potable water for construction, compaction, dust control, street or parking lot sweeping, building wash down where non-potable or recycled water is sufficient.	Yes See Section 8.3
4	Other	Prohibit use of potable water for sewer system maintenance or fire protection training without prior approval by the City Manager.	No
4	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	Prohibit allowing potable water to escape from breaks within the customer's plumbing system for more than twenty-four (24) hours after the customer is notified or discovers the break	Yes See Section 8.3
4	Other - Prohibit vehicle washing except at facilities using recycled or recirculating water	Prohibit washings cars, boats, trailers, aircraft, or other vehicles except to wash such vehicles at commercial or fleet vehicle washing facilities using water recycling equipment	Yes See Section 8.3
4	Pools and Spas - Require covers for pools and spas	Require covers for swimming pools when not in use	No
4	Other	Prohibit Use of Outdoor Misters	No

8.3 Penalties, Charges, Other Enforcement of Prohibitions

Legal Requirements:

CWC 10632 (a)(6) Penalties or charges for excessive use, where applicable.

The City has penalties for violation of the water use restrictions that were mentioned above in Table 8-2. The fines noted in Table 8-2 are based on City Municipal Code, Section 6-520(e) and are discussed in further specific detail in the below Table 8-3.

Table 8-3: Penalties for Water Wastage

Incident	Penalty Fee	Deferral Conditions
1	\$45	Fee shall be deferred for a period of two years conditioned upon the customer not having a fourth incident of water wastage within a two-year period. If the customer does not have such fourth incident of water wastage within two years such deferral shall become permanent. However, such fee shall be due and owing by the customer if a fourth incident of water wastage occurs within two years.
2	\$45	Fee shall be deferred for customers who attend a course in water conservation. The deferral shall be conditioned upon the customer's successful completion of a water conservation course provided by the Department of Public Utilities and the customer not having a third incident of water wastage within a two-year period. The deferred fee shall be collected if a third incident of water wastage occurs within a two-year period.
3	\$45 plus fee from 2 nd violation	A customer shall have the option of submitting proof of implementation of retrofit measures of no less value than the fee imposed for such third incident of water wastage in lieu of that fee. Retrofit measures of a value less than that fee shall be credited toward payment of the fee.
4	\$45 plus fee from 1 st violation	None
After 4	\$45 per incident	None

If a customer has more than four incidents of water wastage within a two-year period, the City may implement any or all of the following measures:

- Require the customer to get a landscape evaluation, lawn water audit, and water budget, as appropriate, in order to learn efficient water use. This work shall be completed at the customer's expense by landscape irrigation auditors certified by the Irrigation Association.
- Require a customer to repair any defects in the watering system of such customers within fourteen days of notice by the City to repair.

- Installation by the City of flow restrictors or termination of water service for exterior use.
- Termination of all water service to a customer unless in the opinion of the Director of Public Utilities such termination would result in an unreasonable risk to the health and safety of persons.
- Require restoration of water service after termination be contingent on an agreement by the customer to adhere to the provisions of Section 6-520(e) of the City's Municipal Code.

8.4 Consumption Reduction Methods

Legal Requirements:

CWC 10632 (a)(5) Consumption reduction methods in the most restrictive stages. Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply.

The City of Fresno is employing a variety of different techniques to encourage community members to be more involved and educated about water conservation. The following section will discuss the measures taken to ensure that the overall consumption is reduced. The primary methods being employed by the City are as follows:

- Expanded Public Information Campaign
- Improved Customer Billing
- Increased Meter Frequency Reading
- Rebate Programs
- Landscape Irrigation Efficiency Programs
- Decreased Line Flushing
- Reduced System Water Loss
- Increased Water Waste Patrols

8.4.1 Categories of Consumption Reduction Methods

The water consumption reduction methods discussed in the preceding section can be seen and are discussed in detail in Table 8-4 below.

Table 8-4: Stages of WSCP – Consumption Reduction Methods (DWR Table 8-3)

Stage	Consumption Reduction Methods by Water Supplier	Additional Explanation or Reference
1	Expand Public Information Campaign	The City of Fresno has placed a lot of emphasis on doing community outreach that includes classroom presentations, outreach educational information, and water tours.
1	Improve Customer Billing	The City of Fresno has designated new water meter rates so that consumers who are using less water will see savings in their water bills, while those using more will have a larger water bill.
1	Offer Water Use Surveys	The City of Fresno uses water leak surveys to all community members.
1	Provide Rebates on Plumbing Fixtures and Devices	The City offers rebates on a variety of plumbing fixtures that are high-efficiency such as washers, toilets, and urinals.
1	Provide Rebates for Landscape Irrigation Efficiency	The City offers rebates for Micro Irrigation Conversions, Soil Moisture Sensors, Smart Irrigation Controller, and Rain Sensors to improve efficiencies.
1	Provide Rebates for Turf Replacement	The City provides rebates for community members who wish to replace their turf with a drought resistant garden.
2	Decrease Line Flushing	The City decreases the frequency and duration of water system flushing maintenance activities.
2	Reduce System Water Loss	The City increases efforts to correct water system losses, including repairing leaks and eliminating illicit connections.
2	Increase Water Waste Patrols	The City conducts more frequent patrols to discourage water wasting and correct water wasting practices in the community.
3	Increase Frequency of Meter Reading	The City may increase frequency of meter reading to better track services that may have leaks or unusually high water consumption
4	Moratorium or Net Zero Demand Increase on New Connections	The City will temporarily limit or ban new water service connections within the service area.

