CHAPTER THREE – WATER SUPPLY

LAW

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 (a)… Provide:

(1) A copy of any groundwater management plan adopted by the urban water supplier.

(2) A description of any groundwater basin or basins from which the urban water supplier pumps groundwater… information as to whether the department has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted …and a detailed description of the efforts being undertaken by the urban water supplier to eliminate the long-term overdraft condition.

(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.

(4) A detailed description and analysis of the amount and location of groundwater that is protected to be pumped by the urban water supplier.

3.1 Water Supply System

3.1.1 WATER SOURCES

The City currently utilizes local groundwater as its sole source of water supply. No natural surface water sources exist. Some private surface water sources, namely irrigation district canals, pass through the City, but are not intended for urban use. Irrigation canals are dedicated for agricultural uses. Currently, the City does not utilize recycled water and storm water as water sources. Desalinated seawater or brackish ground water are not viable water source options. [Checklist #14, §10631(b)]

3.1.2 SYSTEM FACILITIES

The City's municipal water system extracts its water supply from underground aquifers utilizing eight active groundwater wells within the City (Figure 3.1-1). The pumping capacities of the City wells are shown on Table 3.1-1. The City's distribution system consists of a grid work of over forty-three miles of mains whose sizes range from six (6) inches to twelve (12) inches in diameter. Due largely to a major pipe replacement project in 2004, the City's four (4) inch service water mains are now a minimum of six (6) and eight (8) inch diameter C-900 PVC pipes.

3.1.3 SYSTEM OPERATION

The largest storage facility is the 100,000 gallon elevated storage tank located at the intersection of Kaweah Avenue and Pine Avenue. Well pumps are controlled by pressure switches that regulate the "on/off" status of the pumps. These pressure settings were developed by the City staff for

turning the pumps on and off to maintain an average City-wide pressure during varying demands. The low settings will turn the pumps on to maintain a constant safe operating pressure throughout the system, while the high settings will turn the pumps off to prevent high pressures from damaging distribution mains, their appurtenances, and plumbing fixtures at customers' residences and offices. The wells are regulated by the RUGID computer at the elevated storage tank site. The trigger for which a well will be pumping is determined by the water level in the storage tank. The RUGID computer is currently programmed to use Well E12W first and E11W last. During the winter months, water demand is low and the City typically operates six wells. During summer months, additional wells are turned on to help meet increased demand. Well E6W is primarily a peak demand, standby, production well. Since well E6W has a history of chemical contamination from DBCP, public notification is required when used.

3.2 Water Storage

The system's pressure regulation and storage needs are provided by a 100,000-gallon elevated steel tank located at Pine and Kaweah Avenues, in the central area of the City. In addition to the elevated storage tank, three hydropneumatic tanks (located at wells E11W, E12W and E13W) provide a volume of 5,000 gallons, 5,430 gallons, and 5,000 gallons respectively.

