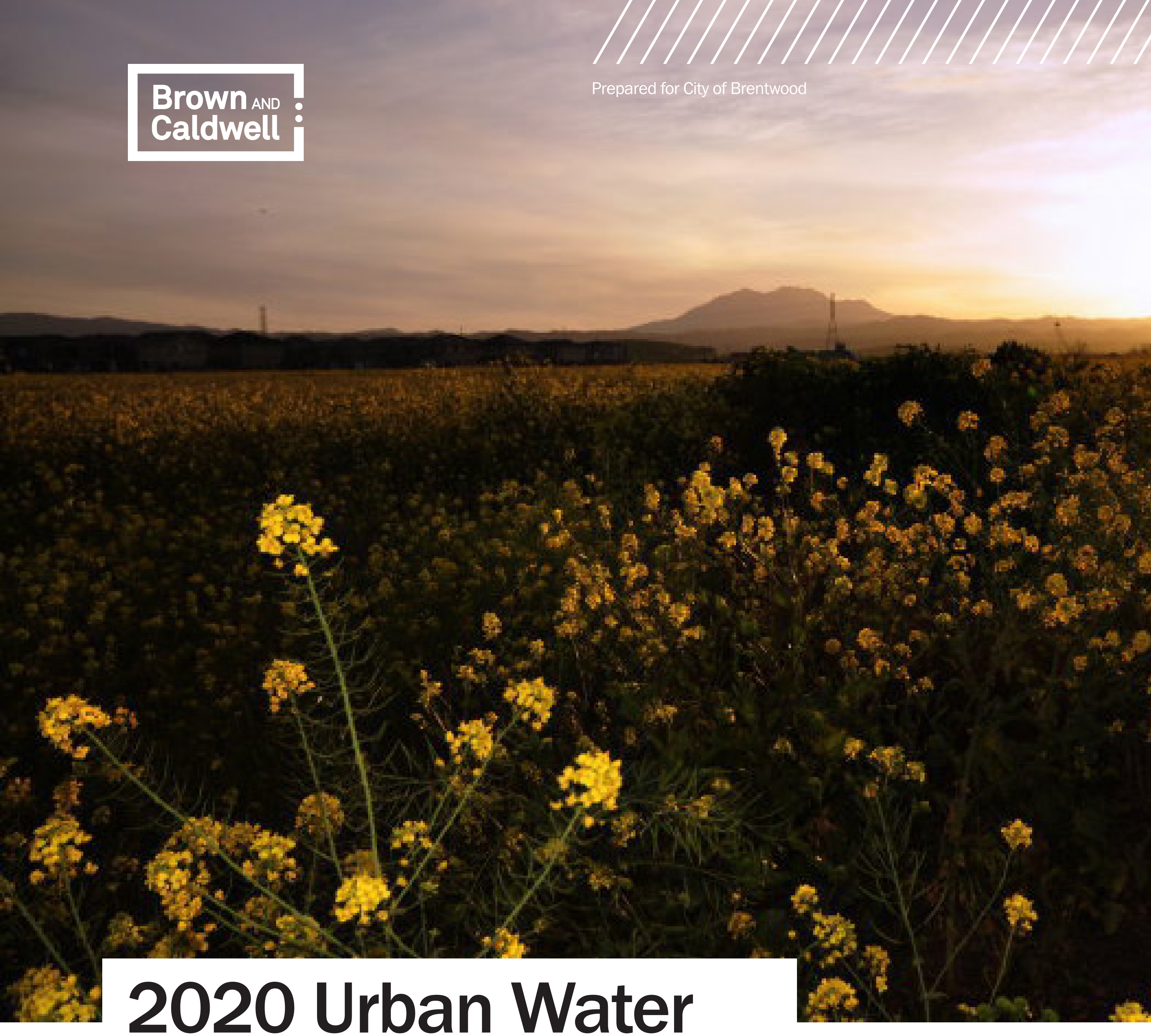
Brown AND Caldwell

Prepared for City of Brentwood



2020 Urban Water Management Plan

June 2021
Revised December 2021

THE CITY OF
BRENTWOOD
HERITAGE ▪ VISION ▪ OPPORTUNITY

FINAL

2020 Urban Water Management Plan

Prepared for
City of Brentwood
Brentwood, CA
June 16, 2021

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June 16, 2021

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Brentwood, California 94513-7344

1011-156033

Subject: 2020 Urban Water Management Plan

Dear Ms. Williford,

In completion of the City of Brentwood 2020 Urban Water Management Plan (UWMP) authorization dated October 29, 2020, we are pleased to submit this 2020 UWMP. We have updated your 2015 UWMP to incorporate more recent data and information as well as new requirements in the law and from the California Department of Water Resources.

Please let me know if you have any questions.

Very truly yours,

Brown and Caldwell

Rene Guillen

Rene Guillen, P.E., ENV SP
Project Manager

Enclosure: 2020 Urban Water Management Plan for the City of Brentwood

Project Participants

City of Brentwood

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List of Abbreviations

AB	Assembly Bill
Act	Urban Water Management Planning Act of 1983
AF	acre-feet
AFY	acre-feet per year
AMI	advanced metering infrastructure
Annual Assessment	annual water supply and demand assessment
AWIA	America’s Water Infrastructure Act of 2018
AWWA	American Water Works Association
CASGEM	California Statewide Groundwater Elevation Monitoring
CCWD	Contra Costa Water District
CII	commercial, industrial, and institutional
CIMIS	California Irrigation Management Information System
City	City of Brentwood
COBWTP	City of Brentwood Water Treatment Plant
CWC	California Water Code
DMM	Demand Management Measure
DOF	Department of Finance
DRA	Drought Risk Assessment
DRU	California Department of Finance Demographic Research Unit
DWR	California Department of Water Resources
ECCID	East Contra Costa Irrigation District
EPA	US Environmental Protection Agency
ERP	Emergency Response Plan
ETo	evapotranspiration
°F	degrees Fahrenheit
GPCD	gallons per capita per day
GSA	Groundwater Sustainability Agencies
GSP	Groundwater Sustainability Plan
HMP	hazard mitigation plan
IRWM	Integrated Regional Water Management
IPR	indirect potable reuse
MCL	maximum contaminant level
MG	million gallons
mgd	million gallons per day
mg/L	milligrams per liter
MGY	million gallons per year
N/A	not available
NA	not active
RBWTP	Randall-Bold Water Treatment Plant
RRA	Risk and Resilience Assessment
RWQCB	Regional Water Quality Control Board
SB	Senate Bill
SGMA	Sustainable Groundwater Management Act
ECC Subbasin	East Contra Costa Subbasin
SWRCB	State Water Resources Control Board
TDS	total dissolved solids
UWMP	Urban Water Management Plan
WSCP	Water Shortage Contingency Plan
WWTP	Wastewater treatment plant

Section 1

Introduction

This Urban Water Management Plan (UWMP) was prepared for the City of Brentwood's (City) water system in cooperation with the City staff. This UWMP addresses the City's water system and includes a description of the service area, water use, water supply sources and reliability, water shortage contingency planning, and water conservation activities.

This section provides an overview of the UWMP, the basis for preparing this UWMP, plan implementation, and organization. In order to aid the reader in understanding the context of the UWMP content, text at the beginning of some sections and subsections in this UWMP is italicized quoting specific portions of the Act that are relevant to the particular UWMP sections.

1.1 Urban Water Management Planning Act

This UWMP is the year 2020 UWMP as required by the Urban Water Management Planning Act of 1983 (Act). The Act is described in California Water Code (CWC) Division 6, Part 2.55 and Part 2.6, Section 10608 and Sections 10610 through 10656. The Act became part of the CWC with the passage of Assembly Bill (AB) 797 during the 1983–1984 regular session of the California legislature. Subsequently, assembly bills between 1990 and 2003 amended the Act. The Act was amended in November 2009 with the adoption of Senate Bill (SB)X 7-7 and was most recently amended in 2014. The Act is described in CWC Division 6, Part 2.55 and Part 2.6, Section 10608 and Sections 10610 through 10656.

The Act requires every urban water supplier providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet (AF) of water annually to adopt and submit an UWMP every five years to the California Department of Water Resources (DWR). The Act describes the contents of the UWMP as well as how urban water suppliers should adopt and implement the UWMP.

This 2020 UWMP includes newly required and updated components to address the revision of the Act for the 2020 UWMP, including but not limited to:

- UWMP summary lay description
- Description of current and projected land uses in service area
- Five previous years of system water losses
- Water savings
- Energy analysis
- Seismic Risk assessment and mitigation plan
- 5-year Drought Risk Assessment (DRA)
- Additional components within the Water Shortage Contingency Plan (WSCP)

1.2 Plan Implementation

"An urban water supplier shall implement its plan adopted pursuant to this chapter in accordance with the schedule set forth in its plan" (CWC §§ 10643).

