California Water Service Company

2007 Urban Water Management Plan

Visalia District

Adopted

December 21, 2007

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California Water Service Company
2007 Urban Water Management Plan
Contact Sheet

Date plan submitted to the Department of Water Resources: January 11, 2008

Name of person preparing this plan: **Tom Salzano, Water Resources Planning Supervisor**

Phone: **(408) 367-8340**

Fax: **(408) 367-8427**

E-mail address: **tsalzano@calwater.com**

District Office: **California Water Service Company – Visalia District**
216 North Valley Oaks Drive
Visalia, CA 93292-6717

District Manager: **Phil Mirwald**

District Phone: **(559) 624-1600**

1 Introduction

California Water Service Company is an investor-owned public utility supplying water service to 1.7 million Californians through 435,000 connections. Its 25 separate water systems serve 63 communities from Chico in the North to the Palos Verdes Peninsula in Southern California. In 2000, Cal Water merged with the Dominguez Services Corporation incorporating several northern and southern California water systems. California Water Service Group, Cal Water's parent company, is also serving communities in Washington, New Mexico and Hawaii. Rates and operations for districts located in California are regulated by the California Public Utilities Commission (CPUC) and are set separately for each of the systems. Cal Water incorporated in 1926 and has provided water service to the Visalia community since 1927.

1.1 Purpose

California Water Code §10644(a) requires urban water suppliers to file with the Department of Water Resources, the California State Library, and any city or county within which the supplier provides water supplies, a copy of its Urban Water Management Plan, no later than 30 days after adoption. All urban water suppliers as defined in Section 10617 (including wholesalers), either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet annually are required to prepare an Urban Water Management Plan.

California Water Service Company will follow the California Water Code and file an Urban Water Management Plan at least once every five years on or before December 31, in years ending in five and zero. However, since California Water Service Company operates 25 Districts, updating and submitting all 25 Urban Water Management Plans in a single year is unfeasible. Therefore, the Districts have been divided into three sets that will follow an established three-year schedule. The Plan for Visalia is part of the 2007 grouping and was last submitted in 2004. The next update for this District will be in 2010.

This UWMP is a foundation document and source of information for a Water Supply Assessment and a Written Verification of Water Supply. An UWMP also serves as:

- A long-range planning document for water supply,
- Source data for development of a regional water plan, and
- A source document for cities and counties as they prepare their General Plans.
- A key component to Integrated Regional Water Management Plans.

1.2 Public Review

California Water Service Company completed a draft of the Urban Water Management Plan for the District on July 1, 2007. The draft was sent to the Cities and County listed in Table 1.2-1 for review and comment. Copies of the draft plan were made available at the California Water Service Company San Jose Corporate, and District office for public review and comment.

California Water Service Company conducted a formal public meeting to present information on its general rate case request to the CPUC. Presentation of the Urban Water Management Plan is included in the proceedings and serves as a public review of the Urban Water Management Plan. A public hearing was held on November 13, 2007, at 7:00 p.m. at the following location:

Visalia Convention Center - San Joaquin Ballroom B
303 E Acequia Avenue
Visalia, California

Proof of the public hearing is presented in Appendix A

Table 1.2-1: Coordination with Appropriate Agencies (Table 1)

	Commented on the draft	Was sent a copy of the draft plan	Was sent a notice of intention to adopt
City of Visalia	✓	✓	✓
Kaweah Delta Water Conservation District	✓	✓	✓

1.3 Plan Adoption

No additional comments were received by December 14, 2007. The final plan was adopted by the Vice President of Engineering & Water Quality on December 21, 2007 and was submitted to California Department of Water Resources within 30 days of approval. Appendix A presents a copy of the signed Resolution of Plan Adoption.

The agencies listed in Table 1.2-1 above will also be sent a copy of the final version of this report; as well as, a copy to the California State Library.

In addition to the resolution, Appendix A also contains the following:

- Any comments received during the public review of this plan.
- Minutes from the public hearing.
- The review sheet check list from Department of Water Resources.

1.4 Water Management Tools

California Water Service Company uses the following water management tools to maximize water resources for the district:

- Hydraulic analysis will be used to identify limitations in the water distribution network and provide recommendations if main replacement is required.
- SCADA/Water measurement provides information as to how the district is operating and gives a historical record of the district. California Water Service

Company maintains detailed records including the water sales and the customer service connections by sector and used this information for future projections.

- Geographical Information Systems (GIS) will be used to combine several sources of information and allow land usage management tools to provide insight into the growth of the district.
- Water quality data analysis provides a detailed compositional analysis of the water and provides information on potential supply shortfalls that can result from mineral intrusion or contamination.
- Water Supply and Facilities Master Plan provides details into the district from a global perspective and evaluates the major equipment and facilities replacement schedule, and identifies long-term projects. A Master Plan for the Visalia District was completed in 2005.

1.5 Plan Organization

This plan is organized as described in the following outline. The corresponding provisions of the California Urban Water Management Planning Act are included as references. Tables in this plan have cross-references to the tables as listed in the "Guidebook to Assist Water Suppliers in the Preparation of a 2005 Urban Water Management Plan" prepared by the California Department of Water Resources.

Table 1.5-1: Plan Organization

Section	Executive Summary	Act Provision
Contact Sheet	List of Contact Persons	-
Chapter 1	Introduction This chapter describes the requirement and the purpose of the Urban Water Management Planning Act, plan adoption, schedule, and management tools.	§10620 (d, f) §10621(a -b) §10635(b) §10642 §10643 §10644 (a) §10645
Chapter 2	Service Area Information This chapter describes the district service area and includes area information, population estimate, and climate description.	§10631 (a)
Chapter 3	Water Sources This section includes a detailed discussion of the water supply sources including a section on the water quality.	§10620 (d)(1)(2) §10631 §10633 §10634
Chapter 4	Water Shortage Contingency Plan This chapter describes the District's planning during water shortages during drought and emergency situations.	§10631 (d) §10632
Chapter 5	Water Use Provisions This chapter describes the water supply projection methodology used to estimate water demand and supply requirements to 2030 in five-year increments.	§10631

Table 1.5-1: Plan Organization		
Section	**Executive Summary**	**Act Provision**
Chapter 6	Supply And Demand Comparison This discusses the water supply outlook for the district under different hydrologic conditions in accordance with DWR guidelines. Specifically, supply and demand comparisons in five-year increments to 2030 under normal, dry-year, and multiple dry-year conditions are presented in this section.	§10635 (a)
Chapter 7	Water Demand Management Demand management measures used to benchmark conservation methods are described in this chapter.	§10631
References	References The sources of any information used in this plan are listed in this section.	-
Appendix A	Resolution To Adopt The Urban Water Management Plan This section includes the following: 1) Resolution 2) Letters to and comments from various agencies 3) Minutes from the public hearing 4) DWR Checklist	§10621 (b) §10642 §10644 (a)
Appendix B	Service Area Map This appendix includes the service area map of the district as filed with the Public Utilities Commission.	-
Appendix C	Water Supply, Demand, And Projection Worksheets This section includes the spreadsheets used to estimate the water demand for the district.	-
Appendix D	DWR's Groundwater Bulletin 118 Sections from the Department of Water Resources Bulletin 118 are included as reference and detail the basin for the district.	§10631 (b)(1-4)
Appendix E	Tariff Rule 14.1 Water Conservation And Rationing Plan This section contains the tariff rule for reference.	-
Appendix F	Water Efficient Landscape Guidelines and Joint Water Conservation Recommendations For Regulated Water Companies This appendix contains two items. The first item is the Guideline for Water Efficient Landscape that California Water Service Company uses at its properties, including renovations. The second item are Water Conservation Recommendations supported by Cal Water and other Regulated Water Companies.	-
Appendix G	CUWCC Annual Reports This sections contains the reports filed with the California Urban Water Conservation Council.	§10631 (j)
Appendix H	BMP Economic Analysis Assumptions Worksheets for each BMP are presented in this section.	-
Appendix I	Kern County Water Agency ID-4 Urban Management Plan This section contains the Management Plan	§10631 (b)(1-4)

1.6 Implementation of Previous UWMP

California Water Service Company has 25 separate water service districts and maintains separate plans for each district. The plans have been divided into 3 groups, with each group being updated on a 3-year cycle, as approved by the Public Utilities Commission. The last Urban Water Management Plan for the District was published in 2004 as part of the general rate case. The BMP programs outlined in that plan and the status of each program as of last year is discussed in Section 7.6.

2 Service Area Information

2.1 General Information

The Visalia District is located in Tulare County, serving the City of Visalia and segments of unincorporated Tulare County including the community of Goshen. It is situated in the Tulare Lake hydrologic region, within the King-Kaweah-Tule Rivers sub-area. The service area is built upon the alluvium of the Kaweah River. The district lies approximately 42 miles southeast of the City of Fresno and 75 miles north of the City of Bakersfield. Figure 2.1-1 shows a general location map of the District and Figure 2.1-2 shows the general service area.

The area's climate is mild with an average temperature of 63.5 degrees and average rainfall of 10.3 inches. The summers are hot and dry and winters are mild with low humidity.

Major transportation links in the District include the Golden State Highway (State Route 99), State Route 63 and State Route 198. The Southern Pacific and the Atchison, Topeka and Santa Fe Railroads provide rail service to the region.

No major geologic features are located in the Visalia region. However, the San Andreas Fault Zone lies approximately 75 miles to the west-southwest; the Garlock Fault Zone lies 125 miles to the south-southeast. In combination, these faults are responsible for the uplift of base rock that forms the Transverse Mountain Range that separates the Tulare Lake basin from the Los Angeles basin. The District's location with respect to major faults is shown in Figure 2.1-3.

The Kaweah River provides drainage for the southern Sierra Nevada Mountains. This river splits east of Visalia forming the St. Johns River that flows just north of Visalia while the Kaweah River continues south. Lake Kaweah is located on the Kaweah River about twenty miles up stream from the city. This 143,000 AF reservoir operated by the U.S. Army Corps of Engineers provides both flood control and water storage. The Kaweah River flows intermittently into the Tulare Lake Bed.

Figure 2.1-1: General Location of Visalia District

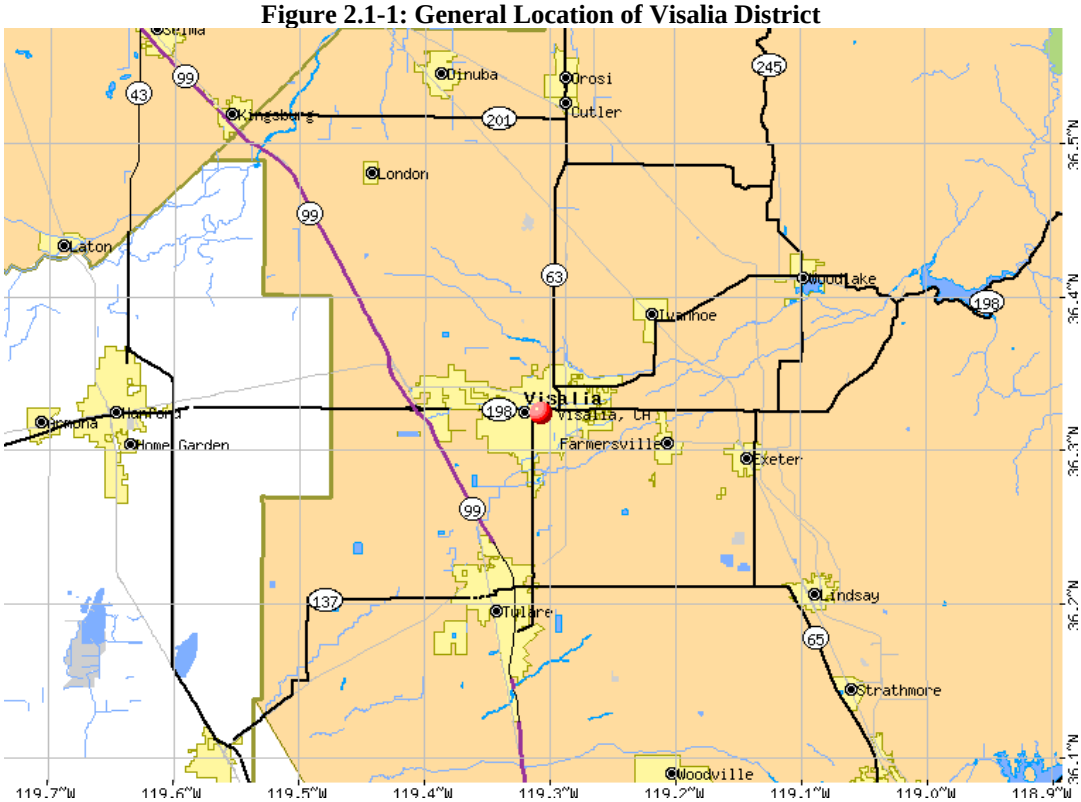


Figure 2.1-2: General Service Area

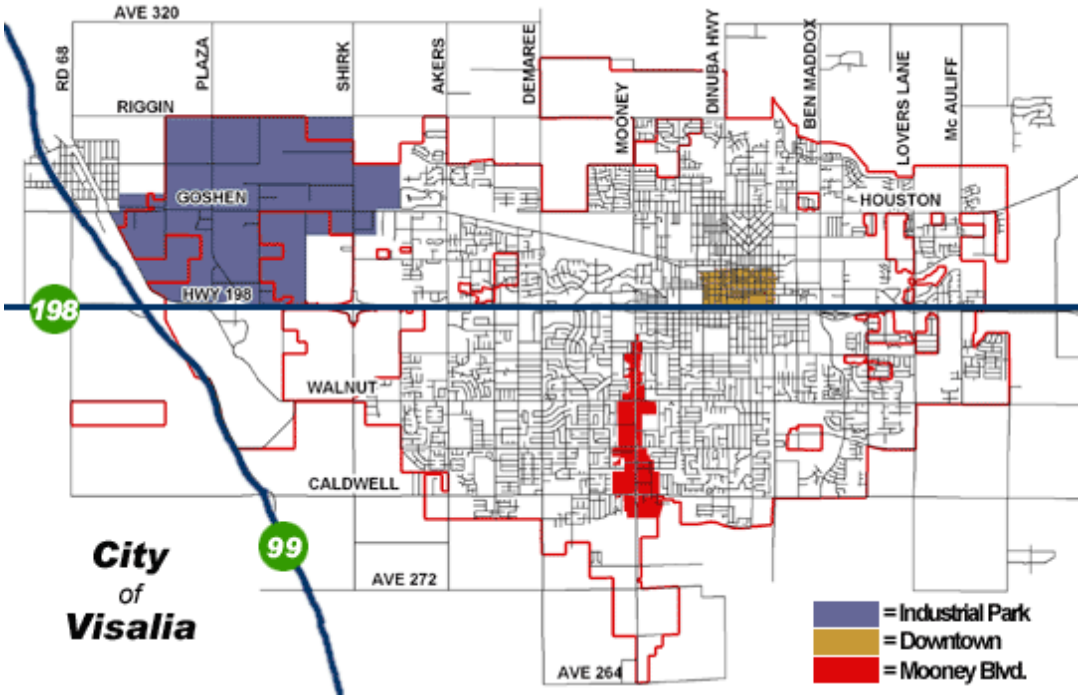
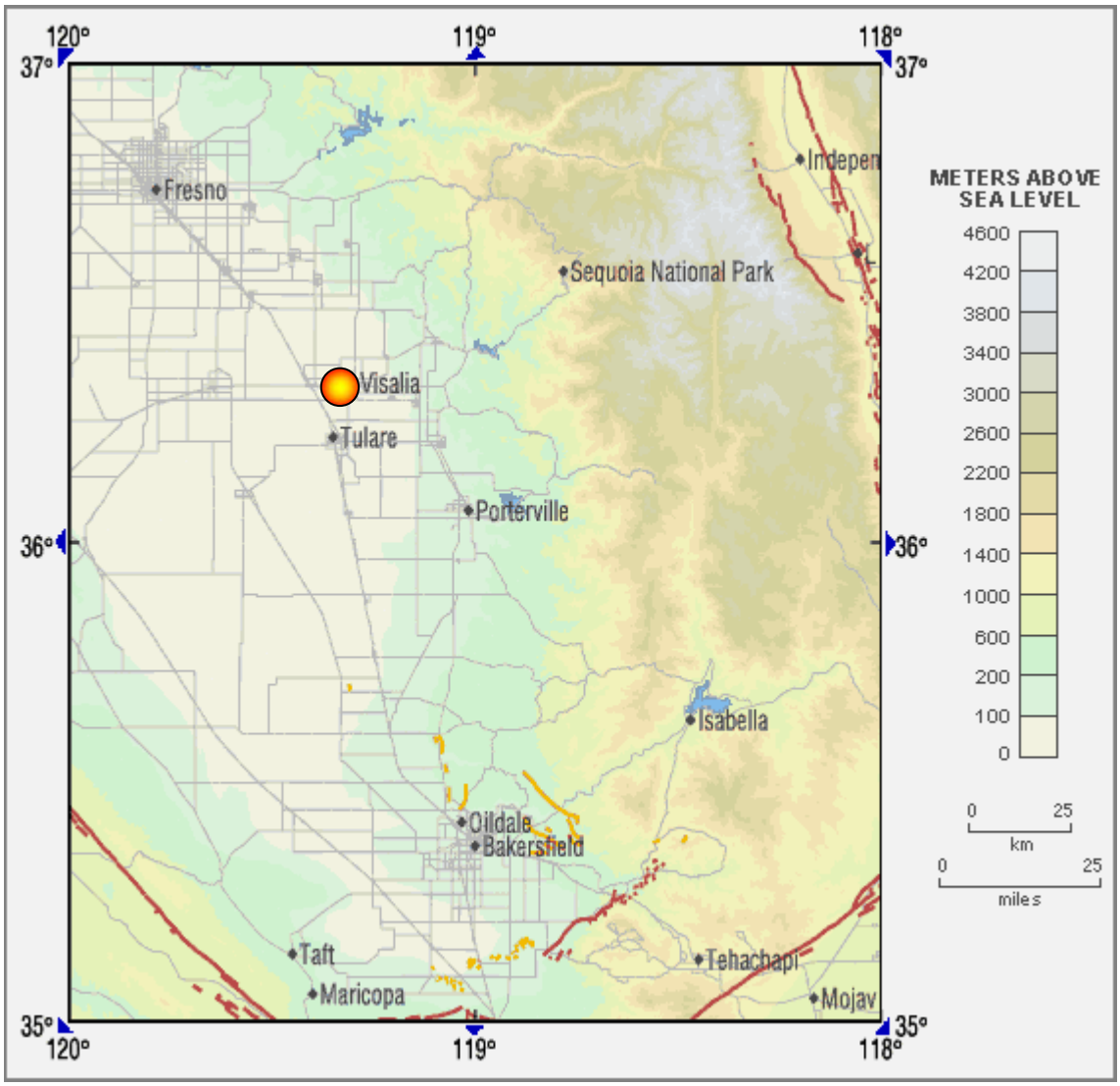


Figure 2.1-3: Major Fault Lines near Visalia District



Source: USGS

2.2 Service Area Population

The Visalia District is a rapidly growing district which is increasing service connections through redevelopment of existing service areas and by delivering new services to undeveloped areas of Visalia. The Visalia system is surrounded by and includes large parcels of land used for agricultural functions; however, urban development is encroaching on these parcels. Large tracts in the western area are used for industry. The rate of growth for industrial services artificially reflects rapid growth due to the acquisition of a city-owned industrial water service system.

