California Water Service

2015 Urban Water Management Plan

Bakersfield District

June 2016

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List of Acronyms

AB	Assembly Bill
AF	Acre-Foot
AMI	Advanced Metering Infrastructure
AMR	Automatic Meter Reading
BCR	Benefit-Cost Ratio
BMP	Best Management Practice
CEHTP	California Environmental Health Tracking Program
CASGEM	California Statewide Groundwater Elevation Monitoring Program
CII	Commercial, Industrial, Institutional, water use sectors
CIMIS	California Irrigation Management Information System
CPUC	California Public Utilities Commission
CUWCC	California Urban Water Conservation Council
CVP	Central Valley Project
CWC	California Water Code
DMMs	Demand Management Measures
DOF	Department of Finance
DWR	Department of Water Resources
eARDWP	Electronic Annual Reports to the Drinking Water Program (SWRCB)
ETo	Reference Evapotranspiration
GIS	Geographic Information System
GPCD	Gallons per Capita per Day
IOU	Investor-Owned Utility
IRWM	Integrated Regional Water Management
LAFCO	Local Agency Formation Commission
MGD	Million Gallons Per Day
MOU	Memorandum of Understanding Regarding Urban Water Conservation
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
PWS	Public Water System
RWQCB	Regional Water Quality Control Board
SB	Senate Bill
SB X7-7	Senate Bill Seven of the Senate's Seventh Extraordinary Session of 2009
SGMA	Sustainable Groundwater Management Act
SWP	State Water Project
SWRCB	State Water Resources Control Board
RUWMP	Regional Urban Water Management Plan
USBR	United States Bureau of Reclamation
UWMP	Urban Water Management Plan
WARN	Water/Wastewater Agency Response Network
WDR	Waste Discharge Requirement
WRR	Water Recycling Requirement
WSCP	Water Shortage Contingency Plan

Chapter 1
Introduction and Overview

This chapter discusses the importance and uses of this Urban Water Management Plan (UWMP), the relationship of this plan to the California Water Code (CWC), the relationship of this plan to other local and regional planning efforts, and how this plan is organized.

This chapter contains the following sections:

1.1 Background and Purpose

California Water Service Company (Cal Water) is an investor-owned public utility supplying water service to 1.7 million Californians through 435,000 connections. Its 24 separate water systems serve 63 communities from Chico in the North to the Palos Verdes Peninsula in Southern California. California Water Service Group, Cal Water's parent company, is also serving water to communities in Washington, New Mexico and Hawaii. Rates and operations for districts located in California are regulated by the California Public Utilities Commission (CPUC). Rates are set separately for each of the systems.

Cal Water's Bakersfield District was formed in 1926 with the purchase of Bakersfield Water Works. Later, the unincorporated communities of Olcese, and North Garden were incorporated into the District. Cal Water also operates the City of Bakersfield water system through an operations and maintenance contract. The City of Bakersfield prepares a separate UWMP for their system.

The UWMP is a foundational document and source of information about Bakersfield District's historical and projected water demands, water supplies, supply reliability and vulnerabilities, water shortage contingency planning, and demand management programs. Among other things, it is used as:

- A long-range planning document by Cal Water for water supply and system planning
- Source data on population, housing, water demands, water supplies, and capital improvement projects used in

- Regional water resource management plans prepared by wholesale water suppliers and other regional planning authorities,
- General Plans prepared by cities and counties,
- Statewide and broad regional water resource plans prepared by the California Department of Water Resources (DWR), State Water Resources Control Board (State Board or Board), or other state agencies.

UWMPs are updated every five years. The last update was completed in 2010. This document is an update to the 2010 UWMP and carries forward information from that plan that remains current and is relevant to this plan. Although this plan is an update to the 2010 UWMP, it was developed to be a self-contained, stand-alone document and does not require readers to reference information contained in previous updates.

1.2 Urban Water Management Planning and the California Water Code

The UWMP Act requires urban water suppliers to prepare an UWMP every five years and to file this plan with the DWR, the California State Library, and any city or county within which the supplier provides water supplies. All urban water suppliers, 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 UWMP (CWC §10617).

The UWMP Act was enacted in 1983. Over the years it has been amended in response to water resource challenges and planning imperatives confronting California. A significant amendment was made in 2009 as a result of the governor's call for a statewide 20 percent reduction in urban water use by 2020. Colloquially known as 20x2020, the Water Conservation Act of 2009 (also referred to as SB X7-7) required urban retail water suppliers to establish water use targets for 2015 and 2020 that would result in statewide water savings of 20 percent by 2020. Beginning in 2016, urban retail water suppliers are required to comply with the water conservation requirements in SB X7-7 in order to be eligible for state water grants or loans. Chapter 5 of this plan contains the data and calculations used to determine compliance with these requirements.

The UWMP Act contains numerous other requirements that an UWMP must satisfy. Appendix A to this plan lists each of these requirements and where in the plan they are addressed.

1.3 Relation to Other Planning Efforts

This plan provides information specific to water management and planning by the Bakersfield District. However, water management does not happen in isolation; there are other planning processes that integrate with the UWMP to accomplish urban planning.

Some of these plans include city and county General Plans, Water Master Plans, Recycled Water Master Plans, integrated resource plans, Integrated Regional Water Management Plans, Groundwater Management Plans and others.

This plan is informed by and helps to inform these other planning efforts. In particular, this plan utilizes information contained in city and county General Plans and local and regional water resource plans to the extent data from these plans is applicable and available.

1.4 Plan Organization

The organization of this Plan follows the same sequence as outlined in 2015 UWMP Guidebook.

Chapter 1 - Introduction and Overview

Chapter 2- Plan Preparation

Chapter 3 - System Description

Chapter 4 - System Water Use

Chapter 5- Baselines and Targets

Chapter 6 - System Supplies

Chapter 7— Water Supply Reliability

Chapter 8 – Water Shortage Contingency Planning

Chapter 9 — Demand Management Measures

Chapter 10 — Plan Adoption, Submittal, and Implementation

In addition to these ten chapters, this plan includes a number of appendices providing supporting documentation and supplemental information. Pursuant to CWC §10644(a)(2), this plan utilizes the standardized forms, tables, and displays developed by DWR for the reporting of water use and supply information required by the UWMP Act. This plan also includes other tables, figures, and maps, to augment the set developed by DWR. The plan notes if a table, figure, or map is part of DWR's standardized set or supplemental to it.

Chapter 2
Plan Preparation

This chapter discusses the type of UWMP Bakersfield District is preparing and includes information that will apply throughout the plan. Coordination and outreach during the development of the plan is also discussed.

This chapter includes the following sections:

2.1 Basis for Preparing a Plan

2.2 Regional Planning and Reporting

2.3 Units of Measure

2.4 Coordination and Outreach

2.1 Basis for Preparing a Plan

Per CWC §10617, Bakersfield District is an urban water supplier providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually. It is therefore obligated under CWC §10621(d) to update and submit its 2015 UWMP to DWR by July 1, 2016.

Bakersfield District is an urban retail water supplier, as defined by CWC §10608.12. Bakersfield District does not provide water at wholesale.

Bakersfield District operates the Public Water Systems (PWS) listed in Table 2-1. Public Water Systems are the systems that provide drinking water for human consumption and these systems are regulated by the State Water Resources Control Board (Board), Division of Drinking Water. The Board requires that water agencies report water usage and other information via the electronic Annual Reports to the Drinking Water Program (eARDWP). The information provided in this UWMP is consistent with the data reported in the eARDWP. PWS data reported to the Board is used by the state to determine whether or not a retail supplier has reached the threshold (3,000 or more connections or 3,000 acre-feet of water supplied) for submitting an UWMP.

Table 2-1: Public Water Systems			
Public Water System Number	Public Water System Name	Number of Municipal Connections 2015	Volume of Water Supplied 2015 (AF)
1510003	Bakersfield	62,654	48,680
1510055	North Garden	6,962	6,353
	Total	**69,616**	**55,033**

2.2 Regional Planning

Regional planning can deliver mutually beneficial solutions to all agencies involved by reducing costs for the individual agency, assessing water resources at the appropriate geographic scale, and allowing for solutions that cross jurisdictional boundaries. Cal Water participates in regional water resources planning initiatives throughout California in the regions in which its 25 water districts are located. In the region in which the Bakersfield District is located, Cal Water participated in the development of the Kern Integrated Regional Water Management Plan adopted in 2011.

2.3 Individual or Regional Planning and Compliance

Urban water suppliers may elect to prepare individual or regional UWMPs (CWC §10620(d)(1)). Bakersfield District is preparing an individual UWMP.

Urban retail water suppliers may report on the requirements of SB X7-7 (2009 California Conservation Act) individually or as a member of a "Regional Alliance." As described in Chapter 5, Bakersfield District is a member of a Regional Alliance and this UWMP provides information on the District's progress towards meeting its SB X7-7 water conservation targets both as an individual urban retail water supplier and as a member of a Regional Alliance.

Table 2-2: Plan Identification	
☑	Individual UWMP
☐	Regional UWMP
Notes: Bakersfield District is a member of a Regional Alliance. Chapter 5 provides information on the District's progress towards meeting its water conservation targets under SB X7-7 both as an individual urban retail water supplier and as a member of its Regional Alliance.	

2.4 Fiscal or Calendar Year and Units of Measure

Annual volumes of water reported in this UWMP are measured in acre-feet (AF) and are reported on a calendar year basis. Water use and planning data reported in this UWMP for calendar year 2015 cover the full twelve months of the year, as required by the UWMP Guidelines. Table 2-3 summarizes the units of measure used throughout this UWMP.

Table 2-3: Agency Identification	
Name of Agency	California Water Service: Bakersfield District
Select one or both	
☐	Agency is a wholesaler
☑	Agency is a retailer
Fiscal or Calendar Year	
☑	UWMP Tables Are in Calendar Years
☐	UWMP Tables Are in Fiscal Years
Units of Measure	
☑	Acre Feet (AF)
☐	Million Gallons (MG)
☐	Hundred Cubic Feet (CCF)

2.5 Coordination and Outreach

Coordination with other water suppliers, cities, counties, and other community organizations in the region is an important part of preparing an UWMP (CWC §10620; CWC §10642). This section identifies the agencies and organizations Bakersfield District sought to coordinate with during preparation of this plan.

2.5.1 Wholesale and Retail Coordination

Urban retail water suppliers relying on one or more wholesalers for water supply are required to provide these wholesalers with information regarding projected water supply and demand. Bakersfield District provided information regarding projected water supply and demand to the wholesale water suppliers listed in Table 2-4.

Table 2-4: Retail: Water Supplier Information Exchange
Bakersfield District has informed the following wholesale supplier(s) of projected water use in accordance with CWC 10631.
Wholesale Water Supplier Name
Kern County Water Agency
Kern Delta Water District
City of Bakersfield

2.5.2 Coordination with Other Agencies and the Community

Bakersfield District coordinated with cities, counties, and other community organizations during preparation of this UWMP. Cal Water provided notice to these entities and the communities it serves 60 days prior to the public hearing it held on May 10, 2016, to present the draft of the UWMP, address questions, and receive comments. Cities and counties receiving the public hearing notification from Bakersfield District as required per CWC §10621 (b) are listed in Table 10-1 in Chapter 10 of this plan.

Chapter 3
System Description

This chapter provides a description of Bakersfield District's water system and the service area, including climate, population, and demographics, to help in understanding various elements of water supply and demand.

This chapter includes the following sections:

3.1 Service Area General Description

3.2 Service Area Map(s)

3.3 Service Area Climate

3.4 Service Area Population and Demographics

3.1 Service Area General Description

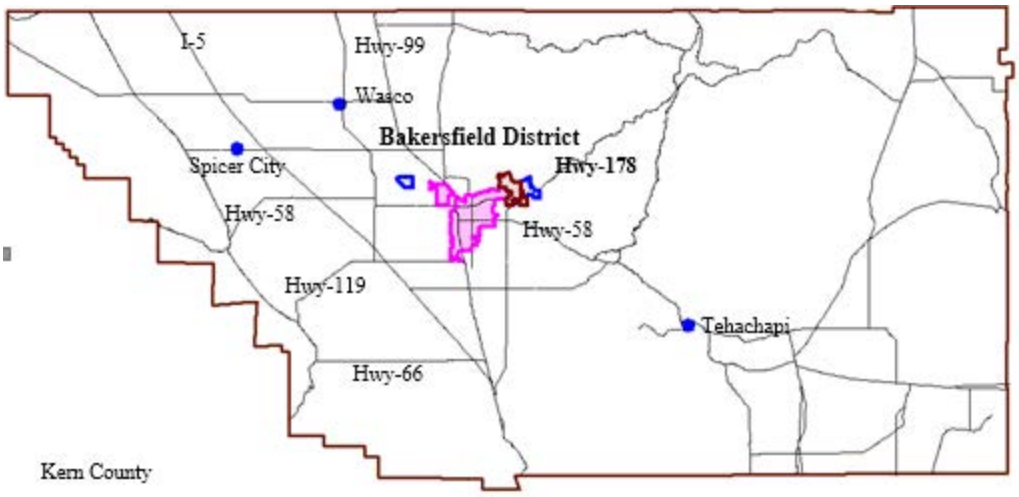
The Bakersfield District is located in Kern County, situated in the Tulare Lake hydrologic region, within the Kern Valley Floor Rivers sub-area. The service area is built upon the alluvium of the Kern River flood plain and covers approximately 51 square miles. The District is approximately 115 miles north of the City of Los Angeles and 290 miles south of the City of Sacramento. The Cities of Oildale and Shafter are to the north of Bakersfield. The towns of Rosedale and Green Acres are to the west, Pumpkin Center, Panama, and Greenfield are to the south, and Mayfield is to the east. Figure 3-1 shows a general location map of the District.

The system serves portions of the City of Bakersfield and segments of unincorporated Kern County lands adjacent to the City of Bakersfield. The water system to the west of the District is owned by the City of Bakersfield but operated under contract by Cal Water. The Oildale Mutual Water Company and North of the River Municipal Water District serve Oildale and unincorporated lands to the north of the District. East Niles Community Services District provides service to the region east of the District. In 1999 Cal Water acquired the Olcese Water District, which includes the community of Rio Bravo. Cal Water also started operating the Tejon-Castac Water District's water system in 2005.

Major transportation links in the District include the Golden State Highway (State Route 99), and Stockdale Highway (State Route 58). The Westside Freeway (Interstate 5) is approximately 15 miles to the west south west of the District at its closest point. The Southern Pacific Railroad and the Burlington Northern Santa Fe Railroad provide rail service to the region.

Water served by the District comes from local groundwater, surface water from the Kern River, and State Water Project water purchased from the Kern County Water Agency. The District delivers water to residential, commercial, industrial, and governmental customers. Residential customers comprised approximately 90 percent of service connections and 67 percent of water uses in the District in the last five years.

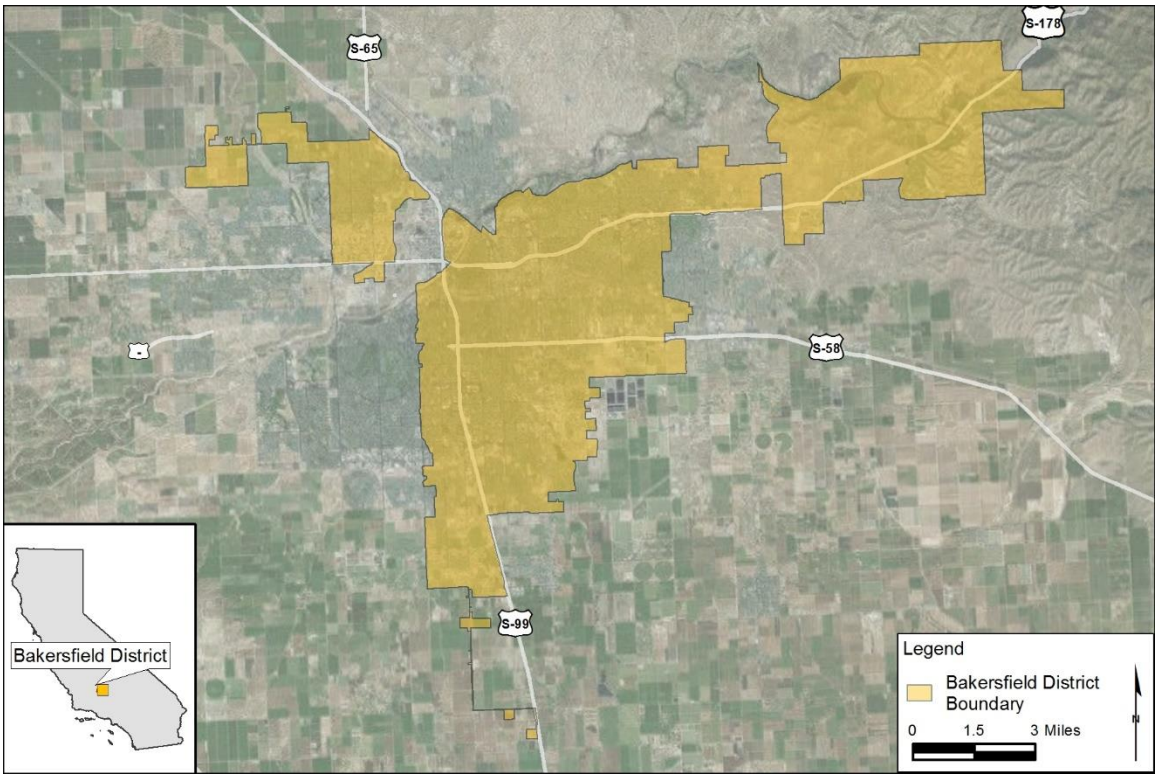
Figure 3-1. General Location of Bakersfield District



3.2 Service Area Maps

A detailed service area map is provided in Appendix E. Figure 3-2 shows current service area boundaries.

Figure 3-2. Bakersfield District Service Area Boundaries



3.3 Service Area Climate

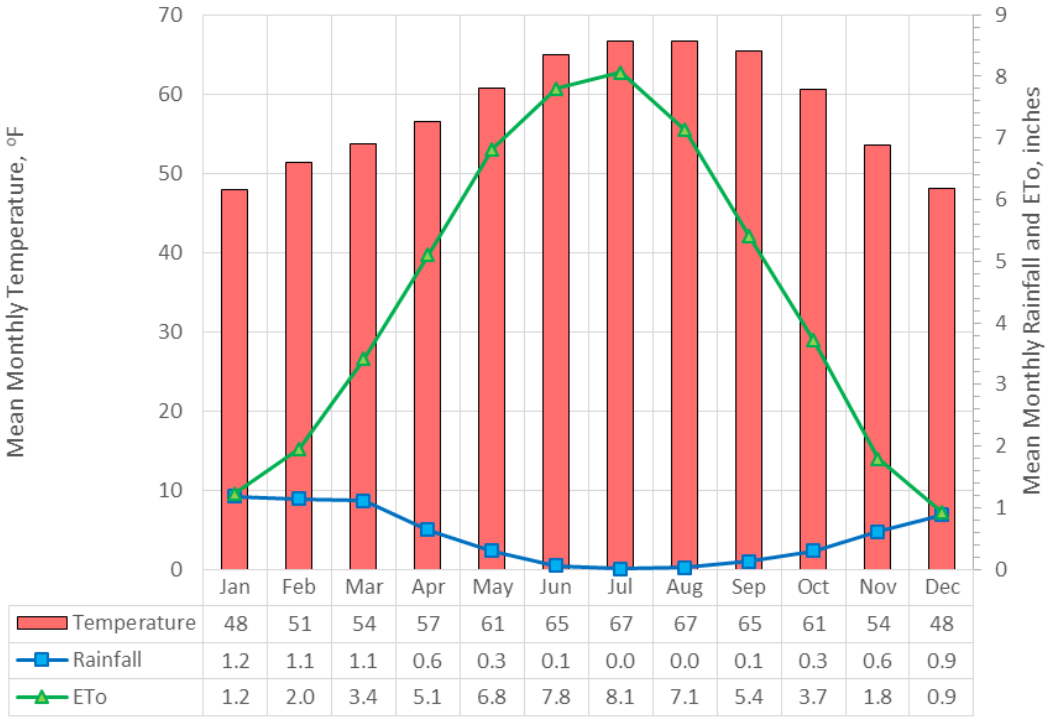
The climate for the Bakersfield District is moderate with hot dry summers and cool winters. The majority of precipitation falls during late autumn, winter, and spring. Figure 3-3 displays monthly averages for rainfall, reference evapotranspiration (ETo), and daily air temperature. Additional climate data is provided in Appendix F, worksheet 13. Rainfall and temperature data are obtained from the PRISM Climate Group.[1] ETo values are from the California Irrigation Management Information System (CIMIS).[2]

On average, the District receives between six and seven inches of rainfall, annually. ETo averages 53 inches, annually. Annual rainfall is only 11 percent of ETo, on average. This indicates that the Bakersfield District is located in a water-deficient environment. The desert landscape with poorly developed soils and scrubby vegetation are evidence of this low amount of naturally available water. Nearly all irrigation requirements are met with District water sources due to the lack of rainfall in the region. Annual rainfall in

[1] www.prism.oregonstate.edu.
[2] CIMIS Zones Map, Zone 15.