This 2020 UWMP updates the water conservation implementation plan and projected schedules in the City's 2015 UWMP. The UWMP describes the availability of water and discusses water use, reclamation, and water conservation activities. The UWMP concludes that the water supplies available to the City's treated water customers are adequate over the next 25-year planning period through 2045.

The City will also track actual recycled water use and compare it to the projected use in this UWMP. The City implemented the 2015 UWMP in accordance with the information that was projected in that document.

1.3 Plan Organization

This report is organized into the following sections as outlined in the 2020 Guidebook:

- Section 1 (this section) provides an overview of the Act and a summary of the sections in this UWMP.
- Section 2 provides an overview of the UWMP preparation.
- Section 3 provides a description of the service area, climate, water supply facilities, distribution system, and historical and projected population.
- Section 4 presents historical and projected water use.
- Section 5 describes baselines and targets for per capita water use.
- Section 6 describes system water supplies including recycled water.
- Section 7 addresses water supply reliability and DRA addresses water supply reliability.
- Section 8 describes the City's WSCP.
- Section 9 describes demand management measures (DMM) employed by the City.
- Section 10 describes the actions taken by the City to address the CWC requirements for UWMP adoption, submittal, and implementation.
- References provides a list of references.
- Appendices provide relevant supporting documents.

DWR has provided a checklist of the items that each UWMP must address based upon the Act. This checklist makes it simple to identify exactly where in the UWMP each item has been addressed. The City has completed the checklist for this UWMP and provided it in Appendix A. It references the sections and appendices where specific items can be found.

1.4 Lay Description

"Each plan shall include a simple lay description of how much water the agency has on a reliable basis, how much it needs for the foreseeable future, what the agency's strategy is for meeting its water needs, the challenges facing the agency, and any other information necessary to provide a general understanding of the agency's plan" (CWC §§ 10630.5).

The City lies in Eastern Contra Costa County and is bounded to the north by the City of Oakley, to the west by the City of Antioch, and to the south and east by unincorporated portions of Contra Costa County. The City has cool, humid winters, and hot, dry summers. As of 2020, the City's water system served a population of 65,118 (Department of Finance [DoF], 2020). The City is predominantly residential with some commercial and recreational areas. While agriculture remains important to the local economy it has declined in relative importance as the City has become more suburban. It is estimated that at full buildout the city limits will support a total population of 80,917. Full buildout within the City’s Planning Area would result in a total population of 92,336 (City of Brentwood, 2018a).

Water demands for potable water by water sector for 2020 are from metered customer use. The City meters all water deliveries and serves more than 20,000 connections. The City provides water treatment and distribution services as well as wastewater collection, treatment, and treated water disposal services within its service area. Normal year water demands through 2045 were projected using an assumed GPCD of 152 and population projections developed as part of this UWMP. This GPCD was estimated based on the water use over the last three years (i.e., 2018-2020). This approach takes into account steady stabilization of post-drought water use levels of 2018 and 2019 with increased levels of residential water use in 2020 due to the COVID-19 pandemic. The year 2020 water use was included in the assumption since it is expected that remote work and social habits will persist in the following years, causing water use trends from 2020 to affect future years instead of acting as an isolated event. It is estimated that the per capita water use in the future will not reach pre-drought levels. The City met it’s 2020 per capita water use target that was updated in the 2015 UWMP. With increased water conservation, continued development of the City’s recycled water program, and water loss control efforts to meet the anticipated State standards, overall per capita demand is expected to remain below the water use target into the future.

The City’s water supply consists of both surface water from the Delta and groundwater from existing wells located in the East Contra Costa Subbasin within the larger San Joaquin Valley Groundwater Basin. The City’s surface water supplies stem from a permanent purchase entitlement with East Contra Costa Irrigation District (ECCID). ECCID has pre-1914 water rights, which historically have not been subject to delivery reductions during water shortages, including regulatory restricted and drought years. The City also obtains raw surface water for non-potable landscape irrigation from the ECCID Canal. The City pumps groundwater from an alluvial basin underlying the City. The City has nine permitted groundwater wells within its service area, five of which are active wells. Historical conditions as reflected in the hydrographs and contour maps for the East Contra Costa Subbasin indicate that the groundwater system has no apparent overdraft, suggesting that historical extraction patterns have not exceeded the safe yield of the basin. The City’s wastewater treatment plant (WWTP) produces tertiary filtered and disinfected water suitable for non-potable reuse. Recycled water is an important part of the City’s water resources. Recycled water allows the City to conserve potable water, thereby ensuring a reliable water supply for current and future demand. The City has always met system water demand, regardless of regional hydrology. The City expects no reductions from normal-year supply during single or multiple dry years and thus does not project any water supply shortages into the future.

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Section 2

Plan Preparation

This section presents the basis for preparing the UWMP, UWMP identification number, units of measure, and coordination and outreach efforts.

2.1 Basis for Preparing the Plan

The City is a retail urban water supplier. Table 2-1 presents the Public Water System name and number.

Table 2-1. (DWR Table 2-1 R) Retail: Public Water Systems

Public Water System Number	Public Water System Name	Number of Municipal Connections 2020	Volume of Water Supplied 2020 (MG)
CA0710004	City of Brentwood	20,718	3,983
	Total	20,718	3,983

Source: DDW, 2020

The City has selected individual reporting for this UWMP, as identified in Table 2-2. This UWMP is reporting on a calendar year basis using million gallons (MG) as the unit of measure as noted in Table 2-3.

Table 2-2. (DWR Table 2-2) Plan Identification

✓	Individual UWMP
	Regional UWMP *(checking this triggers the next line to appear)*
No	Does this Regional UWMP include a Regional Alliance?

Table 2-3. (DWR Table 2-3) Agency Identification

Type of Agency (select one or both)	
	Agency is a wholesaler
✓	Agency is a retailer
Fiscal or calendar year (select one)	
✓	UWMP Tables Are in Calendar Years
	UWMP Tables Are in Fiscal Years

Table 2-3. (DWR Table 2-3) Agency Identification	
Units of Measure used in UWMP (select one)	
	Acre Feet (AF)
✓	Million Gallons (MG)
	Hundred Cubic Feet (CCF)

2.2 Coordination and Outreach

"Each urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies to the extent practicable.

[…] Each urban water suppler shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of its plan" (CWC §§ 10620(d)(2)–10642).

The Act requires the City to coordinate the preparation of its UWMP with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable. The City has informed Contra Costa Water District (CCWD), of the City's projected water use, as shown in Table 2-4.

Table 2-4. (DWR Table 2-4) Retail: Water Supplier Information Exchange
The retail supplier has informed the following wholesale supplier(s) of projected water use in accordance with CWC 10631.
Wholesaler water supplier name:
Contra Costa Water District

The City has also coordinated this UWMP with other agencies and community as summarized in Table 2-5. Coordination efforts were conducted to: (1) inform other agencies of the activities of the City, (2) gather high-quality data for use in developing the UWMP, and (3) coordinate planning activities with other related regional plans and initiatives.

Table 2-5. Coordination and Notification for Plan Preparation

Organization/ Agency Name	Participated in Developing the UWMP	Commented on the Draft	Attended Public Meetings	Was Contacted for Assistance	Was sent a Copy of the Draft UWMP	Was sent a Notice of Intention to Adopt	Not Involved/No Information
CCWD					x	x	
ECCID					x	x	
Diablo Water District					x	x	
City of Antioch					x	x	
Town of Discovery Bay					x	x	
Brentwood WWTP	x	x		x	x		
County Supervisors Office						x	
General public		x	x				
Other						x	

Notes:
Coordination and notification includes planned actions (e.g., sharing draft).

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Section 3

System Description

This section describes the City's water supply system, its service area, climate, and projected population.

3.1 Description of Service Area

"Describe the service area of the supplier" (CWC §§ 10631(a)).

The City of Brentwood lies in Eastern Contra Costa County and is bounded to the north by the City of Oakley, to the west by the City of Antioch, and to the south and east by unincorporated portions of Contra Costa County. The City was incorporated in 1948. Its incorporated boundary currently totals 14.8 square miles (9,502 acres), with a sphere of influence totaling 17.4 square miles (11,129 acres) (City of Brentwood, 2021). Figure 3-1 shows the service area and its surroundings.

The City provides water treatment and distribution services as well as wastewater collection, treatment, and treated disposal services for its residents and businesses. The City's water distribution system consists of three pressure zones, one potable water treatment plant, nine groundwater wells (five of which are active), six water reservoirs, seven water booster pump stations, and 347 miles of water mains within the city limits (City of Brentwood, 2013a). The City also has one WWTP. Figure 3-2 shows the locations of these features within the water service area.