Estimate of the population serviced by California Water Service Company is based on overlaying the U.S. Census 2000 Block data with the service area map (SAM), as shown in Figure 2.2-1. A summary of the census data for the Year 2000 is shown in Table 2.2-1. LandView 5 and MARPLOT ® software were used to generate the data[1].

The 2006 service count for district was 35,601 for single family and multifamily residences. Using the ratio of given population and the service count yield a population density of 2.823 persons per residential service (single-family residential services and multifamily units).

California Water Service Company estimates that the average population for 2006 in the Visalia District has increased to approximately 125,960. California Water Service Company bases this estimate on the average annual service connection count, and on the assumption that density has remained unchanged since the census was conducted. California Water Service Company estimates the service area's population could reach 238,980 by 2030. Table 2.2-2 lists the population growth in 5 year increments.

Table 2.2-1: Summary of Census 2000 Data

	Census Blocks	Population	Housing Units
Visalia Service Area	1,221	98,325	34,832

Figure 2.2-1: Approximated SAM with US Census 2000 Tract Map

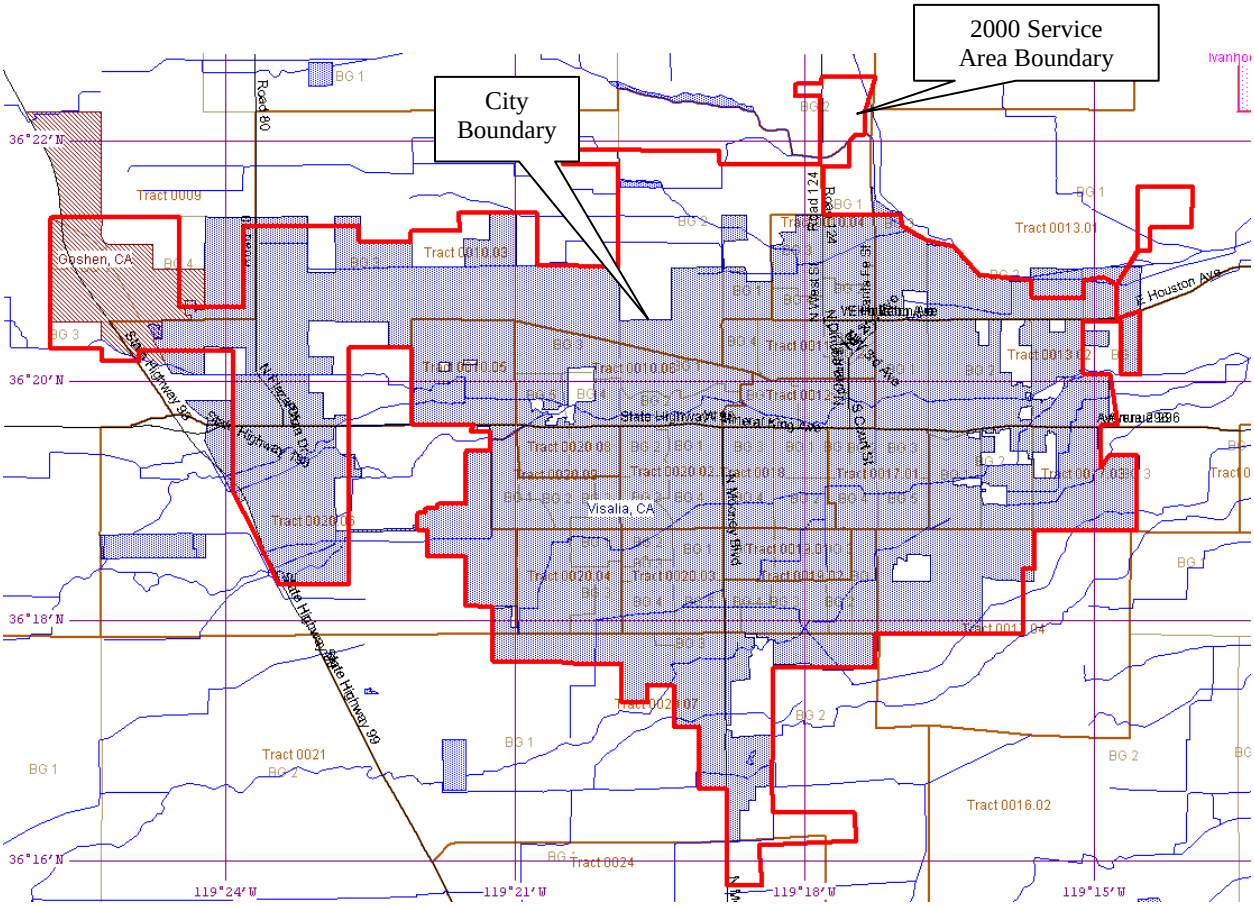
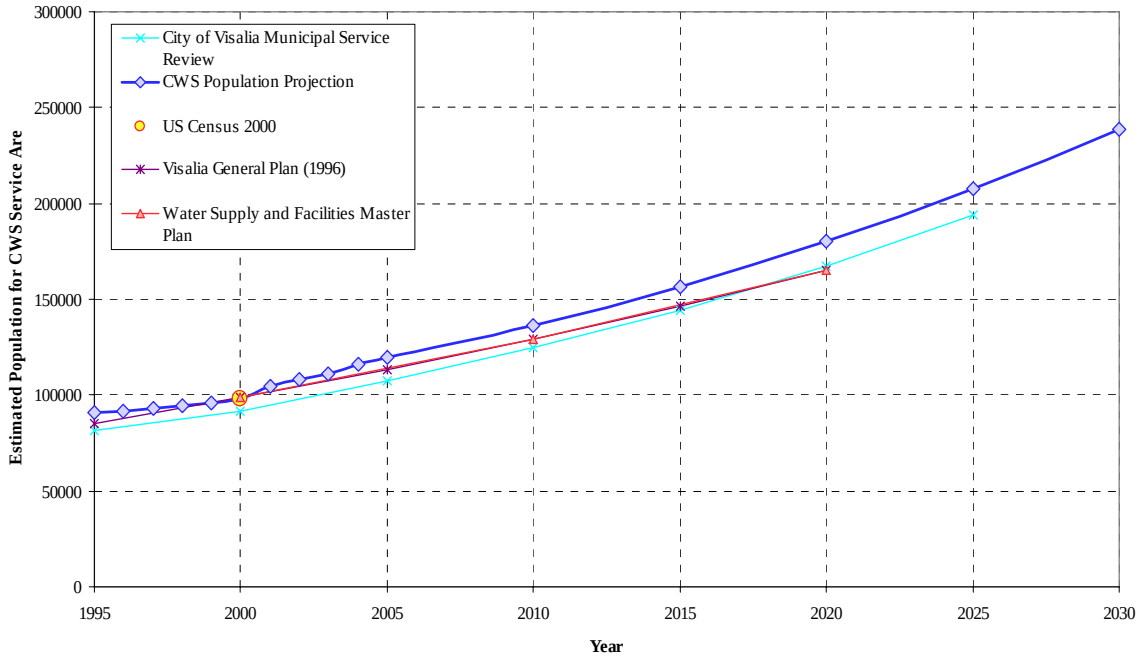


Table 2.2-2: Population - Current and Projected (Table 2)						
	2005	2010	2015	2020	2025	2030
Service Area Population	119,710	136,270	156,670	180,250	207,490	238,980

The population estimates for the district are compared to projections made by other governmental agencies, as shown in Figure 2.2-2. The other data sources are as follows:

- City of Visalia Municipal Service Review
- Visalia General Plan
- CWSC Water Supply and Facilities Master Plan

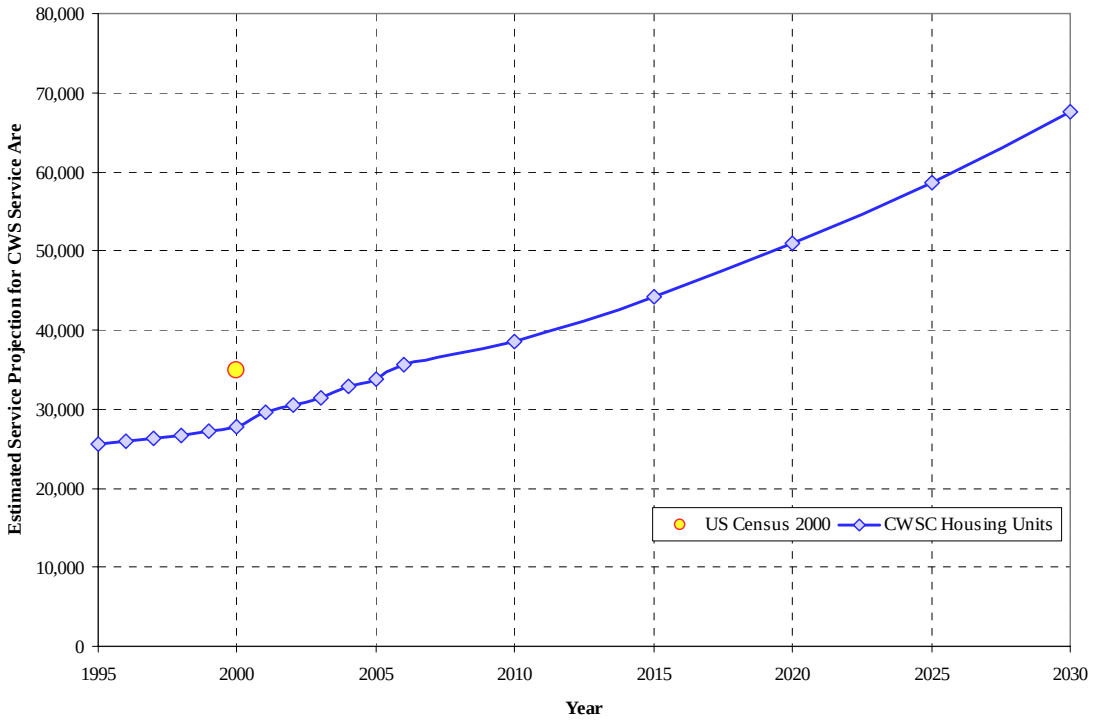
Figure 2.2-2: Estimated Population Comparison



From the graph above, it is shown that the growth rate projected by California Water Service Company is similar, but slightly greater than the projected rate of increase seen in the three other data sources.

Similarly, the housing count was estimated by comparing the US Census 2000 data to the service counts for the Visalia District, Figure 2.2-3. The service count for the year 2000 is lower than US Census 2000 housing units estimate. This is a result of district service connections including one meter that serves several housing units, such as duplexes or apartments, whereas the US Census combines all of the housing units (single and multifamily residences). The US Census 2000 housing units was established by summarizing the individual census blocks enclosed within the service area of the district. As with the population estimate discussed previously, the growth rates for the City of Visalia projection are the same as the Company's projection. But the total housing units are greater since the city boundaries are outside of the service area of the District.

Figure 2.2-3: Estimated Housing Comparison



2.3 Climate

The climate for the Visalia District is moderate with hot dry summers and cool winters. The majority of precipitation falls during late autumn, winter, and early spring.

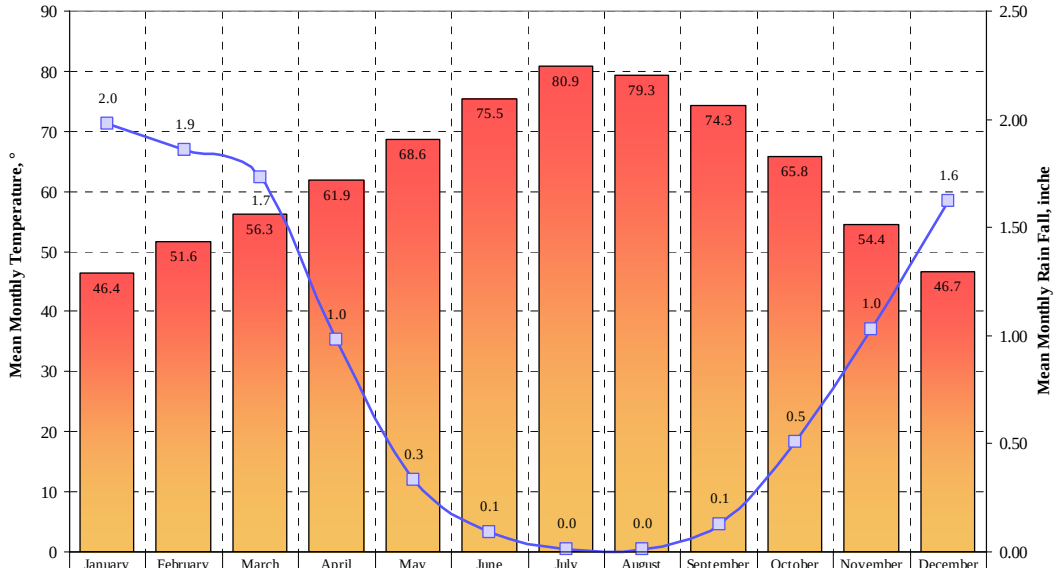
The following table, Table 2.3-1, lists the average annual conditions for the closest weather station to the Visalia District. The average rainfall for the district is 20% of the annual total evapotranspiration value.

Table 2.3-1: Average Annual Climate (Table 3)

Average Temperature	Average Rainfall	Annual Total Evapotranspiration
63.5°F	10.28 inches	50.73 inches

Figure 2.3-1 displays the average monthly temperature and rainfall[2].

Figure 2.3-1: Average Monthly Temperature and Rainfall (Table 3)

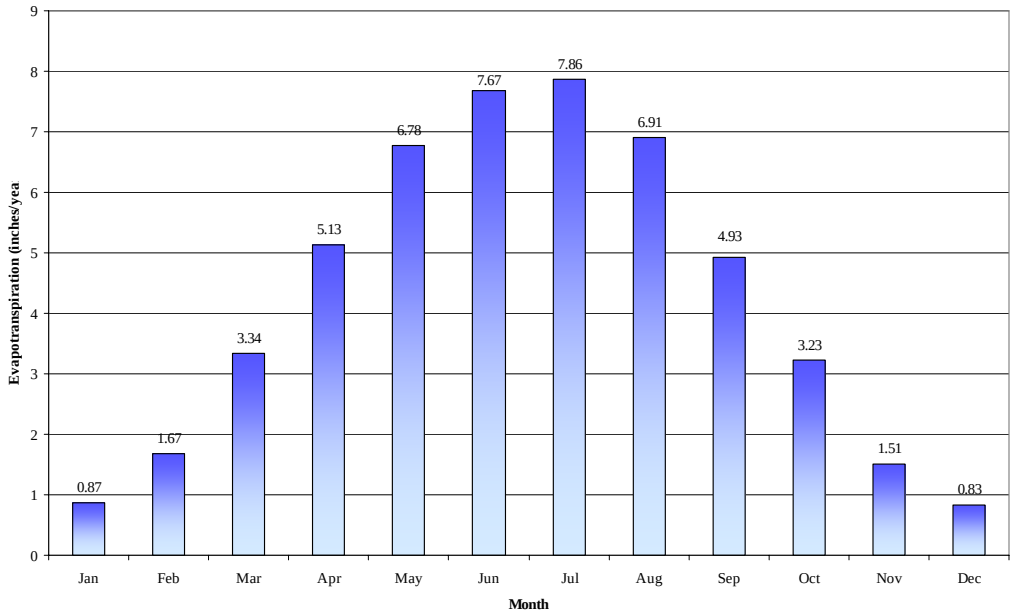


	January	February	March	April	May	June	July	August	September	October	November	December
Temperature	46.4	51.6	56.3	61.9	68.6	75.5	80.9	79.3	74.3	65.8	54.4	46.7
Rainfall	1.98	1.86	1.73	0.98	0.33	0.09	0.01	0.01	0.13	0.51	1.03	1.62

Figure 2.3-2 displays the monthly average evapotranspiration values for the area of the district[3]. Evapotranspiration values estimate the amount of water loss by the combination of two separate processes: evaporation from soil surface and transpiration by plants.

Additional climate data is provided in the Appendix C, worksheet 18.

Figure 2.3-2: Monthly Average ETo Values (Table 3)



3 Water Sources

3.1 Introduction

The sole source of water supply for the customers of the Visalia District is groundwater. The projected water supply source and the current and planned pumping capacity of all the active pump is summarized in Table 3.1-1.

Table 3.1-1: Current and Planned Water Supplies - AFY (Table 4)

Water Supply Sources	2005	2010	2015	2020	2025	2030
Cal Water Groundwater Wells	92,764	105,668	105,668	105,668	105,668	105,668
Transfers in or out	-	-	-	-	-	-
Exchanges In or out	-	-	-	-	-	-
Recycled Water (projected use)	-	-	-	-	-	-
Desalination	-	-	-	-	-	-
Total	92,764	105,668	105,668	105,668	105,668	105,668

Note: This table represents the anticipated production capacity of the current and planned wells within the Visalia District.

Currently, Cal Water does not plan to deliver water to its customers from another source of supply, thus groundwater will continue to be the sole source of supply.

3.2 Purchased Water

The Kaweah Delta Water Conservation District's (KDWCD) does not provide imported water for urban use. Therefore, it is unlikely that sources of imported water will become available in the near future. However, Central Valley Project (CVP) does serve imported water for agricultural use and groundwater recharge through the KDWCD, which could be transferred to urban use.

3.3 Surface Water

The nearest surface water sources include the Kaweah River and the Friant-Kern Canal of the CVP. Cal Water does not currently receive imported surface water as a direct source of supply for its customers. However, as a result of exchange opportunities, Cal Water expects to receive 2,000 AF annually for the next five years from the Friant-Kern Canal for the purpose of groundwater recharge. A more detailed description of this exchange follows in section 3.7.

3.4 Groundwater

Historically, groundwater has satisfied 100 percent of the District's water demand. The groundwater used by the Visalia District is extracted from the unconfined aquifers of the Kaweah Delta that underlie the District. Groundwater extraction is accomplished using 91 wells; 72 of which are currently operational. The historical volume of the groundwater pumped is shown in Table 3.4-1.

Table 3.4-1: Amount of Groundwater Pumped – AFY (Table 6)							
Basin Name (s)	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
San Joaquin Valley Groundwater Basin - Kaweah Sub-basin	26,922	28,915	30,065	30,810	32,700	31,576	31,659
% of Total Water Supply	29.0%	31.2%	32.4%	33.2%	35.3%	34.0%	34.1%

Current design capacity for the operational wells is 57,510 GPM, which is equivalent to 92,764 AFY. This design production capacity represents 183 percent of the ten-year average maximum day demand and 322 percent of the ten-year average, average day demand. As a result, the District has sufficient groundwater production capacity to supply all of the current annual average day and maximum day demands using this source. Additional wells that are planned for the District will increase the design capacity to 65,510 GPM or 105,668 AFY.

The amount of groundwater projected to be pumped for the District is shown on Table 3.4-2. The values shown are based on estimated average demand as described in Section 5.