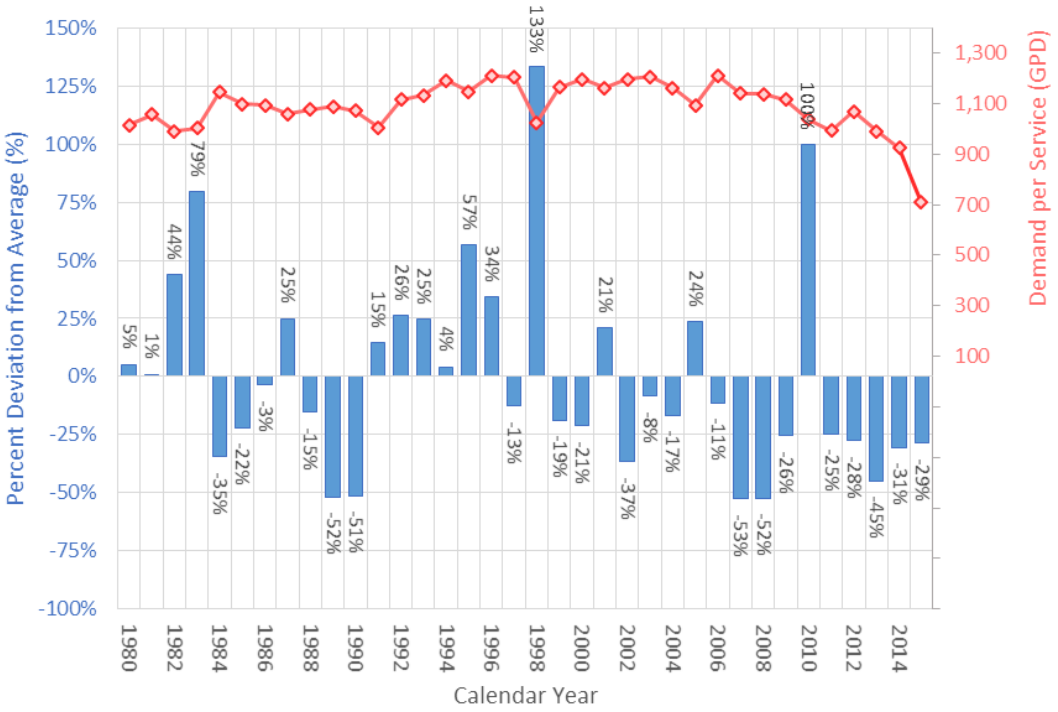
Bakersfield District also is highly variable, as shown in Figure 3-4, and has been below average in nine of the last ten years.

Figure 3-3. Average Monthly Temperature, Rainfall, and ETo



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temperature	48	51	54	57	61	65	67	67	65	61	54	48
Rainfall	1.2	1.1	1.1	0.6	0.3	0.1	0.0	0.0	0.1	0.3	0.6	0.9
ETo	1.2	2.0	3.4	5.1	6.8	7.8	8.1	7.1	5.4	3.7	1.8	0.9

Figure 3-4. Annual Rainfall Deviation from Average



3.3.1 Climate Change

Potential impacts of climate change on District water demands and supplies are discussed in Chapters 4 (System Water Use), 6 (System Supplies), and 7 (Water Supply Reliability Assessment). Here it is noted that climate change is expected to bring higher average temperatures and greater variability in weather, with the potential for more frequent and deeper droughts.

The National Climatic Data Center (NCDC) has established 11 climate regions within California. Each region is defined by unique characteristics, and is shown in Figure 3-5. The Bakersfield District is located in the San Joaquin Valley Region (region G on the map). The San Joaquin Valley Region has experienced a general warming trend in the last several decades, as shown in Figure 3-6. Since 1895, maximum and minimum temperatures have increased at a rate of 0.59 °F and 2.62 °F per 100 years, respectively. More recently, since 1975, maximum and minimum temperatures have increased at a rate of 4.16 °F and 5.86 °F per 100 years, respectively.

Figure 3-5. Climate Regions of California

A. North Coast Region
B. North Central Region
C. Northeast Region
D. Sierra Region
E. Sacramento-Delta Region
F. Central Coast Region
G. San Joaquin Valley Region
H. South Coast Region
I. South Interior Region
J. Mojave Desert Region
K. Sonoran Desert Region

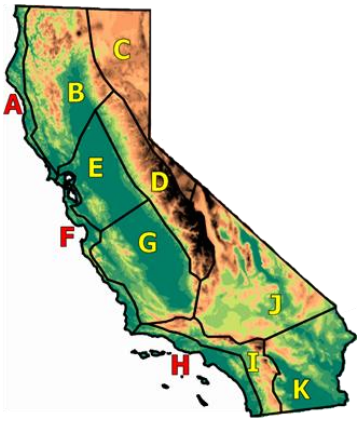
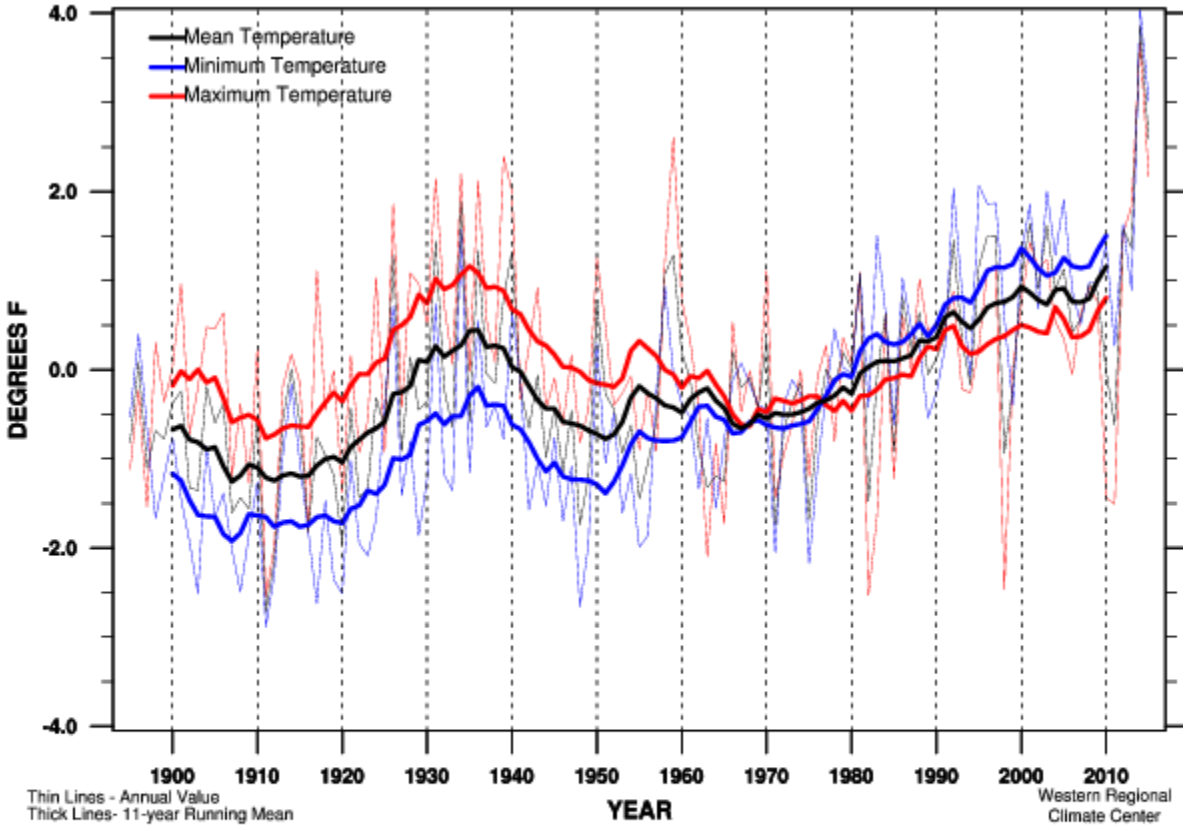


Figure 3-6. Temperature Departure, San Joaquin Valley Region



	Maximum Temperature	Minimum Temperature
Linear Trend 1895-present	+ 0.59 (± 0.57) °F/100yr	+ 2.62 (± 0.49) °F/100yr
Linear Trend 1949-present	+ 1.74 (± 1.41) °F/100yr	+ 4.68 (± 1.07) °F/100yr
Linear Trend 1975-present	+ 4.16 (± 2.96) °F/100yr	+ 5.86 (± 2.40) °F/100yr

3.4 Service Area Population and Demographics

The Bakersfield District has historically been a rapidly growing District. It is increasing service connections through ongoing development within existing service areas and by delivering new services to developing areas in the northeast, northwest and southwest areas of the City Bakersfield. The Bakersfield District is surrounded by land used for agriculture (Northwest and Southwest) or that is fallow (Northeast). The new City Sphere of Influence provides for urban development in all these areas.

Cal Water estimates the service area population was 278,488 in 2015. Service area population grew at an annual average rate of 1.6 percent since 2000. Between the 2000 and 2010 Censuses, population grew at an annual average rate of 1.9 percent. Between 2010 and 2015, population growth slowed to an average annual rate of 0.8 percent. The slowdown is thought to be partly due to the housing market collapse and subsequent recession that occurred in the latter part of the last decade. Going forward, service area population is projected to increase at a rate of 1.03 percent annually until the end of the 2040 planning horizon. This is based on the average growth rates of single- and multi-family residential dwelling units in the service area for the last five years.

To estimate current service area population, Cal Water uses MARPLOT and LandView 5 software to intersect District service area boundaries with Census Blocks from the 2000 and 2010 Censuses. This yields estimates of the number of housing units and population within each Census Block in the District for 2000 and 2010. From these data, Cal Water estimates the total population and the average number of persons per housing unit in the District. Cal Water applies the average number of persons per housing unit to the number of housing units it serves to calculate service area population in non-Census years.

Between the 2000 and 2010 Censuses, the average number of persons per household increased slightly from 2.91 to 2.98. The projection of future population is based on this higher housing unit density. Projected service area population is given in Table 3-1.

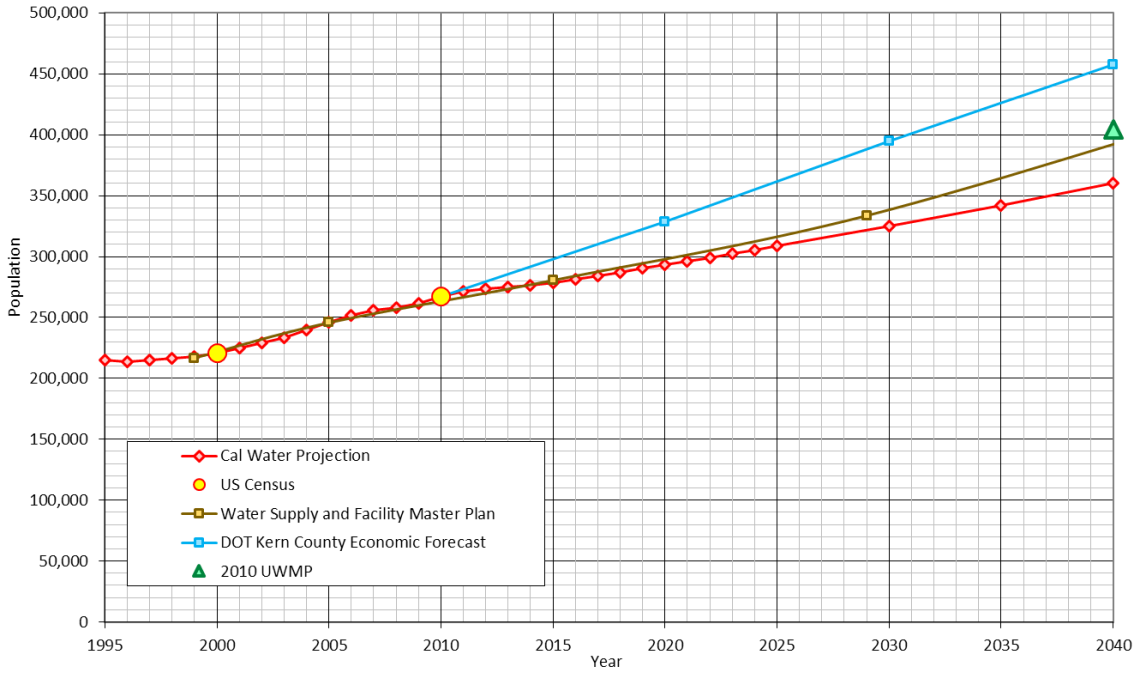
Table 3-1: Population - Current and Projected

	2015	2020	2025	2030	2035	2040
Population Served	278,488	293,152	308,590	324,845	341,959	359,979

Cal Water's current population projection for Bakersfield District is compared in Figure 3-7 to the projections made in its 2009 Water Supply and Facility Master Plan and 2010 UWMP, as well as projections based on population growth rate forecasts for Kern County prepared by the California Department of Transportation (DOT). At the time the population projections in the 2009 Water Supply and Facility Master Plan were made, the District and City of Bakersfield were experiencing high rates of growth. Since then, growth

has slowed significantly. Current population projections are based on this lower growth rate.

Figure 3-7. Population Projection Comparison



Chapter 4
System Water Use

This chapter provides a description and quantifies the Bakersfield District's current water use and the projected uses through the year 2040. For purposes of the UWMP, the terms "water use" and "water demand" are used interchangeably.

This chapter is divided into the following subsections:

4.1 Recycled vs Potable and Raw Water Demand

4.2 Water Uses by Sector

4.3 Distribution System Water Losses

4.4 Estimating Future Water Savings

4.5 Water Use for Lower Income Households

4.6 Climate Change

4.1 Recycled versus Potable and Raw Water Demand

This plan maintains a clear distinction between recycled, potable, and raw water uses and supplies. Recycled water is addressed comprehensively in Chapter 6, but a summary of recycled water demand is included in Table 4-3 of this chapter. The primary focus of this chapter is historical and projected potable and raw water uses in the district.

4.2 Water Uses by Sector

4.2.1 Historical Potable and Raw Water Uses

Actual water use in 2015 by customer category is shown in Table 4-1. Total system demand in 2015 was 55,033 AF. District water use in 2015 was strongly affected by the Drought Emergency Regulation adopted by the State Water Resources Control Board in May of 2015 (SWRCB Resolution No. 2015-0032). Among other things, the Drought Emergency Regulation mandated urban retail water suppliers reduce potable water use between June of 2015 and February of 2016 by percentage amounts specified by the State Water Resources Control Board. The Bakersfield District was ordered to reduce potable water use by 32 percent over this period relative to use over the same period in 2013. Between June and December 2015, water use in Bakersfield was 32.1 percent less than water use over the same period in 2013.

Table 4-1: Retail: Demands for Potable and Raw Water- Actual		
Use Type	2015 Actual	
	Level of Treatment When Delivered	Volume (AF)
Single Family	Drinking Water	32,688
Multi-Family	Drinking Water	3,368
Commercial	Drinking Water	10,104
Industrial	Drinking Water	57
Institutional/Governmental	Drinking Water	4,216
Other	Drinking Water	196
Losses	Drinking Water	4,403
	Total	**55,033**

Residential customers account for approximately 88 percent of services and 67 percent of water use in the District, most of which is associated with single-family water use. Figure 4-1 shows the distribution of services in 2015. Figure 4-2 shows historical water sales by customer category.

Figure 4-1. Distribution of Services in 2015

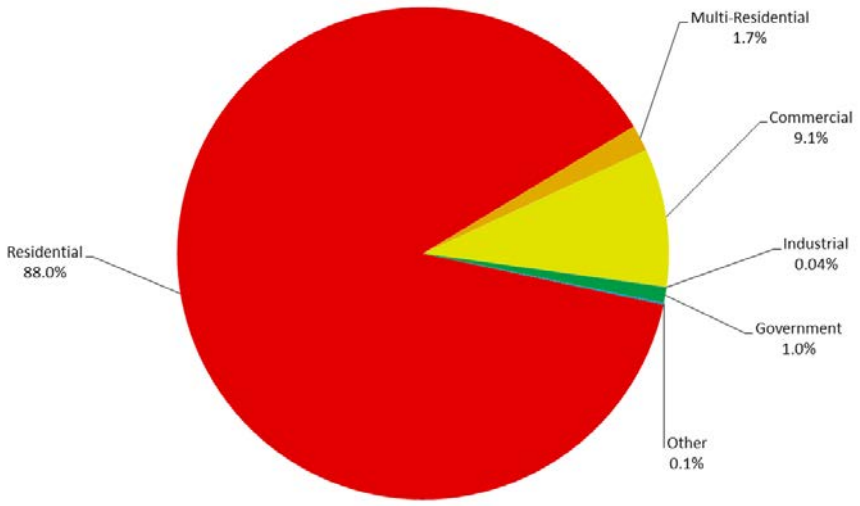
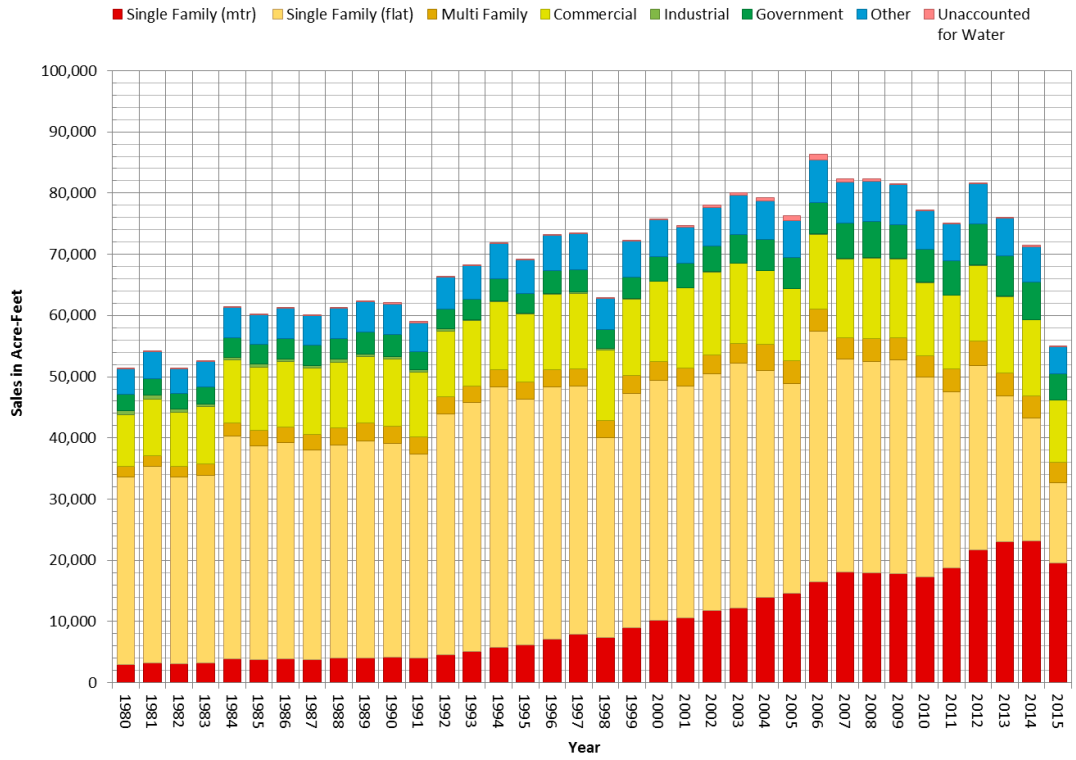


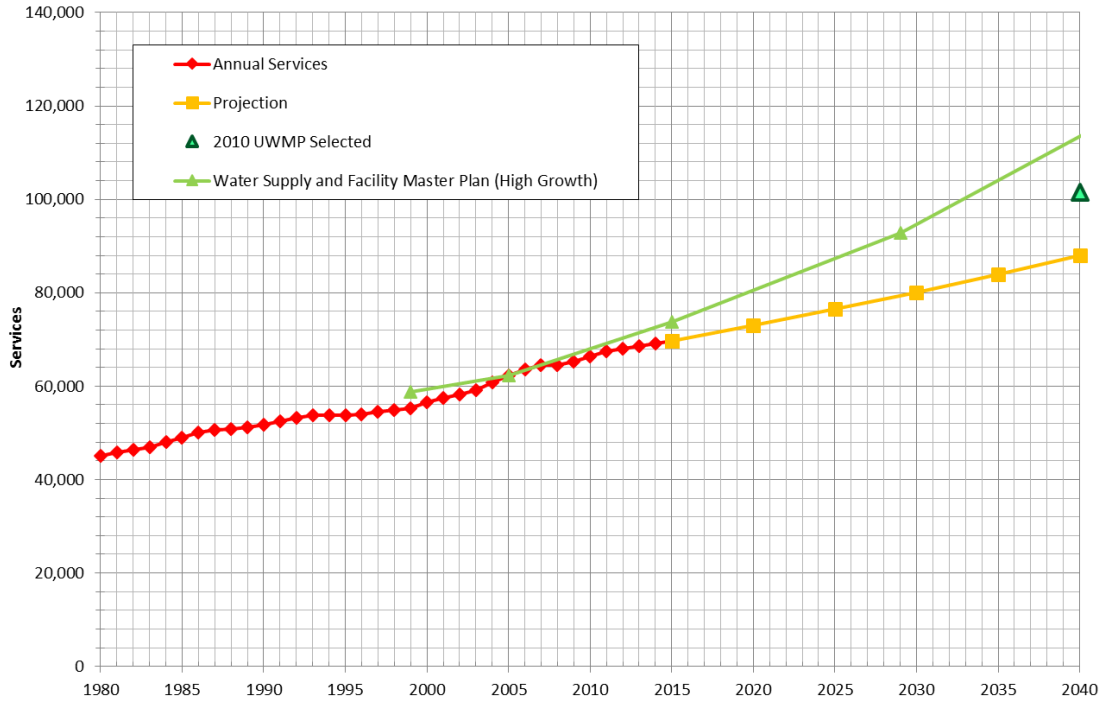
Figure 4-2. Historical Sales by Customer Category



4.2.2 Projected Potable and Raw Water Uses

Projected water demands by customer category through 2040 are shown in Tables 4-2. Future demands are estimated as the product of future services and expected water use per service. Future services are based on historical growth rates in the District. Single-family residential services are projected forward using the historical growth rate for the last five years while multi-family services are projected using the 20-year historical growth rate. Commercial and institutional services are projected forward using the historical growth rate for the past 10 and 5 years, respectively. The forecast assumes no change in the number of industrial services. The projected average annual growth rate in services across all customer categories is approximately 0.9 percent. Historical and projected services are shown in Figure 4-3. Also shown in the figure is the services projections from Cal Water's 2009 Water Supply and Facility Master Plan and 2010 UWMP.