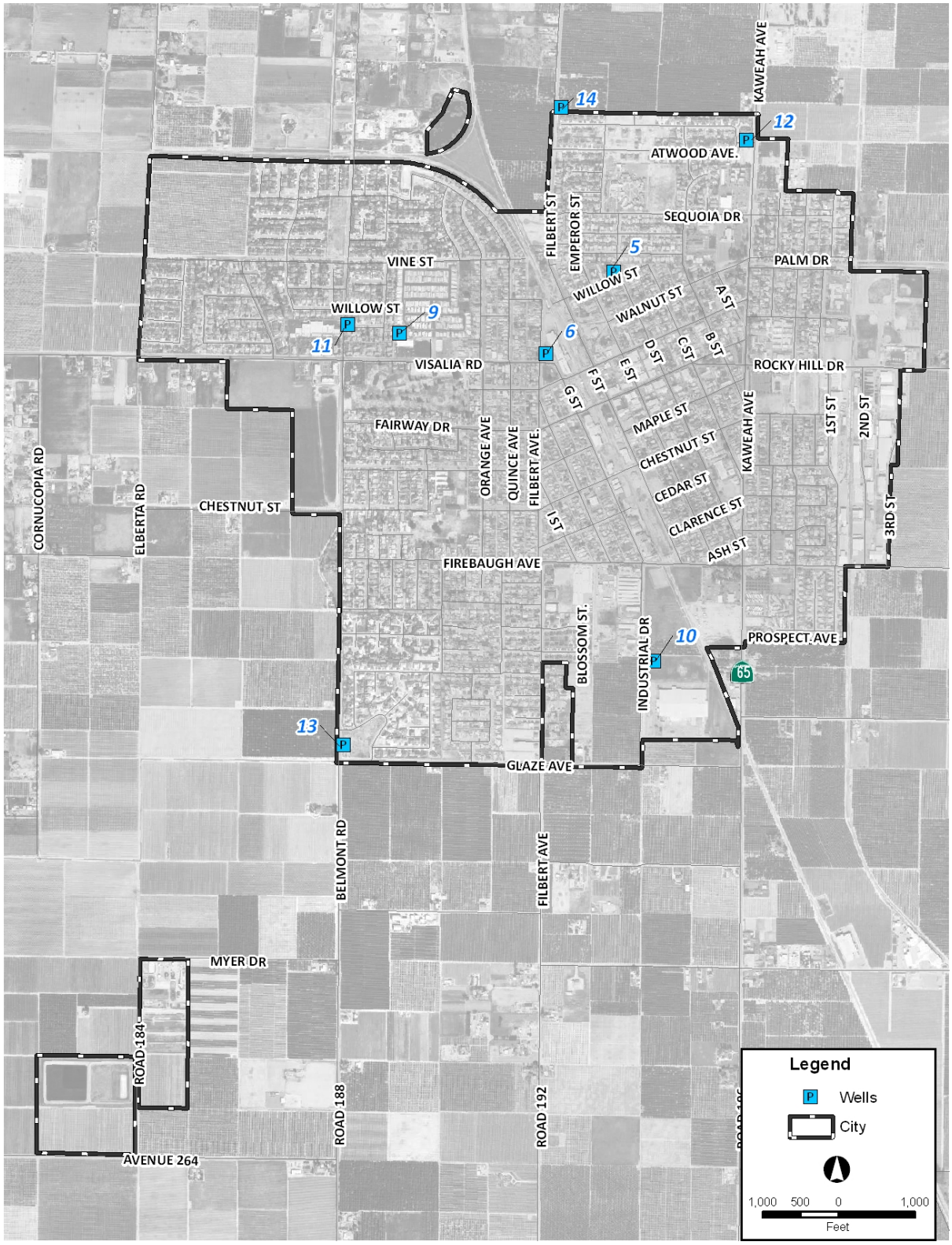
3.3 Groundwater Basin

The groundwater subbasin underlying the City is the Tulare Lake Basin, which is part of the Tulare Lake Hydrologic Region (Figure 3.3-1). This region contains multiple interconnected subbasins that transmit, filter, and store water: the Kings, Kern, Kaweah, Tulare Lake, Tule, Westside, and Pleasant Valley subbasins. The City of Exeter is located within the Kaweah subbasin.

The Tulare Lake Basin is not an adjudicated groundwater basin, as defined by the California Water Plan Update, Bulletin 160-98, Figure 3-28 on page 3-54 and Table 3-16 page 3-55. [Checklist #17, §10631(b)(2)]

The California Water Plan Update, Bulletin 160-98 page 3-50, Table 3-15, lists the 1995 overdraft for the Tulare Lake Hydrologic Region at 820 thousand acre feet (taf). As shown in Table 3-15, groundwater overdraft is expected to decline to 670 taf during 2020. [Checklist #19, 10631(b)(2)]

During dry periods, water levels in the subbasins may decline. However, during wet periods, most of them recover.