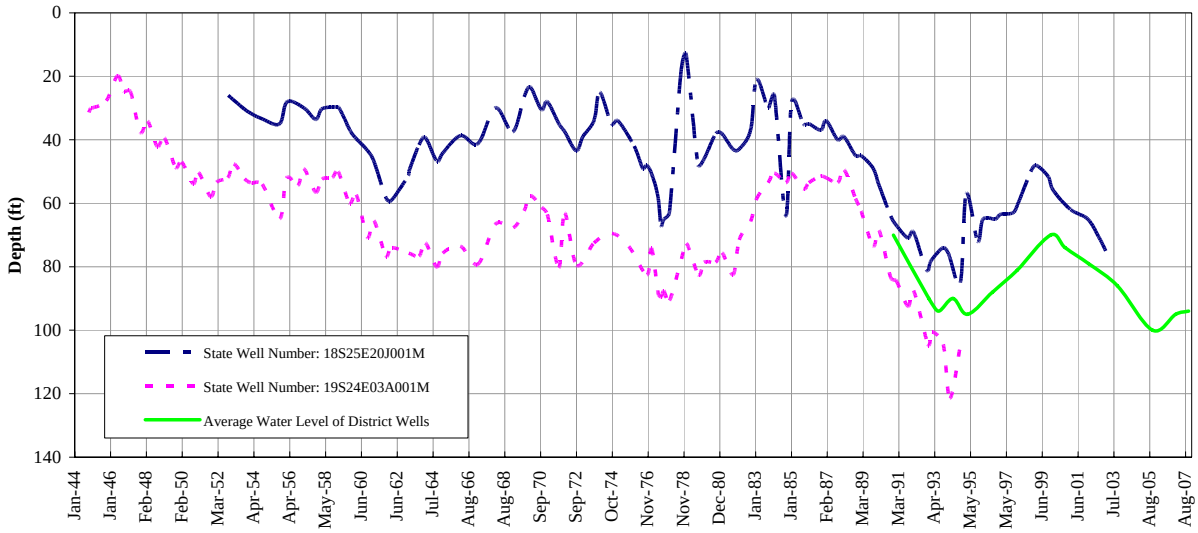
Table 3.4-2: Amount of Groundwater Projected to be Pumped – AFY (Table 7)					
Basin Name(s)	**2010**	**2015**	**2020**	**2025**	**2030**
San Joaquin Valley Groundwater Basin - Kaweah Sub-basin	35,366	40,341	46,099	52,609	60,093
% of Total Water Supply	33.5%	38.2%	43.6%	49.8%	56.9%

Because of storage capacity limitations and distribution system restrictions, operation of these groundwater production facilities at design parameters is not always feasible. Capacity limitations of the distribution system prevent wide dispersal of the water from a single well source. As a result, total well capacity may greatly exceed the actual or projected total system-wide demand, small regional zones may not have sufficient production capacity to meet demand. This condition results in pockets or zones of reduced system pressure; pressure which may meet CPUC General Order 104, but is below optimal system pressure standards.

Cal Water's latest Water Supply and Facilities Master Plan for Visalia recommends the construction of 17 additional wells throughout the system to address existing demand and three tanks to meet peaking and fire flow conditions. While these wells are intended to address existing demand, they will also assist in meeting future demand, since most of the growth will occur as in-fill and on property adjacent to the existing system. Nevertheless, the Master Plan recommends the development of nine additional wells to meet the anticipated demand of 2020.

Average static groundwater elevations in the district have declined up to 80 feet over the past fifty years. Short periods of water level recovery have ranged from 20 to 30 feet over five to ten-year periods of bountiful precipitation. The recent below average rainfall period from 2002 to 2005, coupled with the high growth rate, caused a 30-foot decline in static groundwater level, as shown in the following Figure 3.4-1.

Figure 3.4-1: Average Water Level of District Wells and Two State Wells



The long-term trend of groundwater is a slow decline in water levels. If not addressed the continuation of this decline has the potential to decrease available groundwater supplies at some unknown point in the future, which could be considerably outside of the planning horizon of this document. This condition could result in additional costs in terms of both well construction, and operation and maintenance costs generated by the needed effort to seek groundwater at greater and greater depths. Potential solutions to this condition are being addressed through a number of means including:

- The development and implementation of a regional groundwater management plan being coordinated by the Kaweah Delta Water Conservation District to which both Cal Water and the City of Visalia are both signatory.
- The collection of fees and charges by the City of Visalia to fund the purchase of additional surface water rights and groundwater recharge facilities to slow or eliminate the declining groundwater levels.
- The importation of additional surface water for recharge purposes by the Kaweah Delta Water Conservation District as facilitated by their becoming a long-term Friant Division Central Valley Project contractor.
- Additional actions such as water conservation activities are discussed elsewhere in this document.

As the average static groundwater levels are a function of regional and local conditions, future updates to this Urban Water Management Plan will detail actions to be taken regionally and locally to achieve a long-term balanced groundwater condition for the Visalia District

3.4.1 Basin Boundaries and Hydrology

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 on the west. Major rivers and streams in the subbasin include the Kaweah and St. Johns Rivers.

Additional details of the basin[4] are given in the DWR's Groundwater Bulletin 118, see Appendix D.

The following is given as summary of the basin:

- Tulare Lake Hydrologic Region
- San Joaquin Valley Groundwater Basin
- Kaweah Sub-basin
- Groundwater Basin Number: 5-22.11
- Basin is un-adjudicated

3.4.2 Groundwater Management Plan

The groundwater basin that Cal Water pumps from is an un-adjudicated sub-basin almost entirely within the Kaweah Delta Water Conservation District's (KDWCD) boundaries. As noted previously, Cal Water worked with the Kaweah Delta Water Conservation District, the City of Visalia and others to develop a Groundwater Management Plan under the provisions of Assembly Bill 3030. The Kaweah Delta Water Conservation District is the lead agency in this effort. KDWCD has historically focused on the conservation of flood flows of the Kaweah River for groundwater recharge. While KDWCD is not currently a water supply contractor from the federally funded Friant-Kern Canal, it has historically obtained some water from that facility under surplus conditions and is in the process of obtaining a long-term contract with both a Class 1 and Class 2 water entitlement.

The groundwater management plan acknowledges a continuing decline in groundwater levels of the aquifers below the Visalia District. In an effort to assist in mitigating this groundwater decline, the City of Visalia recently passed a groundwater ordinance that establishes fees which are expected to fund groundwater recharge and other water resource projects within the City. The Groundwater Recharge revenues are derived from three fees: the Groundwater Recharge Fee, Groundwater Extraction Fee, and the Groundwater Mitigation Fee:

- ***The Groundwater Recharge Fee*** was created on December 17, 2001 through an adopted Resolution 2001-09 which adds a fee for groundwater recharge as part of a cooperative agreement with KDWCD to increase groundwater recharge efforts. The fee is collected from the monthly City utility bill and is based on the size of the water service line. First priority of recharge fees is for the agreement with Kaweah Delta Water Conservation District for the acquisition of water and other activities to improve groundwater levels. This fee currently generates approximately $180,000 per year. The portion of the fee that is not sent to KDWCD is available for use by the City to fund groundwater recharge efforts.

- ***The Groundwater Extraction Fee*** became effective January 2006 and is charged to Cal Water or any provider of municipal water supplies, which include all

residential, commercial and industrial water suppliers. This fee is $14 per acre foot of water pumped.

- ***The Groundwater Mitigation Fee*** became effective August 2005 and is charged to any person seeking to annex property. This fee is $950 per acre of land to be developed, the assignment of appropriate water rights or a combination of the two.

All fees in this fund are to be used for acquisition of surface water rights and surface water supplies, groundwater recharge facilities, and other activities to improve groundwater levels and increase supply of water to the City.

3.5 Recycled Water

The recycling of wastewater offers several potential benefits to the City of Visalia, as well as Cal Water and its customers. Perhaps the greatest of these benefits is to help maintain a sustainable groundwater supply either through direct recharge, or by reducing potable supply needs by utilizing recycled water for appropriate uses (e.g., landscape, irrigation) now being served by potable water. Currently, no wastewater is recycled for direct reuse from the domestic or industrial wastewater streams in the District. The potential amount of recycled water that can be produced is proportional to the amount of wastewater that is generated by District, and is discussed in the following sections.

Outside of the Cal Water Visalia District service area, recycled water is utilized by the City of Visalia Waste Water Treatment Facility (WWTF) to meet irrigation water demands near the WWTF. Reuse of this water offsets groundwater use and ultimately benefits the same sub-basin which serves the Visalia District. The WWTF's collection system encompasses approximately 30 square miles. Tertiary treated wastewater is discharged to Mill Creek and to onsite disposal ponds for groundwater recharge, as well as delivered to 250 acres of fodder and fiber crops and a 650 acre walnut orchard immediately south of the WWTF for irrigation.

3.5.1 Wastewater Collection

The City of Visalia operates and maintains the sewer system consisting of gravity sewers, pumping stations, and force mains to collect wastewater from residential, commercial, and industrial customers. The collected wastewater is discharged to trunk sewers and interceptors owned and operated by the City of Visalia and conveyed to the Visalia Wastewater Treatment Plant for treatment.

The wastewater at the treatment plant undergoes secondary treatment with trickling filters, activated sludge, and chlorination. The treated effluent is either discharged to percolation ponds for recharge, into Mill Creek, or to walnut orchards for irrigation. The Visalia Wastewater Treatment Plant has a capacity to treat 16.5 MGD but currently receives 12 MGD from residential, commercial, and industrial customers in the City of Visalia as shown in Table 3.5-1.

Table 3.5-1: Wastewater Flow Rates in Visalia				
Plant	Capacity		Average flow rate	
	MGD	AFY	MGD	AFY
Visalia Treatment Plant	16.5	18,482	12	13,442

A limited amount of recycling is occurring in the City of Visalia. Approximately one irrigation event per month has been occurring during the summer months on walnut orchards near the treatment plant. An irrigation event typically uses 4 MGD of treated wastewater for 4 to 7 days. The approximate recycled water use in the City of Visalia has been 68 acre-feet per year. Currently, the wastewater discharged to Mill Creek is diluted and utilized for agricultural irrigation of alfalfa, cotton, and walnuts.

3.5.2 Estimated Wastewater Generated

Estimates for the district wastewater quantity since 1980 are shown in Figure 3.5-1 and were calculated by annualizing 90 percent of January water use in Cal Water's service area. The future quantity of waste generation is based on a linear equation of the historical estimates. The estimated volume of wastewater generated for the district in five-year increments to the year 2030 is presented in Table 3.5-2.

Figure 3.5-1: Estimated District Annual Wastewater Generated

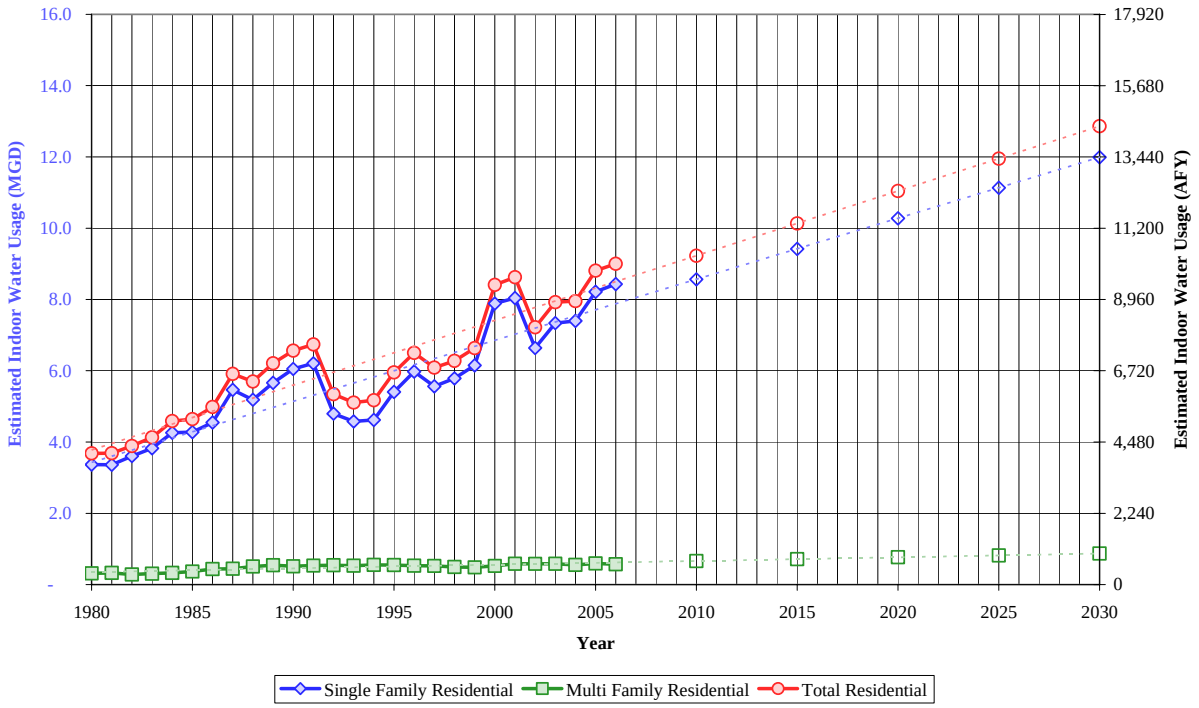


Table 3.5-2: Disposal of wastewater (non-recycled) AF Year (Table 34)							
Method of disposal	**Treatment Level**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**
Stream Discharge	Secondary treatment with trickling filters	10,083	10,336	11,353	12,371	13,388	14,406
	Total	10,083	10,336	11,353	12,371	13,388	14,406

3.5.3 Potential Water Recycling

Because the City of Visalia is approximately four miles east of the treatment plant there currently are no plans to provide recycled water in Cal Water's Visalia service area in the near future. The cost of transmission and distribution of recycled water has to date not been justified based on current and anticipated costs of water and of wastewater disposal.

This potential is being regularly reconsidered and reanalyzed. In particular, there is potential to irrigate the Valley Oaks golf course and Plaza Park near the treatment plant with treated water. The golf course currently utilizes private well water for irrigation and is not a customer of Cal Water. Additionally, the City of Visalia is reviewing as part of their East Downtown Plan, the installation of a new wastewater treatment facility in town which would intercept wastewater flows otherwise headed to the existing WWTF. These flows would be treated to tertiary standards for discharge into Mill Creek for groundwater recharge and for use on landscape and parkways in the new City core.

3.6 Desalinated Water

There are no opportunities for the development of desalinated water in the District.

3.7 Transfer or Exchange Opportunities

The participants in the previously mentioned groundwater management plan see the importation of additional surface water into the sub-basin as an important element to achieving a balanced groundwater condition. As has already been mentioned both the Kaweah Delta Water Conservation district and the City of Visalia are already or will shortly become the beneficiaries of contracts for water supplies to be developed and delivered by the federal Central Valley project. Besides the additional water to be delivered into the area as a contract entitlement, the status as a long-term contractor also affords improved access to surplus federal water supplies that may be available from other federal contractors or which may be surplus to the federal project's overall immediate demands. Monies are being set aside by both Kaweah Delta Water Conservation District as well as the City of Visalia which would enable the purchase of such water supplies when they come available.

One such opportunity was recently presented by Cal Water. Cal Water has brought the opportunity to purchase water from an "outside-the-basin" water source. There is 10,000 acre-feet of water banked in the City of Bakersfield's groundwater bank, which is owned by Cal Water, can be made available over 5 to 7 years for extraction and ultimate delivery to the Visalia area via the Kaweah River and its distributaries for groundwater recharge.

In order to make the cost acceptable as recharge water, the water will be first delivered to citrus growers in Hills Valley Irrigation District (that can use and are willing to pay for the firm nature of this water) and they in turn will provide the City of Visalia and the Visalia District water in a future year at a cost of somewhere between $25 and $50 per acre-foot at a time when the City of Visalia otherwise does not have access to water at equivalent costs. Thus, the City of Visalia will be able to access 10,000 acre-feet of

water it otherwise would not be able to purchase elsewhere at a net cost of somewhere between $25 and $50 per acre-foot.

3.8 Water Supply Reliability

Percentage of rainfall since 1970 is shown in Figure 3.8-1 with the average annual rainfall for the district of 10.26 inches. The most recent driest year occurred in 1999 when the rainfall was 17% below average (8.52 inches). This is taken as the Single Dry Year shown in Table 3.8-1. The three Multiple Dry-Water Years used are based on the most recent and consecutive lowest annual rainfall totals which occurred in 2002, 2003, and 2004. Other below average rainfall periods more severe than those described above have occurred in the district's history. These periods coincide with the drought conditions that California experienced during this time. However, since the district was much smaller during those periods and the water demand was much less, only the most recent below average rainfall totals are being considered.

Figure 3.8-1: Comparison of Annual Rainfall to Historical Average

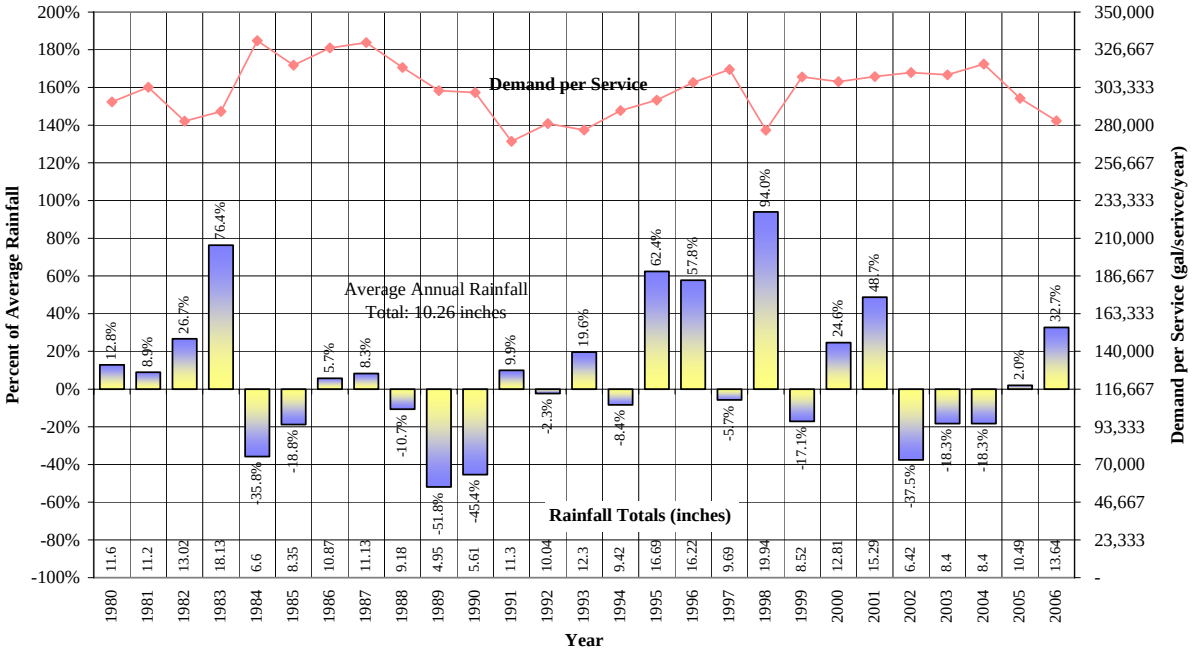


Table 3.8-1: Basis of Water Year Data (Table 9)	
Water Year Type	**Base Year (s)**
Average Water Year	2005
Single-Dry Water Year	1999
Multiple-Dry Water Years	2002-2004

The supply reliability is shown in Table 3.8-2 and shows that during below average rainfall periods, demand has been met by the given supply.