Figure 4-3. Historical and Projected Services



Expected water use per service, shown in Figure 4-4, is based on weather-normalized historical use, adjusted for future expected water savings from plumbing codes and District conservation programs. Weather normalization of historical use was done econometrically using the California Urban Water Conservation Council GPCD Weather Normalization Methodology. Expected water savings from plumbing codes are presented in Section 4.4. Expected water savings from District conservation programs and projected compliance with the District's SB X7-7 2020 per capita water use target are discussed in Chapter 9. The projected trend in average use per service shown in Figure 4-4 does not account for possible effects of climate change on future demand. The potential effects of climate change on demand are discussed in Section 4.6.

Projected water uses in Table 4-2 and Figure 4-4 are predicated on unrestricted demands under normal weather conditions. Demands are assumed to partially rebound by 2020 from 2015 levels on the assumption that the State Water Resources Control Board's mandatory water use reductions end by October 2016, as currently scheduled. The difference between actual and projected demands in 2020 will critically depend on the accuracy of this assumption. If the Emergency Drought Regulations are continued beyond October 2016, then the likelihood of actual demands being less than projected demands in 2020 would be significantly increased.

Figure 4-4. Historical and Projected Average Use per Service in Gallons per Day

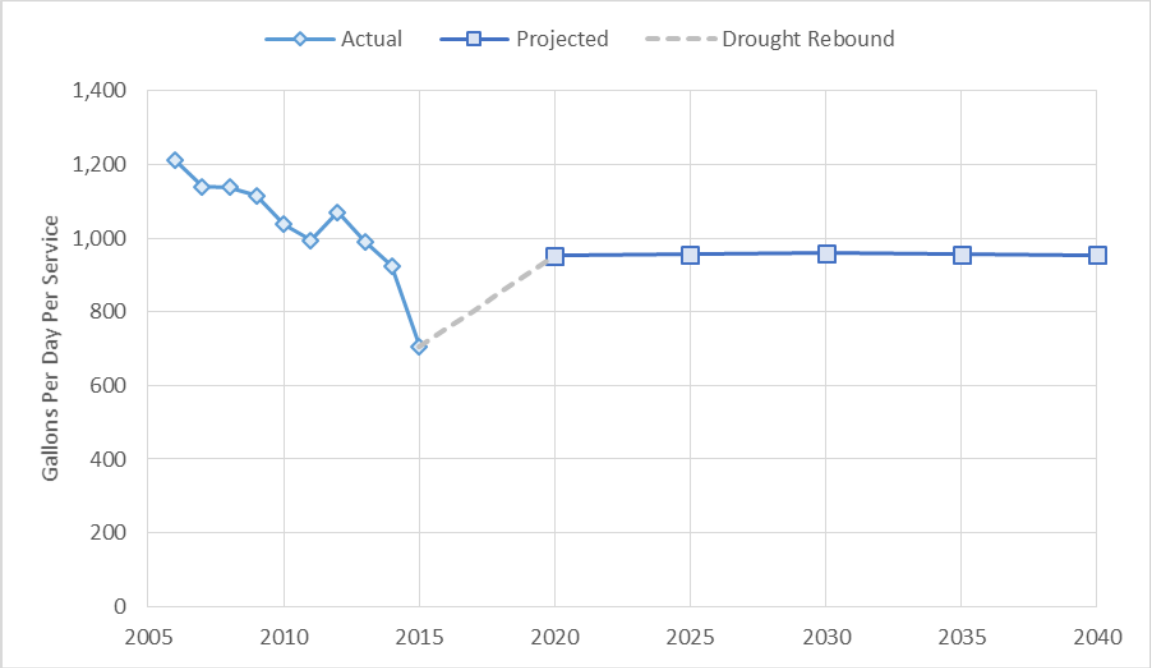


Table 4-2: Retail: Demands for Potable and Raw Water - Projected					
Use Type	Projected Water Use (AF)				
	2020	2025	2030	2035	2040
Single Family	49,340	52,107	54,974	57,547	60,273
Multi-Family	3,748	3,859	4,020	4,166	4,334
Commercial	11,976	12,209	12,486	12,651	12,825
Industrial	49	50	50	50	50
Institutional/Governmental	6,690	7,281	7,898	8,492	9,130
Other	216	219	221	221	221
Losses	5,763	6,153	6,543	6,892	7,257
Total	**77,781**	**81,878**	**86,191**	**90,019**	**94,088**

4.2.3 Total Water Demand Including Recycled Water

Total water demands, including recycled water uses, are shown in Table 4-3. Current and projected recycled water use is discussed in Chapter 6, Section 6.5.

Table 4-3: Retail: Total Water Demands						
	2015	2020	2025	2030	2035	2040
Potable and Raw Water *From Tables 4-1 and 4-2*	55,033	77,781	81,878	86,191	90,019	94,088
Recycled Water Demand *From Table 6-4*	0	0	0	0	0	0
Total Water Demand	**55,033**	**77,781**	**81,878**	**86,191**	**90,019**	**94,088**

4.3 Distribution System Water Losses

For the 2015 UWMP, urban retail water suppliers are required to quantify distribution system water losses for the most recent 12-month period available. For the Bakersfield District, this period is January 1 to December 31 2014. System water loss was calculated using the DWR Water Audit Method, as described in Appendix L of the UWMP Guidelines. Distribution system water loss is reported in Table 4-4. The DWR Water Audit Method calculates two types of water losses: (1) apparent losses and (2) real losses. Apparent losses include unauthorized consumption, metering errors, and data errors. Apparent losses represent unauthorized or unrecorded water delivered to customers. Real losses include distribution system discharges, spills, and leaks of water. Real losses represent a physical loss of water to the system. Table 4-4 reports combined apparent and real distribution system water loss. A copy of the completed water balance worksheet for the Bakersfield District is provided in Appendix M. Actions the Bakersfield District is taking to reduce real and apparent distribution system water losses are discussed in Chapter 9.

Table 4-4: Retail: Water Loss Summary Most Recent 12 Month Period Available	
Reporting Period Start Date	Volume of Water Loss*
01/2014	10,026
*Taken from the field "Water Losses" (a combination of apparent losses and real losses) from the AWWA worksheet.	

4.4 Estimating Future Water Savings

The projections of future water use in Table 4-2 incorporate expected water savings from plumbing codes and appliance standards for residential and commercial toilets, urinals, clothes washers, dishwashers, and showerheads. These savings are commonly referred to as *passive water savings* to differentiate them from water savings resulting from water supplier conservation programs, which are termed *active water savings*. Active water savings resulting from the Bakersfield District's implementation of demand management measures are discussed in Chapter 9 of this plan. The estimates of passive water savings

presented in this chapter were developed with the Alliance for Water Efficiency's *Water Conservation Tracking Tool* using data on the vintage, number, and water using characteristics of residences and businesses within Bakersfield District's service area.

Confirmation that the water use projections contained in this plan incorporate projected future water savings from plumbing codes and appliance standards is provided in Table 4-5. The estimated volume of future water savings from plumbing codes and standards is summarized in Table 4-6.

Table 4-5: Retail Only: Inclusion in Water Use Projections	
Future Water Savings Included Y/N	Yes
If "Yes" to above, state the section or page number where citations of the codes, ordinances, etc… utilized in demand projections are found.	Location in UWMP: Section 4.4 of Chapter 4
Lower Income Residential Demands Included	Yes

Table 4-6: Retail Only: Future Passive Savings						
	2015	2020	2025	2030	2035	2040
Passive Savings (AF)	46	820	1,492	2,077	2,599	3,078

The following codes and standards form the basis for the estimated volume of future passive water savings:

- AB 715, enacted in 2007, requires that any toilet or urinal sold or installed in California on or after January 1, 2014 cannot have a flush rating exceeding 1.28 and 0.5 gallons per flush, respectively. AB 715 superseded the state's previous standards for toilet and urinal water use set in 1991 of 1.6 and 1.0 gallons per flush, respectively. On April 8, 2015, in response to the Governor's Emergency Drought Response Executive Order (EO B-29-15), the California Energy Commission approved new standards for urinals requiring that they not consume more than 0.125 gallons per flush, 75% less than the standard set by AB 715.

- Water use standards for residential and commercial clothes washers and dishwashers are established by the U.S. Department of Energy through its authority under the federal Energy Policy and Conservation Act. Water use efficiency is summarized by the water factor for the appliance which measures the gallons of water used per cycle per cubic foot of capacity. A typical top-loading residential clothes washer manufactured

in the 1990s had a water factor of around 12. In 2015, the allowable water factor for top- and front-loading residential clothes was reduced to 8.4 and 4.7, respectively. In 2018, water factor standard for top-loading residential clothes washers will be reduced to 6.5. In 2010 the allowable water factor for top- and front-loading commercial clothes washers was reduced to 8.5 and 5.5, respectively. The maximum water factor for Energy Star compliant top- and front-loading washers is 3.7 and 4.3, respectively. EPA estimates that Energy Star washers comprised at least 60 percent of the residential market and 30 percent of the commercial market in 2011.[3] An Energy Star compliant washer uses about two-thirds less water per cycle than washers manufactured in the 1990s. Federal dishwasher water use efficiency standards were last updated in 2013. The maximum water use for standard and compact sized dishwashers is 5.0 and 3.5 gallons per cycle, respectively.

- New construction and renovations in California are now subject to CalGreen Code requirements. CalGreen includes prescriptive indoor provisions for maximum water consumption of plumbing fixtures and fittings in new and renovated properties. CalGreen also allows for an optional performance path to compliance, which requires an overall aggregate 20% reduction in indoor water use from a calculated baseline using a set of worksheets provided with the CalGreen guidelines.

- SB 407, enacted in 2009, mandates that all buildings in California come up to current State plumbing fixture standards within this decade. This law establishes requirements that residential and commercial property built and available for use on or before January 1, 1994 replace plumbing fixtures that are not water conserving, defined as "noncompliant plumbing fixtures" as follows:
    - any toilet manufactured to use more than 1.6 gallons of water per flush;
    - any urinal manufactured to use more than one gallon of water per flush;
    - any showerhead manufactured to have a flow capacity of more than 2.5 gallons of water per minute; and
    - any interior faucet that emits more than 2.2 gallons of water per minute.

  For single-family residential property, the compliance date is January 1, 2017. For multi-family and commercial property, it is January 1, 2019. In advance of these dates, the law requires effective January 1, 2014 for building alterations and improvements to all residential and commercial property that water-conserving plumbing fixtures replace all noncompliant plumbing fixtures as a condition for issuance of a certificate of final completion and occupancy or final permit approval by the local building department.

[3] EPA Energy Star Unit Shipment and Market Penetration Report Calendar Year 2011 Summary.

SB 407 also requires effective January 1, 2017 that a seller or transferor of single-family residential property disclose to the purchaser or transferee, in writing, the specified requirements for replacing plumbing fixtures and whether the real property includes noncompliant plumbing. Similar disclosure requirements go into effect for multi-family and commercial transactions January 1, 2019. SB 837, passed in 2011, reinforces the disclosure requirement by amending the statutorily required transfer disclosure statement to include disclosure about whether the property is in compliance with SB 407 requirements. If enforced, these two laws will require retrofit of non-compliant plumbing fixtures upon resale or major remodeling for single-family residential properties effective January 1, 2017 and for multi-family and commercial properties effective January 1, 2019.

California has also adopted regulations governing the future use of landscape water use.

- The California Water Commission approved the State's updated Model Water Efficient Landscape Ordinance (MWELO) on July 15, 2015. The updated MWELO supersedes the State's MWELO developed pursuant to AB 1881. Local agencies have until December 1, 2015 to adopt the MWELO or to adopt a Local Ordinance which must be at least as effective in conserving water as MWELO. Local agencies working together to develop a Regional Ordinance have until February 1, 2016 to adopt. The size of landscapes subject to MWELO has been lowered from 2500 sq. ft. to 500 sq. ft. The size threshold applies to residential, commercial, industrial and institutional projects that require a permit, plan check or design review. Additionally, the maximum applied water allowance (MAWA) has been lowered from 70% of the reference evapotranspiration (ETo) to 55% for residential landscape projects, and to 45% of ETo for non-residential projects. This water allowance reduces the landscape area that can be planted with high water use plants such as cool season turf. For typical residential projects, the reduction in the MAWA reduces the percentage of landscape area that can be planted to high water use plants from 33% to 25%. In typical non-residential landscapes, the reduction in MAWA limits the planting of high water use plants to special landscape areas. The revised MWELO allows the irrigation efficiency to be entered for each area of the landscape. The site-wide irrigation efficiency of the previous ordinance (2010) was 0.71; for the purposes of estimating total water use, the revised MWELO defines the irrigation efficiency (IE) of drip irrigation as 0.81 and overhead irrigation and other technologies must meet a minimum IE of 0.75.

- CalGreen requires that automatic irrigation system controllers for new landscaping provided by a builder and installed at the time of final inspection must be weather- or soil moisture-based controllers that automatically adjust irrigation in response to changes in plant water needs as weather or soil conditions change.

The estimates of future water savings in Table 4-6 do not include potential landscape water savings from implementation of MWELO or CalGreen because estimating these savings required data that was not available to the District at the time this plan was prepared, including data on existing and future landscape areas, plant materials, irrigation equipment, and probable enforcement of and compliance with the landscape design and irrigation equipment requirements.

4.5 Water Use for Lower Income Households

California Senate Bill No. 1087 (SB 1087), Chapter 727, was passed in 2005 and amended Government Code Section 65589.7 and Water Code Section 10631.1. SB 1087 requires local governments to provide a copy of their adopted housing element to water and sewer providers. In addition, it requires water providers to grant priority for service allocations to proposed developments that include housing units for lower income families and workers. Subsequent revisions to the UWMP Act require water providers to develop water demand projections for lower income single and multi-family households.

Cal Water does not maintain records of the income level of its customers and does not discriminate in terms of supplying water to any development. Cal Water is required to serve any development that occurs within its service area, regardless of the income level of the future residents. It is ultimately the City's or County's responsibility to approve or not approve developments within the service area.

As a benefit to its customers, Cal Water offers a Low Income Rate Assistance Program (LIRA) in all of its service districts. Under the LIRA Program lower income customers that qualify are able to receive a discount on their monthly bills.

For the purposes of estimating projected demand of lower income households, Cal Water used the City of Bakersfield's 2015-2023 Regional Housing Needs Assessment and Inventory to estimate the average percentage of households in the service area that qualify as lower income.[4] Based on these data, 43 percent of total households are classified as lower income. Lower income households are defined as households with income that is less than or equal to 80 percent of the median income for the area. Projected residential water demand for lower income households is shown in Table 4-7. These demands are incorporated into the service area demand projection given in Table 4-2.

Table 4-7. Residential Demand of Lower Income Households

	2015	2020	2025	2030	2035	2040

[4] City of Bakersfield Administrative Report to Mayor and City Council dated January 4, 2016, Table 1. Accessed from http://publicagenda.bakersfieldcity.us/CoverSheet.aspx?ItemID=2063&MeetingID=132.

	(actual)					
Demand (AF)	15,396	22,669	23,898	25,190	26,351	27,587

4.6 Climate Change

A hotter and dryer climate is expected to increase demand for outdoor water use. Cal Water has econometrically estimated the sensitivity of class-level water demand to deviations in precipitation and temperature from their long-term averages using historical data on monthly water sales and weather for the District.[5] The weather effect is measured as predicted sales conditional on observed weather versus predicted sales conditional on long-term average weather. The predicted weather effect is then summed on an annual basis and expressed as a percentage of annual weather-normalized sales. An estimate of the variance in annual water sales caused by departures in precipitation and temperature from their long term averages was developed for each customer class. The variance estimates of class-level water sales were weighted and summed across classes for an aggregate district-level estimate of the standard deviation of water demand induced by variation in precipitation and temperature. The standard deviation in District demand due to weather variability is 1.7 percent. The maximum deviation, based on historical weather data, is 2.8 percent.

A selection of climate change scenarios for 2040 for the Southwest United States contained in the Regional Climate Trends and Scenarios for the U.S. National Climate Assessment, Part 5, is shown in Table 4-8, along with the expected effect on District water demand.[6] Based on the scenarios in the table, temperature increases by 2040 associated with climate change imply a 2 to 3 percent increase in demand relative to weather-normalized demand. This expected effect is solely due to predicted changes in temperature. While the climate change scenarios also include predicted changes in the pattern and amount of precipitation, this has not been included in Cal Water's demand modeling at this time due to the large uncertainty associated with these estimates.[7]

The predicted effect of climate change on demand is based on current patterns of outdoor water use. It does not account for changes households and businesses may make in the way they use water in the future given a warming climate. For example, social norms and economic incentives regarding the type and extent of residential and non-residential landscaping may change over time which could lead to outdoor water use having a lower

[5] A&N Technical Services, Inc., Cal Water Long Term Water Demand Forecast Model, December 2014.
[6] Kunkel, K.E, L.E. Stevens, S.E. Stevens, L. Sun, E. Janssen, D. Wuebbles, K.T. Redmond, and J.G. Dobson, 2013: Regional Climate Trends and Scenarios for the U.S. National Climate Assessment. Part 5. Climate of the Southwest U.S., NOAA Technical Report NESDIS 142-5.
[7] Ibid. A discussion and depiction of the uncertainty around the precipitation forecasts is found on pages 55-56, Table 7, and Figure 27 of the cited report.

share of total demand compared to what is currently observed. In this case, the predicted effect of climate change would be offset to some extent by changes in the way households and businesses use water.

Table 4-8. Climate Change Effect on Demand

Climate Scenario	Year 2040 degree C	Year 2040 degree F	% Change from mean Temperature	Effect on Demand
B1	1.4	2.5	3.4%	2.0%
A1B	1.6	2.9	3.9%	2.3%
A2	1.5	2.7	3.7%	2.1%
80%ile	2.0	3.6	4.9%	2.8%

Chapter 5
Baselines and Targets

With the adoption of the Water Conservation Act of 2009, also known as SB X7-7, the state is required to reduce urban water use by 20 percent by the year 2020. Each urban retail water supplier must determine baseline per capita water use during their baseline period and also target water use for the years 2015 and 2020 in order to help the state achieve the 20 percent reduction.

SB X7-7 defines an urban retail water supplier as "a water supplier, either publicly or privately owned, that directly provides potable municipal water to more than 3,000 end users or that supplies more than 3,000 acre-feet of potable water annually at retail for municipal purposes." (CWC 10608.12) As shown in Chapter 2, the Bakersfield District meets both of these thresholds.

In this Chapter, the Bakersfield District demonstrates compliance with its per capita water use target for the year 2015. This will also demonstrate whether or not the District is currently on track to achieve its 2020 target. Compliance will be verified by DWR's review of the SB X7-7 Verification Tables submitted with this plan. These tables are included with this plan in Appendix I.

This chapter includes the following sections:

5.1 Wholesale Agencies

5.2 Updating Calculations from 2010 UWMP

5.3 Baseline Periods

5.4 Service Area Population

5.5 Gross Water Use

5.6 Baseline Daily per Capita Water Use

5.7 2015 and 2020 Targets

5.8 2015 Compliance Daily per Capita Water Use

5.9 Regional Alliance

5.1 Wholesale Agencies

Wholesale water suppliers are not required to establish and meet baseline and targets for daily per capita water use. However, they can provide important support to their retail water suppliers through adopted policies and programs to encourage demand reduction in their service area. Wholesale water suppliers can also participate in a Regional Alliance established to meet the region's daily per capita water use targets.

The Bakersfield District coordinated its demand reduction policies and programs with the wholesale water suppliers listed in Table 2-4.

5.2 Updating Calculations from 2010 UWMP

The District reported base period population and water use, selected the 2020 target method, and calculated its 2020 water use target in its 2010 UWMP. SB X7-7 allows the District to update these estimates, change the target methodology, and revise its 2020 urban water use target in its 2015 UWMP (CWC 10608.20).

Per the UWMP Guideline requirements, Cal Water has updated District population estimates to incorporate information from the 2010 Census that was not available at the time the 2010 UWMP was prepared. It has not changed the base period or methodology upon which the District's 2020 urban water use target is based. The updated population estimates are slightly higher than the estimates in the 2010 plan for most years. A comparison between the two sets of population estimates is provided in Appendix I. The revised population estimates decreased the District's 2020 water use target from 239 to 237 GPCD.

5.3 Baseline Periods

Under SB X7-7 urban retail water suppliers must establish two baseline periods for historical water use and population in the District. The first of these is either a 10- or 15-year continuous period ending between 2004 and 2010. The second is a 5-year continuous period ending between 2007 and 2010. The 10-15 year period is used to establish the 2020 water use target under Method 1 (CWC 10608.20). The 5-year period is used to confirm that the selected 2020 target meets SB X7-7's minimum water use reduction requirements (CWC 10608.22). The baseline periods the District is using are summarized in SB X7-7 Table 1.