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WELL LOCATIONS

Figure 3.1-1

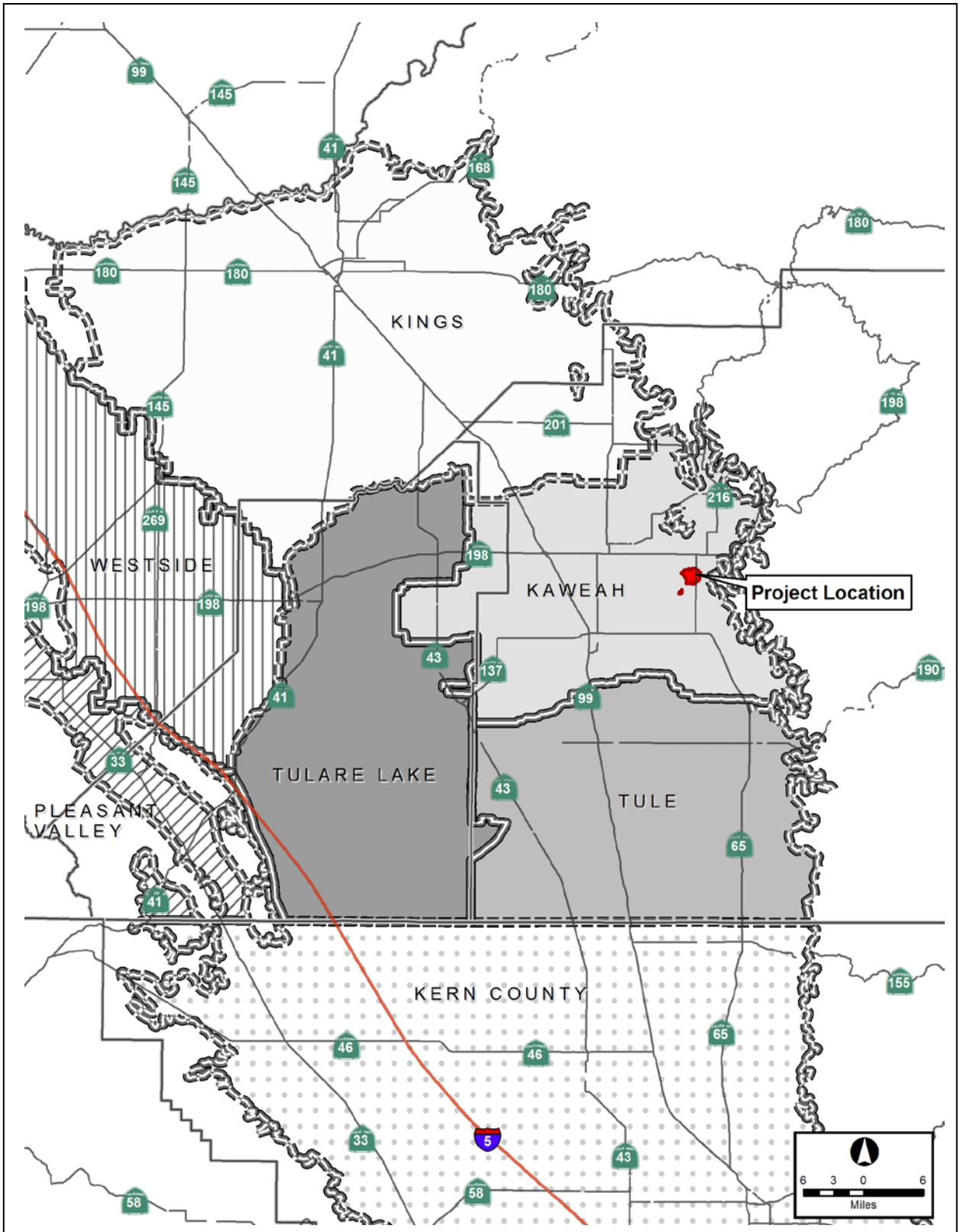
Table 3.1-1
Water Supply Wells

Well No.	Location	H.P.	Well Capacity (gpm)	Depth (ft)	Water Level Static (ft)	Water Level Pumping (ft)	Back-up Power Supply
5*	Willow Street east of D Street	75	1,183	634	-	-	None
6*	Intersection of G Street and Palm Street in a park	75	1,130	420	62	78.3	None
9	West of Albert Ave and North of Visalia Rd.	75	794	296	89.4	100.2	Diesel Generator
10	East side of Industrial Dr, midway between Firebaugh Ave. and Glaze Ave.	125	1,452	430	84.9	94	Propane Generator
11	West of Belmont Ave. and north of Visalia Rd.	75	1,051	430	79	105.8	Propane Generator
12	West side of Highway 65 at northern boundary of City in northeaster part of the City.	100	250	620	108	327.8	None
13	Near the Intersection of Glaze Ave. and Belmont St.	150	1,500	580	83	106.3	Diesel Generator
14	Near the Intersection of Atwood Ave. and N Filbert Road	100	550	555	78	315	None

			Avg. Well Depth (ft)	Avg. Static Level (ft)	Avg. Pumping Level (ft)
Total	(all wells)	7,910			
Total	(w/o best producing well – w/o E13W)	6,410			
Total	(w/o Public Notification needed – w/o E5W & E6W)	5,597			
Total	(w/o best producing well and Public Notification – w/o E5W, E6W, & E13W)	4,097	495	83	161

Reference: Table 4-1, Historical Well Production, and Table 4-2, Well Capacities and Characteristics, of the Exeter Water System Master Plan, September 2008.

***NOTES:**
Well No 5 is currently inactive.
Well No 6 is currently used for a backup water supply.



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3.3.1 BASIN BOUNDARIES AND CHARACTERISTICS

The City of Exeter is geographically located within the Kaweah Subbasin which is located in the southern portion of the San Joaquin Valley Groundwater Basin. The southern portion of the valley is internally drained by the Kings, Kaweah, and Tule Rivers that flow into the Tulare drainage basin.

The Kaweah Subbasin lies between the Kings Groundwater Subbasin on the north, the Tule Groundwater Subbasin on the south, crystalline bedrock of the Sierra Nevada foothills on the east, and the Kings River Conservation District to the west. The subbasin generally comprises lands in the Kaweah Delta Water Conservation District. Major rivers and streams in the subbasin include the Kaweah and St. Johns Rivers. The Kaweah River is the primary source of recharge to the area. Average annual precipitation is seven to thirteen inches, increasing eastward.