8.5 Determining Water Shortage Reductions

Legal Requirements:

CWC 10632 (a)(9) *A mechanism for determining and actual reductions in water use pursuant to the urban water shortage contingency analysis.*

The City of Fresno has assessed its overall water reduction by evaluating the water usage trends that were discussed in SBX7-7 in conjunction with the AWWA water loss calculator. See Chapters 5 and 4, respectively, for additional information.

The overall decrease of water use per capita and compliance with the 2015 Interim Water Conservation target indicate that the reduction measures have been effective in the community. Future water savings from conservation measures will be similarly determined through meter reading data from production and consumption meters.

8.6 Revenue and Expenditure Impacts

Legal Requirements:

CWC 10632 (a)(7) *An analysis of the impacts of each of the actions and conditions described in paragraphs (1) to (6), inclusive, on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts, such as the development of reserves and rate adjustments.*

The City has completed its metering program and all water service connections are now metered resulting in 100 percent of the City's revenues from water charges being derived from the City's established metered water rates based on actual water consumption.

The mandatory conservation measures implemented in 2012 through 2015 as a result of implementing the WSCP and Executive Orders issued in 2013, 2014 and 2015 resulted in a decrease of water consumption and the related revenues. The mandatory conservation goal for the City in 2015 was 28%. As the City worked to meet the conservation goal, its revenue reductions were less than the 28% water reduction mandate. This is explained by the fact that the City has a two component water rate structure that includes the fixed 'water meter service charge' for all service connections and a volumetric based 'water quantity charge.' Therefore, the reduction in revenues was affected by a lesser percentage than the overall total reduction in water use.

8.6.1 Drought Rate Structures and Surcharges

At present the City does not have in place a drought rate structure. The City has however just hired a consultant to review existing water rates and, if appropriate, develop new future water rates. As an additional task to this effort, the consultant will review, develop, and recommend a drought rate structure for the City's consideration. With such a rate structure in place, should a water shortage take place, the City will be able to institute an alternate water rate structure that may apply and change depending on the stage of drought that the community is experiencing. At this time there are no details as to how the rate structure will be developed, but conceptually each of the four stages specified in the WSCP would have a water rate increase associated with it.

The use of this type of structure during a drought will minimize expenditure impacts that are incurred during a drought. The effects of the decrease in revenue due to the drought, with a corresponding increase in expenditure, will allow for the City to function without going into debt.

8.6.2 Use of Financial Reserves

The City of Fresno Water System maintains two reserve funding sources that can be used to meet a portion of the utility's revenue requirements during emergency or drought conditions. They are as follows:

- Water Operating Reserves – This is a cash set aside in the Water Enterprise Fund that provides a “rainy day savings account” for unexpected cash flow shortages and large unexpected expenses or losses. Normally, these reserves are not intended to be used to make up income shortfalls. However, in an emergency situation, they can be transferred to the Water Rate Stabilization Fund (see below) for transfer back to the Water Enterprise Fund to meet revenue requirements, including debt coverage ratios.
- Water Rate Stabilization Fund - Indentures from previous bond issuances required the establishment of the Water Rate Stabilization Fund. These funds can be drawn on to meet a portion of the utility's revenue requirements through unexpected low-revenue periods and may be applied to debt coverage ratios calculations to help avoid technical default of bond covenants and loan agreements.

In addition, the City maintains funding in the Emergency Reserve Fund for the purpose of meeting unforeseen emergencies (see Section 1212 of the City's Municipal Code for more information). This funding may be used by an affirmative vote of at least five

members of the City Council upon presentation of a statement declaring the reason for use of the funding. This funding would be used only if the Water System reserves were insufficient to meet revenue requirements.

8.6.3 Other Measures

If the funding mentioned above is not sufficient to compensate for loss of revenue during a water shortage, the City may elect to temporarily suspend components of its operations and maintenance activities.