The City lies in the Marsh Creek watershed and is surrounded by the foothills of Mount Diablo and the rich farmlands of the Sacramento-San Joaquin Delta (Delta), which drains into the San Francisco Bay. The Marsh Creek watershed drains to the east side of Mount Diablo. It covers about 128 square miles of rangeland, farmland, protected parkland, and urban land (City of Brentwood, 2016). The creek flows approximately 30 river miles from its headwaters in the Morgan Territory Preserve through Brentwood and Oakley to empty into the Delta at Big Break near the confluence of the Sacramento and San Joaquin Rivers. Deer Creek, Dry Creek, and Sand Creek are all smaller creek systems that join Marsh Creek within the City of Brentwood. All three of these systems flow from the west to the east (City of Brentwood, 2021).

The geological setting of Contra Costa County is composed of surficial (Quaternary) deposits that overlie fault-bounded bedrock assemblages. East Contra Costa County has four groundwater regions. The City occupies the largest region, an area where groundwater occurs in material that was deposited by streams that originate in the coast ranges to the west. Aquifer materials capable of yielding quantities of water suitable for municipal and/ or agricultural purposes extend to depths of 600 feet below the ground surface.

Local development began in the late 19th century. The area that would eventually become the City of Brentwood began as a farming community that is still today known throughout the Bay Area for its agricultural products, primarily its cherries, corn, and peaches. Since 1990, many of the old farms and orchards have been replaced by suburban developments. The predominant land use is now residential with the majority of residential development being single family housing. Concurrent with the housing boom of the early and mid-2000's, the City experienced a substantial increase in retail services uses, as well as moderate growth in the light industrial sector (City of Brentwood, 2013a).

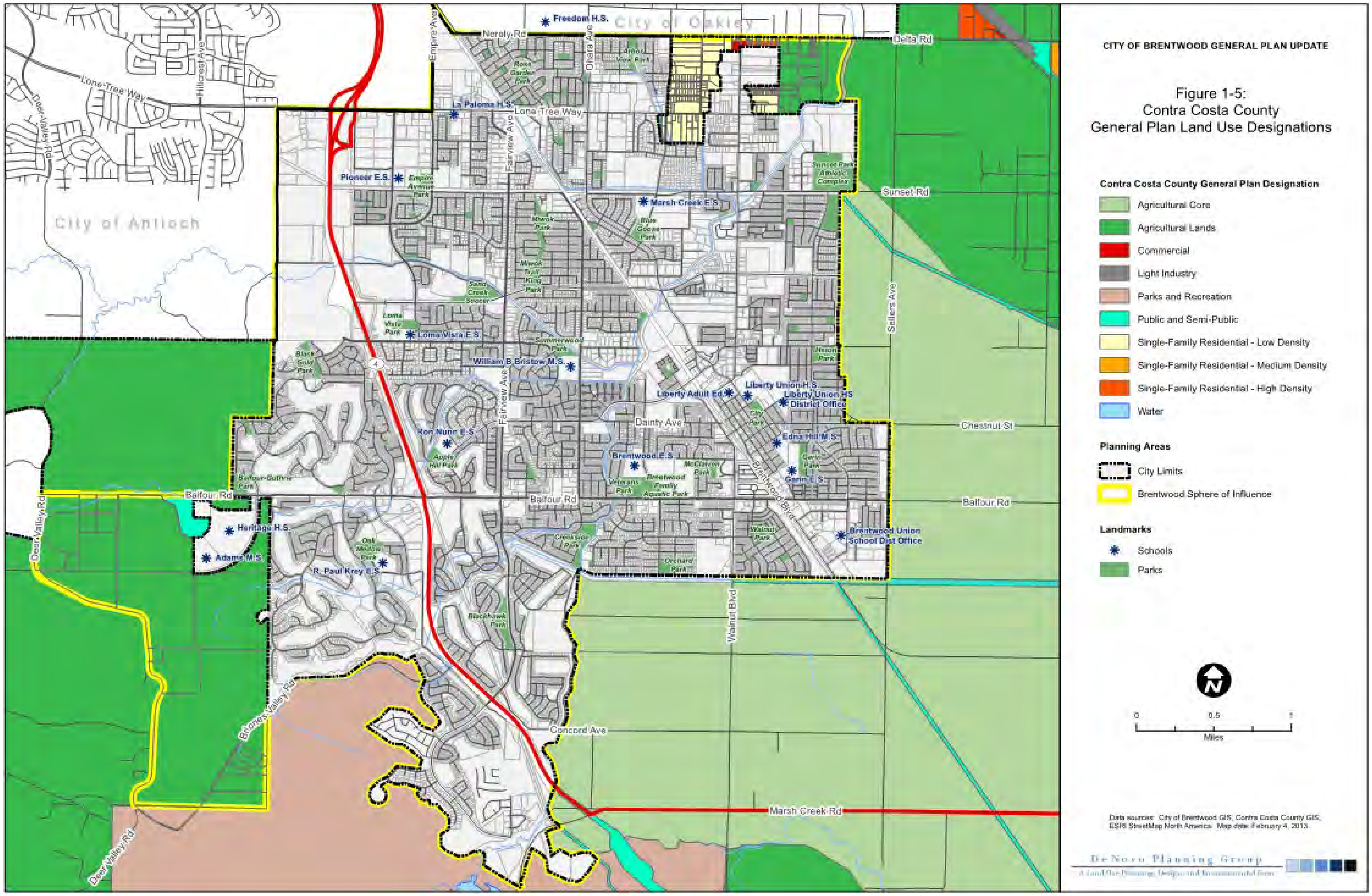

Figure 3-1. City of Brentwood planning and service area

Source: City of Brentwood, 2013a

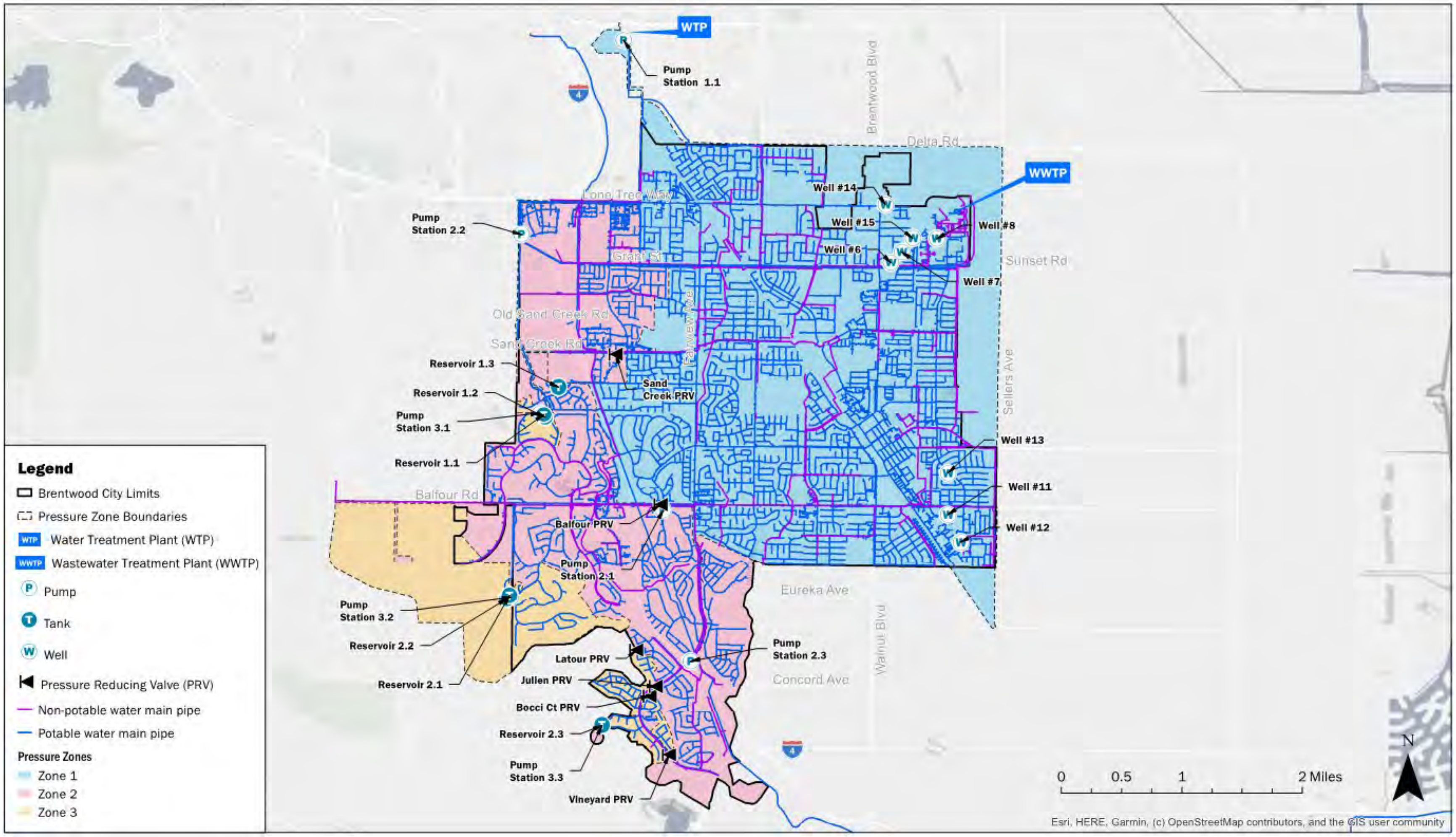

Figure 3-2. City of Brentwood water service area

3.2 Service Area Climate

"[Describe the service area] climate" (CWC §§ 10631(a)).