SB X7-7 Table 1: Baseline Period Ranges			
Baseline	**Parameter**	**Value**	**Units**
10- to 15-year baseline period	2008 total water deliveries	82,317	Acre Feet
	2008 total volume of delivered recycled water	0	Acre Feet
	2008 recycled water as a percent of total deliveries	0.00%	percent
	Number of years in baseline period[1]	10	years
	Year beginning baseline period range	1995	
	Year ending baseline period range[2]	2004	
5-year baseline period	Number of years in baseline period	5	years
	Year beginning baseline period range	2003	
	Year ending baseline period range[3]	2007	
[1]If the 2008 recycled water percent is less than 10 percent, then the first baseline period is a continuous 10-year period. If the amount of recycled water delivered in 2008 is 10 percent or greater, the first baseline period is a continuous 10- to 15-year period.			
[2]The ending year must be between December 31, 2004 and December 31, 2010.			
[3]The ending year must be between December 31, 2007 and December 31, 2010.			

5.3.1 Determination of the 10-15 Year Baseline Period

The 10-15 year baseline period must be a continuous period ending between 2004 and 2010. It can be up to 15 years in length if recycled water comprised 10 percent or more of the retail urban water supplier's 2008 deliveries. Otherwise, the baseline period is set to 10 years.

The Bakersfield District did not have recycled water deliveries in 2008. Therefore it is using a 10-year baseline period commencing January 1, 1995 and running through December 31, 2004. The 10-year baseline period is unchanged from the 2010 UWMP.

5.3.2 Determination of the 5-Year Baseline

The 5-year baseline period must be a continuous period ending between 2007 and 2010. The Bakersfield District's 5-year baseline period commences January 1, 2003 and runs through December 31, 2007. The 5-year baseline period is unchanged from the 2010 UWMP.

5.4 Service Area Population

As noted above, Cal Water has updated the baseline period population estimates to incorporate information from the 2010 Census that was not available at the time the 2010

UWMP was prepared. Updating resulted in a small change in the original population estimates.

Urban retail water suppliers must estimate their service area population in a manner that is consistent with DWR requirements. For water suppliers whose boundaries correspond by 95 percent or more with a city or census designated place, population estimates prepared by the Department of Finance may be used. Where this is not the case, water suppliers may use the DWR Population Tool or estimate their population using other methods, provided these methods comply with Methodology 2 – Service Area Population – of DWR's *Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use*.

Cal Water uses a population estimation methodology based on overlaying Census Block data from the 2000 and 2010 Censuses with the District's service area. LandView 5 and MARPLOT software are used with these data to estimate population per dwelling unit for 2000 and 2010. The per dwelling unit population estimates are then combined with Cal Water data on number of dwelling units served to estimate service area population for non-Census years.

Cal Water also estimated service area population using DWR's Population Tool. The estimates prepared using Cal Water's methodology and DWR's Population Tool differed by significantly less than one percent. A comparison of the estimates generated by the two approaches is provided in Appendix I. Cal Water is electing to use the population estimates produced by its methodology in order to maintain consistency with population projections it has prepared in other planning documents and reports.

The population methodology and estimates used to calculate baseline and 2015 daily per capita water use are summarized in SB X7-7 Tables 2 and 3.

SB X7-7 Table 2: Method for Population Estimates	
Method Used to Determine Population (may check more than one)	
☐	1. **Department of Finance** (DOF) DOF Table E-8 (1990 - 2000) and (2000-2010) and DOF Table E-5 (2011 - 2015) when available
☐	**2. DWR Population Tool**
☑	**3. Other** DWR recommends pre-review

SB X7-7 Table 3: Service Area Population		
Year		**Population**
10 to 15 Year Baseline Population		
Year 1	1995	214,863
Year 2	1996	213,683
Year 3	1997	215,318
Year 4	1998	216,301
Year 5	1999	217,530
Year 6	2000	220,851
Year 7	2001	224,924
Year 8	2002	229,212
Year 9	2003	233,630
Year 10	2004	240,029
5 Year Baseline Population		
Year 1	2003	233,630
Year 2	2004	240,029
Year 3	2005	246,177
Year 4	2006	251,898
Year 5	2007	256,127
2015 Compliance Year Population		
2015		278,488

5.5 Gross Water Use

Annual gross water use is defined as the amount of water entering the District's distribution system over a 12-month period, excluding:

- Recycled water delivered within the service area
- Indirect recycled water
- Water placed in long-term storage
- Water conveyed to another urban supplier
- Water delivered for agricultural use

Gross water use must be reported for each year in the baseline periods as well as 2015. The Bakersfield District's annual gross water use is summarized in SB X7-7 Table 4. Volumes are in acre-feet. No water delivery exclusions are taken.

SB X7-7 Table 4: Annual Gross Water Use									
	Baseline Year	**Volume Into Distrib. System**	**Deductions**						**Annual Gross Water Use**
			Recycled Water	Exported Water	Change in Dist. System Storage (+/-)	Indirect Recycled Water	Water Delivered for Agricultural Use	Process Water	
10 to 15 Year Baseline - Gross Water Use									
Year 1	1995	69,164	0	0	0	0	0	0	69,164
Year 2	1996	73,246	0	0	0	0	0	0	73,246
Year 3	1997	73,501	0	0	0	0	0	0	73,501
Year 4	1998	62,863	0	0	0	0	0	0	62,863
Year 5	1999	72,220	0	0	0	0	0	0	72,220
Year 6	2000	75,822	0	0	0	0	0	0	75,822
Year 7	2001	74,655	0	0	0	0	0	0	74,655
Year 8	2002	77,986	0	0	0	0	0	0	77,986
Year 9	2003	79,994	0	0	0	0	0	0	79,994
Year 10	2004	79,229	0	0	0	0	0	0	79,229
10 - 15 year baseline average gross water use									**73,868**
5 Year Baseline - Gross Water Use									
Year 1	2003	79,994	0	0	0	0	0	0	79,994
Year 2	2004	79,229	0	0	0	0	0	0	79,229
Year 3	2005	76,338	0	0	0	0	0	0	76,338
Year 4	2006	86,304	0	0	0	0	0	0	86,304
Year 5	2007	82,362	0	0	0	0	0	0	82,362
5 year baseline average gross water use									**80,845**
2015 Compliance Year - Gross Water Use									
2015		55,033	0	0	0	0	0	0	**55,033**

5.6 Baseline Daily Per Capita Water Use

Baseline daily per capita water use is calculated by converting annual gross water use to gallons per day and dividing by service area population. Daily per capita water use for each baseline year and 2015 are summarized in SB X7-7 Table 5.

SB X7-7 Table 5: Gallons Per Capita Per Day (GPCD)				
Baseline Year		Service Area Population	Annual Gross Water Use (AF)	Daily Per Capita Water Use (GPCD)
10 to 15 Year Baseline GPCD				
Year 1	1995	214,863	69,164	287
Year 2	1996	213,683	73,246	306
Year 3	1997	215,318	73,501	305
Year 4	1998	216,301	62,863	259
Year 5	1999	217,530	72,220	296
Year 6	2000	220,851	75,822	306
Year 7	2001	224,924	74,655	296
Year 8	2002	229,212	77,986	304
Year 9	2003	233,630	79,994	306
Year 10	2004	240,029	79,229	295
10-15 Year Average Baseline GPCD				**296**
5 Year Baseline GPCD				
Baseline Year		Service Area Population	Annual Gross Water Use (AF)	Daily Per Capita Water Use (GPCD)
Year 1	2003	233,630	79,994	306
Year 2	2004	240,029	79,229	295
Year 3	2005	246,177	76,338	277
Year 4	2006	251,898	86,304	306
Year 5	2007	256,127	82,362	287
5 Year Average Baseline GPCD				**294**
2015 Compliance Year GPCD				
2015		278,488	55,033	**176**

5.7 2015 and 2020 Targets

Urban retail water suppliers may select from four GPCD target methods (CWC 10608.20).

- Target Method 1: 20% reduction from 10-year baseline GPCD
- Target Method 2: Water use efficiency performance standards
- Target Method 3: 95% of Hydrologic Region Target
- Target Method 4: Savings by water sector, DWR Method 4

Regardless of target method selected, the final target cannot exceed 95 percent of the 5-year baseline period average GPCD (CWC 10608.22).

The Bakersfield District has selected Target Method 1, which sets the 2020 target to either 80 percent of the 10-year baseline or 95 percent of the 5-year baseline average GPCD, whichever is less. This results in a 2020 target of 237 GPCD. The 2015 interim target is the midpoint between the 10-year baseline average GPCD and the 2020 target.

The District's GPCD baselines and targets are summarized in Table 5-1.

Table 5-1: Baselines and Targets Summary

Baseline Period	Start Years	End Years	Average GPCD	2015 Interim Target	Confirmed 2020 Target
10-15 year	1995	2004	296	266	237
5 Year	2003	2007	294		

5.8 2015 Compliance Daily per Capita Water Use

Compliance daily per capita water use in 2015 is summarized in Table 5-2. In reporting their compliance daily per capita water use, urban retail water suppliers may elect to consider the following factors and adjust the estimate accordingly (CWC 10608.24):

- Differences in evapotranspiration and rainfall in the baseline period compared to the compliance reporting period.
- Substantial changes to commercial or industrial water use resulting from increased business output and economic development that have occurred during the reporting period.
- Substantial changes to institutional water use resulting from fire suppression services or other extraordinary events, or from new or expanded operations, that have occurred during the reporting period.

Cal Water is not electing to make any adjustments to the District's compliance daily per capita water use in 2015. The Bakersfield District's 2015 compliance daily per capita water use is 176 gallons compared to its 2015 interim target of 266 gallons. The Bakersfield District is in compliance with its 2015 interim target.

The low per capita water use in 2015 partially reflects the impacts of the Drought Emergency Regulation adopted by the State Water Resources Control Board in May of 2015 (SWRCB Resolution No. 2015-0032). Among other things, the Drought Emergency Regulation mandated urban retail water suppliers reduce potable water use between

June of 2015 and February of 2016 by percentage amounts specified by the State Water Resources Control Board. The Bakersfield District was ordered to reduce potable water use by 32 percent over this period relative to use over the same period in 2013.

However, the Drought Emergency Regulation does not explain all of the decline in per capita water use, which has been trending downward since 2006 when it reached its zenith of 306 gallons per person per day. By 2014 this had fallen by 24 percent, to 231 GPCD. Between 2014 and the end of 2015, per capita water use had fallen an additional 24 percent, to 176 GPCD.

Table 5-2: 2015 SB X7-7 Compliance

2015 Actual GPCD	2015 Interim Target	Optional Adjustments to 2015 GPCD *From Methodology 8*				Actual as Percent of Target	In Compliance? Y/N
		Extraordinary Events	Economic Adjust	Weather Adjust	Adjusted Actual 2015 GPCD		
176	266	0	0	0	176	66%	YES

5.9 Regional Alliance

Urban retail water suppliers may report on the requirements of SB X7-7 individually or as a member of a "Regional Alliance." The Bakersfield District is a member of a Regional Alliance and this UWMP provides information on the District's progress towards meeting its SB X7-7 water conservation targets as both an individual urban retail water supplier and a member of a Regional Alliance.

The Bakersfield District has formed a Regional Alliance with other Cal Water urban retail water districts located in the Tulare Lake Hydrologic Region. Compliance with the Regional Alliance's 2015 interim target is demonstrated in Appendix I and summarized in Table SB X7-7 RA Table 1 – Compliance Verification on the following page.

The Regional Alliance's 2015 compliance daily per capita water use is 168 gallons compared to its 2015 interim target of 251 gallons. The Regional Alliance is in compliance with its 2015 interim target.

SB X7-7 RA Table 1: Compliance Verification				
2015 GPCD (Actual)	2015 Interim Target GPCD	Economic Adjustment[1] *Enter "0" if no adjustment*	Adjusted 2015 GPCD *(if economic adjustment used)*	Did Alliance Achieve Targeted Reduction for 2015?
168	251	0	168	YES

[1]Adjustments for economic growth can be applied to either the individual supplier's data or to the aggregate regional alliance data (but not both), depending upon availability of suitable data and methods.

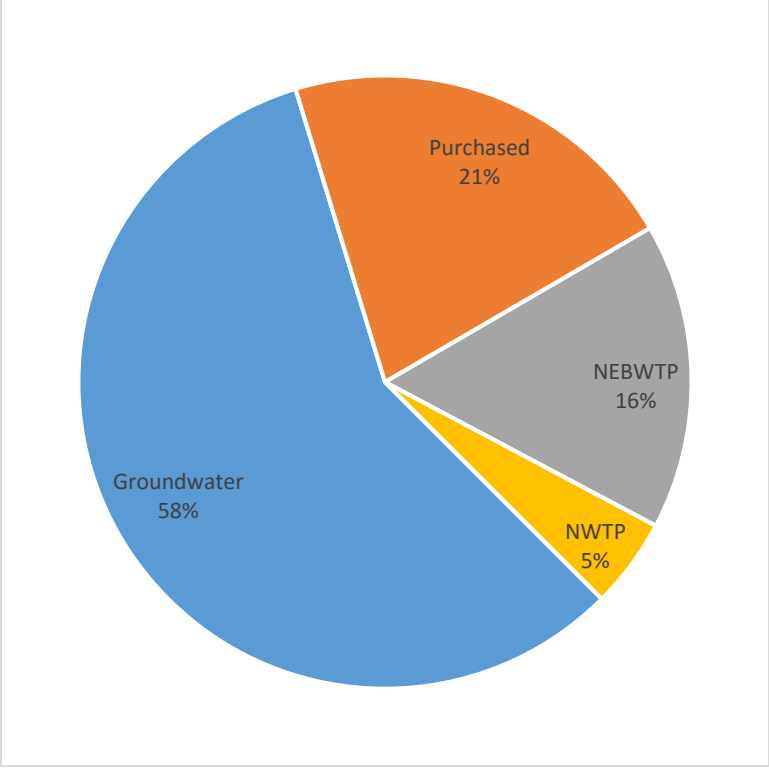
Chapter 6
System Supplies

The water supply for the customers of the Bakersfield District comes from a combination of the following sources:

- Groundwater
- Untreated local surface water purchased from City of Bakersfield
- Treated local surface and imported water purchased from Kern County Water Agency (KCWA) Improvement District 4 (ID-4)

Figure 6-1 shows the breakdown of water supply for 2011-2015. Groundwater was 58 percent of total production. Kern River water purchased from the City of Bakersfield and treated by Cal Water's North East Bakersfield Water Treatment Plant (NEBWTP) equaled 16 percent of the total. Purchases from the City treated at the North West Treatment Plant (NWTP) was 5 percent of the total supply. Purchased treated Kern River or State Water Project (SWP) water from Improvement District No. 4 (ID-4) of the Kern County Water Agency (KCWA) provided remaining 21 percent.

Figure 6-1: Water Sources (2011-2015)



While groundwater and purchased ID-4 treated water will continue to be a significant percentage of the District's future water supply, Cal Water continues to investigate a number of additional surface water treatment plant expansions and new projects.

6.1 Purchased Water

The Bakersfield District purchases water from two sources:

- Untreated local surface water purchased from City of Bakersfield
- Treated local surface and imported water purchased from ID-4

Purchases from City of Bakersfield

Cal Water utilizes surface water treatment plants to supply a portion of the total supply to the City of Bakersfield and is proposing three additional plants. The water treatment plants are a key component of the District supply and will also be utilized to address several water quality issues.

Northeast Bakersfield Water Treatment Plant

In June 2003, Cal Water commenced operation of the Northeast Bakersfield Water Treatment Plant (NEBWTP). The first phase treats a base load of 22,403 AFY (20 MGD) of pumped Kern River water. The plant has a present capacity of 23 MGD with a future build-out capacity of 60 MGD. Cal Water has a signed long-term supply agreement for 67,200 AFY with the City of Bakersfield for water supplied to the plant. The City of Bakersfield holds pre-1914 appropriative rights to Kern River water.

Two additional expansions of the NEBWTP will provide addition water to the District. Phase 2 will add another 20 MGD (22,400 AFY) of base load capacity to bring the total to 40 MGD (44,800 AFY) with a peaking capacity 46 MGD. It is projected to be online by 2030. Phase 3 of the expansion of the plant will add another 20 MGD (22,400 AFY) of base load capacity to bring the total to 60 MGD (67,200 AFY) with a peaking capacity of 69 MGD. It is not projected to be online during the planning horizon of this UWMP.

North West Water Treatment Plant

Cal Water has constructed a micro-filtration plant in the North Garden WTP in North West Bakersfield area that treats Kern River water and serves the area. The plant has a capacity of 8,960 AFY (8.0 MGD) base load (10.4 MGD peaking) capacity. Half of the total base load (4,480 AFY, 4.0 MGD) is supplied to the City of Bakersfield under contract.

Southwest Bakersfield Water Treatment Plant

Phase 1 of the proposed Southwest Bakersfield WTP will provide 22,400 AFY (20 MGD) of base load capacity (peaking capacity will be 23 MGD); however, half of the capacity will be contracted to the City so Cal Water's share will be 11,200 AFY (10 MGD) base load (11.5 MGD peaking capacity).

Phase 2 of the proposed Southwest Bakersfield WTP will provide another 22,400 AFY (20 MGD) of base load capacity to bring the total to 44,806 AFY (40 MGD) (peaking capacity will be 46 MGD). Since half of the capacity will be contracted to the City, Cal Water's share will be 22,403 AFY (20 MGD) base load (23 MGD peaking). The source of raw water is Kern River based on a long-term supply contract with the City.

Implementation of Phase 1 and 2 will depend on the rate of growth in the Southwest area. Currently both phases for this project are on hold. Recent drought conditions affecting surface water supplies have emphasized the need to maintain groundwater capacity in the short term.

Rosedale Ranch and Seventh Standard Corridor Water Treatment Plant

Phase 1 of the proposed Rosedale Ranch and Seventh Standard Corridor (RRSS) WTP will provide 7,840 AFY (7.0 MGD) of base load capacity (peaking capacity will be 8.0 MGD). The source of raw water would be Kern River based on a long-term supply contract with the City. Phase 2 would add another 5,040 AFY (4.5 MGD) of base load capacity. Implementation of Phase 2 will depend on the rate of growth in the Rosedale Ranch and the Seventh Standard Corridor. Implementation of Phase 1 and 2 will depend on the rate of growth in this area. Currently both phases for this project are on hold until economic conditions improve.

Purchases from Kern County Water Agency, Improvement District 4

Cal Water purchases imported supplies from the Kern County Water Agency (KCWA) - Improvement District No. 4 (ID-4). KCWA is a contractor of the State Water Project (SWP) and imports water for Municipal and Industrial use in the urbanized area through the California Aqueduct.

Cal Water purchases imported water from ID-4, which serves as a regional water management agency. ID-4 built and operates a surface water treatment plant, the Henry C. Garnett Water Treatment Plant (HGWTP) that serves Cal Water, East Niles Community Services District, and North of the River Water District. ID-4 obtains its water supply from KCWA entitlements to SWP supplies and from Kern River flows. ID-4 uses these waters to recharge groundwater aquifers and to supply its conventional multi-media high rate filtration plant. Cal Water has a contract with ID-4 to purchase 20,500 acre-feet/year

(10.26 MGD average annual) of treated water from the treatment plant during normal hydrologic conditions. Depending on the needs of other water suppliers and the production capabilities of the plant Cal Water can purchase up to 15 percent more than this amount; Cal Water also has a contracted peaking capacity of 15.5 MGD. Cal Water annually prepares a monthly demand schedule for this water and submits it to ID-4. The schedule is weighted so that the greatest volume of deliveries is during the peak summer demand period. Total treatment plant capacity of the ID-4 plant is about 50,400 AFY (45 MGD). Each of the entities that are served by ID-4 has a fixed contractual allocation of ID-4 treatment plant capacity. The water acquired from ID4 is obtained through five service connections.

Rapid growth is occurring in the northwest Bakersfield area. To provide a reliable supply for this area, Cal Water entered into an agreement with KCWA for expansion of the ID-4 treatment plant and for construction of the Northwest feeder pipeline to convey water to the area from the expanded ID-4 treatment plant. Cal Water has contracted for an additional 9,000 AF/YR (8.0 MGD average annual flow) and added peaking capacity of 15.0 MGD.

The ID-4 treatment plant water is used throughout the year by the District and in particular to meet peak summer demands and thereby reduce pumping of groundwater aquifers during that period. Groundwater elevations in the District have stabilized since use of this supply came on line in 1977. To insure use of water from the ID-4 plant, KCWA uses financial incentives (pump tax) so as to minimize the extraction of groundwater.

The reliability of KCWA's imported water supply from the SWP has been impacted by the recent Wanger Decision that limits pumping in the Delta. Pumping restrictions have been implemented, at least temporarily, because of the negative impact of pumping on Delta Smelt populations, which are protected under the California Endangered Species Act. The restrictions will be in place from late December through June and could reduce available supply from this source by up to 30 percent. This level of reduction could limit KCWA's ability to deliver normal allocation amounts to each of its retail customers, especially in critically dry or consecutive dry years. Delta pumping restrictions due to Delta Smelt and other emerging species of concern are expected to last indefinitely. Consequently, restrictions in available supply would largely be made up for using groundwater supply, especially in drought conditions.

6.2 Groundwater

Historically, groundwater has satisfied up to 80 percent of the District's water demand. Groundwater continues to make up a significant percentage of the District's water supply and is crucial to meeting demand. The groundwater used by the Bakersfield District is extracted from the unconfined aquifers of the Kern River Fan that underlie the District.