The total storage capacity of the Kaweah Subbasin is estimated to be 15,400,000 acre-feet to a depth of 300 feet and 107,000,000 acre-feet to the base of fresh groundwater. These calculations were calculated using an estimated specific yield of 10.8 percent and water levels collected by DWR and cooperators. These same calculations give an estimate amount of subbasin groundwater supply in 1995 to be 11,600,000 acre-feet of groundwater to a depth of 300 feet.[1]

The subbasin information provided above was derived from California's Groundwater Bulletin 118 dated 02/27/2004. The Bulletin was prepared by the State Department of Water Resources and is provided in Appendix D for further reference. [Checklist #16, §10631(b)(2)]

3.3.2 GROUNDWATER MANAGEMENT PLANS

The City of Exeter is located within the Kaweah subbasin. Generally, the groundwater within this subbasin is managed by the Kaweah Delta Water Conservation District (District). The District has adopted a Groundwater Management Plan (Plan) for the subbasin. Each year the District prepares an annual report on the Plan. The latest report is the 2008 Annual GWMP Report and is included in Appendix E. This Plan pertains to the geographic region that surrounds the City of Exeter. Although the District does not regulate groundwater within the City limits of Exeter, the District's Plan is considered when the City evaluates plan affecting local groundwater. [Checklist #15, §10631(b)(1)]

3.3.3 GROUNDWATER MANAGEMENT ACTIVITIES

Groundwater management activities within the Kaweah Subbasin are conducted and coordinated by a number of agencies. The main agency that coordinates with the various groups that affect groundwater in the area is the Kaweah Delta Water Conservation District. The County of Tulare's General Plan update, the Water Conservation District and City of Visalia's groundwater modeling projects, the 2008 Annual Groundwater Management Plan Meeting are all activities that demonstrate coordinated planning and management of groundwater resources in the Kaweah Basin.