The City has cool, humid winters, and hot, dry summers. Historical climate data for the City were obtained from the California Irrigation Management Information System (CIMIS). Based on the historical data obtained from CIMIS, the City's average daily temperature ranges from 37 to 91 degrees Farenheit (ºF); the extreme low and high temperatures have been 11 and 111ºF, respectively over the time period January 1986 to December 2020. The rainy season typically begins in November and ends in March. Table 3-1 summarizes the City's average climate conditions. Average monthly precipitation during the winter months is about two inches, but records show that the monthly winter precipitation has been as high as eight inches (in February 1998) and as low as zero inches (multiple months). Water demands during the winter are low relative to summer months (May to September). The combination of hot and dry weather during the summer results in high water demands during these periods. Landscape irrigation, including turf irrigation in the summer, significantly contributes to the higher summer demands. Evapotranspiration (ET_0) records, which measure the loss of water from the soil both by evaporation and by transpiration from the plants growing thereon, indicate average monthly values ranging from 1.2 inches in the City's wet Januarys to 8.2 inches in much drier Julys.

Table 3-1. City Service Area Climate Characteristics

Month	Standard Monthly Average ET_0 (inches)	Average Total Rainfall (inches)	Average Temperature (°F)	
			Max	Min
January	1.18	2.44	56.24	38.94
February	2.05	2.22	60.23	40.61
March	3.66	1.41	65.24	43.49
April	5.29	0.80	70.23	45.40
May	6.95	0.54	76.47	48.93
June	7.87	0.30	83.67	51.71
July	8.20	0.15	88.51	54.97
August	7.33	0.17	90.47	55.84
September	5.75	0.26	86.55	54.12
October	3.97	0.68	77.90	49.03
November	2.01	1.13	65.39	42.02
December	1.27	2.23	55.93	37.58

Notes:
Source: DWR, 2021b – Data recorded January 1986 to December 2020 from Brentwood Station 47, CIMIS www.cimis.water.ca.gov.

3.3 Effects of Climate Change

Climate change is expected to increase average temperatures and cause more variability in rainfall amounts. These changes are likely to result in an increase in the City's water demands and potentially reduce the reliability of some of the existing water supplies, particularly those stemming from the Delta. The following sections summarize actions the City undertook during the most recent drought and local planning efforts that identified some of the potential adverse effects of climate change to the region.

3.3.1 City Actions

Climate change is expected to lead to an increase in the frequency and severity of drought. Back in 2015 when the state was in the midst of its fourth straight year of drought, Governor Jerry Brown issued Executive Order B-29-15 mandating statewide reductions in water use for the first time. In response to the Governor's Executive Order and the subsequent State Water Resources Control Board (SWRCB) drought regulations, the City adopted a Resolution at their April 28, 2015 Council meeting requiring customers to reduce potable water use by 35 percent relative to the amounts they used in 2013. Besides implementing the mandatory restrictions set by the State, the City increased the frequency of their water conservation workshops and disseminated additional information to the public encouraging water conservation. Penalties were levied to those customers that were non-compliant with the mandatory 35 percent reduction. While the City's water reduction mandates have since been levied, the City continues its proactive efforts to optimize water use. These efforts are reflected on their projected water demands presented in Section 4 of this UWMP.

3.3.2 East Contra Costa County Integrated Regional Water Management Plan

In 2019, the East Contra Costa County Integrated Regional Water Management (IRWM) members, which includes the City, prepared an update to their 2013 IRWM plan. Included in the 2019 IRWM is a discussion on the regional impacts of climate change to water supply and demand.

Most of the water suppliers in the region are dependent on surface water supplies from the Delta. The long-term sustainability of the Delta and the fresh water supply it provides face a litany of threats and challenges. There is concern that climate change-related sea-level rise and extreme weather can adversely impact access and the quality of surface water supplies from the Delta. Sea-level rise has the potential to inundate infrastructure and cause increasingly brackish or saline water to reach the Delta intakes (reducing water quality) more frequently and for longer periods of time throughout the year. When combined with extreme weather events, there is an increased probability of increased runoff and pollutants entering the system as well as increased turbidity and sediments.

There are also concerns that the timing and volume of flows are likely to change due to changing temperature patterns. Changes in seasonal runoff patterns from climate change are likely to lead to further reduced water supply reliability. Changes in precipitation and temperature in the Sierra Nevada region affect the timing and quantity of tributary flows which in turn affects the availability of fresh surface water for the region. Contributing factors include a reduced Sierra snowpack, earlier snowmelt, and extended drought periods punctuated by intense precipitation events. Additionally, the availability of high-quality freshwater in the Delta is heavily dependent on the operation of Central Valley Project/State Water Project (CVP/SWP) reservoirs; therefore, impact to these projects may impact the City even though it does not directly use CVP/SWP water supply (ECCC, 2019).

3.4 Service Area Population and Demographics

"Describe the service area of the supplier, including current and projected population [...] The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available" (CWC §§ 10631(a)).

The following section describes current and projected population of the service area. A discussion on social, economic, and demographic factors as well as land use trends potentially affecting water management planning in the service area is also included.

3.4.1 Service Area Population

The City was among the fastest growing cities in California during the early and mid-2000's. In 2020, the City's water system served a population of 65,118 (DoF, 2020). When the City was incorporated it had a population of 1,700. During the late 1990's and early 2000's its population increased significantly. These growth trends since have tapered substantially mirroring economic trends in the City. The City underwent a dramatic economic boom from 2000 through 2008. This growth stalled in 2009, paralleling changes in the U.S. economy, particularly the real estate market collapse in California. As a result, the City experienced a one percent decrease in population from 2009 to 2010 (City of Brentwood, 2010). Since then, the annual growth rate has averaged 2.3 percent before peaking in 2015 at 4.1 percent (City of Brentwood, 2016b). It is estimated that at full buildout the city limits will support a total population of 80,917. Full buildout within the City's Planning Area would result in a total population of 92,336 (City of Brentwood, 2018a).

Current and historical population data for the City came from the California Department of Finance Demographic Research Unit (DRU). The City uses historical population estimates in its annual fiscal model reports to evaluate historical growth and to project population growth. Economic and demographic mathematical models are used to drive population projections. These models can be adjusted and constrained by examining local governments' plans, policies, and regulations that affect land development.

Population projections are used by the annual fiscal model developed by the City's Finance Department. The department uses the City's growth model, which is based on projected residential and commercial growth. Projections consider historical and present trends, taking into account available vacant land, redevelopment activities, and current land use policies and plans. Residential and commercial projections indicate that the worst of the development slowdown is over. As of 2020, the total number of new single-family houses projected through 2025 is 910. Combined with the 680-multi-family permits, the City is expecting over 3,000 new residents by 2025 (City of Brentwood, 2020b). Commercial growth (in square feet), which declined over the past several years, is forecasted to see modest activity during the middle part of the decade (City of Brentwood, 2016b). Office development is expected to be limited as vacant building availability in other cities can, in most cases, be attained at a lower cost than constructing new office buildings (City of Brentwood, 2016b). Table 3-2 provides the estimated 2020 population and projected future population through 2045.

Table 3-2. (DWR Table 3-1) Retail: Population - Current and Projected – Used for this UWMP

	2020	2025	2030	2035	2040	2045 (opt)
Population served	65,118	68,752	72,589	76,640	80,917	85,433

Notes:

Source: Population data for 2020 and 2040 was obtained from the 2020 Electronic Annual Report (DDW, 2020) and City's General Plan (City of Brentwood, 2013a), respectively.

The 2040 population is the City's population projection at build-out. The law of growth was used to project population numbers between 2025 and 2035 and the estimate for 2045.

3.4.2 Other Social, Economic, and Demographic Factors

"Describe the service area of the supplier, including… other social, economic and demographic factors affecting the supplier's water management planning." (CWC §§ 10631).

Other socio-economic and demographic factors that affect water management planning include the uncertainty in estimating future population growth and per capita water use. Affordability of housing has many people choosing to reside in Brentwood. Of the roughly 21,000 housing units, the City has a home ownership rate of over 78 percent with 95 percent of the spaces occupied by single family homes. Even though population and employment rates in the City continue to grow (City has an employment rate of approximately 97 percent [City of Brentwood, 2019a]), a large portion of the Brentwood residents commute to jobs outside of the City, primarily to employment opportunities in San Francisco, Oakland, Concord, Walnut Creek, Antioch, and Pittsburgh (City of Brentwood, 2013a). The largest employers within the City are community-service retail and government employers (e.g., school districts).