6.2.1 Basin Description

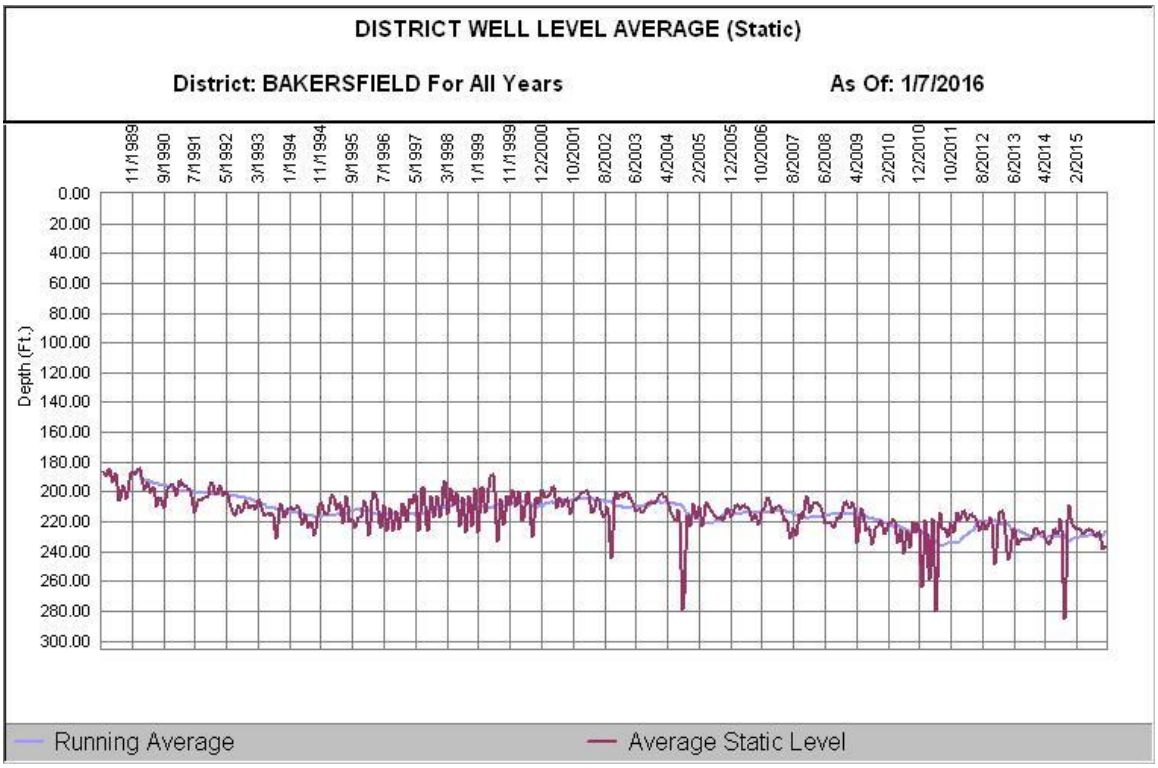
The Kern County Groundwater sub-basin is bounded on the north by the Kern County line and the Tule Groundwater sub-basin, on the east and southeast by granite bedrock of the Sierra Nevada foothills and Tehachapi Mountains, and on the southwest and west by the marine sediments of the San Emigdio Mountains and Coast Ranges. Principal rivers and streams include Kern River and Poso Creek.

DWR Groundwater Bulletin 118 published in 2003 does not classify the basin as overdrafted. Figure 6-2 shows that water levels have generally remained fairly constant since 1990. Figure 6-2 also shows the decline in groundwater levels as a result of the 1987-1992 drought. Recovery began in 1995 resulting in an average increase of 12 feet. During the more recent drought groundwater previously banked in the basin was pumped to make up the shortfall in surface supplies. This resulted in a further decline in groundwater levels. Cal Water is working with regional wholesale water suppliers to responsibly manage the groundwater basin. An important feature of local drought resiliency is groundwater banking which provides a buffer during extreme drought conditions.

Additional details of the basin[8] are given in the DWR's Groundwater Bulletin 118.

[8] California's Ground Water Bulletin 118, 2003; Tulare Hydrologic Region; San Joaquin Valley Groundwater Basin; Kern County Subbasin; Groundwater Basin Number: 5-22.14
http://www.water.ca.gov/pubs/groundwater/bulletin_118/california's_groundwater__bulletin_118_-_update_2003_/bulletin118_entire.pdf

Figure 6-2: Average Ground Water Level for the District



6.2.2 Groundwater Management

The groundwater basin that Cal Water pumps from is an un-adjudicated basin. Recharge and in-lieu programs are managed by the City of Bakersfield and Kern County Water Agency ID-4. A Groundwater Management Plan has not been developed; however ID-4 has an annual Report on Water Conditions within ID-4, which contains the same information as a GWMP. The Agency's management plan in attached in Appendix G.

In response to changing water laws and environmental conditions, Cal Water plans to work with water management partners to balance water use with a combination of surface and ground water supplies. In 2015, 33,388 AF was pumped. By 2040, Cal Water hopes to reduce the use of groundwater to 20,984 AF annually. This, along with the groundwater recharge activities Cal Water is participating in, will allow water levels to rebound and increase basin storage. Additional water sources will need to be investigated after this time to limit groundwater withdrawals as Bakersfield grows. Managing the quantity of water stored in the groundwater aquifers in the region will help perpetuate the availability of this critical resource. Groundwater is not only important to meeting current demand but is also a source that can be further utilized in times of prolonged drought to make up for the loss of surface water supplies.

Sustainable Groundwater Management Act

Background – On September 16, 2014, Governor Brown signed into law Assembly Bill 1739, Senate Bill 1168, and Senate Bill 1319 (AB-1739, SB-1168, and SB-1319). This three-bill legislative package is known collectively as the Sustainable Groundwater Management Act (SGMA). SGMA was amended in the later part of 2015 by Senate Bill 13, Senate Bill 226 and Assembly Bill 1390 to provide clarity to the original law and guidance on groundwater adjudications. This new legislation defines sustainable groundwater management as the "management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results" [Water Code § 10721(u)]. The legislation defines "undesirable results" to be any of the following effects caused by groundwater conditions occurring throughout the basin [Water Code § 10721(w) (1-6)]:

- Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply;
- Significant and unreasonable reduction of groundwater storage;
- Significant and unreasonable seawater intrusion;
- Significant and unreasonable degraded water quality;
- Significant and unreasonable land subsidence;
- Surface water depletions that have significant and unreasonable adverse impacts on beneficial uses of the surface water.

The legislation provides for financial and enforcement tools to carry out effective local sustainable groundwater management through formation of Groundwater Sustainability Agencies (GSA's) consisting of local public agencies, water companies regulated by the CPUC and mutual water companies. The legislation requires that GSA's within High and Medium Priority basins under the California Statewide Groundwater Elevation Monitoring (CASGEM) program subject to critical conditions of overdraft prepare and submit a Groundwater Sustainability Plan (GSP) for the basin by January 31, 2020 [Water Code § 10720.7(a) (1)], and requires GSA's in all other groundwater basins designated as High or Medium Priority basins to prepare and submit a GSP by January 31, 2022 [Water Code § 10720.7 (a) (2)]. Following State approval, the basin would thereafter be managed under the GSP The legislation does not require adjudicated basins to develop GSPs, but they are required to report their water use.

Intended Outcomes and Benefits – The key intended outcomes and benefits of SGMA are numerous, and include:

- Advancement in understanding and knowledge of the State's groundwater basins and their issues and challenges;
- Establishment of effective local governance to protect and manage groundwater basins;
- Management of regional water resources for regional self-sufficiency and drought resilience;
- Sustainable management of groundwater basins through the actions of GSA's, utilizing State assistance and intervention only when necessary;
- All groundwater basins in California are operated to maintain adequate protection to support the beneficial uses for the resource;
- Surface water and groundwater are managed as "a Single Resource" to sustain their interconnectivity, provide dry season base flow to interconnected streams, and support and promote long-term aquatic ecosystem health and vitality;
- A statewide framework for local groundwater management planning, including development of sustainable groundwater management best management practices and plans;
- Development of comprehensive and uniform water budgets, groundwater models, and engineering tools for effective management of groundwater basins;
- Improved coordination between land use and groundwater planning;
- Enforcement actions as needed by the SWRCB to achieve region-by-region sustainable groundwater management in accordance with the 2014 legislation.

To assist in attaining the above outcomes, the California Department of Water Resources (DWR) will provide GSA's with the technical and financial assistance necessary to sustainably manage their water resources. The benefits of these outcomes include:

- A reliable, safe and sustainable water supply to protect communities, farms, and the environment, and support a stable and growing economy;
- Elimination of long-term groundwater overdraft, an increase in groundwater storage, avoidance or minimization of subsidence, enhancement of water flows in stream systems, and prevention of future groundwater quality degradation.

Cal Water Position – Cal Water's groundwater basin philosophy continues to be to work collaboratively with all stakeholders in the basins where we operate and to do what is best for the groundwater basin including the sharing of burden(s) and benefits on an equitable basis with said stakeholders. Cal Water recognizes and deeply supports the goals, objectives, and intended outcomes of the SGMA. Moreover, the company recognizes the numerous challenges of the legislation along a variety of technical, legal, political, and financial/economic dimensions, particularly when the geographical diversity of the Company's service territory is considered. None-the-less, Cal Water intends to take an active role in the local and state-wide management of groundwater resources over the next 5-25+ years by fully supporting and participating in the principal edicts of SGMA. A number of specific steps that the Company intends to take with respect to this position and role include (among others):

- Outreach to public agencies to ensure that the Company's presence, rights and interests, as well as historical and current resource management concerns are honored/incorporated within the GSA and GSP formulation process(es);

- Outreach to applicable local and regulatory agencies to ensure that the Company is at full participation, while also meeting the requirements and expectations set forth by SGMA;

- The enhanced use of digital/electronic groundwater monitoring equipment and other new technology aimed at measuring withdrawal rates, pumping water levels, and key water quality parameters within the context of day-to-day operations;

- Full participation in the development of GSP's and formulation of groundwater models being constructed in basins where the Company has an operating presence;

- Full participation in individual and/or joint projects aimed at mitigating seawater intrusion and other "undesirable results";

- Inclusion of sound groundwater management principles and data in all applicable technical reports, studies, facility master plans, and urban water management plans (including this 2015 update), particularly as these undertakings relate or pertain to water resource adequacy and reliability;

- Inclusion of sound groundwater management principles and data in all general rate case (GRC) filings and grant applications to ensure that resource management objectives remain visible and central to Cal Water's long-term planning/budgeting efforts;

SGMA related information in the 2015 UWMP – The Urban Water Management Plans prepared by Cal Water over the past decade, including the 2015 update, already contain

many of the elements required by SGMA and thus already serve as a road map toward the implementation of SGMA and the basin GSP. The UWMP addresses all water supply sources including groundwater. SGMA's specific concerns with groundwater are addressed as follows:

- Chapter 4 addresses Cal Water's historic and future customer growth and water demand in the basin.
- Chapter 6 addresses Cal Water's historic and future water supplies in the basin.
- Chapter 6 addresses the potential actions Cal Water will need to take to develop additional water supplies to maintain supply reliability.
- Chapter 6 discusses water quality and necessary actions to protect and decontaminate water supplies.
- Chapter 6 addresses supplementing water supplies with recycled water.
- Chapter 7 addresses the projected ability of the combined supply, including groundwater, to reliably serve customer demands under normal, single-dry-year and multiple-dry-year conditions.

6.2.3 Overdraft Conditions

As discussed above, the sub-basin from which Bakersfield District pumps was not considered to be overdrafted in the 2003 Bulletin 118. The basin is also not among those that were recently designated by DWR as critically overdrafted. The record of static elevations supports this. This is not to say that Cal Water and other basin pumpers must not continue to take necessary actions to maintain the health of the basin.

Cal Water plans to continue to use groundwater as a major source of supply into the future. In addition to being part of the supply to meet every day demand, groundwater wells provide reliability of supply for times when treated surface water is in short supply due to treatment plant maintenance or drought. Drought conditions in 2013-2015 reduced the amount of available surface water, causing increased reliance on groundwater supply.

6.2.4 Historical Pumping

Table 6-1 shows the volumes pumped from the sub-basin over the past 5 years.

Table 6-1 Retail: Groundwater Volume Pumped (AF)						
Groundwater Type	Location or Basin Name	2011	2012	2013	2014	2015
Alluvial Basin	San Joaquin Valley Basin	41,835	45,709	41,157	45,495	33,388
Total		**41,835**	**45,709**	**41,157**	**45,495**	**33,388**

6.3 Surface Water

Cal Water purchases local surface water from the City of Bakersfield, as described above in Section 6.1.

6.4 Stormwater

There are no plans to divert stormwater for beneficial uses in the District.

6.5 Wastewater and Recycled Water

The recycling of wastewater offers several potential benefits to 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. Indirect recycling occurs through the recharge of groundwater. The potential amount of recycled water that can be produced is proportional to the amount of wastewater that is generated by the District, and is discussed in the following sections.

6.5.1 Recycled Water Coordination

The relevant wastewater collection, treatment, and discharge agencies are as follows:

- City of Bakersfield Public Works Department
- Kern Sanitation Authority
- North of River Sanitation District

6.5.2 Wastewater Collection, Treatment, and Disposal

Four wastewater treatment plants serve the City of Bakersfield. The City of Bakersfield owns, operates and maintains the collection sewer system for Treatment Plant 2 and Treatment Plant 3. The Kern Sanitation Authority and North of River Sanitary District Number 1 also own and maintain the sewer systems for their respective treatment plants. The collection systems consist of gravity sewers less than 24 inches in diameter, raw

sewage pumping stations and force mains. The North of River Sanitary District Number 1 wastewater treatment plant only receives wastewater from residential customers. None of the Bakersfield treatment plants is located within the Cal Water district boundary.

All four wastewater treatment plants servicing Bakersfield utilize secondary treatment with trickling filters.

Table 6-2 estimates the volume of wastewater collected from Bakersfield District customers in 2015. The estimate is calculated by annualizing 90% of January water use in the service area.

Table 6-2 Retail: Wastewater Collected Within Service Area in 2015						
			Receiving Wastewater Treatment			
Name of Wastewater Collection Agency	Wastewater Volume Metered or Estimated?	Volume of Wastewater Collected in 2015 (AF)	Name of Wastewater Treatment Agency Receiving Collected Wastewater	Treatment Plant Name	Is WWTP Located Within UWMP Area?	Is WWTP Operation Contracted to a Third Party?
City of Bakersfield	Estimated	13,463	City of Bakersfield	Treatment Plant No.2	No	
City of Bakersfield	Estimated	8,713	City of Bakersfield	Treatment Plant No.3	No	
Kern Sanitation Authority	Estimated	3,409	Kern Sanitation Authority	KSA Treatment Plant	No	
North of River Sanitation District	Estimated	3,555	North of River Sanitation District	NRSD Treatment Plant	No	
Total Wastewater Collected from Service Area in 2015:		**29,140**				

Table 6-3 Retail: Wastewater Treatment and Discharge Within Service Area in 2015

✓	No wastewater is treated or disposed of within the UWMP service area. The supplier will not complete the table below.									
							2015 Volumes			
Wastewater Treatment Plant Name	Discharge Location Name or Identifier	Discharge Location Description	Wastewater Discharge ID Number *(optional)*	Method of Disposal	Does This Plant Treat Wastewater Generated Outside the Service Area?	Treat-ment Level	Waste water Treated	Discharged Treated Waste water	Recycled Within Service Area	Recycled Outside of Service Area
						Total				

6.5.3 Recycled Water System

Cal Water's Bakersfield District does not have a dedicated recycled water system. A portion of the recycled water from Treatment Plant 3 is used for irrigation within the plant boundary and for irrigating our new soccer park (Sports Village) next to the plant.

It is anticipated that treated wastewater will continue to be used for agricultural irrigation. Agricultural reuse of the wastewater saves on groundwater withdrawal and in turn helps preserve Cal Water's groundwater supply. The additional source of treated water for agriculture from the petroleum industry also offsets part of the demand for water. Because agricultural application utilizes all of the treated wastewater supply and is the only anticipated use of recycled water in the future, the projected recycled water supply for Cal Water's Bakersfield service area through the year 2040 is 0 acre-feet per year. Cal Water has not implemented any incentive programs to encourage recycled water use because they do not own and operate the wastewater system.

6.5.4 Recycled Water Beneficial Uses

The recycling of wastewater offers several potential benefits to 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.

Table 6-4 Retail: Current and Projected Recycled Water Direct Beneficial Uses Within Service Area

✓ Recycled water is not used and is not planned for use within the service area of the supplier. The supplier will not complete the table below.

Beneficial Use Type	General Description of 2015 Uses	Level of Treatment	2015	2020	2025	2030	2035	2040 (opt)
Name of Agency Producing (Treating) the Recycled Water:								
Name of Agency Operating the Recycled Water Distribution System:								
Supplemental Water Added in 2015								
Source of 2015 Supplemental Water								
Agricultural irrigation								
Landscape irrigation (exc golf courses)								
Golf course irrigation								
Commercial use								
Industrial use								
Geothermal and other energy production								
Seawater intrusion barrier								
Recreational impoundment								
Wetlands or wildlife habitat								
Groundwater recharge (IPR)								
Surface water augmentation (IPR)								
Direct potable reuse								
		Total:	**0**	**0**	**0**	**0**	**0**	**0**

IPR - Indirect Potable Reuse

Table 6-5 Retail: 2010 UWMP Recycled Water Use Projection Compared to 2015 Actual		
✓	Recycled water was not used in 2010 nor projected for use in 2015. The supplier will not complete the table below.	
Use Type	2010 Projection for 2015	2015 actual use
Agricultural irrigation		
Landscape irrigation (exc golf courses)		
Golf course irrigation		
Commercial use		
Industrial use		
Geothermal and other energy production		
Seawater intrusion barrier		
Recreational impoundment		
Wetlands or wildlife habitat		
Groundwater recharge (IPR)		
Surface water augmentation (IPR)		
Direct potable reuse		
Total		

6.5.5 Actions to Encourage and Optimize Future Recycled Water Use

Cal Water supports the use of recycled water as a means to offset potable water use and has become one of the largest retail providers of recycled water in California; however, Cal Water has not implemented any incentive programs to encourage recycled water use in Bakersfield because it does not own or operate the wastewater system. Additionally, as a regulated utility, Cal Water must receive approval from the CPUC prior to implementing a recycled water program.

Cal Water's supply portfolio in some districts already includes recycled water; elsewhere, the Company is participating in studies of the possibility of adding this supply source. Cal Water is eager to expand its portfolio to provide recycled water to its customers wherever possible, and to form partnerships with other agencies and jurisdictions to accomplish this. Any such project must be economically feasible. Approval of such an investment by the CPUC is contingent on a demonstration that it is beneficial to ratepayers.

Table 6-6 Retail: Methods to Expand Future Recycled Water Use			
✓	Supplier does not plan to expand recycled water use in the future. Supplier will not complete the table below but will provide narrative explanation.		
Name of Action	Description	Planned Implementation Year	Expected Increase in Recycled Water Use
NA	NA	NA	NA

6.6 Desalinated Water Opportunities

There are no opportunities for the development of desalinated water in the District. Bakersfield is located inland at a great distance from any source of saline water.

6.7 Exchanges or Transfers

With the exception of the City of Bakersfield agreements mentioned earlier Cal Water does not have any transfer agreements in place. Increased future demand will be supplied by treated surface water provided through ID-4 and the City of Bakersfield. Long term agreements with these agencies will be developed as needed. Excess groundwater supplies will be stored for aquifer recovery and drought management.

6.7.1 Exchanges

For the purposes of augmenting groundwater recharge in Cal Water's Visalia District, the Bakersfield District has participated in a transfer of banked groundwater. There is 10,000 acre-feet of water banked in the City of Bakersfield's groundwater bank, which is owned by Cal Water and 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.

6.7.2 Transfers

Cal Water is not planning on having any new transfer agreements.

6.7.3 Emergency Interties

The District only has interties with KCWA and City of Bakersfield.

6.8 Future Water Projects

The discussion above describes Cal Water's plans for future added capacity at its three water treatment plants. In addition, as ageing wells are taken out of service, new wells will be drilled.

Table 6-7 Retail: Expected Future Water Supply Projects or Programs						
	No expected future water supply projects or programs that provide a quantifiable increase to the agency's water supply. Supplier will not complete the table below.					
	Some or all of the supplier's future water supply projects or programs are not compatible with this table and are described in a narrative format. LOCATION OF THE NARRATIVE___________________________					
Name of Future Projects or Programs	Joint Project with other agencies?		Description (if needed)	Planned Implementation Year	Planned for Use in Year Type	Expected Increase in Water Supply to Agency
Northeast Bakersfield Water Treatment Plant expansion	Yes	City of Bakersfield	Increase WTP base load capacity	2030	Average Year	
Southwest Bakersfield Water Treatment Plant Phase 2	Yes	City of Bakersfield	Increase WTP base load capacity	2025	Average Year	

6.9 Summary of Existing and Planned Sources of Water

Table 6-8 shows the actual volumes of purchased water for calendar year 2015. Table 6-9 shows the projected supply volumes through 2040.