Table 3.8-2: Supply Reliability - AF Year (Table 8)				
Average / Normal Water Year	Single Dry Water Year	Multiple Dry Water Years		
		Year 1	Year 2	Year 3
92,764	95,990	99,216	102,442	105,668
% of Normal	103.5%	107.0%	110.4%	113.9%

Because the source of supply in the Visalia District comes solely from an un-adjudicated basin, and not directly from impounded surface water runoff, the long-term reliability of supply relies on a number of regional and local factors. The short-term reliability of groundwater as a source of supply is excellent. In this case, total water supply availability (pumping capacity) figures have been used to determine reliability. Using such an approach assumes that there will be sufficient groundwater available during the planning term to meet anticipated needs. It is important to note that there has been a trend towards increasing depth to groundwater over the period of record, as seen in Figure 3.4-1. Using a projection of this trend, it is anticipated that water supply (pumping capacity) will decrease with the advance in time. A comparison between such changes in water supply versus future demands reveals that the supply will be adequate to reliably meet demands within the planning term.

It is understood that ultimately the reliability of the water supply to the Visalia District is function of the long term balance between aquifer replenishment and groundwater extraction. To better plan for ways to achieve this balance, Cal Water has teamed with the City of Visalia and Kaweah Delta Water Conservation District in the development of a numerical groundwater model, specifically focused for the Visalia District. The model will be utilized for several applications including, but not limited to, assisting in the land use decision-making process, analysis of various recharge opportunities to determine the most effective strategies, and the determination of a practical rate of withdrawal in the future. As has been previously mentioned, with the implementation of this cooperative effort of measures, activities and projects, it is anticipated that a long-term balanced groundwater condition can be achieved.

Although the historical record shows that the demand can be met by the supply, several factors that could negatively affect the reliability are listed in Table 3.8-3.

Table 3.8-3: Factors Resulting In Inconsistency of Supply (Table 10)				
Name of supply	Legal	Environmental	Water Quality	Climatic
Groundwater	✓		✓	✓

Since aquifer levels tend to be quite reactive with respect to rainfall amounts, climatic variation could impact the consistency of supply. An extended drought period may significantly reduce the available supply of groundwater, depending on the depth of wells throughout the district. Water quality concerns have not shown to be a major contributor

to consistency of supply in the Visalia District. However, emerging contaminants or reduced MCLs for contaminants known to be present may affect the local availability of groundwater resources. Potential legal issues resulting from conflicts with agricultural water users or future adjudication efforts could also have unforeseen consequences for urban water suppliers in the area.

3.8.1 Water Quality

The drinking water delivered to customers in the Visalia District meets or surpasses all federal and state regulations. The U.S. Environmental Protection Agency as authorized by the Federal Safe Drinking Water Act of 1974 sets drinking water standards. A state can either adopt the USEPA standard or set state standards that are more stringent than those set by the federal government.

There are two general types of drinking water standards: Primary and Secondary. Primary Standards are designed to protect public health by establishing Maximum Contamination Levels (MCL) for substances in water that may be harmful to humans. MCLs are established very conservatively for each contaminant and are generally based on health effects which may occur if a person were to drink three liters of the water per day for 70 years. Secondary Standards are based on the aesthetic qualities of the water such as taste, odor, color, and certain mineral content. These standards, established by the State of California, specify limits for substances that may affect consumer acceptance of the water.

The quality of groundwater produced by the district's active wells can vary depending on location. Several wells have been tested to produce water that exceeds the Secondary Standard for manganese; however, these wells have either been taken out of service or treated to reduce the contaminant level in the water delivered. Other issues of concern in the district are arsenic, nitrate and salt. The presence of these contaminants puts into question the potential availability of these facilities if the concentrations were to increase above the existing treatment capacity. Also of concern is the potential loss of other wells due to contaminate migration.

Additionally, some wells have been found to contain concentrations of volatile organic compounds (VOCs), particularly trichloroethylene (TCE), tetrachloroethylene (PCE) and carbon tetrachloride (CTC), which have, on occasion, exceeded the MCL for these substances. A number of wells contain detectable concentrations of the inorganic compound nitrate. The District is increasing its monitoring of pesticides (DBCP), nitrate, arsenic, and pentachlorophenol. In all cases if the concentration of these compounds exceeds the MCL, the wells are taken out of service or appropriate treatment technologies are applied.

3.9 Water Supply Projects

The makeup of the water supply delivered to the customers of Cal Water's Visalia district is not likely to change considerably in the future. The primary source of supply will continue to be groundwater. Cal Water, with the assistance of Boyle Engineering, has

prepared a Water Supply and Facilities Master Plan for the District. This Master Plan provides recommendations for new well location and a general schedule for new well development. These recommendations are based both on meeting future demands and replacing existing aging facilities. A per lot fee is charged for new development to pay for facilities supplying water to new developments.

Future water supply projects are summarized in Table 3.8-1.

Table 3.9-1: Future Water Supply Projects (Table 17)

Project Name	Projected Start Date	Projected Completion Date
Stn 55 - New Well	2005	2007
Stn 93 - New Well	2006	2006
Stn 94 - New Well	2006	2007
Stn 95 - New Tank	2008	2009
Stn 96 - New Well and Tank	2007	2009
Stn 97 - New Well and Tank	2008	2010

4 Water Shortage Contingency Plan

4.1 Worst Case Water Supply Availability

The Visalia District's groundwater source is from an un-adjudicated ground water basin. Based on the assessment of water supply reliability, it is anticipated that the Cal Water will be able to supply its customer's full service demand. The most likely threat is due to a serious prolonged drought, which could potentially reduce aquifer water levels to below current well depths, reducing pumping volumes, potentially force adversely affected wells out of service and increase the cost of well operation. In no case is there foreseen the potential of not being able to meet demands of the Visalia District.

4.2 Stages of Action

California Water Service Company has developed a four-stage rationing plan. The plan includes voluntary and mandatory stages. Approval from the CPUC must be obtained prior to implementation of mandatory restrictions

Table 4.2-1: Consumption Reduction Methods (Table 27)

Shortage	Stage	Demand Reduction Goal	Type Of Program
Minimum 5 - 10%	Stage 1	10% reduction	Voluntary
Moderate 10 - 20%	Stage 2	20% reduction	Voluntary or Mandatory*
Severe 20 - 35%	Stage 3	35% reduction	Mandatory*
Critical 35 - 50%	Stage 4	50% reduction	Mandatory*

* Mandatory = Allocations

4.2.1 Actions to Be Undertaken By California Water Service Company

The following outline lists the actions to be taken during periods when a reduction in consumption is required:

Stage 1

- California Water Service Company maintains an ongoing public information campaign consisting of distribution of literature, speaking engagements, monthly bill inserts, and conservation messages printed in local newspapers.
- Educational programs in area schools are also ongoing.

Stage 2

- California Water Service Company will aggressively continue its public information and education programs.
- Ask consumers for 10 to 20 percent voluntary or mandatory water use reductions.
- Prior to implementation of mandatory reductions, obtain approval from CPUC.
- Lobby for passage of drought ordinances by appropriate governmental agencies.

Stage 3

- Implement mandatory reductions after receiving approval from CPUC.
- Maintain rigorous public information campaign explaining water shortage conditions.
- Water use restrictions go into effect; prohibited uses can include watering resulting in gutter flooding, using a hose without shutoff device, filling of pools or fountains, etc.
- Limiting landscape irrigation by restricting the hours of the day and or days of the week during which water for irrigation can be used.
- Monitor production weekly for compliance with necessary reductions.
- Installation of a flow restrictor on the service line of customers who consistently violate water use restrictions.

Stage 4

- All of steps taken in prior stages intensified.
- Discontinuance of water service for customers consistently violating water use restrictions.
- Monitor production daily for compliance with necessary reductions.
- More restrictive conditions for, or a prohibition, of landscape irrigation

4.2.2 Mandatory Prohibitions

Due to Cal Water's investor-owned status, it is not authorized to pass any ordinances. Should conditions warrant mandatory reductions, Cal Water will request authority to add Tariff Rule 14.1, Mandatory Water Conservation Plan (see Appendix E), to existing tariffs for a district. Included in Rule 14.1 is Section A. Conservation - Nonessential or Unauthorized Water Use which prohibits use of water for filling or refilling of swimming pools, use of water which results in flooding or runoff in gutters, etc.

4.2.3 Consumption Limits

California Water Service Company maintains extensive water use records on individual metered customer accounts. These records are reviewed in the districts on a daily basis to identify potential water loss problems.

In order to protect itself against serious and unnecessary waste or misuse of water, Cal Water may meter any flat rate service and apply the regularly established meter rates where the customer continues to misuse or waste water beyond five days after Cal Water has given the customer written notice to remedy such practices.

4.2.4 Monitoring Procedure during Periods of Water Shortages

During all stages of water shortages, daily production figures are reported to and monitored by the district manager on a daily basis. Consumption will be monitored through these daily production figures in the district for compliance with necessary reductions.

4.2.5 Penalties or Charges for Excessive Use

Cal Water, after one written warning, shall install a flow-restricting device on the service line of any customer observed by Cal Water personnel to be using water for any non-essential or unauthorized use defined in Section A. of Tariff Rule 14.1 (see Appendix E). Repeated violations of unauthorized water use will result in discontinuance of water service.

4.2.6 Analysis of Revenue and Expenditure Impacts

California Water Service Company is an investor-owned water utility and, as such, is regulated by the CPUC. On March 8, 1989, the Commission instituted an investigation to determine what actions should be taken to mitigate the effects of water shortages on the State's regulated utilities and their customers. In decision D. 90-07-067, effective July 18, 1990, the Commission authorized all utilities to establish memorandum accounts to track expenses and revenue shortfalls caused both by mandatory rationing and by voluntary conservation efforts. Subsequently, D. 90-08-55 required each class A utility (more than 10,000 connections) seeking to recover revenues from a drought memorandum account to submit, for Commission approval, a water management program that addresses long-term strategies for reducing water consumption. Utilities with approved water management programs were authorized to implement a surcharge to recover revenue shortfalls recorded in their drought memorandum accounts.

However, the Commission's Decision 94-02-043 dated February 16, 1994, states:

> *10. Now that the drought is over, there is no need to track losses in sales due to residual conservation.*
> *11. The procedures governing voluntary conservation memorandum accounts (see D.92-09-084) developed in this Drought Investigation will no longer be available to water companies as of the date of this order.*
> *12. Procedures and remedies developed in the Drought Investigation that are not specifically authorized for use in the event of future drought in these Ordering Paragraphs will no longer be available to water companies as of the date of this order except upon filing and approval of a formal application.*
> *(CPUC Decision 94-02-043, Findings of Fact, paragraphs 10-12)*

It was at this time that Cal Water significantly curtailed conservation activities in its districts. At the time that triggers for voluntary or mandatory reductions should occur in the future, Cal Water will determine if a filing to the CPUC is necessary to enforce the reductions and to begin tracking lost sales from the required reductions.

4.3 Implementing the Plan

Section 357 of the Water Code requires that suppliers that are subject to regulation by the CPUC shall secure its approval before imposing water consumption regulations and restrictions required by water shortage emergencies.

4.4 Supply Shortage Triggers

Although California Water Service Company's Visalia District is not currently experiencing a supply shortage, Cal Water intends to manage its supply prudently. If a supply deficiency should occur, Cal Water will implement the appropriate "Stage of Action" unless the Public Utilities Commission adopts findings to implement a less restrictive stage.

Table 4.4-1: Water Supply Triggering Levels	
Stage	% Shortage
Stage 1	Up to 10% supply reduction
Stage 2	10 to 20% supply reduction
Stage 3	20 to 35% supply reduction
Stage 4	35 to 50% supply reduction

4.5 Three-Year Minimum Water Supply

Table 4.5-1 lists the minimum water supply for the next three years based on current trends of the supply. The basis of the normal supply is the 10-year average covering the period 1997 to 2006.

Table 4.5-1: Three-Year Estimated Minimum Water Supply (Table 24) (AFY)				
Source	**Normal**	**2007**	**2008**	**2009**
Cal Water Groundwater Eells	28,834	23,199	23,199	23,199
Total	28,834	23,199	23,199	23,199

For the next three years, the minimum supply from Groundwater is 23,199 AFY. This is based on the minimum ground water production for the past ten years.

4.6 Catastrophic Water Supply Interruption

Cal Water has an Emergency Response Plan in place that coordinates overall company response to a disaster in any or all of its districts. In addition, the Emergency Response Plan requires each district to have a local disaster plan that coordinates emergency responses with other agencies in the area. Because of Visalia's relative geographical isolation, Cal Water does not currently have the ability to form inter-connections with neighboring water utilities for emergency purposes. Several small mutual water companies exist in the area but none have sufficient supply capacities to meet the demand requirements of Cal Water's customers.

Cal Water also inspects its facilities annually for earthquake safety. To prevent loss of these facilities during an earthquake, auxiliary generators and improvements to our water storage facilities have been budgeted for and installed as part of our annual process.

5 Water Use Provisions

5.1 Distribution of Services

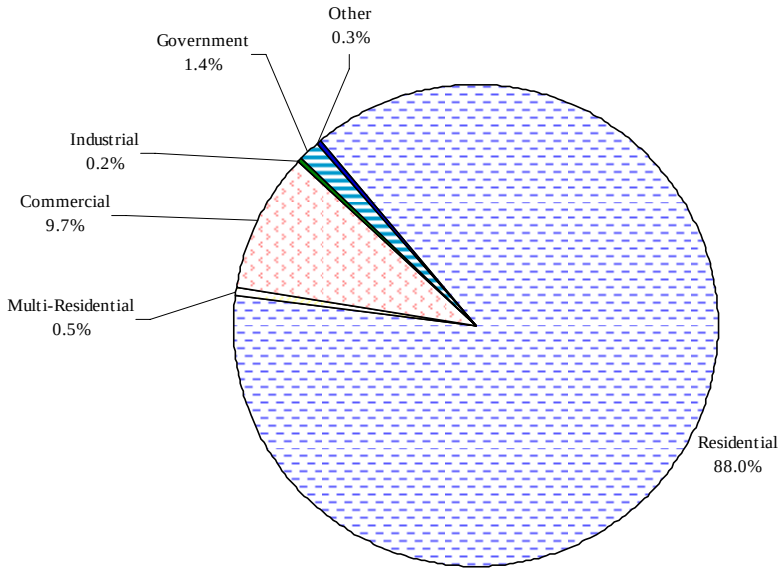
California Water Service Company classifies customer service connection categories as follows:

- Residential
- Multifamily
- Commercial
- Industrial
- Government
- Other

The residential sector of Cal Water service customers includes permanent single and multifamily residents. Service for seasonal customers was not considered.

Land use in the Visalia District is dominated by residential and commercial activities, as seen in the service count of the District, Figure 5.1-1. Single-family residential services account for 88.0 percent of all services; multifamily residential services represent 0.5 percent, and commercial services 9.7 percent. Thus, 98.2 percent of all services are for residential and commercial facilities. The remaining 1.8 percent includes industrial, governmental uses, and other functions such as temporary construction meters.

Figure 5.1-1: Distribution of Services (2006)



5.2 Historical and Current Water Demand

Demand per service was established as a function of historical sales and service data. Projected demand is the mathematical product of total projected services and demand per

service. Historical sales values are illustrated in Figure 5.2-1. Historical service counts are illustrated in Figure 5.2-2. The resulting combined demand per service for all services fluctuated between 270,000 and 330,000 gallons per service per year, Figure 5.2-3.