3.4.3 Land Uses within Service Area

"The description shall include the current and projected land uses within the existing or anticipated service area affecting the supplier's water management planning. Urban water suppliers shall coordinate with local or regional land use authorities to determine the most appropriate land use information, including, where appropriate, land use information obtained from local or regional land use authorities…"(CWC §§ 10631(a)).

The City is predominantly residential with some commercial and recreational areas. While agriculture remains important to the local economy, it has declined in relative importance as the City has become more suburban. The City has no heavy industry and only a small light industry area in the northeastern part of the City. Changes in the economy can have a strong impact on growth.

Brentwood continues to expand development in its residential and commercial sectors. The City has outlined 29 projects that would convert over 485 acres to residential areas, with 95 percent planned for single family use (City of Brentwood, 2020a). On the commercial sector, the City is currently assessing 27 commercial projects which if all implemented would convert over 145 acres to new commercial space (City of Brentwood, 2020a). New developments are more likely to install water conserving devices and be more energy efficient.

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Section 4

System Water Use

This section describes the urban water system demands and the resulting projections for future water demands for the City.

4.1 Water Use by Sector

"Quantify, to the extent records are available, past and current water use, and projected water use (over the same five-year increments described in subdivision (a)), identifying the uses among water use sectors, including, but not necessarily limited to, all of the following uses: (A) Single-family residential; (B) Multifamily; (C) Commercial; (D) Industrial; (E) Institutional and governmental; (F) Landscape; (G) Sales to other agencies; (H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof; (I) Agricultural, (J) Distribution system water loss.

[...] The water use projections shall be in the same five-year increments described in subdivision (a)" (CWC §§ 10631(d)(1)–10631(d)(2)).

Water demands for potable water by water sector for 2020 are from metered customer use. The City meters all water deliveries. The City's water system serves more than 20,000 connections. Historical water deliveries were obtained from the City's annual reports. The City provides water treatment and distribution services as well as wastewater collection, treatment, and treated water disposal services to the following water sectors:

- **Single-Family Residential –** This sector refers to single-family residences in an identifiable suburban residential neighborhood or cluster-style development designed with open space and other amenities.
- **Multi-Family Residential –** This sector refers to families living in apartments and condominiums in structures of two or three stories with off-street parking and other requirements for higher density living.
- **Commercial/Institutional/Industrial –** This sector includes commercial, government, and industrial uses. It primarily includes uses associated with commercial buildings (e.g., landscaping; toilets; heating, ventilation, air conditioning, etc.) and commercial uses (e.g., car washes, laundries, nurseries, etc.).
- **Landscape –** This sector primarily includes raw water (untreated) use for irrigation at parks, schools, cemeteries, churches, residences, or public facilities. This sector also includes recycled water at various parkways and landscaped medians throughout the City.
- **Other –** This sector includes metered water used for construction and unmetered water used for fire response from fire hydrants throughout the City. Hydrant meters are read quarterly.

Table 4-1 presents the current 2020 water uses by sector. Several assumptions were used in calculating actual water use and the water use projections. The industrial and institutional/government water sector volumes are blank in the DWR tables because the City includes them in the commercial water sector when tracking and reporting. The City has no agriculture deliveries; deliveries to agricultural users are made by the ECCID. The City land use plan includes numerous parks, large areas of agriculture conservation, and special planning areas that are underdeveloped.

Table 4-1. (DWR Table 4-1) Retail: Demands for Potable and Non-Potable Water - Actual

	2020 Actual		
Use Type	Additional Description (as needed)	Level of Treatment when Delivered	Volume
Single Family		Drinking Water	2,701
Multi-Family		Drinking Water	116
Commercial[a]		Drinking Water	192
Industrial	Included with Commercial use data	--	--
Institutional/Governmental	Included with Commercial use data	--	--
Landscape[b]	From potable water supply	Drinking Water	461
Landscape[b]	From untreated water supply	Raw Water	185
Other[b]		Drinking Water	12
Losses		Drinking Water	348
		TOTAL	4,015

Notes:

Source: Water delivery data compiled using 2020 Electronic Annual Report (DDW, 2020).

Units: million gallons per year (MGY)

a. *Institutional and Industrial data included in Commercial totals.*

b. *Landscape and Other use types also use recycled water. The amount of recycled water within the Other use type cannot be accurately quantified, as such it is assumed that all recycled water was utilized for the Landscape sector. The City's recycled water use is quantified in Table 6-6 and is not included in this table.*

Figure 4-1 shows the total potable and raw water demand breakdown by sector. According to the 2020 water delivery data from the City, the single-family residential sector had the highest demand for water at 63 percent. Landscape water use, a combination of potable and non-potable, had the second highest demand for water at 22 percent. Commercial water and multi-family residential sectors contributed much less demand, with only four and three percent, respectively. Potable and non-potable water deliveries in 2020 totaled approximately 4,015 MG.

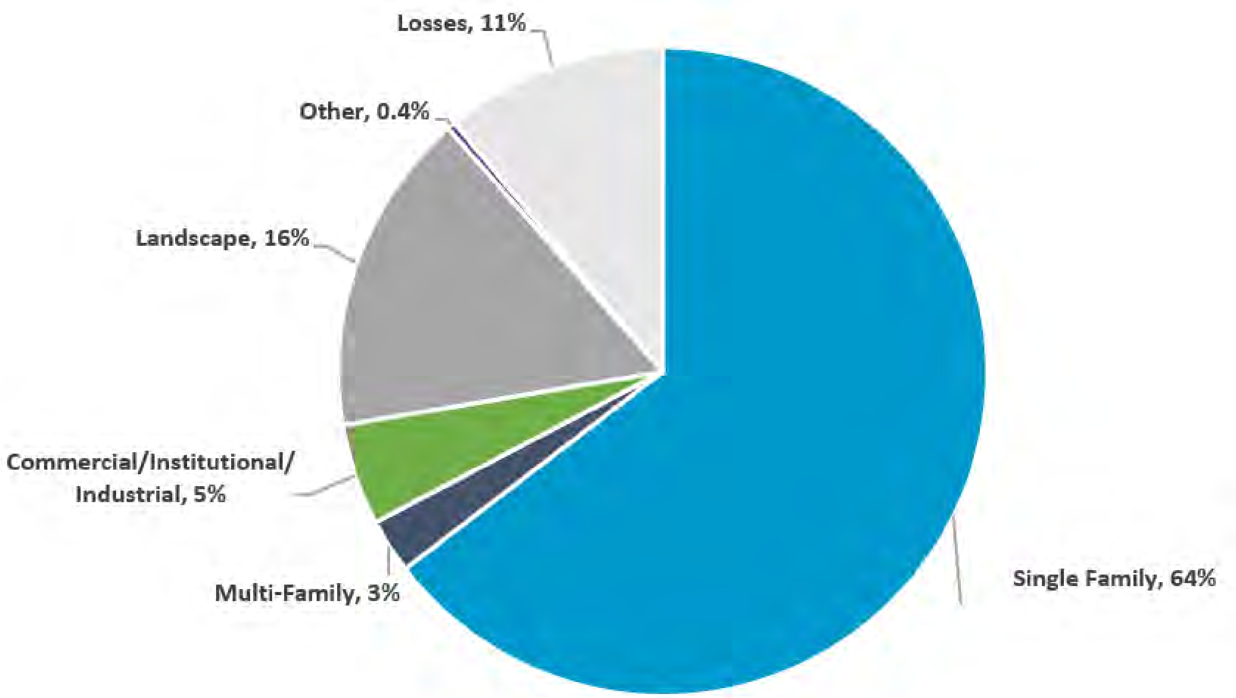

Figure 4-1. 2020 City of Brentwood potable and raw water demand by water use sector

Based on the City's General Plan, the projected average annual water use at buildout is approximately 7,100 MGY (City of Brentwood, 2013a). The City's General Plan tabulated this buildout demand using the City's average per capita baseline water use of 241 GPCD that occurred from 2001 through 2010. With the onset of the drought and the proactive measures taken by the City to curtail water use, the City's per capita demand decreased substantially. While a partial rebound in per capita water use from drought to pre-drought levels was observed (see Figure 4-2), water use will not increase back to the 241 GPCD baseline. In reviewing the City's water use data (see Figure 4-2), it appears that water consumption stabilized between 2017 and 2019 at around 145 GPCD but saw a notable increase in 2020 with the onset of the COVID-19 pandemic.