[1] California's Groundwater Bulletin 118 – Appendix D

Other groups that affect groundwater levels and usage in the Exeter area include Consolidated People's Ditch Company (People's) and Exeter Irrigation District (EID). Both groups own, maintain and operate irrigation networks near and within the City of Exeter. The EID's facilities within the City boundaries consist of a pipe network. Since it is a closed system, there is no direct exchange of waters between the City and the EID. However, People's does operate open canals within the City limits and accepts an agreed amount of municipal storm water. The City enjoys a close and cooperative relationship with both of these groups.

3.3.4 AGREEMENT WITH LOCAL IRRIGATION GROUPS

The City of Exeter (City) currently has a surface water agreement with the Consolidated People's Ditch Company (People's). The City is allowed to discharge a limited amount of storm water into the People's ditch network in exchange for a fee to cover maintenance. People's have several open water networks that within the City's boundaries. There are no formal agreements regarding surface water between the City and the Exeter Irrigation District (EID). The EID has only closed pipe systems that run through the City's boundary.

3.3.5 CITY SUPPLY WELLS

The City currently has six active water supply wells and two standbys. Each well has a vertical turbine pump; individual pump output varies from a low of 250 gallons per minute (gpm) to a high of 1,500+gpm. The City has a total of eight wells (E5W, E6W, E9W, E10W, E11W, E12W, E13W, and E14W) which are located throughout the City (Table 3.1-1). The use of two of the wells (E5W and E6W) requires public notification because of a history of chemical contamination from Dibromochloropropane (DBCP). Well E5W has been inactive for many years and E6W is used only during the peak water usage period in the summer.

The eight total wells a have a total supply capacity of 7910gpm. The total supply capacity without requiring public notification, meaning the removal of wells E5W and E6W from the total, is 5597gpm. The firm capacity, which is defined as the total capacity less one of the largest wells out of service (E13W), is approximately 6410gpm. The firm capacity without requiring public notification is 4097gpm. The City's water system has no current interconnections to any other water system.

3.3.6 GROUNDWATER LEVELS

The City of Exeter's overall static water level varies in different areas of the City, but presently ranges from around 60 to 100 feet (Table 3.1-1). This compares favorably to the historic water levels. The depth to groundwater in the late 1960's was approximately 80 feet.

Groundwater levels over the entire Kaweah Subbasin are monitored by the Department of Water Resources (DWR). Changes in groundwater levels are based on annual water level measurements by DWR and cooperators. Water level changes were evaluated by Quarter Township and computed through a custom DWR computer program using geostatistics (kriging). On average, the subbasin water level has declined about 12 feet from 1970 through 2000. The period from 1970 through 1978 showed steep declines totaling about 25 feet. The ten-year period

from 1978 to 1988 saw stabilization and rebound of about 50 feet, bringing water levels above the 1970 water level by 25 feet. 1988 through 1995 again showed steep declines, bottoming out in 1995 at nearly 35 feet below the 1970 level. Water levels then rose about 22 feet from 1996 to 2000, bringing water levels to approximately 12 feet below 1970 levels.[2]

3.4 Water Supply Projections

In determining the adequacy of water supply facilities, the source must be large enough to meet varying water demand conditions, as well as provide sufficient water during potential emergencies such as power outages and natural disasters. There are no currently planned future water supply programs other than the continued development of the City's groundwater supply. Groundwater has been a consistent and reliable source of water throughout the recorded history on the area. The level of water supply is anticipated to be consistent with the values shown on Figure 3.4-1. [Checklist #52, §10634] There is no need for, and there are no opportunities for, surface water treatment facilities. [Checklist #30, §10631(h)]

3.4.1 NORMAL PRODUCTION CAPACITY

In accordance with industry standard practices and the California Department of Health Services (DHS) criteria for "Adequate Source Capacity" regarding water supply, the source should be sized to serve the Maximum Day Demand (MDD). On the day of maximum demand, it is desirable to maintain a water supply rate equal to the MDD rate. For the purposes of analysis, the most recent average per capita consumption rate of 235gpcd[3] based on the calculations for a Base Daily Per Capita Water Use for a ten to fifteen year period. Water required for peak hour demands or for fireflows can come from storage or additional pumping.