Table 6-8 Retail: Water Supplies — Actual (AF)				
Water Supply	Additional Detail on Water Supply	2015		
		Actual Volume	Water Quality	Total Right or Safe Yield *(optional)*
Purchased or Imported Water	*KCWA-ID-4*	12,496	Drinking Water	
Groundwater		33,388	Drinking Water	
City of Bakersfield Surface water	*Northeast Bakersfield WTP*	8,027	Drinking Water	
City of Bakersfield Surface water	*North Garden WTP*	1,122	Drinking Water	
City of Bakersfield Surface water	*Southwest Bakersfield Water Treatment Plant*	0	Drinking Water	
Total		**53,033**		

Table 6-9 Retail: Water Supplies — Projected (AF)

Water Supply	Projected Water Supply *Report To the Extent Practicable*									
	2020		**2025**		**2030**		**2035**		**2040** *(opt)*	
	Reasonably Available Volume	Total Right or Safe Yield *(optional)*	Reasonably Available Volume	Total Right or Safe Yield *(optional)*	Reasonably Available Volume	Total Right or Safe Yield *(optional)*	Reasonably Available Volume	Total Right or Safe Yield *(optional)*	Reasonably Available Volume	Total Right or Safe Yield *(optional)*
Purchased water	20,500		20,500		20,500		20,500		20,500	
Groundwater	27,598		6,491		10,804		14,632		18,701	
Surface water *(Northeast Bakersfield WTP)*	16,802		33,604		33,604		33,604		33,604	
Surface water *(North Garden WTP)*	4,481		4,481		4,481		4,481		4,481	
Surface water *(Southwest Bakersfield Water Treatment Plant)*	8,401		16,802		16,802		16,802		16,802	
Total	**77,781**		**81,878**		**86,191**		**90,019**		**94,088**	

6.10 Climate Change Impacts to Supply

Cal Water recently completed an initial study of climate change impacts for a sample of its districts, including Bakersfield.[9] The sample districts account for 85% of Cal Water's total 2014 production and reflect the diversity of all Cal Water districts, including geographic, hydrologic, and climatic conditions and primary and secondary supply sources. The study was undertaken because it is critical for Cal Water to gain a better understanding of the potential impacts of climate change on the availability of its diverse supplies. The impacts are inherently uncertain, but Cal Water believes that the only responsible course is to carefully incorporate climate change into its ongoing water supply planning.

The initial study represents a first step in that path. In order for Cal Water to determine how its long-term water supply planning should reflect climate change impacts, it must first have an understanding of what the impacts of climate change on its supply sources might be. That was the purpose of the study.

Changes in climate can affect the availability of local groundwater and surface water supplies, as well as purchased imported supplies. This study separately addressed the impacts on each of these for each sample district. It relied on the best available projections of changes in climate (temperature and precipitation) through the end of the century, and then used the climate projections to examine how surface water flows and groundwater recharge rates may change. The study generally relied on studies done by or data provided by wholesale suppliers.

The study results provide an integrated view of how projected climate changes may affect water supply availability for Cal Water's service districts, and represent a first step in integrating potential future climate change impacts into Cal Water's ongoing supply planning.

6.10.1 Estimating Changes in Climate

Climate change is primarily driven by increased concentrations of greenhouse gases (GHGs) in the atmosphere. The trajectory of future climate change is a function of the rate at which those concentrations are projected to increase and the manner in which the atmosphere and oceans respond to increased concentrations. Both are difficult to model. Thus, while the scientific community overwhelmingly agrees that climate change will occur (and indeed may already have begun), the trajectory of those changes is very uncertain.

[9] California Water Service Company, *Potential Climate Change Impacts on the Water Supplies of California Water Service*. January 2016.

The projections of temperature and precipitation that underlie this study are based on 40 of the latest Global Circulation Models (GCMs) run as part of the Coupled Model Intercomparison Project Phase 5 (CMIP5). Generally speaking, this type of approach is termed an ensemble analysis, for which the downscaled climate projections for any particular Cal Water Service District were based on the median of the 40 downscaled GCM datasets. The GCMs used by the analysis are driven by two GHG emission pathways that bound the possible trajectories of GHG concentrations.

6.10.2 Impacts of Climate Change on Water Supplies

Since the supplies for each district consist of a mix of local surface water, local groundwater, and/or purchased imports, climate change impacts were estimated for each of these components. Based on the breakdown of district production among the supply sources, Table 6-10 shows the ranges of projected overall climate change impacts on available supply, relative to the historic average. The average reductions in Bakersfield supplies due to climate change are estimated to be between 12% and 20% by the end of the century.

Table 6-10 Projected Changes in Average Available Supply due to Climate Change				
District	Percentage Change in Supply			
		2020	2050	2100
BK	Minimum	-10%	-10%	-12%
	Maximum	-12%	-16%	-20%
VIS	Minimum	-7%	-8%	-8%
	Maximum	-9%	-10%	-14%
KRV	Minimum	-13%	-16%	-19%
	Maximum	-16%	-21%	-31%
MPS/SSF/BG	Minimum	0%	-2%	-6%
	Maximum	0%	-7%	-15%
LAS	Minimum	-3%	-3%	-10%
	Maximum	-4%	-18%	-28%
CH	Minimum	2%	2%	0%
	Maximum	3%	1%	-3%
ORO	Minimum	0%	8%	5%
	Maximum	0%	-8%	-7%
DOM/HR/PV	Minimum	0%	0%	-1%
	Maximum	0%	-2%	-3%
STK	Minimum	0%	0%	-8%
	Maximum	0%	-14%	-17%
SLN	Minimum	-6%	-6%	-6%
	Maximum	-7%	-7%	-7%

6.10.3 Next Steps and Key Conclusions

Possible next steps for Cal Water's study of climate change include:

- Methodological enhancements to reduce some of the uncertainties in the results;
- Development and acquisition of better and more complete data;
- Extending the study to other Cal Water districts;
- Developing a plan to mitigate anticipated climate change impacts on supply; and
- Integrating climate change into the Company's ongoing water supply planning.

Three critical messages emerged from the study:

- Cal Water supplies in the 21st century are likely to be adversely affected by climate change.

- These impacts will vary considerably across districts, depending on geography and source mix. For some districts, the impacts can be significant; for others, little or no impacts are projected.

- The impacts will generally increase over time. Anticipated late-century impacts are forecast to be significantly higher in some districts than impacts at mid-century. Moreover, during the period that climate change is forecast to increasingly constrain supplies, demands are also generally forecast to increase, further exacerbating the adverse impacts on water supply reliability.

Chapter 7
Water Supply Reliability Assessment

This chapter addresses the reliability of the Bakersfield District's water supplies. Assessment of water supply reliability is complex and dependent upon a number of factors, such as the number of water sources, regulatory and legal constraints, hydrological and environmental conditions, climate change, and expected growth, among others. Based on available historical information and projections of future water uses, regulatory and legal constraints, and hydrological and environmental conditions, including climate change, Cal Water has made its best determination of the future reliability of Bakersfield District's water supplies.

7.1 Constraints on Water Sources

The reliability of imported water supply from the SWP and CVP has been seriously impacted by the Wanger Decision that limits pumping in the Delta. Pumping restrictions have been implemented, at least temporarily, because of the negative impact of pumping on Delta Smelt populations, which are protected under the California Endangered Species Act. The restrictions will be in place from late December through June and could reduce available supply from this source by up to 30 percent. This level of reduction may limit KCWA's ability to deliver normal amounts to the District, especially in dry or consecutive dry years. Delta pumping restrictions due to Delta Smelt and other emerging species of concern are expected to last for at least several years. To offset reduced purchased water supplies, the Bakersfield system will need to rely more heavily on groundwater production to meet demand.

At this point, the combined District groundwater and purchased supplies are projected to be sufficient to meet future demands under all hydrologic conditions. However, water quality and climate change are concerns that must be closely monitored and addressed.

Drinking water is regulated by the U.S. Environmental Protection Agency (EPA) as authorized by the Federal Safe Drinking Water Act of 1974. States can either adopt the EPA standard or set state standards that are more stringent than those set by the federal government. Typically, California adopts federal standards but there are several constituents for which the state has adopted a stricter standard.

There are two 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 derived from health-based criteria, which include technological and economic considerations based on feasibility of achieving and monitoring these concentrations in drinking water

supply systems. 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 EPA and State of California, specify limits for substances that may affect consumer acceptance of the water.

The primary source of surface water comes from the Kern River, which is considered a high quality supply. Source water originates from the central Sierra Nevada as a snowpack runoff. No portions of the Kern River are currently listed on the Central Valley Regional Water Quality Control Board's 303(d) list of impaired water bodies. Cal Water and the Kern County Water Agency, along with several other partners, perform a regular survey of the Kern River watershed that focuses on identifying any activities that could affect water quality and water quantity.

Surface water supplies from the Kern River are treated through a 22 million gallon daily (MGD) microfiltration plant in northeast Bakersfield and an eight MGD microfiltration plant in the northwest. Additionally, Kern County Water Agency (KCWA) operates a conventional treatment plant that takes water from the Kern River, State Water Project, and local groundwater. Treated surface water is purchased from KCWA as a supplemental supply.

Groundwater serves as primary major source of supply to the Bakersfield district. The primary aquifers consist of alluvial sediments (mixtures of sand, silt, clay, cobbles, and boulders), and marine and continental deposits in the deeper portion of the aquifers. Primary sources of recharge are from the Kern River; irrigation canals that radiate away from the river; and artificial recharge through imported water supplies at groundwater banking facilities. Since the Kern River is the primary source of recharge to aquifers, groundwater flow occurs in a radial pattern away from river.

Local groundwater supplies contain inorganic constituents which are naturally present in the environment. Concentrations of inorganic constituents in groundwater are a result of natural processes as well as human activities. Arsenic and hydrogen sulfide (H2S) are the most prevalent inorganic contaminants in the Bakersfield district. Nitrate has historically been a concern but was largely mitigated by constructing wells with deep sanitary seals.

Arsenic appears to be present due to natural geochemical processes. Regional trends for arsenic distribution indicate that concentrations are high in the deeper groundwater and increase to the southwest. Drought conditions appear to influence arsenic concentrations with an increasing trend. No wells in the North Garden system are vulnerable to increasing arsenic trends.

However, North Garden wells are more vulnerable to hydrogen sulfide. While H_2S is not directly regulated through a primary or secondary MCL, it has an offensive odor which

typically exceeds the regulatory limit. Wells containing H_2S are treated through catalytic granular activated carbon.

Organic constituents are a consequence of products used in business, industry, and agriculture. They can either enter the environment through normal usage, spills, or improper disposal. In Bakersfield, the most prevalent organic contaminants are 1,2,3-trichloropropane (TCP); tetrachloroethylene (PCE); trichloroethylene(TCE); and methyl tertiary-butyl ether (MtBE).

Groundwater contamination from TCP poses a significant threat to numerous Bakersfield and North Garden wells. The Division of Drinking Water has identified TCP as a primary contaminant and is actively working to develop an MCL. It is anticipated that a draft MCL will be published in late 2016 with formal issuance of an MCL in 2017. Because TCP has been detected in a significant number of the District wells at levels likely to exceed the MCL, the District anticipates needing to install treatment on a large number of TCP-contaminated wells. Cal Water is actively planning for the large scale treatment of TCP-contaminated wells and is working to ensure compliance with any new TCP-related water quality regulations.

Contamination from PCE, TCE, and/or MtBE is also a significant concern. Since these organic constituents have been regulated by a primary MCL for numerous years, the contamination is mitigated through an appropriate treatment method.

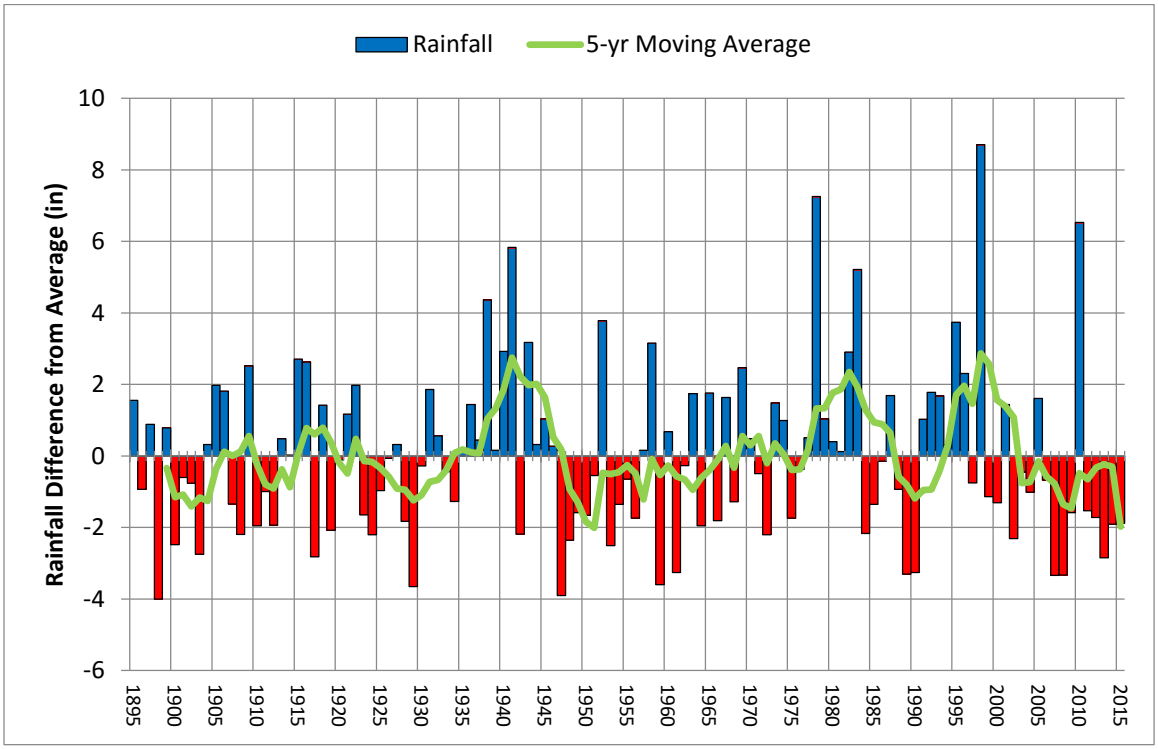
Overall, groundwater quality throughout the Bakersfield region is good quality. The area where some of wells are experiencing quality problems are a consequence of past land use practices and high levels of pumping from the area's groundwater system. Drought conditions appear to be increasing contaminant concentrations and exacerbating water quality problems where they exist.

7.2 Reliability by Type of Year

Figure 7-1 compares annual rainfall to the historic average (6.41 inches). The designation of Base Years for drought planning shown in Table 7-1 below comes from the data underlying this chart.

A normal hydrologic year occurred in 1914 when precipitation was approximately 0.4 percent below the historic average for the period from 1903 to 2015. The driest year occurred in 1947 when the rainfall was approximately 61% percent below average (2.51 inches). This is taken as the single dry year shown in Table 7-1. The multiple dry-water years used are 2007 through 2009.

Figure 7-1. Deviation of Annual Rainfall from Long-Term Average



Source: PRISM Climate Group, Oregon State University, http://prism.oregonstate.edu

Table 7-1 Retail: Basis of Water Year Data			
Year Type	Base Year	Available supplies if year type repeats	
		Agency may complete these columns for volume only, percent only, or both	
		Volume available (AF)	% of avg supply
Average Year	1914	94,088	100%
Single-Dry Year	1947	96,722	
Multiple-Dry Years 1st Year	2007	96,429	
Multiple-Dry Years 2nd Year	2008	96,422	
Multiple-Dry Years 3rd Year	2009	95,207	
NOTES: Available volumes are the maximum volumes across all forecast years in Tables 7-2, 7-3, and 7-4.			

7.3 Supply and Demand Assessment

Water supply and demand patterns change during normal, single dry, and multi dry years. To analyze these changes, Cal Water relies on historical usage to document expected changes in future usage in water demand; such as, assuming increasing demand due to increased irrigation needs or a decrease in demand due to awareness of drought conditions.

Table 7-2 shows the projected supply and demand totals for a normal year. The supply totals match those in Table 6-9; the demand totals match Table 4-3. (The balance between supply and demand totals excludes usage reductions that are not directly a function of Cal Water supplies, but are externally-imposed by other entities, such as the 2015 state-mandated cutbacks.)

Table 7-2 Retail: Normal Year Supply and Demand Comparison (AF)					
	2020	2025	2030	2035	2040 *(Opt)*
Supply totals *(autofill fm Table 6-9)*	77,781	81,878	86,191	90,019	94,088
Demand totals *(autofill fm Table 4-3)*	77,781	81,878	86,191	90,019	94,088
Difference	**0**	**0**	**0**	**0**	**0**

Table 7-3 shows the projected supply and demand totals for the single dry year.

Table 7-3 Retail: Single Dry Year Supply and Demand Comparison (AF)					
	2020	2025	2030	2035	2040 (Opt)
Supply totals	79,958	84,169	88,603	92,538	96,722
Demand totals	79,958	84,169	88,603	92,538	96,722
Difference	**0**	**0**	**0**	**0**	**0**

Table 7-4 shows the projected supply and demand totals for the multiple dry years.

Table 7-4 Retail: Multiple Dry Years Supply and Demand Comparison (AF)						
		2020	2025	2030	2035	2040 (Opt)
First year	Supply totals	79,717	83,915	88,335	92,259	96,429
	Demand totals	79,717	83,915	88,335	92,259	96,429
	Difference	**0**	**0**	**0**	**0**	**0**
Second year	Supply totals	79,711	83,909	88,329	92,252	96,422
	Demand totals	79,711	83,909	88,329	92,252	96,422
	Difference	**0**	**0**	**0**	**0**	**0**
Third year	Supply totals	78,706	82,851	87,215	91,089	95,207
	Demand totals	78,706	82,851	87,215	91,089	95,207
	Difference	**0**	**0**	**0**	**0**	**0**

7.4 Regional Supply Reliability

Cal Water coordinates on an ongoing basis with all relevant agencies in the region to optimize the use of regional water supplies. This includes the City of Bakersfield, ID-4, and other public and private entities with which Cal Water can collaborate to protect and enhance local groundwater and surface water resources.

Cal Water also has its own aggressive conservation program that has and will continue to reduce per-capita usage and therefore demands on critical water sources. Cal Water is committed to helping its customers use water efficiently and has developed a range of water conservation programs to support this goal. To ensure that it is providing the right mix of programs in the most cost-effective manner possible, Cal Water routinely conducts comprehensive conservation program analysis and planning. This is done on a five-year cycle in tandem with the UWMP. Cal Water's current Conservation Master Plan provides the basis for the information on the implementation of and expected water savings from Demand Management Measures (DMMs) presented in Chapter 9. A copy of the Conservation Master Plan is provided in Appendix L. Cal Water also monitors and supports the goals of the Kern County Integrated Regional Water Management Plan. These goals include:

- Through cooperation and collaboration with other regions restore water supplies to levels that will mitigate for water lost from the region and eliminate overdraft
- Pursue and implement cost effective water use efficiency programs

- Increase water storage capacity in the region by increasing recharge acreage and expanding groundwater banking programs before all prime recharge land has been developed
- Integrate management of water banking facilities to maximize conjunctive use over the planning horizon
- Improve the linkage between land use planning and water supply in the region throughout the planning horizon
- Increase educational opportunities to improve public awareness of water supply, conservation, and water quality issues throughout the planning horizon

Chapter 8
Water Shortage Contingency Planning

This chapter describes the water shortage contingency plan for the Bakersfield District. The water shortage contingency plan includes the stages of response to a water shortage, such as a drought, that occur over a period of time, as well as catastrophic supply interruptions which occur suddenly. The primary objective of the water shortage contingency plan is to ensure that the District has in place the necessary resources and management responses needed to protect health and human safety, minimize economic disruption, and preserve environmental and community assets during water supply shortages and interruptions.

Rule 14.1, as filed with the California Public Utilities Commission (CPUC), serves as Cal Water's Water Shortage Contingency Plan (WSCP) and includes Mandatory Staged Restrictions of Water Use. In the event that more stringent measures are required, Cal Water may request the addition of Schedule 14.1 which includes Staged Mandatory Water Use Reductions.

On April 1, 2016, Cal Water filed its current Schedule 14.1 with the California Public Utilities Commission (CPUC).[10] The Schedule lays out the staged mandatory reductions and drought surcharges associated with Cal Water's Water Shortage Contingency Plan. This filing is consistent with Resolution W-5034, adopted by the Commission on April 9, 2015, ordering compliance with requirements of the State Water Resources Control Board (SWRCB).

Schedule 14.1 is an extension of the Water Shortage Contingency Plan provided in Rule 14.1. The information presented in this chapter, is based on the current versions of both Rule 14.1 and Schedule 14.1 which are based, in part, on the specific SWRCB requirements associated with the Governor's Executive Order requiring statewide cutbacks to address the unprecedented drought.

8.1 Stages of Action

Table 8-1 defines the four stages of action in Cal Water's WSCP.

[10] Schedule 14.1, along with the underlying Cal Water Rule 14.1 are included as Appendix J.

Table 8-1 Retail: Stages of WSCP		
Stage	Complete One or Both	
	Percent Supply Reduction[1]	Water Supply Condition
	numerical value as percent	*narrative description*
1	Up to 10%	Minimal shortage
2	Up to 20%	Moderate shortage
3	Up to 35%	Severe shortage
4	Greater than 35%	Critical shortage
[1] One stage in the WSCP must address a water shortage of 50%.		

8.2 Prohibitions on End Uses

Except where necessary, to address an immediate health or safety need, or to comply with a term or condition in a permit issued by a state or federal agency, customers are prohibited, at all times, from using potable water for the following actions, as each is declared a non-essential, wasteful use of water:

1. Use of potable water through a broken or defective plumbing fixture or irrigation system when Cal Water has notified the customer in writing to repair the broken or defective plumbing fixture or irrigation system, and the customer has failed to effect such repairs within seven (7) business days of receipt of such notice;

2. The application of potable water to landscapes in a manner that causes runoff such that water flows onto adjacent property, non-irrigated areas, private and public walkways, roadways, parking lots, or structures; and,

3. The use of a hose that dispenses potable water to wash vehicles, including cars, trucks, buses, boats, aircraft, and trailers, whether motorized or not, except where the hose is fitted with a shut-off nozzle or device attached to it that causes it to cease dispensing water immediately when not in use.

Restrictions of water use by Stage of the Water Shortage Contingency Plan are included in Table 8-2.