Figure 5.2-1: Historical Sales

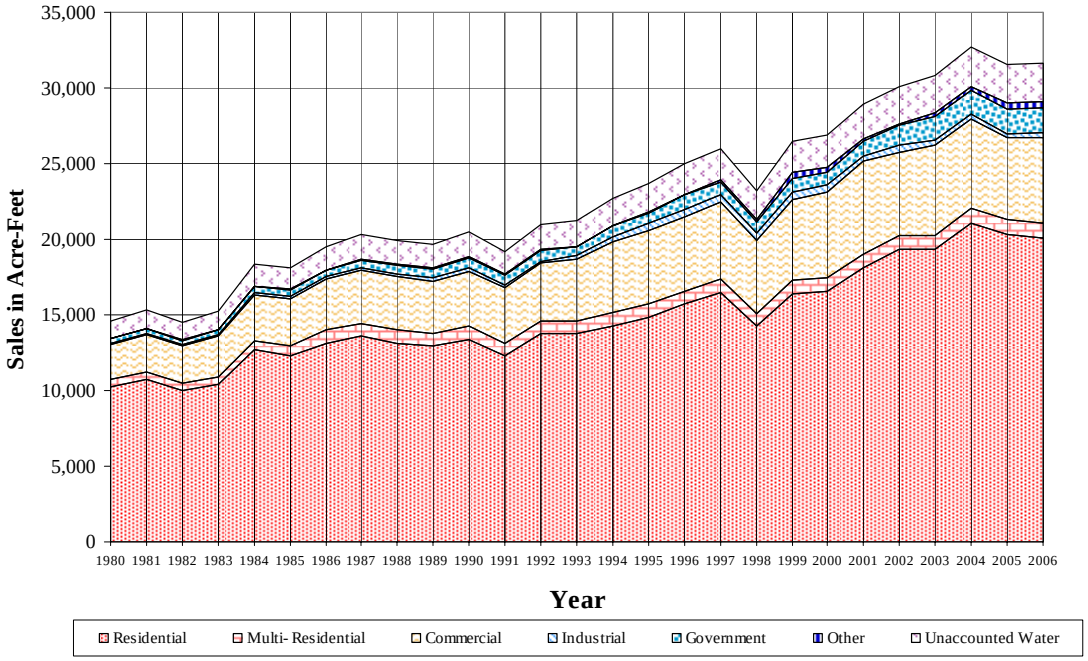


Figure 5.2-2: Historical Service Counts

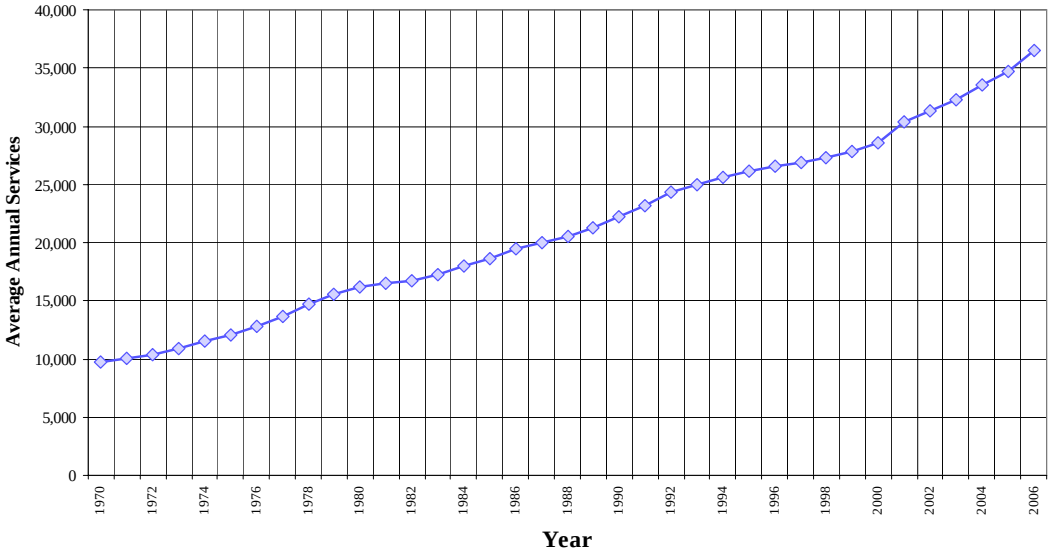
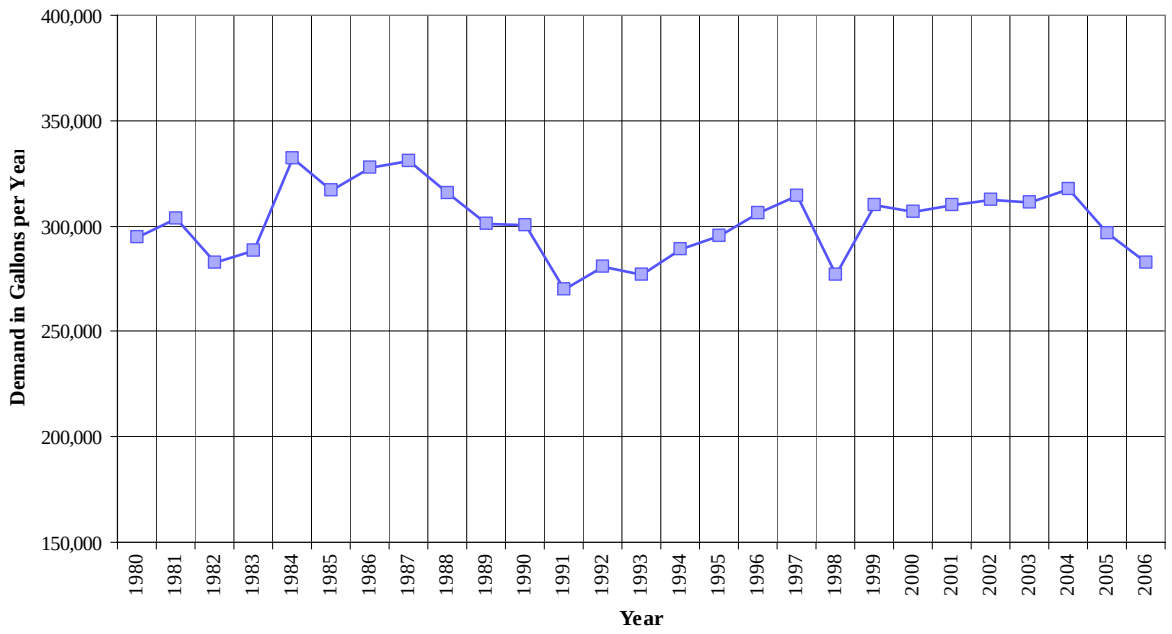


Figure 5.2-3: Historical Demand per Service



A response to the statewide drought conditions resulted in a reduction in the demand per service values for 1991. This response, however, was short-lived with demand per service rebounding the following two years to previous levels. Curbing the rising demand per service will require the implementation of conservation activities. The Company has set a goal of a 10% reduction in demand (based on pre-drought levels). Implementation of Best Management Practices (BMPs) will assist in achieving this goal.

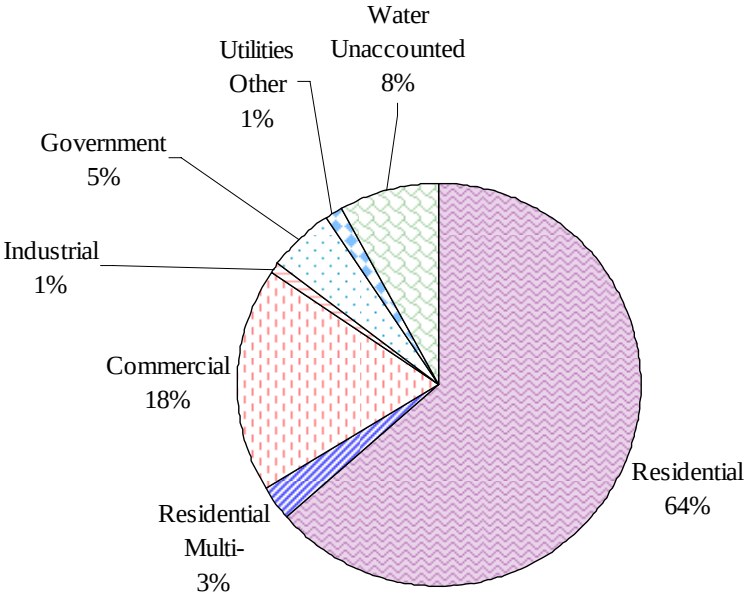
5.3 Per Capita Water Demand

Per-capita water use in the district is summarized in Table 5.3-1, and is based on the end of 2006 year total demand. Per-capita water use is estimated at 224 gallons per day. The statewide average is 190 gallons per capita per day, while the Tulare Lake Hydrological Region average was 301 gallons per capita per day. Visalia's per-capita use is higher than statewide averages because of its hotter, drier climate.

Table 5.3-1: Per Capita Water Demand (2006)

Units	All Users	Residential
Million Gallons	10,289	6,859
Estimated Population	125,960	125,960
Gallons/Person in Year	81,687	54,458
Gallons Per Capita Per Day	223.8	149.2
Gallons Per Capita Per Minute	0.155	0.104

Figure 5.3-1: Percent of Total Demand by Type of Use (2006)



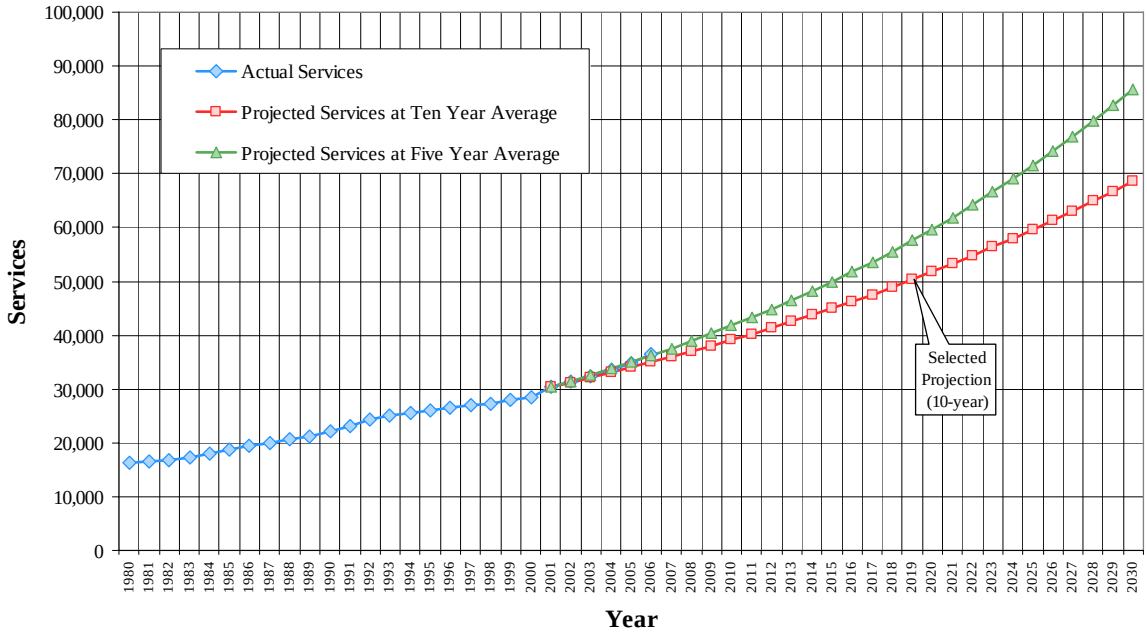
For the purpose of projecting total system demand, the projected number of services for each customer class was multiplied by the demand per service for that classification. This process was employed because of the significant difference between the demand per service associated with certain uses and the combined or average demand per service.

Single family residential water use represents the smallest demand per service segment in the district at approximately 220,000 gallons per service per year, yet this category uses 64 percent of the total demand. The multifamily residential use was three percent of the total demand with a demand per service that is greater than 1,544,464 gallons per service per year. The combined residential sector component of demand is equal to 67 percent of total demand.

5.4 Historical and Projected Water Demand

Historic and projected service counts are also shown graphically in Figure 5.4-1.

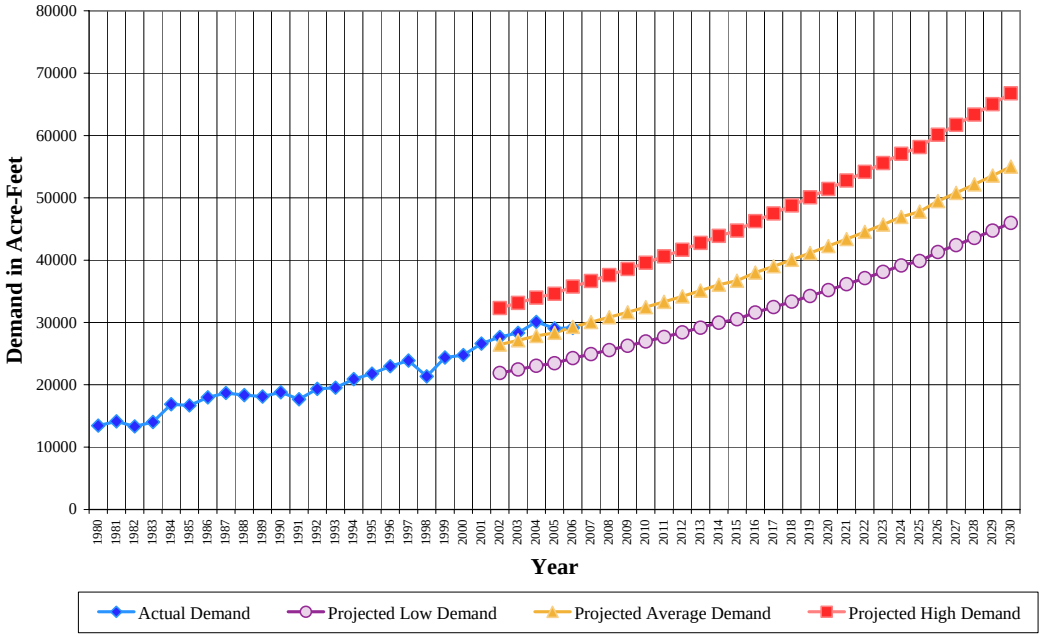
Figure 5.4-1: Historical & Projected Services



Projected service connections based on past service counts are labeled 5 Yr. Avg. and 10 Yr. Avg. The 5 Yr. Avg. is the short-term growth rate, calculated from 2002 to 2006, which has an overall annual average growth rate of 3.73%. The 10 Yr. Avg. is a long-term growth rate, calculated from 1997 to 2006, which exhibits an overall annual average growth rate of 3.24%.

Three projection scenarios were used to develop a range of projected demand for the Visalia District. The previously discussed service connection growth pattern was applied to three different sets of demand per service data. Data generated through each scenario is compiled and located separately in Appendix C (Worksheets 10a, 11a, and 12a). Comparative demand data for the three scenarios is presented in Figure 5.4-2. The starting point for each projection was the actual annual average number of services in 2002. This provides a comparison of projected values to actual values over a several-year period.

Figure 5.4-2: Historical & Projected Demand (without system losses)



5.4.1 Scenario 1

The ten year average growth rate was applied to the lowest demand per service for each customer class. The projected total demand for the year 2030 is 45,969 AF (without system losses), see Table 5.4-2. This scenario provides a valid bottom for the projected demand range and indicates the level to which demand can be reduced without impacts to public health and safety.

5.4.2 Scenario 2

The average recorded demand per service for each customer class combined with the 10 year average growth rate yields a total district demand without system losses of 55,004 AF in the year 2030. This scenario represents the normal demand, which would most likely occur provided the Company's 10% conservation goal is achieved and maintained. To accomplish this level of demand, appropriate conservation programs must be effectively implemented. However, with any effective conservation program comes some degree of demand hardening, a condition that reduces a community's ability to respond to future shortages with reduced consumption. Projected average system demand in 5-year increments is shown in Table 5.4-3.

5.4.3 Scenario 3

The ten year average growth rate combined with the highest recorded demand per service value for each customer class projects a total district demand without system losses of 66,769 AF in the year 2030. This scenario provides a valid top for the projected demand range and illustrates to what level demand could escalate if conservation efforts fail. Projected high system demand in 5-year increments is shown in Table 5.4-4.

Table 5.4-1: Past, Current, and Projected Water Deliveries for Scenario 1 (Table 12a)

		Water Use Sectors	Single family	Multifamily	Commercial	Industrial	Institutional/Gov.	Landscape/ Agriculture	Recycled	Other	Total
2000	metered	# of accounts	8,159	188	3,191	60	236	-	-	36	11,870
		Deliveries AFY	5,326	857	5,719	458	848	-	-	310	13,519
	unmetered	# of accounts	16,712	-	-	-	-	-	-	-	16,712
		Deliveries AFY	11,249	-	-	-	-	-	-	-	11,249
2005	metered	# of accounts	12,718	196	3,360	64	507	-	-	70	-
		Deliveries AFY	8,365	926	5,431	288	1,636	-	-	408	17,054
	unmetered	# of accounts	17,773	-	-	-	-	-	-	-	17,773
		Deliveries AFY	11,996	-	-	-	-	-	-	-	11,996
2010	metered	# of accounts	34,712	220	3,738	70	272	-	-	45	39,057
		Deliveries AFY	20,843	799	4,428	315	507	-	-	61	26,953
	unmetered	# of accounts	-	-	-	-	-	-	-	-	-
		Deliveries AFY	-	-	-	-	-	-	-	-	-
2015	metered	# of accounts	40,241	234	4,040	74	307	-	-	53	44,949
		Deliveries AFY	24,162	849	4,785	332	572	-	-	72	30,773
	unmetered	# of accounts	-	-	-	-	-	-	-	-	-
		Deliveries AFY	-	-	-	-	-	-	-	-	-
2020	metered	# of accounts	46,650	248	4,366	78	360	-	-	63	51,765
		Deliveries AFY	28,011	902	5,172	349	671	-	-	85	35,190
	unmetered	# of accounts	-	-	-	-	-	-	-	-	-
		Deliveries AFY	-	-	-	-	-	-	-	-	-
2025	metered	# of accounts	54,080	264	4,719	82	384	-	-	74	59,603
		Deliveries AFY	32,472	959	5,590	367	715	-	-	100	40,203
	unmetered	# of accounts	-	-	-	-	-	-	-	-	-
		Deliveries AFY	-	-	-	-	-	-	-	-	-
2030	metered	# of accounts	62,694	280	5,100	86	409	-	-	87	68,656
		Deliveries AFY	37,644	1,019	6,041	386	761	-	-	118	45,969
	unmetered	# of accounts	-	-	-	-	-	-	-	-	-
		Deliveries AFY	-	-	-	-	-	-	-	-	-

Table 5.4-2: Past, Current, and Projected Water Deliveries for Scenario 2 (Table 12b)

		Water Use Sectors	Single family	Multifamily	Commercial	Industrial	Institutional/Gov.	Landscape/ Agriculture	Recycled	Other	Total
2000	metered	# of accounts	8,159	188	3,191	60	236	-	-	36	11,870
		Deliveries AFY	5,326	857	5,719	458	848	-	-	310	13,519
	unmetered	# of accounts	16,712	-	-	-	-	-	-	-	16,712
		Deliveries AFY	11,249	-	-	-	-	-	-	-	11,249
2005	metered	# of accounts	12,718	196	3,360	64	507	-	-	70	16,915
		Deliveries AFY	8,365	926	5,431	288	1,636	-	-	408	17,054
	unmetered	# of accounts	17,773	-	-	-	-	-	-	-	17,773
		Deliveries AFY	11,996	-	-	-	-	-	-	-	11,996
2010	metered	# of accounts	34,712	220	3,738	70	272	-	-	45	39,057
		Deliveries AFY	24,161	1,042	5,704	592	801	-	-	170	32,471
	unmetered	# of accounts	-	-	-	-	-	-	-	-	-
		Deliveries AFY	-	-	-	-	-	-	-	-	-
2015	metered	# of accounts	40,241	234	4,040	74	307	-	-	53	44,949
		Deliveries AFY	28,009	1,107	6,165	622	904	-	-	201	37,009
	unmetered	# of accounts	-	-	-	-	-	-	-	-	-
		Deliveries AFY	-	-	-	-	-	-	-	-	-
2020	metered	# of accounts	46,650	248	4,366	78	360	-	-	63	51,765
		Deliveries AFY	32,470	1,177	6,663	655	1,061	-	-	235	42,262
	unmetered	# of accounts	-	-	-	-	-	-	-	-	-
		Deliveries AFY	-	-	-	-	-	-	-	-	-
2025	metered	# of accounts	54,080	264	4,719	82	384	-	-	74	59,603
		Deliveries AFY	37,642	1,251	7,202	689	1,130	-	-	277	48,191
	unmetered	# of accounts	-	-	-	-	-	-	-	-	-
		Deliveries AFY	-	-	-	-	-	-	-	-	-
2030	metered	# of accounts	62,694	280	5,100	86	409	-	-	87	68,656
		Deliveries AFY	43,638	1,329	7,784	725	1,203	-	-	325	55,004
	unmetered	# of accounts	-	-	-	-	-	-	-	-	-
		Deliveries AFY	-	-	-	-	-	-	-	-	-

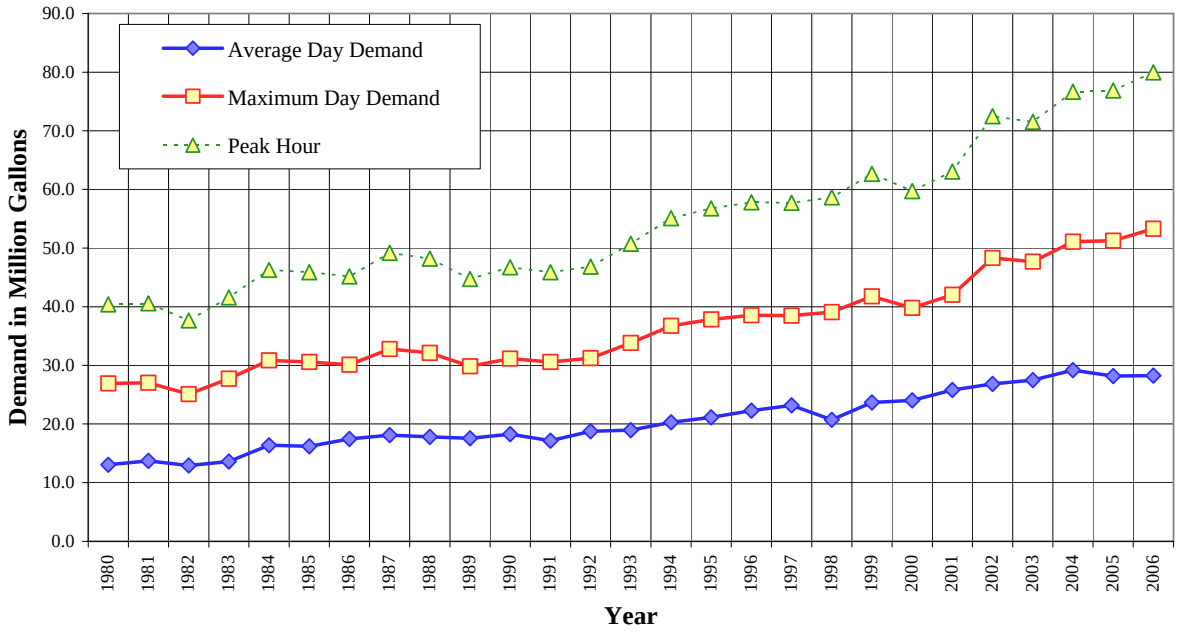
Table 5.4-3: Past, Current, and Projected Water Deliveries for Scenario 3 (Table 12c)