8.7 Resolution or Ordinance

Legal Requirements:

CWC 10632 (a)(8) *A draft water shortage contingency resolution or ordinance.*

The City's updated WSCP was developed in conjunction with the City's 2015 UWMP and will be approved with the 2015 UWMP approval. The resolution providing the Mayor or City Manager with authority to enact each stage of the WSCP is included in Appendix B of this document. A draft resolution to implement the WSCP is provided in Appendix K.

8.8 Catastrophic Supply Interruption

Legal Requirements:

CWC 10632 (a)(3) *Actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster.*

In addition to responding to drought conditions, the City's WSCP can be used to respond to emergency or catastrophic conditions that impact the availability of the City's water supplies, and/or the ability to deliver water within the City's service area. Potential events are listed below:

- Loss of Surface Water Supply
- Loss of Groundwater Supply
- Area-Wide Electrical Power Failure
- Natural Disaster – Earthquake or Flood

In the event of a supply interruption, there are several measures that could be taken that would mitigate the overall negative impacts of a water shortage. The following discussion indicates possible events and counteractions to maintain water service to the service area.

The City has an agreement with the City of Clovis that discusses an intertie system between the two cities that could be used by either entity during an emergency. Completion of construction of this intertie is anticipated in Fiscal Year 2017. Activation of the intertie with the City of Clovis would supplement the City's water supply.

The City also cooperates with the County of Fresno's Office of Emergency Services and the WSCP is included in the County's Disaster Plan. The goal during any emergency scenario is to maintain water supply such that the health and safety of the community is protected.

In the event of contamination, either of the surface or ground water supplies, the non-impacted water supply could be utilized more heavily or the intertie with the City of Clovis could be activated. Additionally, overall demand reduction, and the use of other wells or treated surface water would help meet demands.

If a regional power outage were to occur, the City could utilize backup power generators to operate wells. This measure in conjunction with demand reduction could supply sufficient water for health and safety purposes. The City has more than 35 wells with backup power sources. The City has budgeted for the installation of a backup generator for the NESWTF. The new SESWTF, currently under construction, will also be equipped with a backup power generator.

If a natural disaster occurs, in addition to the actions discussed above, the City would isolate any areas of the system that were compromised for emergency repairs and potentially use of the intertie with the City of Clovis. Implementing the WSCP could also occur to reduce demands.

8.9 Minimum Supply Next Three Years

Legal Requirements:

CWC 10632 (a)(2) *An estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency's water supply.*

As discussed in Chapter 4, the City currently has the following sources of supply:

- Groundwater,

- Surface water from FID (Kings River),
- Surface water from the USBR (CVP-Friant Division, San Joaquin River),
- Recycled water supply from the RWRf and North Fresno WRF.

The driest historical three-year period was 2013, 2014, and 2015, which is the latter part of the 2012-2015 drought. This has been the driest three consecutive hydrologic years in the last one-hundred years. For purposes of this evaluation, it has been assumed that the minimum water supply for the next three years is based on these three consecutive years of severe drought water supply conditions. Under these conditions, surface water deliveries from FID and USBR would be reduced significantly. Table 8-5 presents the estimated minimum water supply for the next three years.

Table 8-5: Minimum Supply Next Three Years (DWR Table 8-4)

Available Water Supply	Multiple Dry Year Supply, af/yr		
	Year 2016	Year 2017	Year 2018
Groundwater ¹	126,600	127,500	128,500
Surface Water – FID ²	81,200	67,300	47,100
Surface Water – USBR ³	37,200	0	0
Recycled – RWRf Tertiary ⁴	7,000	7,000	7,000
Recycled – RWRf Secondary ⁴	10,000	10,000	10,000
Recycled – Extraction Wells, Tertiary ⁴	2,500	2,500	2,500
Total	264,500	214,300	195,100
(1) Groundwater Supply based on interpolation for specific years using data taken from Table 6-3. (2) FID surface water allocation entitlement based on interpolation for specific years using data taken from Table 6-5 and applying percentage reductions from Table 7-1. (3) USBR surface water supply values taken from Table 7-2 for second, third, and fourth year multiple dry year supplies. (4) Recycled water supply values taken from Table 7-7 for second, third, and fourth year multiple dry year supplies.			

The minimum supplies shown above for the next three years are adequate to meet projected demands for similar multiple dry years conditions as shown in Table 7-9 for 2020 for the second, third, and fourth years of an extended dry period.

7.0 ASSESSMENT FINDINGS

It is concluded that the City of Fresno water system has sufficient capacity to supply the Parc West project and other projected demands within the City's service area through the year 2040. Therefore, it is recommended that the City of Fresno Water Division approve this assessment and forward the report to the City of Fresno Planning Division for inclusion in the CEQA documentation for the proposed Parc West project.

APPENDIX A – ADOPTED WESTLAKE DEVELOPMENT WATER SUPPLY ASSESSMENT