Table 8-2 Retail: Restrictions and Prohibitions on End Uses			
Stage	Restrictions and Prohibitions on End Users	Additional Explanation or Reference *(optional)*	Penalty, Charge, or Other Enforcement?
1	Landscape - Limit landscape irrigation to specific days	Limited to no more than 3 days per week	Yes
1	Landscape - Limit landscape irrigation to specific times	Limited to 8 am and 6pm	Yes
1	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	Must be repaired within 5 business days	Yes
1	Landscape - Restrict or prohibit runoff from landscape irrigation		Yes
1	Landscape - Other landscape restriction or prohibition	Prohibit application of potable water to outdoor landscapes within 48 hours of measurable rainfall.	Yes
1	Other - Require automatic shut off hoses		Yes
1	Other - Prohibit use of potable water for washing hard surfaces		Yes
1	Other	Limits filling ornamental lakes or ponds; prohibit use of potable water in a water feature except where the water is recirculated	Yes
2	Landscape - Limit landscape irrigation to specific days	Limited to no more than 3 days per week	Yes
2	Landscape - Limit landscape irrigation to specific times	Limited to 8 am and 6pm	Yes
2	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	Must be repaired within 3 business days	Yes
2	Landscape - Restrict or prohibit runoff from landscape irrigation		Yes
2	Landscape - Other landscape restriction or prohibition	Prohibits irrigation of ornamental turf on public street medians with potable water; prohibit application of potable water to outdoor	Yes

Table 8-2 Retail: Restrictions and Prohibitions on End Uses			
Stage	Restrictions and Prohibitions on End Users	Additional Explanation or Reference *(optional)*	Penalty, Charge, or Other Enforcement?
		landscapes within 48 hours of measurable rainfall.	
2	CII - Lodging establishment must offer opt out of linen service		Yes
2	CII - Restaurants may only serve water upon request		Yes
2	Other - Require automatic shut off hoses		Yes
2	Other - Prohibit use of potable water for washing hard surfaces		Yes
2	Other	Limits filling ornamental lakes or ponds; prohibit use of potable water in a water feature except where the water is recirculated	Yes
3	Landscape - Limit landscape irrigation to specific days	Limited to no more than 2 days per week	Yes
3	Landscape - Limit landscape irrigation to specific times	Limited to 8 am and 6pm	Yes
3	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	Must be repaired within 2 business days	Yes
3	Landscape - Restrict or prohibit runoff from landscape irrigation		Yes
3	Landscape - Other landscape restriction or prohibition	Prohibits irrigation of ornamental turf on public street medians with potable water; prohibit application of potable water to outdoor landscapes within 48 hours of measurable rainfall.	Yes
3	CII - Lodging establishment must offer opt out of linen service		Yes
3	CII - Restaurants may only serve water upon request		Yes

Table 8-2 Retail: Restrictions and Prohibitions on End Uses			
Stage	Restrictions and Prohibitions on End Users	Additional Explanation or Reference *(optional)*	Penalty, Charge, or Other Enforcement?
3	Other - Require automatic shut off hoses		Yes
3	Other - Prohibit use of potable water for washing hard surfaces	Prohibits use of potable water for street cleaning with trucks except for initial wash-down for construction purposes if street sweeping is not feasible	Yes
3	Other	Limits filling ornamental lakes or ponds; prohibit use of potable water in a water feature except where the water is recirculated	Yes
3	Other - Prohibit use of potable water for construction and dust control	Prohibited unless no other method or source of water can be used	Yes
4	Landscape - Prohibit all landscape irrigation	Prohibited except with hand-held bucket nozzle to maintain trees and shrubs.	Yes
4	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	Must be repaired within 1 business day	Yes
4	Landscape - Restrict or prohibit runoff from landscape irrigation		Yes
4	CII - Lodging establishment must offer opt out of linen service		Yes
4	CII - Restaurants may only serve water upon request		Yes
4	Other - Require automatic shut off hoses		Yes
4	Other - Prohibit use of potable water for washing hard surfaces	Prohibits use of potable water for street cleaning with trucks	Yes
4	Other	Limits filling ornamental lakes or ponds; prohibit use of potable water in a	Yes

Table 8-2 Retail: Restrictions and Prohibitions on End Uses			
Stage	Restrictions and Prohibitions on End Users	Additional Explanation or Reference *(optional)*	Penalty, Charge, or Other Enforcement?
		water feature except where the water is recirculated	
4	Other - Prohibit use of potable water for construction and dust control	No exceptions	Yes

8.3 Penalties, Charges, Other Enforcement of Prohibitions

In accordance with Rule 14.1, Cal Water is authorized to take the following actions to enforce restrictions of water use that are in effect:

First Violation: Cal Water shall provide the customer with a written notice of violation.

Second Violation: If Cal Water verifies that the customer has used potable water for non-essential, wasteful uses after having been notified of the first violation, Cal Water shall provide the customer with a second written notice of violation and is authorized to install a flow-restricting device on the customer's service line.

If Schedule 14.1 is implemented, Cal Water is authorized to take the following actions when its personnel verify a customer is using potable water for non-essential, wasteful uses.

First Violation: Cal Water shall provide the customer with a written notice of violation. In addition, Cal Water is authorized to take the following actions:

A. If the customer currently receives service through a metered connection, install a real-time water measurement device on the customer's service line and provide the customer with access to information from the device. The cost of the device, including installation and ongoing operating costs, may be billed to the customer, and nonpayment may result in discontinuance of service.
B. If the customer does not currently receive service through a metered connection, install a water meter on the customer's service line, charge the customer for water use pursuant to Cal Water's metered service tariffs and rules, and install a real-time water measurement device on the customer's service line and provide the customer with access to information from the device. The cost of the device, including

installation and ongoing operating costs, may be billed to the customer, and nonpayment may result in discontinuance of service.

Second Violation: If Cal Water verifies that the customer has used potable water for non-essential, wasteful uses after having been notified of the first violation, Cal Water shall provide the customer with a second written notice of violation. In addition to the actions prescribed under the first violation above, Cal Water is authorized to take the following actions:

A. Apply the following waste of water penalties, which are in addition to any other charges authorized by this Schedule or other Cal Water tariffs.

   i. If Stage 1 is in effect, $25
   ii. If Stage 2 is in effect, $50
   iii. If Stage 3 is in effect, $100
   iv. If Stage 4 is in effect, $200

B. At its sole discretion, waive the waste of water penalty if the customer participates in a water use evaluation provided by Cal Water and/or provides documentation to Cal Water proving that a drip irrigation system, micro spray irrigation system, high-efficiency sprinkler system, or properly programmed smart irrigation controller has been installed, after a notice of violation was delivered, and is in use at the customer's service address.

Third Violation: If Cal Water verifies that the customer has used potable water for non-essential, wasteful uses after having been notified of the second violation, Cal Water shall provide the first and second violations above, Cal Water is authorized to take the following actions:

A. Apply the following waste of water penalties, which are in addition to any other charges authorized by this Schedule or other Cal Water tariffs.

   i. If Stage 1 is in effect, $50
   ii. If Stage 2 is in effect, $100
   iii. If Stage 3 is in effect, $200
   iv. If Stage 4 is in effect, $400

B. At its sole discretion, waive the waste of water surcharge if the customer participates in a water use evaluation provided by Cal Water and/or provides documentation to Cal Water proving that a drip irrigation system, micro spray irrigation system, high-efficiency sprinkler system, or properly programmed smart irrigation controller has

been installed, after notice of violations have been delivered, and is in use at the customer's service address.

Fourth Violation: If Cal Water verifies that the customer has used potable water for non-essential, wasteful uses after having been notified of the third violation, Cal Water shall provide the customer with a fourth written notice of violation. In addition to actions set forth in previous violations prescribed above, Cal Water is authorized to install a flow-restricting device on the customer's service line.

Egregious Violations: Notwithstanding the foregoing framework for penalties, customers who Cal Water has verified are egregiously using potable water for non-essential, wasteful uses are subject to having a flow- restricting device installed on their service line. After providing the customer with one notice of egregious violation, either by direct mail or door hanger, which documents the egregious use of potable water for non-essential, wasteful uses and explains that failure to correct the violation may result in the installation of a flow-restricting device on the customer's service line, Cal Water is authorized to install a flow-restricting device on the customer's service line.

DROUGHT SURCHARGES

Cal Water may elect to implement actions such as water budgets with associated surcharges through the implementation of Schedule 14.1. An example of such a program is included in Appendix J.

8.4 Consumption Reduction Methods by Agencies

Table 8-3 Retail: Stages of WSCP - Consumption Reduction Methods		
Stage	Consumption Reduction Methods by Water Supplier	Additional Explanation or Reference *(optional)*
2	Expand Public Information Campaign	
2	Offer Water Use Surveys	Offered as part of standard conservation program. Will expand as needed to achieve additional savings.
2	Provide Rebates or Giveaways of Plumbing Fixtures and Devices	Offered as part of standard conservation program. Will expand as needed to achieve additional savings.
2	Provide Rebates for Landscape Irrigation Efficiency	Offered as part of standard conservation program. Will expand as needed to achieve additional savings.
2	Decrease Line Flushing	

Table 8-3 Retail: Stages of WSCP - Consumption Reduction Methods		
Stage	Consumption Reduction Methods by Water Supplier	Additional Explanation or Reference *(optional)*
2	Reduce System Water Loss	
2	Increase Water Waste Patrols	
2	Other	Mandatory water budgets and banking-- Water budgets will be based on a customer's consumption during a historical base period and will include a percentage reduction designed to meet necessary water-use reductions.
2	Implement or Modify Drought Rate Structure or Surcharge	Drought surcharges charged to customers for each unit of water used over the established water budget for the billing period. For Stage 2 surcharges are two times the highest residential tier rate, with exceptions discussed in Section 8.3
3	Expand Public Information Campaign	
3	Offer Water Use Surveys	Offered as part of standard conservation program. Will expand as needed to achieve additional savings.
3	Provide Rebates or Giveaways of Plumbing Fixtures and Devices	Offered as part of standard conservation program. Will expand as needed to achieve additional savings.
3	Provide Rebates for Landscape Irrigation Efficiency	Offered as part of standard conservation program. Will expand as needed to achieve additional savings.
3	Decrease Line Flushing	
3	Reduce System Water Loss	
3	Increase Water Waste Patrols	
3	Other	Mandatory water budgets and banking
3	Implement or Modify Drought Rate Structure or Surcharge	Drought surcharges charged to customers for each unit of water used over the established water budget for the billing period.
4	Expand Public Information Campaign	
4	Offer Water Use Surveys	Offered as part of standard conservation program. Will expand as needed to achieve additional savings.

Table 8-3 Retail: Stages of WSCP - Consumption Reduction Methods		
Stage	Consumption Reduction Methods by Water Supplier	Additional Explanation or Reference *(optional)*
4	Provide Rebates or Giveaways of Plumbing Fixtures and Devices	Offered as part of standard conservation program. Will expand as needed to achieve additional savings.
4	Provide Rebates for Landscape Irrigation Efficiency	Offered as part of standard conservation program. Will expand as needed to achieve additional savings.
4	Decrease Line Flushing	
4	Reduce System Water Loss	
4	Increase Water Waste Patrols	
4	Other	Mandatory water budgets and banking
4	Other	Mandatory water budgets and banking
4	Implement or Modify Drought Rate Structure or Surcharge	Drought surcharges charged to customers for each unit of water used over the established water budget for the billing period.
NOTES: The actions included may be implemented through a combination of Rule 14.1 and Schedule 14.1 and would be evaluated based on specific need.		

8.5 Determining Water Shortage Reductions

All customers in the District are metered. The metered demands will be used to monitor reductions that result from actions taken by Cal Water when implementing its WSCP.

8.6 Revenue and Expenditure Impacts

In 2008 the CPUC allowed for the creation of a Water Revenue Adjustment Mechanism (WRAM) and Modified Cost Balancing Accounts (MCBA). The goals of the WRAM and MCBA are to sever the relationship between sales and revenue to remove the disincentive to reduce water use. The WRAM and MCBA are designed to be revenue neutral in order to ensure that both the utility and ratepayers are neither harmed nor benefitted.

During the current drought, the CPUC authorized a memorandum account through Resolution W-4976 to track incremental drought-related costs and waste of water penalties which may be recovered through rates if deemed appropriate by the Commission.

8.7 Resolution or Ordinance

Cal Water is an investor-owned water utility that is regulated by the California Public Utilities Commission (CPUC). As such, it does not have the authority to adopt resolutions or ordinances. As described above, Rule 14.1, as filed with the California Public Utilities Commission (CPUC), serves as Cal Water's Water Shortage Contingency Plan and includes Mandatory Staged Restrictions of Water Use. In the event that more stringent measures are required, Cal Water may request the addition of Schedule 14.1 which includes Staged Mandatory Water Use Reductions. Cal Water will work with local planning and enforcement departments to ensure consistency with local resolutions and ordinances.

8.8 Catastrophic Supply Interruption

Cal Water has an Emergency Response Plan (ERP) in place that coordinates the overall company response to a disaster in any or all of its districts. In addition, the ERP requires each District to have a local disaster plan that coordinates emergency responses with other agencies in the area.

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

During an emergency, the District can transfer water from a neighboring water system owned by the City of Bakersfield using three emergency connections. These interconnections can be used to help offset the impact of the interruption in service to District customers resulting from the failure of water supply facilities. Because these are two-way connections, these facilities can also be used to supply either imported water or pumped groundwater from the Bakersfield District to the City of Bakersfield water system. Cal Water operates this system under contract for the City.

Cal Water also maintains backup power at several of its key supply sources including the Northeast Treatment Plant, the Northwest Treatment Plant, and a number of its wells throughout the main system and the North Garden system. There is also backup power for some of its pressure systems located in the main Bakersfield system to maintain pressure in the event of a regional power outage. These backup sources are routinely tested, maintained properly, and replaced when necessary.

8.9 Minimum Supply Next Three Years

Table 8-4 provides estimates of total supply volumes that would be produced if the hydrology of the multi-year drought period discussed in Chapter 7 were to occur in the

immediate future. These volumes are equal to the projected 2020 supplies in Table 7-4. Since District near-term supplies over a multi-year dry period are projected to be at least sufficient to serve demands, it is likely that current supply sources could produce more water. Cal Water does not have sufficient information to estimate how much more.

Table 8-4 Retail: Minimum Supply Next Three Years (AF)			
	2016	2017	2018
Available Water Supply	79,717	79,711	78,706

Chapter 9
Demand Management Measures

This chapter provides a summary of past and planned demand management measure (DMM) implementation in the Bakersfield District, as well as an overview of the expected water savings and projected compliance with the Water Conservation Act of 2009 (SB X7-7).

This chapter contains the following sections:

9.1 Demand Management Measures for Wholesale Agencies

9.2 Demand Management Measures for Retail Agencies

9.3 Implementation over the Past Five Years

9.4 Planned Implementation to Achieve Water Use Targets

9.5 Members of the California Urban Water Conservation Council

9.1 Demand Management Measures for Wholesale Agencies

Because the Bakersfield District is a retail water supplier, this section does not apply.

9.2 Demand Management Measures for Retail Agencies

Cal Water centrally administers its conservation programs for its 24 districts. For purposes of this section, these programs have been grouped in accordance with the DMM categories in Section 10631(f) of the UWMP Act. These categories are:

(i) Water waste prevention ordinances
(ii) Metering
(iii) Conservation pricing
(iv) Public education and outreach
(v) Distribution system water loss management
(vi) Water conservation program coordination and staffing support, and
(vii) Other demand management measures

Following are descriptions of the conservation programs Cal Water operates within each of these DMM categories.

9.2.1 Water Waste Prevention Ordinances

Because of its investor owned status Cal Water enforcement of water use restrictions is authorized by the CPUC through Rule 14.1 or Schedule 14.1. Restrictions may also be regulated by ordinances passed by the local governments in each community served. Cal Water has worked with municipalities to pass ordinances and coordinate activities. Cal Water will continue this effort on an ongoing basis. The City of Bakersfield has adopted various Municipal Code Ordinances relating to water wastage. The ordinances apply to all water utilities who supply water within the incorporated City of Bakersfield boundaries, as well as the City Domestic Water System. A list of these ordinances is provided and described below:

- 12.28.020 Water on sidewalks -- Any person owning or having in his possession any water pipe, drain or hose and who permits the water there from to run across any sidewalk, public street or alleyway, so as to injure the same or obstruct or interfere with the free travel thereon, or who permits said water to run into or upon the surface of the street, shall be punished as set forth in general penalty provision Section 1.40.010, excepting, however, that it is not unlawful to use a reasonable amount of water to clean any sidewalk or portion thereof within the city. (Ord. 3434 § 2, 1992: prior code§ 10.07.070)
- 12.28.030 Allowing irrigation water to overflow into gutters -- It is unlawful for the owner, agent or tenant of any dwelling house, apartment house, flat building or any building or premises in the city where water is used to irrigate or sprinkle the lawn or plants on or about said premises to allow the water so being used to run, or for such person to sprinkle said premises until the water floods the parking space between the sidewalk and the curb and overflows into the gutter and street. (Prior code § 8.56.010)
- 12.28.040 Duty to turn off water before it overflows into gutters -- It shall be the duty of all owners, agents or tenants of dwelling houses, apartment houses, flat buildings and all such premises where water is used to irrigate or sprinkle the lawn and plants on or about said premises, to shut or turn off all water before the same runs over the curb in front of said premises and into the gutter and street. (Prior code§ 8.56.020)
- 14.04.300 Service connections, meters and customers' facilities - Water wastage Where negligent or wasteful use of water exists on a customer's premises, seriously affecting the general service, the city may discontinue the service if such conditions are not corrected within five days after giving customer written notice of intent to do so. (Prior code § 1.46.150(g))

Additionally, the City of Bakersfield has established city-wide landscape standards to promote water use efficiency by encouraging landscape design to minimize watering and avoid unnecessary runoff of irrigation water. These standards are now implemented through a model water efficient landscape ordinance (Bakersfield Municipal Code, 17.04.358, amended 17.61).

Due to worsening drought conditions, Cal Water filed Schedule 14.1 with the CPUC in the spring of 2015 which went into effect on June 1, 2015. Cal Water's Schedule 14.1 filing, which applies to both residential and non-residential customers, is responsive to Governor Brown's emergency drought declaration and executive order requiring a statewide 25% reduction in urban potable water use. It also complies with regulations adopted by the State Water Resources Control Board (State Board) and the CPUC to achieve that reduction by the end of February 2016. Schedule 14.1 puts measures in place to enable Cal Water to enforce the water-use prohibitions set by the State Board, including:

- Applying water to outdoor landscapes that causes runoff onto adjacent property, non-irrigated areas, private and public walkways, roadways, parking lots, or structures
- Using a hose to wash motor vehicles unless the hose is fitted with a shut-off nozzle or device that causes it to cease dispensing water immediately when not in use
- Applying water to driveways and sidewalks
- Using water in a fountain or other decorative water feature, except where the water is part of a recirculating system
- Applying water to outdoor landscapes during and within 48 hours after measurable rainfall
- Using potable water to irrigate outside of new construction without drip or microspray systems
- Using potable water on street medians
- Filling or refilling ornamental lakes or ponds except to sustain existing aquatic life

Additionally, Schedule 14.1 requires that:

- Customers must fix leaks within their control within five business days of notification
- Hotel/motel operators must provide option to not have towels or linens laundered daily during a guest's stay, and must provide clear notice of this option in easy-to-understand language
- Restaurants and other eating and drinking establishments may only serve drinking water upon request

With the approval of the Schedule 14.1 filing, beginning June 1, 2015, individual customers in each Cal Water district were provided water budgets based upon their water use each month in 2013 minus the state-mandated reduction for the Bakersfield District of 32%. If a customer used less than his or her water budget, the unused water was carried forward, similar to rollover minutes on a cell phone plan. Water used in excess of the monthly budget was subject to a drought surcharge. The surcharge was discounted for customers on Cal Water's Low-Income Rate Assistance (LIRA) program. To help with compliance, the customer's monthly bill showed his or her water budget for the following month. Customers' water use history back to 2011 and their water budgets were also available online beginning in June of 2015.

Cal Water's Schedule 14.1 filing is included as Appendix J of this UWMP.

9.2.2 Metering

All non-residential and approximately two-thirds of residential services within the Bakersfield District are metered. Meters are read monthly and routinely maintained and calibrated. Metered customers are billed monthly based on their metered water use. As of 2015 Bakersfield had approximately 20,000 unmetered residential service connections. The District is in the process of converting these connections to metered service and expects to have converted all connections to metered service by the end of 2022.

Cal Water is also piloting automatic meter reading (AMR) and advanced metering infrastructure (AMI) in several of its districts. AMI may be used by Cal Water in the future to detect and alert households of leaks and other possible problems as well as to provide customers with tailored water use information to help them use water more efficiently.

9.2.3 Conservation pricing

As an investor owned utility, Cal Water rates and charges are reviewed and authorized by the CPUC every three years. Starting in 2008 Cal Water adopted tiered rate designs for single family residential service. Uniform volumetric rate designs are employed by Cal Water for other water service classes. Current volumetric rates by class of service within Bakersfield District are provided in Table 9-1.

Table 9-1: Volumetric Water Rates by Class of Service ($/CCF)

Class of Service	Tier 1 (1-13 ccf)	Tier 2 (14-34 ccf)	Tier 3 (35+ ccf)	All units of water
Single Family	$1.68	$1.82	$2.12	
Non Residential				$1.70

Per the Memorandum of Understanding Regarding Urban Water Conservation in California (MOU), conservation pricing provides economic incentives to customers to use water efficiently via a volumetric water rate. The MOU considers uniform, seasonal, tiered (block), and allocation-based rate designs as each being potentially consistent with conservation pricing, provided that either (1) 70% or more of total annual revenue is derived from the volumetric component of the rate design or (2) the proportion of total revenue from the volumetric component of the rate design equals or exceeds the long-run incremental cost of providing water service, or (3) the utility's metering technology, rate structure, and customer communication programs satisfy various requirements specified by the MOU.