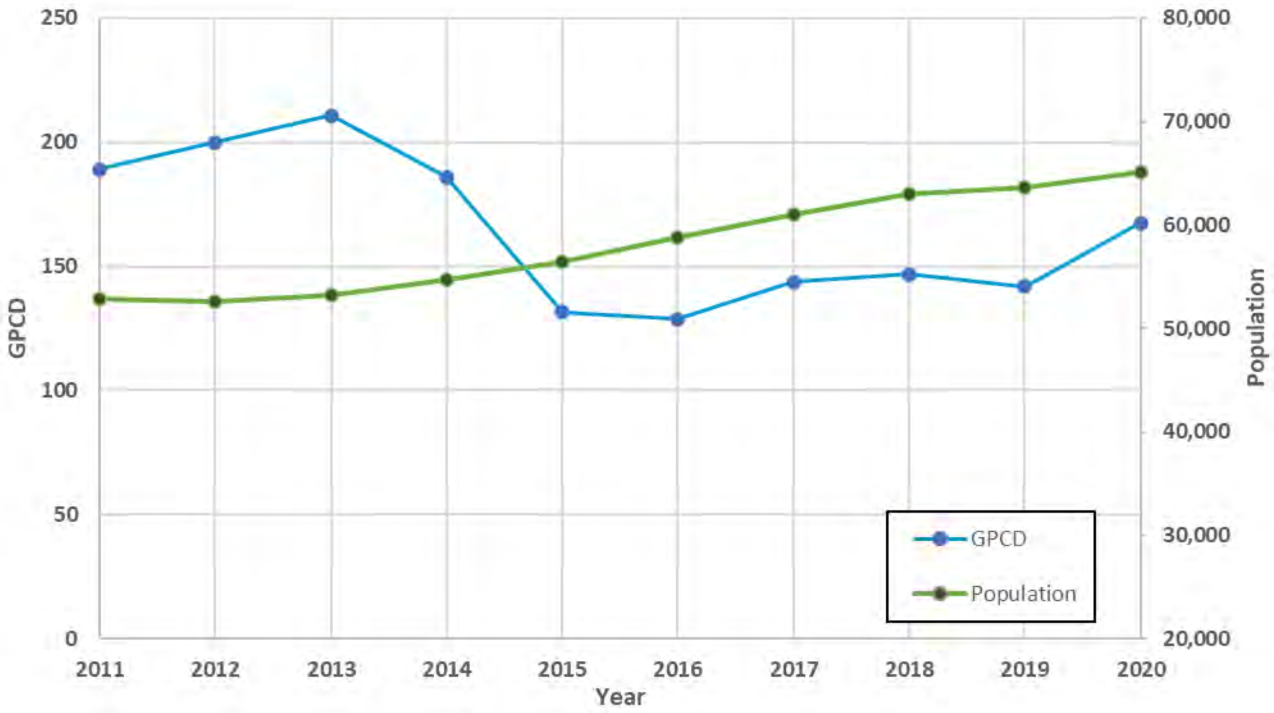

Figure 4-2. City of Brentwood per capita water demand

Notes: Data for this figure was obtained from DWR's Public Water System Statistics reports.

Normal year water demands through 2045 were projected using an assumed GPCD of 152 and the projected population (see Table 3-2). This GPCD was estimated based on the water use over the last three years (i.e., 2018-2020). This approach takes into account steady stabilization of post-drought water use levels of 2018 and 2019 with increased levels of residential water use in 2020 due to the COVID-19 pandemic. The year 2020 water use was included in the assumption since it is expected that remote work and social habits will persist in the following years, causing water use trends from 2020 to affect future years instead of acting as an isolated event. The projected GPCD is below the City's 2020 SBx7-7 goal (193 GPCD) (described in Section 5 of this UWMP). With increased water conservation, continued development of the City's recycled water program, and water loss control efforts to meet the anticipated State standards (discussed in Section 4.3), overall per capita demand for a normal year type is expected to remain below the 193 GPCD target into the future. Table 4-2 presents the projected water use by water use sector in five-year increments through 2045. The projected demand breakdown by customer category for the City's potable and raw water customers is based on an average demand breakdown for years 2018 to 2020 by customer category.

Table 4-2. (DWR Table 4-2 R) Retail: Demands for Potable and Raw Water - Projected

Use Type	Additional Description (as needed)	Projected Water Use *Report to the extent that records are available*				
		2025	2030	2035	2040	2045 (opt)
Single Family		2,449	2,586	2,730	2,883	3,044
Multi-Family		109	115	122	128	136
Commercial		206	218	230	243	257
Industrial	Included with Commercial use data	--	--	--	--	--
Institutional/Governmental	Included with Commercial use data	--	--	--	--	--
Landscape		624	659	695	734	775
Other		14	15	16	17	18
Losses		414	437	462	487	515
TOTAL		3,817	4,030	4,255	4,492	4,743

Notes:
Units: MGY

Water use varies continuously throughout the day and fluctuates year round based primarily on seasonal climate changes. System production facilities must be sized to meet the demand on the maximum day of the year, not just the average. Maximum daily water demand projections provide the basis for sizing and staging future water facilities. The City's General Plan Existing Conditions Report had projected a maximum water demand of 41 million gallons per day (mgd), with water supplied from all sources of supply (surface and groundwater) (City of Brentwood, 2013a). This was based on an average daily demand of 19.5 mgd and a maximum-day peaking factor of 2.1. However, as noted previously, the City's per capita demand has decreased substantially post drought. As such, maximum daily water demand was assessed using two distinct scenarios: 1) water demands included in the General Plan and 2) water demands developed as part of this UWMP. Table 4-3 summarizes the projected maximum daily demands for both scenarios. Actual water demands are expected to fall in between these two projections. Based on these projections, it is possible that an expansion of the City of Brentwood Water Treatment Plant (COBWTP) might be required by 2030 to meet maximum daily water demands. This assessment assumed that a 16.5 mgd expansion of the COBWTP would happen all at once.

Table 4-3. Current and Projected Maximum Daily Water Demands (2025-2045) for the City of Brentwood

Year	Total maximum Daily Demand – General Plan (mgd)	Total Maximum Daily Demand – 2020 UWMP (mgd)	Well Supply (mgd)	RBWTP and COBWTP Supply (mgd)
2025	30	22	5.3	22.5
2030	33.5	23	5.3	39
2035	37	24	5.3	39
2040	41	26	5.3	39
2045	44.7	27	5.3	39

Notes:
Source: General Plan Existing Conditions Report (City of Brentwood, 2013a) and projections developed as part of this UWMP using the same 2.1 maximum-day peaking factor.
RBWTP = Randall-Bold Water Treatment Plant

Table 4-4 summarizes the current and projected demands for potable, recycled, and raw water usage by the City. The City's current and projected use of recycled water is described in Section 6.

Table 4-4. (DWR Table 4-3 R) Retail: Total Gross Water Use (Potable and Non-Potable)

	2020	2025	2030	2035	2040	2045 (opt)
Potable water, raw, other non-potable (From DWR Tables 4-1R and 4-2R)	4,015	3,817	4,030	4,255	4,492	4,743
Recycled water demand (From DWR Table 6-4)	316	364	412	460	508	508
Total water demand	4,331	4,181	4,442	4,715	5,000	5,251

Notes:
Units: MGY

4.2 Distribution System Water Losses

"Quantify, to the extent records are available, past and current water use over the same five-year increments described in subdivision (a), and projected water use, identifying the uses among water use sectors, including, but not necessarily limited to, all of the following uses: [...] (J) Distribution system water loss.

[...] For the 2015 urban water management plan update, the distribution system water loss shall be quantified for the most recent 12-month period available. For all subsequent updates, the distribution system water loss shall be quantified for each of the five years preceding the plan update.

[...] The distribution system water loss quantification shall be reported in accordance with a worksheet approved or developed by the department through a public process. The water loss quantification worksheet shall be based on the water system balance methodology developed by the American Water Works Association" (CWC §§ 10631 (d)(1) and (2)–10631(d)(3)(A) and (B)).

The City's water distribution system consists of approximately 347 miles of distribution pipelines and transmission mains. Beginning in 2015, water suppliers were required to quantify their distribution system losses using the American Water Works Association (AWWA) Method water audit (Title 23 California Code of Regulations Section 638.1 et seq.). The water audit is an accounting exercise that tracks all sources and uses of water within a water system over a specified period. The AWWA water audits are provided in Appendix E. The volume of water loss reported in the preceding five years is shown in Table 4-5.

Table 4-5. (DWR Table 4-4) Retail: 12 Month Water Loss Audit Reporting

Reporting Period Start Date (mm/yyyy)	01/2016	01/2017	01/2018	01/2019	01/2020
Volume of water loss	308.3	359.9	333.4	338.6	332.7

Notes:
Source: Volume of water loss from the field "Water Losses" (a combination of apparent losses and real losses) from the AWWA water audit worksheets (Appendix E). Value for 2020 was obtained from the City of Brentwood's draft audit.
Units: MGY

4.3 Estimating Future Water Savings

"Water use projections, where available, shall display and account for the water savings estimated to result from adopted codes, standards, ordinances, or transportation and land use plans identified by the urban water supplier, as applicable to the service area.