3.4.2 STANDBY PRODUCTION CAPACITY

Standby production capacity is required for system reliability. Under normal operating conditions, it is possible that one or two of the City's wells can be out of service during MDD conditions due to equipment malfunction, for servicing, or for water quality concerns. The DHS criteria recommend calculating the system capacity with the largest well being out of service. To mitigate the potential impact of lost production capabilities, the City should thus have wells with a capacity of 1,500gpm (E13W) in surplus of MDD demand.

Using the DHS recommended calculations and the highest flow rates of the past 5 years; the City's MDD was approximately 2,740gpm in 2007.[4] Additionally, Fire Flow Requirements (FFR) add a demand of 1,500gpm. The total MDD with FFR is 4,240gpm. The current supply availability of 5,597gpm[5] is able to handle these demands. Although the recommended supply availability considers the largest well being out of service and drops supply to only 4,097gpm, in the event of a major fire the City plans to activate back up well, E6W. This brings the available

[2] California's Groundwater Bulletin 118 – Appendix D
[3] Historical Water Production, Table 5.1-4
[4] Calculated from Historical Water Production, Table 5.1-1; Calculations shown in Section 5.1.1
[5] Water Supply Wells, Table 3.1-1

supply to 5,227gpm and therefore exceeds the design demands of the system running at its peak while addressing a major fire at the same time.

3.4.3 FUTURE GROUNDWATER SUPPLY CAPACITY

An adequate source of supply for the City will consist of groundwater wells with a combined production capacity that continues to meet the MDD, in addition to a standby well production capacity of 1500gpm. The projected yearly water supply through the planning horizon of 2040 is shown in Table 3.4-1 and graphically in Figure 3.4-1.