The Bakersfield District's rate structure, metering, and customer communication programs comply with Option 3 of the Urban MOU's definition of conservation pricing. Urban MOU BMP compliance reports are provided in Appendix L.

9.2.4 Public Education and Outreach

Cal Water's public outreach program is divided into four components, as follows:

Residential Customer Assistance – This category provides tailored assistance to residential customers through home water surveys and monthly water use reports. It provides assistance to residential customers wanting to reduce their indoor and outdoor water uses. While available to all residential customers, marketing of home water surveys is generally focused on high use residential customers.

Non-Residential Customer Assistance – This category provides tailored assistance to commercial customers through commercial water surveys, monthly landscape reports to large landscape customers, and large landscape water use surveys. It provides assistance to commercial customers wanting to reduce their use of water for sanitation, hygiene, process, and landscape purposes.

Public Information and School Education – Cal Water's public information program provides general information on the need for and value and methods of water conservation through multiple media outlets, including its website, direct mail, external print media, and radio. Cal Water's school education program includes the Cal Water H2O Challenge, a project-based learning competition for grades 4-6, Cal Water Town, an interactive online learning tool, and general information and learning materials for students and teachers.

Rebate Program Information and Marketing – Through its website, bill inserts, newsletters, and radio and print media, Cal Water advertises and markets a variety of conservation rebate programs, including rebate programs for high-efficiency toilets,

urinals, and clothes washers, and irrigation equipment and landscape efficiency improvements.

9.2.5 Programs to Assess and Manage Distribution System Real Loss

Per the MOU, Cal Water annually quantifies the District's volume of apparent and real water loss. Cal Water's conservation staff have received training in the AWWA water audit method and component analysis process and have completed water balances for each Cal Water district using AWWA's water audit software. For the five-year period 2011-2015, apparent and real water loss in the Bakersfield District averaged 5,748 AF, or approximately 8 percent of total production.

In addition to its routine and planned system maintenance and water loss reporting, Cal Water is planning to implement a lift-and-shift sonic data logger leak detection program in the District starting in 2017. The lift-and-shift program will survey up to one-third of main miles annually in three shifts. Each leak detection shift will last approximately 80 days. Lift-and-shift sonic data logging technology will enable Cal Water to quickly and efficiently locate leaks in one part of the water distribution network and then redeploy the equipment to another part of the network. Staff will review sound files from the loggers for potential leak warnings and discuss this information with District management, who can then assign work orders for repair crews to investigate and repair leaks. Cal Water conservatively estimates the lift-and-shift program will reduce real water loss in the District by up to 657 AFY – enough water for about 2,000 households. Additional potential benefits of the program include reduced excavation of streets, less staff overtime spent responding to and repairing catastrophic main breaks, and improvement to the best management practices of the valve maintenance program. This program was submitted as part of Cal Water's 2015 General Rate Case with the CPUC and is subject to CPUC approval prior to implementing.

9.2.6 Water Conservation Program Coordination and Staffing Support

Because of its status as an investor owned utility, conservation program staffing positions must be approved by the CPUC through its General Rate Case every three years. Currently authorized conservation program staffing consists of five full-time positions, which include:

- One Conservation Program Manager
- One Conservation Program Analyst
- One Landscape Program Analyst
- Two Conservation Program Coordinators

These five staff positions manage all aspects of Cal Water's conservation programs deployed across 24 separate districts serving a combined population of about 2 million through 470,000 service connections. Staffing constraints have been one of the primary challenges Cal Water has faced in expanding the scope and reach of its conservation programs throughout its service districts. To ensure adequate management and oversight of the expansion and utilization of its conservation programs, Cal Water is proposing in its current General Rate Case to add three additional Conservation Program Coordinator positions. Proposed staffing is summarized in Table 9-2. If approved, total staffing level would increase from 5 to 8 FTE positions. While this would still be below the average for conservation programs of similar size and scope operated by other water utilities, it would be a substantial improvement over Cal Water's current conservation program staffing levels.

Table 9-2: Planned Conservation Program Staffing

Staff Position	Responsibilities	Position Status
Conservation Program Manager	Long-term program planning and implementation; program budgeting and oversight; staff oversight and management; contracting and oversight of outside services	Existing
Conservation Program Coordinator	Management and oversight of conservation programs in Cal Water districts	2 Existing 3 Proposed
Conservation Program Analyst	Program analysis and reporting, including but not limited to preparation of reports related to CPUC requirements, urban water management plans, BMP compliance reports, and SB X7-7 compliance reports	Existing
Landscape Program Analyst	Analysis and tracking of landscape program implementation and performance; coordination of landscape program rollouts; GIS/GPS management; assist regional conservation program coordinators with management/oversight of landscape programs	Existing

9.2.7 Other Demand Management Measures

In addition to the DMM programs described above, Cal Water operates rebate, give-away, and direct installation programs aimed at plumbing fixture replacement and irrigation equipment and landscape efficiency improvements. Following are brief descriptions of each of these DMMs.

MaP Premium and Non-Premium Toilet Replacement – This program replaces old toilets with MaP certified high-efficiency toilets. Financial rebates, direct installation, and direct distribution are used to deliver toilets to customers. For residential customers, MaP premium certified toilets which have greater water savings potential are eligible for a $100 rebate while the rebate for MaP non-premium toilets is $50. For commercial customers, a rebate of $100 is available for valve-type toilets flushing 1.28 gallons or less and EPA WaterSense labeled tank-type toilets. Cal Water centrally administers the program. This program is available to all residential and non-residential customers. Cal Water markets the program through direct mail, print media, bill stuffers, and its website. Where advantageous, Cal Water partners with local or regional agencies and community organizations to offer the program.

Urinal Valve and Bowl Replacement – This program replaces old urinals with high-efficiency urinals meeting the new 0.125 gallon per flush water use standard adopted by the California Energy Commission in April 2015. Financial rebates of up to $150 are available to customers. The program targets offices and public buildings receiving significant foot traffic. Cal Water centrally administers the program. While this program is available to all non-residential customers, marketing focuses on prime targets, such as restaurants and high-density office buildings. Cal Water markets the program through direct mail, print media, bill stuffers, and its website.

Clothes Washer Replacement – This program provides customer rebates up to $150 for residential and up to $200 for non-residential high-efficiency clothes washers. The program targets single-family households, multi-family units, multi-family common laundry areas, and commercial coin-op laundries. Cal Water centrally administers the program, and markets the program through direct mail, print media, bill stuffers, and its website. This program is available to all residential and non-residential customers. Where advantageous, Cal Water partners with local or regional agencies to offer the program.

Residential Conservation Kit Distribution – This program offers Cal Water residential customers conservation kits featuring a range of water-saving plumbing retrofit fixtures. Kits are available at no charge to customers, who can request them via Cal Water's website, via mail, or by contacting or visiting their District. Each kit includes the following items: high-efficiency showerheads, kitchen faucet aerator, bathroom faucet aerators, full-stop hose nozzle, and toilet leak detection tablets. Cal Water centrally administers

this program as part of a company-wide program operated in each of its districts. This program is available to all residential customers. Cal Water markets the program through direct mail, print media, bill stuffers, and through its website.

Smart Controllers Rebates/Vouchers – This program targets residential and non-residential customers with high landscape water use. The program offers financial incentives up to $125 for residential controllers and up to $25 per station for commercial-grade controllers to either the customer or contractor for proper installation of the Smart Controller at customer sites. The landscape contractor has the direct relationship with customers and is typically the entity customers listen to when making landscape and irrigation decisions. The program educates contractors about the customer benefits of Smart Controllers along with proper installation of the devices. This program is offered to all residential and non-residential customers. Cal Water markets the program through direct mail, print media, bill stuffers, and its website.

High Efficiency Irrigation Nozzle Web Vouchers/Rebates – Water efficient sprinkler nozzles (popup and rotating) and integrated pressure-regulated spray bodies use significantly less water than a standard sprinkler head by distributing water more slowly and uniformly to the landscape. In addition to reducing water use, water directed from these nozzles reduces run-off onto streets and sidewalks with a more directed flow. Customers are able to obtain the nozzles and spray bodies either directly through Cal Water or via a web-voucher program. Restrictions on the number of nozzles individual customers may receive vary by customer class and/or landscape size. Cal Water centrally administers this program as part of a company-wide program operated in most of its districts.

Turf Buy-Back – This program offers customers a $1 per square foot rebate to replace turf with qualified drought-tolerant landscaping. Customer applications are screened to ensure program requirements are met, including before and after photos of the retrofitted landscape area. Turf replacement rebates were offered in a subset of Cal Water districts starting in 2014 and offered across all districts starting in 2015 as a drought response measure. Governor Brown's Executive Order B-29-15 calls on the Department of Water Resources to lead a statewide initiative, in partnership with local agencies, to replace 50 million square feet of lawns and ornamental turf with drought tolerant landscapes.

Table 9-3 summarizes the DMMs currently available to Bakersfield district customers.

Table 9-3: Cal Water DMMs Available to Bakersfield District Customers			
1. Plumbing Fixture Replacement	Customer Class Eligibility		
Rebates	SFR	MFR	COM
MaP Premium Toilet	✓	✓	✓
MaP Non-Premium Toilet	✓	✓	✓
Urinal Bowl & Valve (< 0.125 gal)			✓
Clothes Washer (In Unit)	✓	✓	
Clothes Washer (Commercial)		✓	✓
Direct Install			
MaP Premium Toilet	✓	✓	
MaP Non-Premium Toilet			
Urinal Valve (< 0.125 gal)			
Direct Distribution			
MaP Premium Toilet	✓	✓	
Conservation Kits (showerheads, aerators)	✓		✓
2. Irrigation Equipment/Landscape Upgrades			
Rebates/Vouchers			
Smart Irrigation Controller	✓	✓	✓
High Efficiency Irrigation Popup Nozzle	✓	✓	✓
High Efficiency Irrigation Rotating Nozzle	✓	✓	✓
High Efficiency Irrigation Spray Body		✓	✓
Turf Buy-Back	✓	✓	✓
Direct Distribution			
Smart Irrigation Controller		✓	✓
3. Residential Customer Assistance			
Residential Water Survey	✓	✓	
4. Non-Residential Customer Assistance			
Commercial Water Use Surveys			✓
Monthly Water Use Report			✓
Large Landscape Water Use Survey			✓
Note: MaP Premium toilets: flush vol <= 1.1 gallons; MaP Non-Premium: flush vol <= 1.28 gallons.			

9.3 Implementation over the Past Five Years

Implementation of customer DMMs over the past five years is summarized in Table 9-4. Estimated annual and cumulative water savings from customer DMM implementation is shown in the last row of the table. The water savings estimates are only for the customer DMMs listed in Table 9-3. They do not include water savings from water waste prevention ordinances, conservation pricing, general public information, or distribution system water loss management DMMs. Estimated water savings shown in Table 9-4 were calculated with the Alliance for Water Efficiency's Water Conservation Tracking Model.

Significant additional reductions in water demand were achieved in 2015 in response to the district's drought response measures, including its public information campaigns to save water and its Schedule 14.1 water use restrictions, water budgets, and drought surcharges that went into effect June 1, 2015. Relative to its 2013 reference year under the State Board's Emergency Regulation for Statewide Urban Water Conservation, water demand between June and December 2015 decreased by 32.1 percent. Per capita potable water use in 2015 was 176 GPCD compared to the District's SB X7-7 2015 interim water use target of 266 GPCD. As discussed in Chapter 5 and the next section, for purposes of SB X7-7 compliance, the District has formed a regional alliance with Cal Water's three other Tulare Lake area water districts. Per capita potable water use in 2015 for the regional alliance was 168 GPCD compared to the regional alliance's 2015 interim water use target of 250 GPCD.

Table 9-4: Implementation of Customer DMMs: 2011-2015		
1. Plumbing Fixture Replacement	2011 – 2015 Total	Average Annual
Toilets & Urinals (number distributed)	4,622	924
Clothes Washers (number distributed)	707	141
Conservation Kits (number distributed)	6,198	1,240
2. Irrigation Equipment/Landscape Upgrades		
Smart Controllers (number distributed)	269	54
Nozzles & Spray Bodies (number distributed)	62,768	12,554
Turf Buy-Back (sq ft removed)	23,712	4,742
3. Residential Customer Assistance		
Surveys/Audits (homes receiving)	445	89
4. Non-Residential Customer Assistance		
Surveys/Audits (sites receiving)	15	3
Large Landscape Reports (sites receiving)	802	160
Estimated Water Savings (AF)	**864**	**173**
Note: Estimated water savings shown in the table are only for the 2011-2015 period. Water savings from customer DMMs implemented between 2011 and 2015 will continue after 2015 and last for the useful life of each DMM.		

Annual expenditure for implementation of customer DMMs over the past five years is summarized in Table 9-5. The table highlights expenditures from 2011 through 2015 for administrative, research, planning, program, and public information and school education.

Table 9-5: Annual DMM Expenditure: 2011-2015		
Expenditure Category	2011 – 2015 Total	Average Annual
Admin, R&D, planning	$474,340	$94,868
Program expenditures & incentives	$2,211,140	$442,228
Public information & school education	$346,960	$69,392
Total	**$3,032,440**	**$606,488**

9.4 Planned Implementation to Achieve Water Use Targets

Planned implementation of customer and water loss management DMMs for the period 2016 to 2020 are summarized in Table 9-6. Estimated annual and cumulative water

savings from customer and water loss management DMM implementation is shown in the last two rows of the table. The water savings estimates are only for the customer DMMs listed in Table 9-3 plus the leak detection program Cal Water has proposed to start in 2017. They do not include potential water savings from water waste prevention ordinances, conservation pricing, or general public information and school education DMMs. Estimated water savings shown in Table 9-6 were calculated with the Alliance for Water Efficiency's Water Conservation Tracking Model.

In addition to the DMMs shown in Table 9-6, Cal Water will continue to fully implement the water loss ordinance, metering, conservation pricing, public outreach, and conservation program coordination and staffing support DMMs described previously.

Annual expenditure for DMM implementation in the Bakersfield District, including pro-rated staffing costs, is expected to average $0.91 million. Cumulative expenditure for DMM implementation for the period 2016-2020 is expected to total $4.53 million. Of this total, approximately 41% is earmarked for plumbing fixture, irrigation equipment, and landscape efficiency upgrades; 16% is earmarked for public information and school education programs; 14% is earmarked for distribution system water loss management; 9% is earmarked for site surveys/audits and customer water use reports; and 19% is earmarked for administrative and labor costs.

Because Cal Water is an investor-owned utility, the planned programs and corresponding expenditures for the next five years are subject to CPUC review and approval. The amount of program implementation for 2016 shown in Table 9-6 is what was approved in Cal Water's last General Rate Case. The amounts of program implementation for 2017-2019 are what Cal Water has proposed in its current General Rate Case. Conservation programs and budgets for 2020 will be determined by the subsequent General Rate Case. However, the amounts shown for 2020 in Table 9-6 are consistent with the amounts recommended in Cal Water's current Conservation Master Plan (see Appendix L).

Cal Water puts all proposed conservation programs through a rigorous benefit-cost analysis as part of a comprehensive program review and assessment process. The benefit-cost analysis yields information on expected water savings over the useful life of each DMM, cost of water savings, and avoided water supply cost of water savings. Results are used to rank programs in terms of cost-effectiveness, calculate the overall program unit cost of saved water and program benefit-cost ratio for each district, and develop district conservation budgets. The proposed DMMs for the Bakersfield District have an overall program unit cost of saved water of $373/AF (in 2015 dollars) and a benefit-cost ratio of 0.5. The unit cost of saved water includes all direct program costs associated with implementation of the proposed conservation programs. The low benefit-cost ratio is due to the fact that Bakersfield District can supply its customers with groundwater that has a low marginal pumping cost. However, because of declining groundwater levels in

the region and future implementation of the Sustainable Groundwater Management Act, Cal Water is pursuing strategies, including investment in conservation, to reduce dependence on regional groundwater resources.

Projected SB X7-7 compliance water use for Bakersfield District in 2020 under planned levels of DMM implementation is 237 GPCD compared to its target water use of 237 GPCD. The Bakersfield District is also expected to comply with SB X7-7 under its regional alliance. Projected 2020 potable water demand for the regional alliance under planned levels of DMM implementation is 222 GPCD compared to a regional alliance target of 222 GPCD. Thus, the Bakersfield District is projected to be in compliance with SB X7-7 in 2020 both individually and as a member of its regional alliance.

Table 9-6: Planned Implementation of Customer and Water Loss Management DMMs: 2016-2020

1. Plumbing Fixture Replacement	2016	2017	2018	2019	2020
Toilets & Urinals (number distributed)	164	525	525	525	525
Clothes Washers (number distributed)	207	107	107	107	107
Consv. Kits (number distributed)	100	300	300	300	300
2. Irrigation Equipment/Landscape Upgrades					
Smart Controllers (number distributed)	0	0	0	0	0
Nozzles & Spray Bodies (number distributed)	37,640	23,000	23,000	23,000	23,000
Turf Buy-Back (sq ft removed)	80,000	80,000	80,000	80,000	80,000
3. Residential Customer Assistance					
Monthly home water reports (homes receiving)	15,206	15,206	15,206	15,206	15,206
Surveys/Audits (homes receiving)	200	100	100	100	100
4. Non-Residential Customer Assistance					
Surveys/Audits (sites receiving)	7	4	4	4	4
Large Landscape Reports (sites receiving)	149	149	149	149	149
5. Water Loss Management					
Leak Detection (miles of main)	0	162	242	323	323
Estimated Annual Water Savings (AFY)	**575**	**962**	**1,184**	**1,405**	**1,461**
Cumulative Water Savings (AF)	**575**	**1,537**	**2,721**	**4,126**	**5,586**

9.5 Members of the California Urban Water Conservation Council

Cal Water is a member of the California Urban Water Conservation Council (CUWCC). CUWCC members have the option of submitting their 2013–2014 Best Management

Practice (BMP) annual reports in lieu of, or in addition to, describing the DMMs in their UWMP (CWC 10631). The BMP annual reports for the Bakersfield District are provided in Appendix L.

Chapter 10
Plan Adoption, Submittal, and Implementation

This Chapter provides information on a public hearing, the adoption process for the UWMP, the adopted UWMP submittal process, plan implementation, and the process for amending the adopted UWMP.

This chapter includes the following sections:

10.1 Inclusion of All 2015 Data

This UWMP includes the water use and planning data for the entire calendar year of 2015, per DWR UWMP Guidelines (pg. 2-11).

10.2 Notice of Public Hearing

Prior to adopting the Plan, Cal Water held a formal public hearing to present information on its Bakersfield District UWMP on May 10, 2016, 5:30 PM at the following location:

Bakersfield Customer Center Conference Room
3725 South H Street
Bakersfield, CA 93304

Two audiences were notified of the UWMP review at least 60 days prior to the public hearing: cities and counties, and the public. These audiences were noticed again with the specific date, time and location of the hearing at least two weeks prior to the public hearing. The notice to the public, as specified in Government Code 6066, can be found in Appendix D. Table 10-1 lists the cities and counties notified.

10.2.1 Notice to Cities and Counties

Table 10-1 Retail: Notification to Cities and Counties		
City Name	60 Day Notice	Notice of Public Hearing
City of Bakersfield	✓	✓
County Name	60 Day Notice	Notice of Public Hearing
Kern County	✓	✓

10.2.2 Notice to the Public

Notification to the public and to cities and counties also provided instructions on how to view the 2015 UWMP prior to the hearing, the revision schedule, and contact information of the UWMP preparer. A copy of this notice is included in Appendix D.

10.3 Public Hearing and Adoption

The deadline for public comments was May 17, 2016, one week after the public hearing. The final plan was formally adopted by Cal Water's Vice President of Engineering on June 20, 2016, and was submitted to California Department of Water Resources within 30 days of approval. Appendix B presents a copy of the signed Resolution of Plan Adoption. Appendix C contains the following:

- Letters sent to and received from various agencies regarding this plan
- Correspondence between Cal Water and participating agencies

10.4 Plan Submittal

This UWMP was submitted to DWR within 30 days of adoption and by the July 1, 2016 deadline. The submittal was done electronically through WUEdata, an online submittal tool. The adopted Plan was also sent to the California State Library and to the cities and counties listed in Table 10-1.

10.5 Public Availability

On or about April 26, 2016, a printed hard-copy of the Draft 2015 Urban Water Management Plan and the Conservation Master Plan were made available for review during normal business hours at the Bakersfield District's Customer Center, located at 3725 South H Street, Bakersfield CA. Electronic versions were also made available by visiting Cal Water's website: https://www.calwater.com/conservation/uwmp.

10.6 Amending an Adopted UWMP

If the Plan is amended, each of the steps for notification, public hearing, adoption and submittal will also be followed for the amended plan.

Appendix A: UWMP Act Checklist

Appendix B: Resolution to Adopt UWMP

Appendix C: Correspondences

Appendix D: Public Meeting Notice

Appendix E: Service Area Map

Appendix F: Projection Analysis Worksheets (PAWS)

Appendix G: Supplemental Water Supply Information

Appendix H: DWR UWMP Tables Worksheets

Appendix I: DWR SB X7-7 Verification Forms

Appendix J: Schedule 14.1 and Local Conservation Ordinances

Appendix K: Water Efficient Landscape Guidelines

Appendix L: Conservation Master Plan

Appendix M: DWR/AWWA Water Balance Worksheet