		Water Use Sectors	Single family	Multifamily	Commercial	Industrial	Institutional/Gov.	Landscape/ Agriculture	Recycled	Other	Total
2000	metered	# of accounts	8,159	188	3,191	60	236	-	-	36	11,870
		Deliveries AFY	5,326	857	5,719	458	848	-	-	310	13,519
	unmetered	# of accounts	16,712	-	-	-	-	-	-	-	16,712
		Deliveries AFY	11,249	-	-	-	-	-	-	-	11,249
2005	metered	# of accounts	12,718	196	3,360	64	507	-	-	70	16,915
		Deliveries AFY	8,365	926	5,431	288	1,636	-	-	408	17,054
	unmetered	# of accounts	17,773	-	-	-	-	-	-	-	17,773
		Deliveries AFY	11,996	-	-	-	-	-	-	-	11,996
2010	metered	# of accounts	34,712	220	3,738	70	272	-	-	45	39,057
		Deliveries AFY	28,501	1,223	7,072	1,076	1,188	-	-	513	39,573
	unmetered	# of accounts	-	-	-	-	-	-	-	-	-
		Deliveries AFY	-	-	-	-	-	-	-	-	-
2015	metered	# of accounts	40,241	234	4,040	74	307	-	-	53	44,949
		Deliveries AFY	33,041	1,299	7,643	1,133	1,341	-	-	604	45,061
	unmetered	# of accounts	-	-	-	-	-	-	-	-	-
		Deliveries AFY	-	-	-	-	-	-	-	-	-
2020	metered	# of accounts	46,650	248	4,366	78	360	-	-	63	51,765
		Deliveries AFY	38,303	1,381	8,261	1,192	1,573	-	-	709	51,418
	unmetered	# of accounts	-	-	-	-	-	-	-	-	-
		Deliveries AFY	-	-	-	-	-	-	-	-	-
2025	metered	# of accounts	54,080	264	4,719	82	384	-	-	74	59,603
		Deliveries AFY	44,404	1,467	8,928	1,254	1,675	-	-	836	58,564
	unmetered	# of accounts	-	-	-	-	-	-	-	-	-
		Deliveries AFY	-	-	-	-	-	-	-	-	-
2030	metered	# of accounts	62,694	280	5,100	86	409	-	-	87	68,656
		Deliveries AFY	51,476	1,559	9,650	1,320	1,784	-	-	980	66,769
	unmetered	# of accounts	-	-	-	-	-	-	-	-	-
		Deliveries AFY	-	-	-	-	-	-	-	-	-

5.5 Average Day and Maximum Day Demand

The historical values for Average Day Demand (ADD) and Maximum Day Demand (MDD) and Peak Hour Demand (PHD) from 1980 to the present are shown in Figure 5.5-1.

Figure 5.5-1: Average Day, Maximum Day, and Peak Hour Demand



The ADD and MDD are based on historical records for the District. The Peak Hour Demand (PHD) shown in the graph is based on the MDD multiplied by a peaking factor (PF). A peaking factor of 1.5 was used to plot the above curve for the PHD. This value for a PF is consistent with other Districts. Projected values for ADD, MDD, and PHD in 5-year increments are shown in Table 5.5-1.

The ability of the distribution system to deliver projected future demands has been evaluated by Boyle Engineering using the H2ONET computer-simulation of the hydraulic network. This analysis provided data to support the assertion that the existing distribution system is capable of delivering the anticipated maximum day demands while maintaining pressure throughout the system at levels above the approved California Public Utilities Commission standard.

Table 5.5-1: Average Day, Maximum Day, and Peak Hour Demand			
Projected Year	Average Day Demand (MGD)	Maximum Day Demand (MGD)	Peak Hour Demand (MGD)
2010			
Scenario 1	26.4	46.4	69.6
Scenario 2	31.6	55.5	83.3
Scenario 3	38.2	67.1	100.7
2015			
Scenario 1	30.1	53.0	79.5
Scenario 2	36.0	63.3	95.0
Scenario 3	43.5	76.5	114.7
2020			
Scenario 1	34.5	60.6	90.9
Scenario 2	41.2	72.4	108.6
Scenario 3	49.7	87.4	131.0
2025			
Scenario 1	39.4	69.3	104.0
Scenario 2	47.0	82.6	123.9
Scenario 3	56.6	99.6	149.4
2030			
Scenario 1	45.1	79.3	119.0
Scenario 2	53.6	94.3	141.5
Scenario 3	64.6	113.6	170.4

5.6 Summary

California Water Service Company does not provide water to other agencies and does not supply water for projects such as saline barriers or groundwater recharge and does not plan to supply water in the future.

The district system losses based on average demand projections are summarized in Table 5.6-1.

Table 5.6-1: Additional Water Uses and Losses - AF Year (Table 13 and 14)

Water Use	2000	2005	2010	2015	2020	2025	2030
Sales to Other Agencies	-	-	-	-	-	-	-
Saline barriers	-	-	-	-	-	-	-
Groundwater recharge	-	-	-	-	-	-	-
Conjunctive use	-	-	-	-	-	-	-
Raw water	-	-	-	-	-	-	-
Recycled	-	-	-	-	-	-	-
Unaccounted-for system losses	2,154	2,526	2,895	3,332	3,837	4,418	5,089
Total	2,154	2,526	2,895	3,332	3,837	4,418	5,089

The past, current, and projected water deliveries based on average projected consumption rate is presented in Table 5.6-2.

Table 5.6-2: Total Water Use - AF Year (Table 15)

Water Use	2000	2005	2010	2015	2020	2025	2030
Total of Tables 12, 13, 14	26,921	31,576	35,366	40,341	46,099	52,609	60,093

Figure 5.6-1 graphically displays the past, current, and projected water deliveries for all three scenarios including the unaccounted for system losses. Figure 5.6-2 shows the historical and average projected water source by type of source.

Figure 5.6-1: Historical & Projected Demand (system losses incorporated)

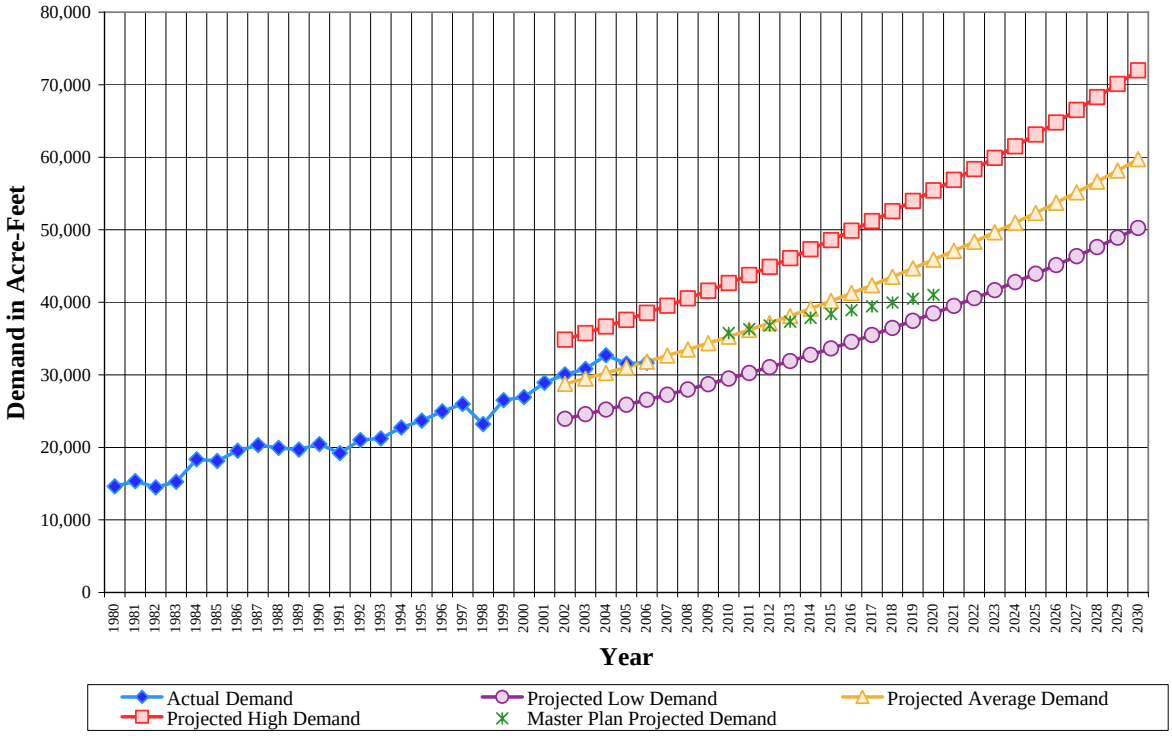
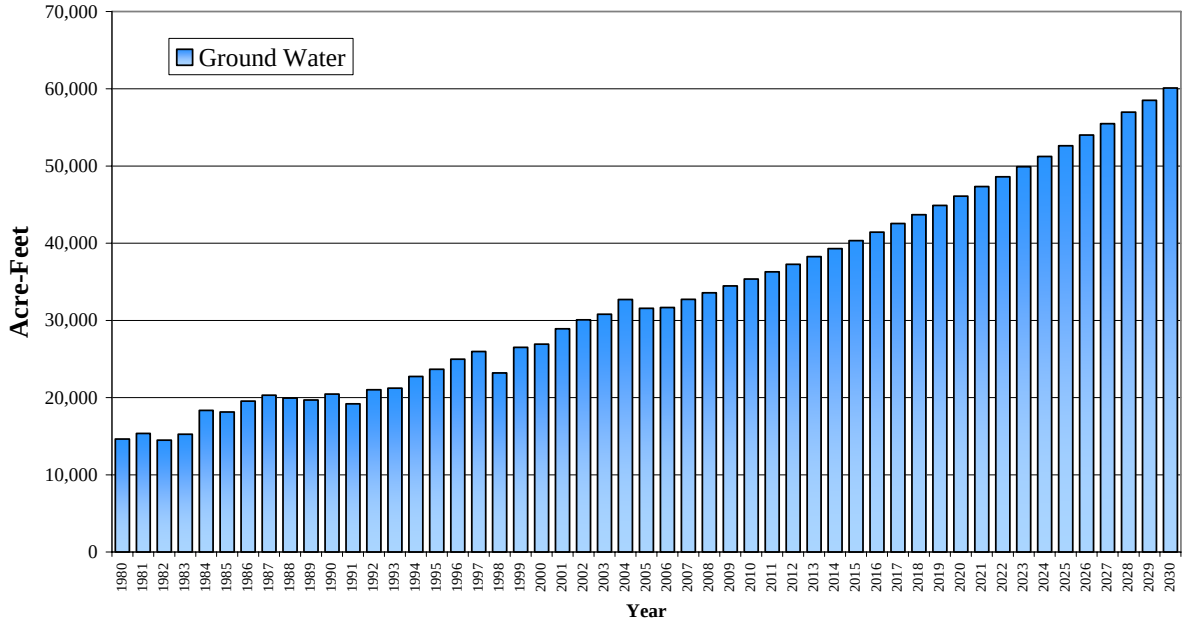


Figure 5.6-2: Historical & Average Projected Distribution by Source



6 Supply and Demand Comparison

6.1 Normal-Year Comparison

Tables 6.1-1, 6.1-2, and 6.1-3 compare the current and projected water supply and demand based on average consumption (Scenario 2). The projected increase in demand is 190% at year 2030 when compared to 2005.

Since the only source of the water supply is groundwater, any deficiency can be made up by pumping from under-utilized wells. Only the active wells were considered when calculating potential supply projections. The design capacity of the four planned new wells to be installed before 2010 was also included in the total supply projections. The water supply projections are held constant through 2030. Cal Water assumes that the increased capacity from the addition of new wells will mostly be offset by the retiring of aging wells in the system. However, the newer wells will generally have a greater production capacity, which will create an overall increase in water supply over time. These assumptions were also applied to the analysis for the single dry year and the multiple dry year scenarios.

The tables show that Cal Water is able to meet the long term demand for the District with a normal water supply. A normal water supply assumes that groundwater supplies remain at current levels.

Table 6.1-1: Projected Normal Water Supply - AF Year (Table 40)

	2010	2015	2020	2025	2030
Cal Water Groundwater Wells	105,668	105,668	105,668	105,668	105,668
% of Normal Year	113.9%	113.9%	113.9%	113.9%	113.9%

Table 6.1-2: Projected Normal Water Demand - AF Year (Table 41)

	2010	2015	2020	2025	2030
Demand	35,366	40,341	46,099	52,609	60,093
% of year 2005	112%	128%	146%	167%	190%

Table 6.1-3: Projected Supply and Demand Comparison - AF Year (Table 42)

	2010	2015	2020	2025	2030
Supply totals	105,668	105,668	105,668	105,668	105,668
Demand totals	35,366	40,341	46,099	52,609	60,093
Difference	70,302	65,327	59,569	53,059	45,575
Difference as % of Supply	67%	62%	56%	50%	43%
Difference as % of Demand	199%	162%	129%	101%	76%

6.2 Single Dry-Year Comparison

In general, and from operational records, the District's demand has shown to increase during a single-dry years as compared to normal years. The water demand increases due to maintenance of landscape and other high water uses that would normally be supplied by precipitation. Tables 6.2-1, 6.2-2, and 6.2-3 compare the current and projected water supply and demand based on the high consumption rate (Scenario 3). The tables show that Cal Water is able to meet the long term demand for the District in single dry years.

Table 6.2-1: Projected Single Dry-year Water Supply - AF Year (Table 43)

	2010	2015	2020	2025	2030
Cal Water Groundwater Wells	105,668	105,668	105,668	105,668	105,668
% of Normal Year	100.0%	100.0%	100.0%	100.0%	100.0%

Table 6.2-2: Projected Single Dry-year Water Demand - AF Year (Table 44)

	2010	2015	2020	2025	2030
Demand	42,758	48,727	55,640	63,425	72,369
% of projected normal	120.9%	120.8%	120.7%	120.6%	120.4%

Table 6.2-3: Projected Single Dry-year Supply and Demand Comparison - AF Year (Table 45)

	2010	2015	2020	2025	2030
Supply totals	105,668	105,668	105,668	105,668	105,668
Demand totals	42,758	48,727	55,640	63,425	72,369
Difference	62,910	56,941	50,028	42,243	33,299
Difference as % of Supply	59.5%	53.9%	47.3%	40.0%	31.5%
Difference as % of Demand	147.1%	116.9%	89.9%	66.6%	46.0%

6.3 Multiple Dry-Year Comparison

Tables 6.3-1, 6.3-2, and 6.3-3 compare the projected water supply and demand occurring between 2006 and 2010 during an extended drought lasting the full length of this period. During the first year, the projected average demand (Scenario 2) was used, followed by high demand year (Scenario 3) for the second year. After this time optional or mandatory water use restrictions are expected to be implemented for the third year which will assume to reduce the demand to average conditions (Scenario 2) again. Thereafter, for years 4-5, the low water demand (Scenario 1) was used as stricter water restrictions are expected.

As with the previous single dry year section, the well capacity appears to be sufficient; however, for a long-term period, capacity may become strained due to lowering water levels.

Table 6.3-1: Projected Supply During Multiple Dry Year To 2010 (Table 46)
AFY

	2006	2007	2008	2009	2010
Cal Water Groundwater Wells	92,764	95,990	99,216	102,442	105,668
% of Normal Year	100.0%	100.0%	100.0%	100.0%	100.0%

Table 6.3-2: Projected Demand Multiple Dry Year To 2010 (Table 47)
AFY

	2006	2007	2008	2009	2010
Demand	31,889	39,595	33,579	28,774	29,542
% of projected normal	100.0%	121.0%	100.0%	83.5%	83.5%

Table 6.3-3: Projected Supply And Demand Comparison To 2010 (Table 48)
During Multiple Dry Year Period - AFY

	2006	2007	2008	2009	2010
Supply totals	92,764	95,990	99,216	102,442	105,668
Demand totals	31,889	39,595	33,579	28,774	29,542
Difference	60,875	56,395	65,636	73,668	76,126
Difference as % of Supply	65.6%	58.8%	66.2%	71.9%	72.0%
Difference as % of Demand	190.9%	142.4%	195.5%	256.0%	257.7%

Tables 6.3-4, 6.3-5, and 6.3-6 compare the projected water supply and demand occurring between 2011 and 2015 during an extended drought lasting the full length of this period. The same demand cycle as described for the previous period is used to compare to the projected supply. As shown in the following tables, supply exceeds demand under such conditions.

Table 6.3-4: Projected Supply During Multiple Dry Year To 2015 (Table 49)
AFY

	2011	2012	2013	2014	2015
Cal Water Groundwater Wells	105,668	105,668	105,668	105,668	105,668
% of Normal Year	100.0%	100.0%	100.0%	100.0%	100.0%

Table 6.3-5: Projected Demand Multiple Dry Year To 2015 (Table 50)
AFY

	2011	2012	2013	2014	2015
Demand	36,297	45,020	38,255	32,858	33,752
% of projected normal	100.0%	120.8%	100.0%	83.6%	83.7%

Table 6.3-6: Projected Supply And Demand Comparison To 2015 (Table 51)
During Multiple Dry Year Period - AFY

	2011	2012	2013	2014	2015
Supply totals	105,668	105,668	105,668	105,668	105,668
Demand totals	36,297	45,020	38,255	32,858	33,752
Difference	69,370	60,648	67,413	72,810	71,916
Difference as % of Supply	65.6%	57.4%	63.8%	68.9%	68.1%
Difference as % of Demand	191.1%	134.7%	176.2%	221.6%	213.1%

Tables 6.3-7, 6.3-8, and 6.3-9 compare the projected water supply and demand occurring between 2011 and 2015 during an extended drought lasting the full length of this period. The same demand cycle as described for the previous period is used to compare to the projected supply. As shown in the following tables, supply exceeds demand under such conditions.