[...] To the extent that an urban water supplier reports the information described in subparagraph (A), an urban water supplier shall do both of the following: (i) Provide citations of the various codes, standards, ordinances, or transportation and land use plans utilized in making the projections.(ii) Indicate the extent that the water use projections consider savings from codes, standards, ordinances, or transportation and land use plans. Water use projections that do not account for these water savings shall be noted of that fact" (CWC §§ 10631(d)(4)(A) and (B)).

Water savings from codes, standards, ordinances, or transportation and land use plans also are known as "passive savings." These various factors generally decrease the water use for new and future customers, compared to historical customers. Below is a summary of the applicable state codes and ordinances that could reduce the City's water demand in the future based on information provided in the Final DWR 2020 UWMP Guidebook (DWR, 2021a).

- **Model Water Efficient Landscape Ordinance –** Effective on December 1, 2015, this new ordinance is projected to reduce the typical residential outdoor landscape demands for new construction by up to 20 percent from the estimated demand using the prior ordinance provisions. Commercial landscape for new construction may reduce outdoor water demand by up to 35 percent over the prior ordinance.
- **California Energy Commission Title 20 appliance standards for toilets, urinals, faucets, and showerheads –** This standard will impact both new construction and replacement fixtures in existing homes. This savings is included in the CALGreen assumption for new construction described below. Assume up to five percent reduction in indoor water use of existing homes.
- **CALGreen Building Code** – Requires residential and non-residential water efficiency and conservation measures for new buildings and structures. It is assumed that this code will reduce residential and non-residential indoor water use by new construction by up to 20 percent.

The water use projections in this analysis do not account for these passive water savings that may be realized from these codes and ordinances, as stated in Table 4-6.

Table 4-6. (DWR Table 4-5) Retail Only: Inclusion in Water Use Projections	
Future water savings Included Y/N	No
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: N/A
Lower income residential demands included	Yes

4.4 Water Use for Lower Income Households

"The water use projections required by Section 10631 shall include projected water use for single-family and multifamily residential housing needed for lower income households, as defined in Section 50079.5 of the Health and Safety Code, as identified in the housing element of any city, county, or city and county in the service area of the supplier" (CWC §§ 10631.1(a)).

Lower income residential demands are included in the City's demand projections, as shown in Table 4-7. To estimate water demands from lower income households, the percent of the population that is low income is estimated from City household income data. In State housing law, extremely low (0 to 50 percent of the area median income), low (51 to 80 percent of the area median income), moderate (81 to 120 percent of the area median income), and above moderate (more than 120 percent of the area median income) incomes are based on the county's median income. Moderate income means average income for the county, and low income is simply below average income (City of Brentwood, 2014a). Since Contra Costa County has a relatively high median household income ($99,716 as of 2019), a family of four with a household income of less than $79,760 is considered to be "low income" in Contra Costa County (Census Bureau, 2019). Based on State housing law and the aforementioned low income threshold for Contra Costa County, City data suggests that approximately 34.5 percent of households in the City are considered "low income" (City of Brentwood, 2019a). For low income water use projections, it is assumed that low income residents are 15 percent of the single-family residences and 20 percent of the multi-family residences. The total percentage equals out to 35 percent which is close to the 34.5 percent of households that are considered "low income".

Table 4-7. Projected Low-Income Water Demands

Low Income Water Demands	2025	2030	2035	2040	2045
Single-family residential	367	388	410	432	457
Multi-family residential	22	23	24	26	27
Total	389	411	434	458	484

Notes:
Units: MGY

Section 5

Baselines and Targets

This section describes the City's SBX7-7 GPCD baseline and targets as updated from the analysis conducted as part of the 2010 and 2015 UWMP. Compliance with the 2020 target is discussed.

5.1 Overview of SBX7-7 Baseline and Target GPCD

"An urban retail water supplier may update its 2020 urban water use target in its 2015 urban water management plan required pursuant to Part 2.6" (commencing with CWC §§10610).

Per the law as adopted in SBX7-7, the City established baseline water use during the baseline period and target water use for the years 2015 and 2020, in order to help the State achieve the target 2020 water use reduction. The City used the Methodologies document (DWR, 2016b) to calculate its baseline water use and to calculate the target GPCD water use by using one of four methods described in the Methodologies document. In 2010, the City selected Method 1 to determine its urban water use target. Based on Method 1 in the 2010 UWMP, the City's 2020 target was 191 GPCD with an interim 2015 target of 214 GPCD. In the 2015 UWMP GPCD analysis, with the updated historical population analysis incorporating the 2010 Census data, the City selected to continue with Method 1, which provided a 2020 target of 193 GPCD with an interim 2015 target of 217 GPCD. Appendix F provides the City's completed verification forms.

5.2 Baseline Periods

"An urban retail water supplier shall include in its urban water management plan due in 2010 [...] the baseline daily per capita water use [...] along with the basis for determining those estimates, including references to supporting data.

[...] An urban retail water supplier may update its 2020 urban water use target in its 2015 urban water management plan required pursuant to Part 2.6 (commencing with Section 10610)" (CWC §§ 10608.20(e)–10608.20(g)).

In the 2020 UWMP, the City had the opportunity to change the years selected for its baseline period as compared to its 2015 UWMP based on changes to the City's distribution area. The City made no changes to the 10-year (baseline GPCD) or 5-year baseline (target confirmation).

5.3 Service Area Population

"An urban retail water supplier shall include in its urban water management plan due in 2010 [...] the baseline per capita water use, [...] along with the bases for determining those estimates, including references to supporting data.

[...] When calculating per capita values for the purposes of this chapter, an urban retail water supplier shall determine population using federal, state, and local population reports and projections" (CWC §§ 10608.20(e)–10608.20(f)).

According to the DWR methodology for estimating service area population (DWR, 2016b), the City is considered to be a Category 1 water supplier because its actual distribution area overlaps substantially (≥95 percent) with the boundaries of the City during baseline and compliance years. To calculate the annual GPCD, the City had to determine the population that it served for each baseline year in both the baseline periods and for the 2020 compliance year. The City conducted this baseline population analysis as part of the 2010 UWMP based on the year 2000 census. Year 2010 census data were not available until after the 2010 UWMP submittal deadline. As part of the 2015 UWMP, the City updated its baseline population using the 2010 census data. The historical population served by the City was modified as shown in Table SBX7-7 Table 3, located in Appendix F. For this 2020 UWMP, the population estimate for 2020 is based on DOF 2020 estimates for the City.

5.4 Gross Water Use

" "Gross Water Use" means the total volume of water, whether treated or untreated, entering the distribution system of an urban retail water supplier, excluding all of the following:

(1) Recycled water that is delivered within the service area of an urban retail water supplier or its urban wholesale water supplier

(2) The net volume of water that the urban retail water supplier places into long term storage

(3) The volume of water the urban retail water supplier conveys for use by another urban water supplier

(4) The volume of water delivered for agricultural use, except as otherwise provided in subdivision (f) of Section 10608.24.

California Code of Regulations Title 23 Division 2 Chapter 5.1 Article Section 596 (a) An urban retail water supplier that has a substantial percentage of industrial water use in its service area is eligible to exclude the process water use of existing industrial water customers from the calculation of its gross water use to avoid a disproportionate burden on another customer sector" (CWC §§ 10608.12).

Gross water use is the measure of water that enters the City's distribution system over a 12-month period with certain allowable exclusions. The allowable exclusions are recycled water delivered within the service area, indirect recycled water, water placed into long-term storage, water conveyed to another urban supplier, water delivered for agricultural use, and process water. Recycled water deliveries were excluded. The City's gross water use is shown in Table SBX7-7 Table 4 located in Appendix F.

5.5 Baseline Daily Per Capita Water Use

"An urban retail water supplier shall include in its urban water management plan due in 2010 […] urban water use target, interim urban water use target, […] along with the bases for determining those estimates, including references to supporting data (10608.20(e)).

[…] An urban retail water supplier may update its 2020 urban water use target in its 2015 urban water management plan […]" (CWC §§ 10608.20(e)–10608.20(g)).

The City's historical gross water and population were used to calculate the baseline daily per capita use in GPCD in Table SBX7-7 Table 5, located in Appendix F. A summary of the resulting 5-year and 10-year baselines is shown in Table SBX7-7 Table 6, located in Appendix F. No changes were made to the baseline daily per capita use for this 2020 UWMP.

Consistent with the 2015 UWMP, the confirmed 2020 GPCD target (from Table SB x7-7 Table 7, located in Appendix F) as well as a summary of the City's baseline GPCD demands and periods is shown in Table 5-1.

Table 5-1. (DWR Table 5-1R) Baselines and Targets Summary
Retail Agency or Regional Alliance Only

Baseline Period	Start Year	End Year	Average Baseline GPCD	Confirmed 2020 Target
10-15 year	2001	2010	241	193
5 Year	2005	2009	243	--

Notes:
Units: All values are in gallons per capita day (GPCD)

5.6 2020 Compliance Daily Per-Capita Water Use

The City's actual 2020 water use is compared to the 2020 target to determine if daily per capita water use met the 2020 target daily per capita water use. Actual water use for the 2020 calendar year and 2020 population described in Section 3 is used to calculate actual 2020 per capita water use. As discussed in Section 4, the 2020 GPCD is below the City's 2020 SBx7-7 goal (193 GPCD).