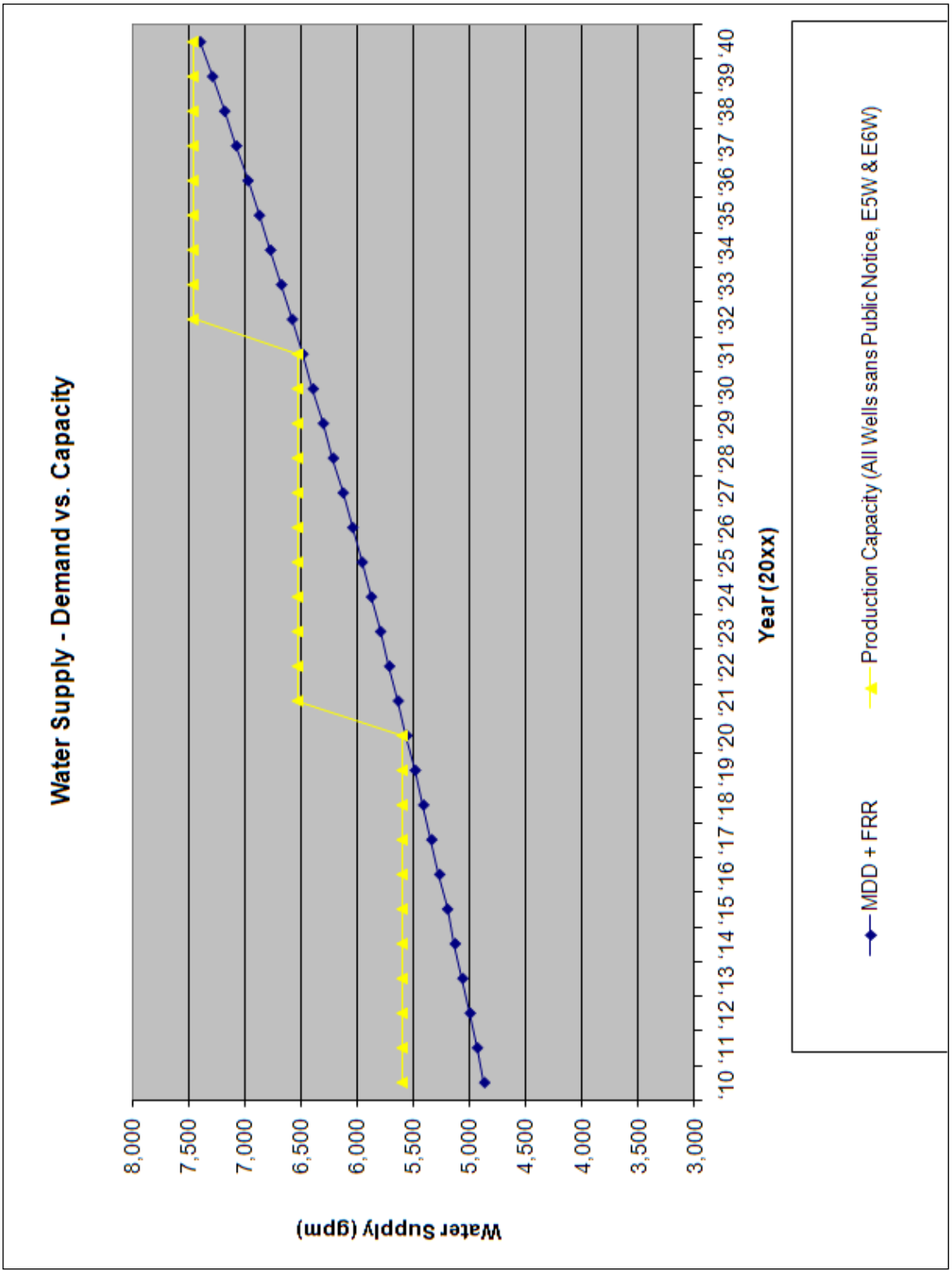
The City will place in service additional in-City wells as required to meet MDD. The average production capacity of the wells in operation is roughly 930gpm. For the purposes of projection and planning, we assume any additional well will provide equal to or exceeding 930gpm of capacity.

The existing water supply currently meets the total water demand, MDD plus FFR. The need for additional service wells are not anticipated until 2020, 2032 as shown on Figure 3.4-1. [Checklist #13, §10631(b)]

Table 3.4-1
Current and Projected Maximum Daily Water Demands and Water Supply Capacity Needs, gallons per minute (gpm)
[Checklist #21, §10631(b)(4)]

	Years (20xx)									
	'11	'12	'13	'14	'15	'16	'17	'18	'19	'20
Demand[6] w/ FRR[7]	4,936	5,001	5,067	5,134	5,202	5,272	5,343	5,415	5,488	5,563
Production Capacity[8]	5,597	5,597	5,597	5,597	5,597	5,597	5,597	5,597	5,597	5,597
	'21	'22	'23	'24	'25	'26	'27	'28	'29	'30
Demand w/ FRR	5,640	5,718	5,797	5,878	5,960	6,044	6,129	6,216	6,305	6,395
Production Capacity	6,527	6,527	6,527	6,527	6,527	6,527	6,527	6,527	6,527	6,527
	'31	'32	'33	'34	'35	'36	'37	'38	'39	'40
Demand w/ FRR	6,487	6,581	6,677	6,774	6,873	6,974	7,077	7,182	7,289	7,398
Production Capacity	6,527	7,457	7,457	7,457	7,457	7,457	7,457	7,457	7,457	7,457

[6] Demand = Maximum Daily Demand
[7] FFR = Fire Flow Requirement, 1500 gpm
[8] Capacity = Total well capacity w/o requiring public notice (Wells 5 & 6 excluded) Anticipates adding future wells.



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EXETER WATER SUPPLY
DEMAND AND CAPACITY QUANTITIES

Figure
3.4-1