Table 6.3-7: Projected Supply During Multiple Dry Year To 2020 (Table 52)
AFY

	2016	2017	2018	2019	2020
Cal Water Groundwater Wells	105,668	105,668	105,668	105,668	105,668
% of Normal Year	100.0%	100.0%	100.0%	100.0%	100.0%

Table 6.3-8: Projected Demand Multiple Dry Year To 2020 (Table 53)
AFY

	2016	2017	2018	2019	2020
Demand	41,429	51,377	43,699	37,592	38,621
% of projected normal	100.0%	120.8%	100.0%	83.8%	83.8%

Table 6.3-9: Projected Supply And Demand Comparison To 2020 (Table 54)
During Multiple Dry Year Period - AFY

	2016	2017	2018	2019	2020
Supply totals	105,668	105,668	105,668	105,668	105,668
Demand totals	41,429	51,377	43,699	37,592	38,621
Difference	64,239	54,291	61,969	68,076	67,047
Difference as % of Supply	60.8%	51.4%	58.6%	64.4%	63.5%
Difference as % of Demand	155.1%	105.7%	141.8%	181.1%	173.6%

Tables 6.3-10, 6.3-11, and 6.3-12 compare the projected water supply and demand occurring between 2021 and 2025 during an extended drought lasting the full length of this period. The same demand cycle as described for the previous period is used to compare to the projected supply. As shown in the following tables, supply exceeds demand under such conditions.

Table 6.3-10: Projected Supply During Multiple Dry Year To 2025 (Table 55)
AFY

	2021	2022	2023	2024	2025
Cal Water Groundwater Wells	105,668	105,668	105,668	105,668	105,668
% of Normal Year	100.0%	100.0%	100.0%	100.0%	100.0%

Table 6.3-11: Projected Demand Multiple Dry Year To 2025 (Table 56)
AFY

	2021	2022	2023	2024	2025
Demand	47,330	57,115	49,896	42,984	44,154
% of projected normal	100.0%	117.5%	100.0%	83.9%	83.9%

Table 6.3-12: Projected Supply And Demand Comparison To 2025 (Table 57)
During Multiple Dry Year Period - AFY

	2021	2022	2023	2024	2025
Supply totals	105,668	105,668	105,668	105,668	105,668
Demand totals	47,330	57,115	49,896	42,984	44,154
Difference	58,338	48,553	55,772	62,684	61,514
Difference as % of Supply	55.2%	45.9%	52.8%	59.3%	58.2%
Difference as % of Demand	123.3%	85.0%	111.8%	145.8%	139.3%

Tables 6.3-7, 6.3-8, and 6.3-9 compare the projected water supply and demand occurring between 2026 and 2030 during an extended drought lasting the full length of this period. The same demand cycle as described for the previous period is used to compare to the projected supply. As shown in the following tables, supply exceeds demand under such conditions.

Table 6.3-13: Projected Supply During Multiple Dry Year To 2030 (Table 55)
AFY

	2026	2027	2028	2029	2030
Cal Water Groundwater Wells	105,668	105,668	105,668	105,668	105,668
% of Normal Year	100.0%	100.0%	100.0%	100.0%	100.0%

Table 6.3-14: Projected Demand Multiple Dry Year To 2030 (Table 56)
AFY

	2026	2027	2028	2029	2030
Demand	47,330	58,627	49,896	42,984	44,154
% of projected normal	100.0%	120.6%	100.0%	83.9%	83.9%

Table 6.3-15: Projected Supply And Demand Comparison To 2030 (Table 57)
During Multiple Dry Year Period - AFY

	2026	2027	2028	2029	2030
Supply totals	105,668	105,668	105,668	105,668	105,668
Demand totals	47,330	58,627	49,896	42,984	44,154
Difference	58,338	47,040	55,772	62,684	61,514
Difference as % of Supply	55.2%	44.5%	52.8%	59.3%	58.2%
Difference as % of Demand	123.3%	80.2%	111.8%	145.8%	139.3%

7 Water Demand Management

7.1 California Urban Water Conservation Council

California Water Service Company is a California Urban Water Conservation Council (CUWCC) member. The CUWCC was created to increase efficient water use statewide through partnerships among urban water agencies, public interest organizations, and private entities. The Council's goal is to integrate urban water conservation Best Management Practices (BMP) into the planning and management of California's water resources. Annual reports filed with the CUWCC are attached in Appendix G. The reports are considered complete according to the CUWCC website.

7.2 Water Conservation Best Management Practices

Implementation of these water conservation BMPs will help limit water demand from customers within the District's service area. This will result in a reduction of water supply requirements for Cal Water's Visalia District, while also reducing the impact of water use statewide. This chapter presents an analysis of urban water conservation BMPs and a description of the methods used to conduct the analysis.

The unpredictable water supply and ever increasing demand on California's complex water resources have resulted in a coordinated effort by the Department of Water Resources (DWR), water utilities, environmental organizations, and other interested groups to develop a list of urban BMPs for conserving water. This consensus-building effort resulted in a Memorandum of Understanding Regarding Urban Water Conservation in California (MOU), as amended March 9, 2005, among parties, which formalizes an agreement to implement these BMPs and makes a cooperative effort to reduce the consumption of California's water resources. The MOU is administered by the CUWCC and is its primary tool for encouraging efficient water use throughout the State.

As a signatory of the MOU, Cal Water has agreed to implement the BMPs as defined in Exhibit 1 of the MOU that are cost beneficial, and complete such implementation in accordance with the schedule assigned to each BMP. The MOU requires that a water utility implement only the BMPs that are economically beneficial. If a BMP is not economically feasible, the water utility may request an economic exemption for that BMP. The BMPs as defined in the MOU are generally recognized as standard definitions of water conservation measures. Table 7.2-1 presents the BMPs as defined by the MOU.

Table 7.2-1: Water Conservation Best Management Practices	
No.	**BMP Name**
1	Water survey programs for single-family residential and multi-family residential connections
2	Residential plumbing retrofit
3	System water audits, leak detection and repair
4	Metering with commodity rates for all new connections and retrofit of existing connections
5	Large landscape conservation programs and incentives
6	High-efficiency washing machine rebate programs
7	Public information programs
8	School education programs
9	Conservation programs for commercial, industrial, and institutional accounts
10	Wholesale agency assistance programs
11	Conservation pricing
12	Conservation coordinator
13	Water waste prohibition
14	Residential ULFT replacement programs

In addition to Cal Water BMPs, the City of Visalia has its own water conservation education program and a new department has been added to assist in conservation efforts. With this in mind the City of Visalia's Natural Resources Conservation Department has added personnel to further educate the community and expand its outreach and education programs. Some of the arenas for education development are school and organizational meetings; City sponsored events; public service announcements and through several forms of advertising; and assisting with conservation programs for the commercial and industrial base.

The City of Visalia has also been proactive in establishing all City buildings erected or renewed from 1999 on with energy and water efficient systems. City planner's work with commercial building developers on new and regentrification construction to install energy and water saving devices such as lavatories and toilets in their plans. Natural Resource personnel are educating the residential developers in the practices of xeriscape methods; low water usage plants and grasses for both common areas and residential housing."

The City of Visalia has also modified ordinances to assist in reducing water wasters thru education, and the adoption of penalties and fines as part of an Administrative Citation process.

These City programs are conducted both, in cooperation with, and in addition to Cal Water's existing and future programs.

7.3 Economic Analysis Methodology

An economic analysis was conducted for seven of the 14 BMPs that are described in the MOU (i.e. BMP nos. 1, 2, 4, 5b, 6, 9, and 14). Economic analyses were not done for BMPs 3, 7, 8, 10, 11, 12, and 13 because they are essentially non-quantifiable, but often critical to the success of those BMPs that are quantifiable. Analysis was also not performed for BMP 5a because Cal Water does not currently distinguish between services with dedicated irrigation meters and those with mixed use meters.

The cost-effectiveness economic analyses were performed using spreadsheet models developed by the CUWCC. In some cases, the models were modified to more closely represent the types of programs that Cal Water would actually be implementing. Each BMP model projects the dollar values of the benefits and costs that would result from implementing a particular BMP. The benefit and cost figures are based on the number of interventions to be completed in accordance with CUWCC coverage requirements, in what is typically a three year implementation schedule. This three year time frame was chosen to coincide both with Cal Water's Urban Water Management Plan submittal schedule for the Visalia District, and its PUC rate case filings.

For BMP 5b, large landscape surveys, Cal Water considered a three year implementation schedule unrealistic and planned a longer five year implementation schedule instead. To be consistent with the other BMP's, the economic analysis of only the first three years are included in the tables below. However, the cumulative water savings data represents full implementation. BMP 4, metering with commodity rates, has already begun in the Visalia District. The Flat Rate Meter Conversion Program is a capitally funded project that is operating independently of this analysis and will be implemented over a 10 year period. But, for the purposes of this plan, the metering conversion program has been evaluated according to the same three year implementation schedule used for the remainder of the BMPs, using actual capital budget amounts as inputs to the model, and the planned conversion schedule over this time frame, as seen in Table 7.3-1.

Table 7.3-1: CIP Meter Conversion Summary

Year	Conversions	CIP Budget
2007	1,300	$1,468,075
2008	1,300	$1,296,805
2009	1,170	$1,241,887
Total	3,770	$4,006,766

Because the models do not account for multiple year implementation schedules, each BMP model was run individually for each year from 2007 to 2009, with values adjusted for inflation as appropriate. BMPs with positive benefit to cost ratios are considered economically feasible and should be implemented as described in the MOU. The results of the economic analysis are discussed in the following section.

Important terms and formulas that are common to all the worksheets in the model are defined in Table 7.3-2.

Table 7.3-2: Definition of Terms Used in the Economic Analysis		
Term	**Definition**	**Comments**
Present Value Benefits:	The total dollar value saved due to conservation resulting from BMP implementation.	Includes both water agency and societal benefits.
Present Value Costs:	The total implementation costs per BMP program.	Includes both water agency and societal costs.
Net Present Value:	Total benefits minus total costs without discounting for time.	A value greater than zero indicates an economically justifiable BMP.
Benefit-Cost Ratio:	The sum of the total benefits divided by the sum of the total costs.	A value greater than one indicates an economically justifiable BMP.
Simple Unit Supply Cost:	The cost per unit (AF) for conserved water.	A value less than CWSC's current marginal cost indicates a less expensive source of supply for conserved water.

7.4 Economic Analysis Results

Table 7.4-1 summarizes the results of the economic analysis.

Table 7.4-1: Benefit-Cost Analysis Summary						
BMP 1: Residential Surveys						
	2007		**2008**		**2009**	
Perspective	**Agency**	**Society**	**Agency**	**Society**	**Agency**	**Society**
Program Costs	$362,745	$362,745	$374,641	$374,641	$383,515	$383,515
Total Benefits	$135,623	$479,661	$139,691	$494,601	$142,161	$504,729
Net Present Value	($227,122)	$116,916	($234,950)	$119,960	($241,354)	$121,214
Benefit-Cost Ratio	0.37	1.32	0.37	1.32	0.37	1.32
Unit Supply Cost ($/AF)	$1,002	$1,002	$1,035	$1,035	$1,059	$1,059
BMP 2: Residential Plumbing Retrofits						
	2007		**2008**		**2009**	
Perspective	**Agency**	**Society**	**Agency**	**Society**	**Agency**	**Society**
Program Costs	$97,499	$97,499	$100,713	$100,713	$102,776	$102,776
Total Benefits	$31,040	$101,224	$31,977	$104,373	$32,546	$106,463
Net Present Value	($66,459)	$3,725	($68,736)	$3,660	($70,230)	$3,687
Benefit-Cost Ratio	0.32	1.04	0.32	1.04	0.32	1.04
Unit Supply Cost ($/AF)	$1,260	$1,260	$1,301	$1,301	$1,328	$1,328
BMP 4: Metering with Commodity Rates						
	2007		**2008**		**2009**	
Perspective	**Agency**	**Society**	**Agency**	**Society**	**Agency**	**Society**
Program Costs	$720,203	$720,203	$720,203	$720,203	$720,203	$720,203
Total Benefits	$931,048	$10,100,657	$931,048	$10,100,657	$931,048	$10,100,657
Net Present Value	$210,845	$9,380,454	$210,845	$9,380,454	$210,845	$9,380,454
Benefit-Cost Ratio	1.29	14.02	1.29	14.02	1.29	14.02
Unit Supply Cost ($/AF)	$215	$215	$215	$215	$215	$215
BMP 5b: Large Landscape Surveys						
	2007		**2008**		**2009**	
Perspective	**Agency**	**Society**	**Agency**	**Society**	**Agency**	**Society**
Program Costs	$119,809	$501,889	$126,851	$521,531	$130,856	$533,576
Total Benefits	$228,400	$266,309	$235,251	$274,298	$239,411	$279,148
Net Present Value	$108,591	($235,580)	$108,400	($247,233)	$108,555	($254,428)
Benefit-Cost Ratio	1.91	0.53	1.85	0.53	1.83	0.52
Unit Supply Cost ($/AF)	$197	$823	$208	$855	$215	$875

Table 7.4-1: Benefit-Cost Analysis Summary (Continued)						
BMP 6: High Efficiency Washing Machine Rebates						
	2007		**2008**		**2009**	
Perspective	**Agency**	**Society**	**Agency**	**Society**	**Agency**	**Society**
Program Costs	$14,993	$75,493	$15,131	$75,631	$15,212	$75,712
Total Benefits	$7,767	$77,425	$8,000	$79,839	$8,141	$81,596
Net Present Value	($7,226)	$1,932	($7,131)	$4,208	($7,071)	$5,884
Benefit-Cost Ratio	0.52	1.03	0.53	1.06	0.54	1.08
Unit Supply Cost ($/AF)	$646	$3,254	$652	$3,260	$656	$3,263
BMP 9: CII Surveys						
	2007		**2008**		**2009**	
Perspective	**Agency**	**Society**	**Agency**	**Society**	**Agency**	**Society**
Program Costs	$169,471	$316,436	$174,029	$320,994	$176,949	$323,914
Total Benefits	$268,778	$553,597	$276,841	$570,832	$281,233	$580,935
Net Present Value	$99,307	$237,161	$102,812	$249,838	$104,284	$257,021
Benefit-Cost Ratio	1.59	1.75	1.59	1.78	1.59	1.79
Unit Supply Cost ($/AF)	$228	$425	$234	$431	$238	$435
BMP 14: ULFT Replacement Program						
	2007		**2008**		**2009**	
Perspective	**Agency**	**Society**	**Agency**	**Society**	**Agency**	**Society**
Program Costs	$333,644	$512,061	$344,801	$529,075	$351,857	$539,898
Total Benefits	$360,686	$674,472	$371,506	$695,585	$378,075	$708,762
Net Present Value	$27,042	$162,411	$26,705	$166,510	$26,218	$168,864
Benefit-Cost Ratio	1.08	1.32	1.08	1.31	1.07	1.31
Unit Supply Cost ($/AF)	$282	$432	$291	$446	$297	$456

According to the analysis, BMPs 4, 9, and 14 have a positive Net Present Value from both the water agency and society perspectives and thus exhibit a benefit/cost ratio over 1.0, as shown in Table 7.4-1. The economic analysis for the Visalia District was completed without incorporating potential cost sharing opportunities into the model. To date, Cal Water has not been successful in developing relationships with other local water agencies for this purpose.

Cal Water proposes adding the implementation of BMPs 9 and 14 to the existing programs beginning in 2007. The implementation of BMPs 4, 9, and 14 will result in a total water savings of 32,316 AF over a 30-year period and will cost a total of $5,557,517. Actual budgeted amounts for BMP 4 are included in this total. The potential annual water savings for all BMPs is shown graphically on Figure 7.4-1 and the proposed annual water savings is shown on Figure 7.4-2. The total water savings resulting from this level of coverage is also summarized in Tables 7.4-2 and 7.4-3.

Figure 7.4-1: Potential Water Savings

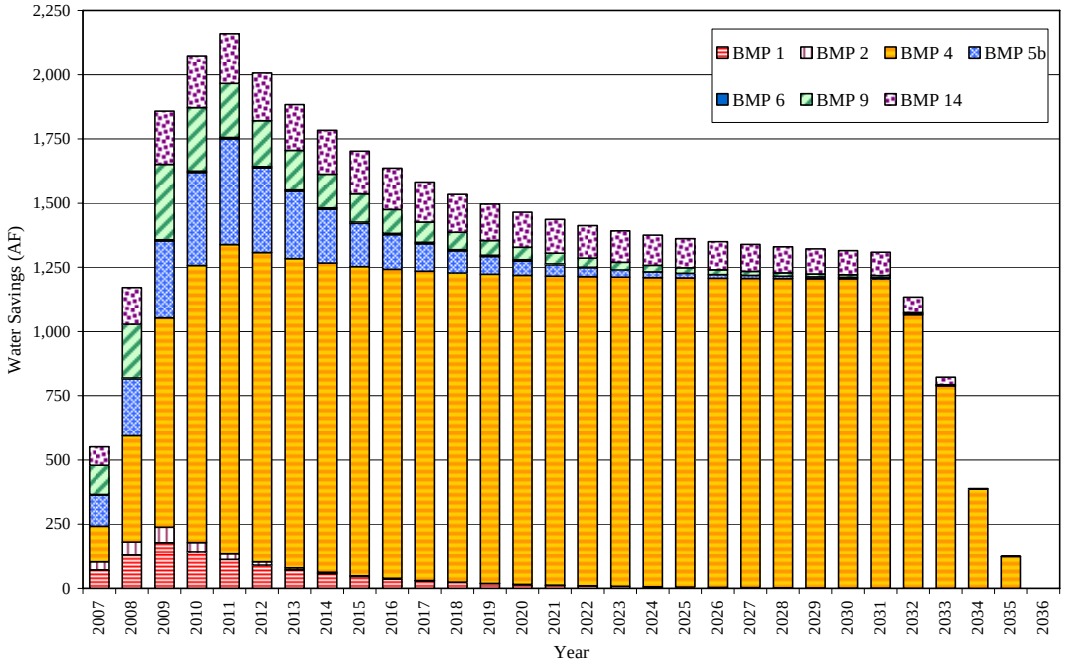


Figure 7.4-2: Proposed Water Savings

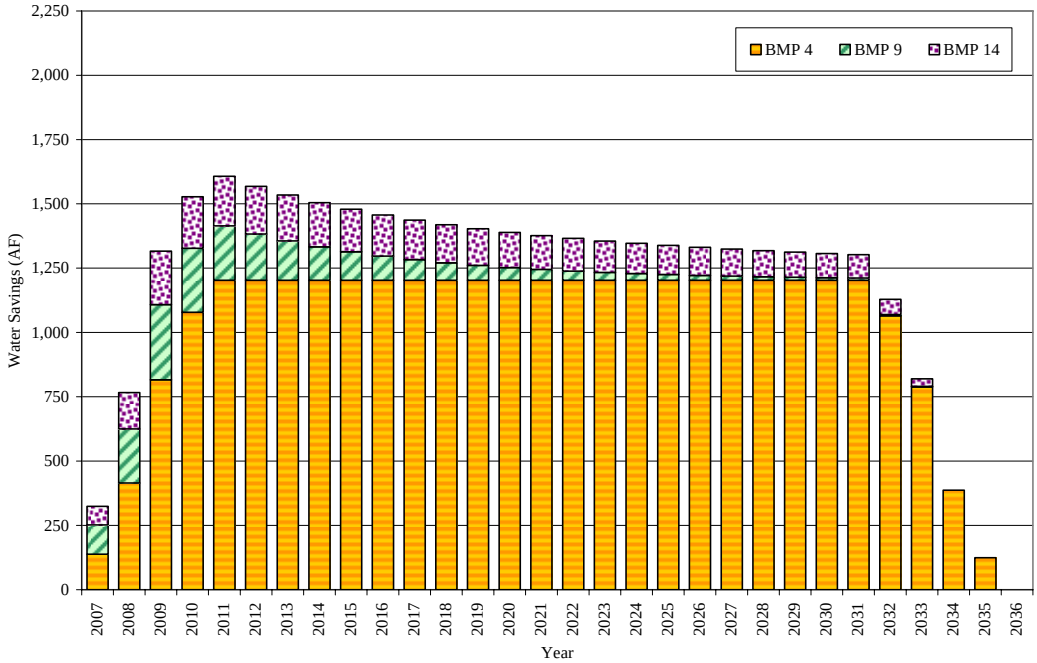


Table 7.4-2: Water Savings and Implementation Costs				
BMP	**Total Interventions**	**Potential Water Savings (AF)**	**Proposed Water Savings (AF)**	**Total Implementation Costs**
BMP 1	5,100	1,086	0	$0
BMP 2	12,060	232	0	$0
BMP 4	3,770	30,082	30,082	$4,006,766
BMP 5b	600	3,048	0	$0
BMP 6	363	70	0	$0
BMP 9	399	2,234	2,234	$520,449
BMP 14	8,184	3,555	3,555	$1,030,302
Total:	30,476	40,308	35,872	$5,557,517

Figures 7.4-1 and 7.4-2 and Table 7.4-2 do not include the water savings and costs associated with BMPs 3, 7, 8, 10, 11, 12, and 13 since no specific level of effort is defined in the MOU for these BMPs. BMP 13 is covered by CPUC General Order 103, and has no cost unless triggered by a water shortage condition.

Table 7.4-3: Annual Water Savings

Year	BMP 1				BMP 2				BMP 4				BMP 5b					
	Incremental Savings (AF)			Annual Savings (AF)	Incremental Savings (AF)			Annual Savings (AF)	Incremental Savings (AF)			Annual Savings (AF)	Incremental Savings (AF)					Annual Savings (AF)
	2007	2008	2009		2007	2008	2009		2007	2008	2009		2007	2008	2009	2010	2011	
2007	72.7			72.7	31.0			31.0	138.3			138.3	122.4					122.4
2008	58.1	72.7		130.8	18.6	31.0		49.5	276.6	138.3		414.9	97.9	122.4				220.3
2009	46.5	58.1	72.7	177.3	11.1	18.6	31.0	60.7	401.1	276.6	138.3	816.0	78.3	97.9	122.4			298.7
2010	37.2	46.5	58.1	141.9	6.7	11.1	18.6	36.4	401.1	401.1	276.6	1,078.8	62.7	78.3	97.9	122.4		361.3
2011	29.8	37.2	46.5	113.5	4.0	6.7	11.1	21.8	401.1	401.1	401.1	1,203.3	50.1	62.7	78.3	97.9	122.4	411.5
2012	23.8	29.8	37.2	90.8	2.4	4.0	6.7	13.1	401.1	401.1	401.1	1,203.3	40.1	50.1	62.7	78.3	97.9	329.2
2013	19.1	23.8	29.8	72.6	1.4	2.4	4.0	7.9	401.1	401.1	401.1	1,203.3	32.1	40.1	50.1	62.7	78.3	263.3
2014	15.2	19.1	23.8	58.1	0.9	1.4	2.4	4.7	401.1	401.1	401.1	1,203.3	25.7	32.1	40.1	50.1	62.7	210.7
2015	12.2	15.2	19.1	46.5	0.5	0.9	1.4	2.8	401.1	401.1	401.1	1,203.3	20.5	25.7	32.1	40.1	50.1	168.5
2016	9.8	12.2	15.2	37.2	0.3	0.5	0.9	1.7	401.1	401.1	401.1	1,203.3	16.4	20.5	25.7	32.1	40.1	134.8
2017	7.8	9.8	12.2	29.8	0.2	0.3	0.5	1.0	401.1	401.1	401.1	1,203.3	13.1	16.4	20.5	25.7	32.1	107.9
2018	6.2	7.8	9.8	23.8	0.1	0.2	0.3	0.6	401.1	401.1	401.1	1,203.3	10.5	13.1	16.4	20.5	25.7	86.3
2019	5.0	6.2	7.8	19.0	0.1	0.1	0.2	0.4	401.1	401.1	401.1	1,203.3	8.4	10.5	13.1	16.4	20.5	69.0
2020	4.0	5.0	6.2	15.2	0.0	0.1	0.1	0.2	401.1	401.1	401.1	1,203.3	6.7	8.4	10.5	13.1	16.4	55.2
2021	3.2	4.0	5.0	12.2	0.0	0.0	0.1	0.1	401.1	401.1	401.1	1,203.3	5.4	6.7	8.4	10.5	13.1	44.2
2022	2.6	3.2	4.0	9.7	0.0	0.0	0.0	0.1	401.1	401.1	401.1	1,203.3	4.3	5.4	6.7	8.4	10.5	35.3
2023	2.0	2.6	3.2	7.8	0.0	0.0	0.0	0.0	401.1	401.1	401.1	1,203.3	3.4	4.3	5.4	6.7	8.4	28.3
2024	1.6	2.0	2.6	6.2	0.0	0.0	0.0	0.0	401.1	401.1	401.1	1,203.3	2.8	3.4	4.3	5.4	6.7	22.6
2025	1.3	1.6	2.0	5.0	0.0	0.0	0.0	0.0	401.1	401.1	401.1	1,203.3	2.2	2.8	3.4	4.3	5.4	18.1
2026	1.0	1.3	1.6	4.0	0.0	0.0	0.0	0.0	401.1	401.1	401.1	1,203.3	1.8	2.2	2.8	3.4	4.3	14.5
2027	0.8	1.0	1.3	3.2	0.0	0.0	0.0	0.0	401.1	401.1	401.1	1,203.3	1.4	1.8	2.2	2.8	3.4	11.6
2028	0.7	0.8	1.0	2.6	0.0	0.0	0.0	0.0	401.1	401.1	401.1	1,203.3	1.1	1.4	1.8	2.2	2.8	9.3
2029	0.5	0.7	0.8	2.0	0.0	0.0	0.0	0.0	401.1	401.1	401.1	1,203.3	0.9	1.1	1.4	1.8	2.2	7.4
2030	0.4	0.5	0.7	1.6	0.0	0.0	0.0	0.0	401.1	401.1	401.1	1,203.3	0.7	0.9	1.1	1.4	1.8	5.9
2031	0.3	0.4	0.5	1.3	0.0	0.0	0.0	0.0	401.1	401.1	401.1	1,203.3	0.6	0.7	0.9	1.1	1.4	4.7
2032		0.3	0.4	0.8		0.0	0.0	0.0	262.8	401.1	401.1	1,065.0		0.6	0.7	0.9	1.1	3.3
2033			0.3	0.3			0.0	0.0	124.5	262.8	401.1	788.4			0.6	0.7	0.9	2.2
2034				0.0				0.0		124.5	262.8	387.3				0.6	0.7	1.3
2035				0.0				0.0			124.5	124.5					0.6	0.6
2036				0.0				0.0				0.0						0.0
Total:				1,086.1				232.1				30,082.4						3,048.4

Table 7.4-3 Continued: Annual Water Savings

Year	BMP 6				BMP 9				BMP 14				Potential Annual Savings (AF)	Proposed Annual Savings (AF)
	Incremental Savings (AF)			Annual Savings (AF)	Incremental Savings (AF)			Annual Savings (AF)	Incremental Savings (AF)			Annual Savings (AF)		
	2007	2008	2009		2007	2008	2009		2007	2008	2009			
2007	1.7			1.7	113.7			113.7	72.0			72.0	551.6	324.0
2008	1.7	1.7		3.3	96.6	113.7		210.3	69.3	72.0		141.3	1,170.5	766.5
2009	1.7	1.7	1.7	5.0	82.1	96.6	113.7	292.4	66.7	69.3	72.0	208.0	1,858.0	1,316.4
2010	1.7	1.7	1.7	5.0	69.8	82.1	96.6	248.5	64.2	66.7	69.3	200.2	2,072.1	1,527.5
2011	1.7	1.7	1.7	5.0	59.3	69.8	82.1	211.2	61.8	64.2	66.7	192.7	2,159.0	1,607.3
2012	1.7	1.7	1.7	5.0	50.4	59.3	69.8	179.6	59.5	61.8	64.2	185.5	2,006.4	1,568.4
2013	1.7	1.7	1.7	5.0	42.9	50.4	59.3	152.6	57.3	59.5	61.8	178.6	1,883.3	1,534.5
2014	1.7	1.7	1.7	5.0	36.4	42.9	50.4	129.7	55.2	57.3	59.5	172.0	1,783.5	1,505.0
2015	1.7	1.7	1.7	5.0	31.0	36.4	42.9	110.3	53.1	55.2	57.3	165.6	1,701.9	1,479.1
2016	1.7	1.7	1.7	5.0	26.3	31.0	36.4	93.7	51.1	53.1	55.2	159.4	1,635.1	1,456.4
2017	1.7	1.7	1.7	5.0	22.4	26.3	31.0	79.7	49.2	51.1	53.1	153.5	1,580.0	1,436.4
2018	1.7	1.7	1.7	5.0	19.0	22.4	26.3	67.7	47.4	49.2	51.1	147.8	1,534.5	1,418.8
2019	1.7	1.7	1.7	5.0	16.2	19.0	22.4	57.6	45.7	47.4	49.2	142.3	1,496.6	1,403.2
2020	1.7	1.7	1.7	5.0	13.7	16.2	19.0	48.9	44.0	45.7	47.4	137.0	1,464.9	1,389.2
2021		1.7	1.7	3.3	11.7	13.7	16.2	41.6	42.3	44.0	45.7	132.0	1,436.6	1,376.8
2022			1.7	1.7	9.9	11.7	13.7	35.3	40.8	42.3	44.0	127.1	1,412.5	1,365.7
2023				0.0	8.4	9.9	11.7	30.0	39.3	40.8	42.3	122.4	1,391.8	1,355.7
2024				0.0	7.2	8.4	9.9	25.5	37.8	39.3	40.8	117.9	1,375.6	1,346.7
2025				0.0	6.1	7.2	8.4	21.7	36.4	37.8	39.3	113.5	1,361.6	1,338.5
2026				0.0	5.2	6.1	7.2	18.5	35.1	36.4	37.8	109.3	1,349.5	1,331.1
2027				0.0	4.4	5.2	6.1	15.7	33.8	35.1	36.4	105.3	1,339.1	1,324.3
2028				0.0	3.7	4.4	5.2	13.3	32.5	33.8	35.1	101.4	1,329.9	1,318.0
2029				0.0	3.2	3.7	4.4	11.3	31.3	32.5	33.8	97.7	1,321.8	1,312.3
2030				0.0	2.7	3.2	3.7	9.6	30.2	31.3	32.5	94.1	1,314.6	1,307.0
2031				0.0	2.3	2.7	3.2	8.2	29.1	30.2	31.3	90.6	1,308.2	1,302.1
2032				0.0		2.3	2.7	5.0		29.1	30.2	59.3	1,133.4	1,129.3
2033				0.0			2.3	2.3			29.1	29.1	822.3	819.8
2034				0.0				0.0				0.0	388.6	387.3
2035				0.0				0.0				0.0	125.1	124.5
2036				0.0				0.0				0.0	0.0	0.0
Total:				69.6				2,234.0				3,555.4	40,308.0	32,316.4

7.5 Additional Issues

Non-economic factors including environmental, social, technological, health, and customer impacts, are not thought to be significant in deciding which BMPs to implement in the Visalia District. No water supply projects are currently planned that would supply water at a higher unit cost. Cal Water has the legal authority to implement the BMPs. However, the costs of implementing these BMPs are subject to CPUC approval.

7.6 Previous Water Demand Management Program Accomplishments

The Company believes that managing demand is an important element in the overall management of water supply and has made efforts to promote conservation through educational, informational, and customer assistance activities. Cal Water had been conducting conservation programs in the Visalia District for several years. However, as a result of the February 1994 CPUC Decision 94-02-1-043 ordering that conservation memorandum accounts be closed, conservation activities have been significantly curtailed in all Cal Water districts.

7.6.1 External Measures to Achieve Public Support

Environmental organizations are seeking expanded water conservation programs and accomplishments by regulated water companies, including more effective and equitable price signals for water consumers and additional cost-effective investments in water efficiency measures by the companies and their customers. Such improvements in water efficiency measures will serve generally to reduce diversions from California's rivers, protect and restore the State's aquatic ecosystems, and reduce energy consumption. Cost-effective efficiency measures will also help mitigate the rising costs of water, wastewater, and energy utility service for consumers and communities.

In 2006 Cal Water participated in a collaborative effort to seek support from the CPUC to increase conservation activities in all districts. Cal Water, California American Water Company, and Golden State Water Company, along with the Mono Lake Committee and the Natural Resources Defense Council provided Joint Recommendations for water conservation to the CPUC. These Recommendations, which are endorsed by eight additional environmental organizations, present a framework for increasing water use efficiency state-wide. Based on these recommendations, Cal Water is proposing an increase in conservation spending to at least 1.5 percent of revenues. A copy of the Joint Water Conservation Recommendations is included in Appendix F.

In addition, Cal Water participates in cooperative conservation activities with the local community. Table 7.6-1 indicates the status of current BMP programs in the Visalia service area.

Table 7.6-1: Conservation Measures		
Conservation Measure	Date Implemented	Program End Date
BMP 02 Plumbing Retrofit	1996	N/A at this time
BMP 04 Metering	2007	2017
BMP 06 Washing Machines	2000	N/A at this time
BMP 07 Public Information	1994	Ongoing
BMP 08 School Programs	1994	Ongoing
BMP 09 CII Surveys	Proposed	2009
BMP 14 Toilet Rebates	Proposed	2009

7.6.2 Internal Measures to Achieve Efficient Water Management

Cal Water currently implements internal measures that are intended to achieve efficient water management; these are discussed below:

Distribution System Water Audit and Leak Detection Program

Cal Water implemented an in-house water audit and leak detection program for its distribution systems. The program was administered by a company employee equipped with state-of-the-art leak detection equipment and trained in the methodology described in the American Water Works Association's *Manual of Water Supply Practices: Water Audits and Leak Detection*. It was expected that each district would be audited once every three years. After realizing initial success, this program was suspended as the rate of leak repair outpaced the rate of new leaks being found.

Water Efficient Landscape Guidelines

In 1992, water efficient landscape guidelines were developed (See Appendix F). These guidelines apply to all landscapes designed for Cal Water properties including renovations. For ease of adoption by districts with a multitude of climates and microclimates, the guidelines are generic. They do, however, adhere to water efficient landscape (Xeriscape) principles.

7.7 Overall District Goals

Cal Water recognizes the importance of conservation in managing its own water resources. While economic and regulatory constraints of integrating conservation into supply management have proven challenging, Cal Water is participating in efforts to develop demand management strategies, standards, and criteria by working with the California Urban Water Conservation Council. This Council was formed as part of the MOU primarily to oversee the implementation of the BMPs and to improve water

conservation practices and analyses. Cal Water is committed to this process and the development of an integrated resource plan.

Cal Water's conservation programs are intended to assist customers in their efforts to use water efficiently as well as to educate them about their water supply overall. This will lead them to make informed decisions concerning the efficient use of water and enable them to better respond to required reductions in water use should a water shortage or emergency occur. During periods of water shortages, the Company's conservation programs can be expanded and may include more restrictive measures such as mandatory reductions, rationing, and penalties.

7.8 Implementation

For the next three years Cal Water's conservation program is planning to coordinate the implementation of seven BMPs in Visalia. The current budget amounts are listed in Table 7.8-1 below. For those BMPs for which a cost effectiveness analysis was performed, BMPs 4, 9, and 14 were deemed cost effective. However, the BMPs listed below are already included in the approved conservation budget. The budget amounts listed below represent a lesser degree of implementation than was used in cost effective analysis. The budget amounts necessary to reach the full coverage requirements and schedule as specified in the MOU are listed in Table 7.8-2.

Table 7.8-1: Current Annual Conservation Program Budget 2007 – 2009

Program		2007	2008	2009	Total
BMP-2	Plumbing Retrofits	$5,552	$5,552	$5,552	$16,656
BMP-4	Metering with Commodity Rates	$1,468,075	$1,296,805	$1,241,887	$4,006,767
BMP-5	Large Landscape Surveys	$13,968	$13,968	$13,968	$41,904
BMP-7	Public Information Campaign	$10,000	$10,000	$10,000	$30,000
BMP-8	School Programs	$15,000	$15,000	$15,000	$45,000
BMP-9	Commercial, Industrial, and Institutional Audits	$14,025	$14,025	$14,025	$42,075
BMP-14	ULFT Replacement Programs	$136,938	$136,938	$136,938	$410,814
Total Per Year		$1,663,558	$1,492,288	1,437,370	$4,593,216

According to the MOU Cal Water is required to implement only those BMPs that are cost effective. The cost effectiveness analysis found BMPs 4, 9, and 14 to be economically feasible. BMP 4 is currently funded by Cal Water's Capital Improvement Program and actual budget amounts are shown in the table. BMPs 7 and 8 are ongoing and are essential to the success of the entire program but no cost effective analysis has been performed for them. Cal Water recognizes the importance of maintaining a comprehensive conservation strategy and has included the remaining BMPs to support this goal in its program. The budget amounts listed below represent the estimated

funding required to implement these BMPs according to the coverage level and schedule described in the MOU. Before implementing these BMPs Cal Water must receive approval from the CPUC.

Table 7.8-2: Proposed Annual Conservation Program Budget 2007 – 2009

Program		2007	2008	2009	Total
BMP-2	Plumbing Retrofits	$5,552	$5,552	$5,552	$16,656
BMP-4*	Metering with Commodity Rates	$1,468,075	$1,296,805	$1,241,887	$4,006,767
BMP-5	Large Landscape Surveys	$13,968	$13,968	$13,968	$41,904
BMP-7	Public Information Campaign	$10,000	$10,000	$10,000	$30,000
BMP-8	School Programs	$15,000	$15,000	$15,000	$45,000
BMP-9	Commercial, Industrial, and Institutional Audits	$169,471	$174,029	$176,949	$520,449
BMP-14	ULFT Replacement Programs	$333,644	$344,801	$351,857	$1,030,302
Total Per Year		$2,015,710	$1,860,155	$1,815,213	$5,691,078

*Currently funded by Cal Water Capital Improvement Program. Actual budget amounts were used.

References

[1] LandView 5 and MARPLOT ® software, US Census Bureau/Environmental Protection Agency, downloaded from: http://www.census.gov/geo/landview/lv5/lv5.html, http://www.epa.gov/ceppo/cameo/marplot.htm

[2] Western Regional Climate Center, Bakersfield WSO Airport Weather Station, http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?cabake+sca

[3] California Irrigation Management Information System (CIMIS), EvapoTranspiration (Eto) Zones Map - Zone 13, http://wwwcimis.water.ca.gov/cimis/welcome.jsp

[4] California's Ground Water Bulletin 118, 2003; Tulare Lake Hydrologic Region; San Joaquin Valley Subbasin; Groundwater Basin Number: 5-22.11