For 2020, there are several allowable adjustments that the City can make to the City's gross water use for extraordinary events, economic adjustments, or weather normalization. The City did not make any adjustments to its 2020 gross water use, as shown in Table 5-2. The City's completed SB x7-7 Verification Form is provided in Appendix F of this document.

Table 5-2. (DWR Table 5-2R) 2020 Compliance

	Optional adjustments to 2020 GPCD Enter "0" if no adjustment is made *From Methodology 8*						
Actual 2020 GPCD	Extraordinary Events	Economic Adjustment	Weather Normalization	Total Adjustments	Adjusted 2020 GPCD	2020 Confirmed Target GPCD	Did Supplier Achieve Targeted Reduction for 2020? Y/N
169	0	0	0	0	169	193	Yes

Notes:
Units: All values are in GPCD

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Section 6

Water Supplies

This section describes the sources of water available to the City for distribution and services. It includes a description of each water source, source limitations, water quality, and other water opportunities, including recycled water. The City's current supply consists of both surface water from the Delta and groundwater from existing wells located in the San Joaquin Groundwater Basin.

6.1 Purchased Water

The City has purchased a permanent capacity share of 6 mgd at the RBWTP and may use additional capacity on an as-need basis (CCWD, 2020). The City anticipates using the entire 6 mgd (2,190 MGY), but does not project to use additional capacity in future years. Currently, the City utilizes at least 1.7 mgd (1,902 AFY) based on existing customer connections in overlap with CCWD's service area. CCWD has operated the RBWTP since 1992. The RBWTP has a design capacity to treat up to 50 mgd. The RBWTP is jointly owned by Diablo Water District and CCWD. The City receives water from the CCWD portion of the facility. Raw water is pumped to the RBWTP from the Rock Slough intake via the Contra Costa Canal, which is operated by CCWD, for treatment prior to distribution as a public water supply. Water can also be stored by CCWD in the off-stream Los Vaqueros Reservoir from the Old River and Middle River intakes. During periods of low salinity in the Delta, raw water is pumped by CCWD into the Los Vaqueros Reservoir and stored for future use. This stored water is supplied to the Contra Costa Canal and blended with raw water from the Rock Slough intake as needed.

6.2 Groundwater

"(If) groundwater […] identified as an existing or planed source of water available to the supplier" (CWC §§ 10631(4)(A)–10631(4)(D)).

The City pumps groundwater from an alluvial basin underlying the City. The City has nine permitted groundwater wells within its service area, five of which are active wells. The total design capacity of the wells is 6.62 mgd. The firm design capacity of the wells, where firm capacity is the capacity of all the wells minus the capacity of the largest well, is 5.18 mgd. Table 6-1 presents the City's permitted wells and their design capacities.

The City treats groundwater with chloramines at the wellheads prior to delivery to the drinking water distribution system. The City has two main well fields. All of the City's active wells are located in the northeast and southeast part of the City. Two of the City wells are currently not in use for different reasons. Well 9 does not have a disinfection system and Well 11 is not used because of high nitrate concentrations at this location (City of Brentwood, 2017). This section provides a description of the groundwater basin, water quality, and the groundwater management framework.

Table 6-1. Permitted Wells for the City of Brentwood

Well Number	Start-up Year	Current Actual Capacity (mgd)	Well Design Capacity (mgd)
6	1987	1.04	1.15
7	1987	0.94	1.01
8	1994	1.08	1.44
9	2000	NA	NA
11	1995	NA	NA
12	1997	0.26	0.58
13	1997	0.28	0.36
14	2001	1.51	1.44
15	2006	0.58	0.65
	Total	5.69	6.62

Notes:

Source: Current actual capacities were provided by City staff. The well design capacities were taken from the 2015 UWMP and confirmed with City staff (City of Brentwood, 2016a).

NA: not active

6.2.1 Basin Description

The City's wells are located within the northwest part of the East Contra Costa Subbasin (ECC Subbasin) within the larger San Joaquin Valley Groundwater Basin. The ECC Subbasin, also referred to as the San Joaquin Valley-East Contra Costa (5-22.19), is a medium priority groundwater basin based on the Groundwater Basin Prioritization by DWR (ECCGSA, 2020b). Prior to November 2018, the ECC Subbasin was part of the Tracy Subbasin. Several of the agencies in the Tracy Subbasin submitted a Basin Boundary Modification Request to separate the Tracy Subbasin into two subbasins along the Old River to form the ECC Subbasin and Tracy Subbasin. The separation was proposed to better facilitate jurisdictional issues. Eastern Contra Costa County has diverse sources of water supplies including surface water and groundwater, which are used for agricultural and municipal/domestic purposes. The proposed subdivision would affect no existing or historic water supply coordination with other local agencies in the subbasin. There are no published studies or agency reports that indicate a hydrogeological connection between the east Contra Costa County portion of the subbasin and the San Joaquin/Alameda County portions. DWR announced a draft decision to approve the basin boundary modification requests in November 2018 (ECCGSA, 2018).

The ECC Subbasin covers the eastern portion of Contra Costa County and is primarily defined by jurisdictional and surface water boundaries (see Figure 6-1). The ECC Subbasin is bounded on the north, east, and south by the Contra Costa County line, which is contiguous with the San Joaquin River (north) and Old River (east). The western boundary (from south to north) follows the Diablo Range north up to the section of the San Joaquin River near the City of Antioch. The ECC Subbasin has a total surface area of approximately 168 square miles (ECCGSA, 2020b).The ECC Subbasin is comprised of continental deposits of Late Tertiary to Quaternary age. Deposits include the Tulare Formation, Older Alluvium, Flood Basin Deposits, and Younger Alluvium (DWR, 2006). The cumulative thickness of these deposits increases from a few hundred feet near the Coast Range foothills on the west to about 3,000 feet along the eastern margin of the basin (City of Brentwood, 2013a).

The City's wells range in depth from 200 to 660 feet, and draw from the Tulare Formation. The Tulare is exposed in the Coast Range foothills along the western margin of the basin and dips east beneath the San Joaquin Valley with increasing depths (ECCGSA, 2020a). It consists of semi-consolidated, poorly sorted, discontinuous deposits of clay, silt, and gravel. The older alluvium deposit consists of loosely to moderately compacted sand, silt, and gravel deposited in alluvial fans during the Pliocene and Pleistocene. The older alluvium is widely exposed between the Coast Range foothills and the Delta. The alluvium thickens eastward to over 300 feet beneath the City and about 400 feet below Old River (ECCGSA, 2020a). It is moderately to locally highly permeable (DWR, 2006).

Flood basin deposits occur in the Delta portion of the ECC subbasin. They are the distal equivalents of the Tulare Formation and older and younger alluvial units and consist primarily of silts and clays. Occasional inter-beds of gravel occur along the present waterways. Due to their fine-grained nature, the flood basin deposits have low permeability and generally yield low quantities of water to wells. Occasional zones of fresh water are found in the basin deposits, but they generally contain poor quality groundwater. The younger alluvium deposits include those deposits that are accumulating or would be accumulating under natural conditions. It includes sediments deposited in the channels of active streams as well as overbank deposits and terraces of those streams.

Groundwater serves a variety of domestic and agricultural uses throughout the ECC Subbasin with limited restrictions due to natural (salinity and boron) and anthropogenic (nitrate) causes. The ECC Subbasin's groundwater quality is generally stable which indicates that groundwater extraction is not degrading water quality and the ECC Subbasin is being operated within its sustainable yield. Groundwater pumped from the ECC Subbasin generally exceeds or is near the recommended secondary maximum contaminant levels (MCL) for total dissolved solids (TDS) (500 milligrams per liter [mg/L]) and chloride (250 mg/L). The observed concentrations may reflect a naturally higher baseline for these constituents (ECCGSA, 2020a). Nitrate concentrations tend to generally exceed the MCL (10 mg/L) as well, particularly for wells pumping from the shallow zone. Nitrate concentrations for the City wells, however, tend to be below the MCL levels. This may be due to past agricultural influences in the area. Arsenic concentrations are generally less than the MCL (10 ug/L) basin wide. Boron concentrations are high in most wells and are attributed to a naturally elevated baseline. To help mitigate some of these issues the City blends its groundwater with surface water supplies. Table 6-2 summarizes water quality concentrations for key constituents.

Table 6-2. ECC Subbasin Water Quality

Constituent	Date Range	Number of Wells Sampled	Average Concentration (mg/L)
TDS	1957-2019	228	1,098
Chloride	1957-2019	280	231
NO_3-N	1957-2019	313	4.7
Arsenic	1957-2019	190	8

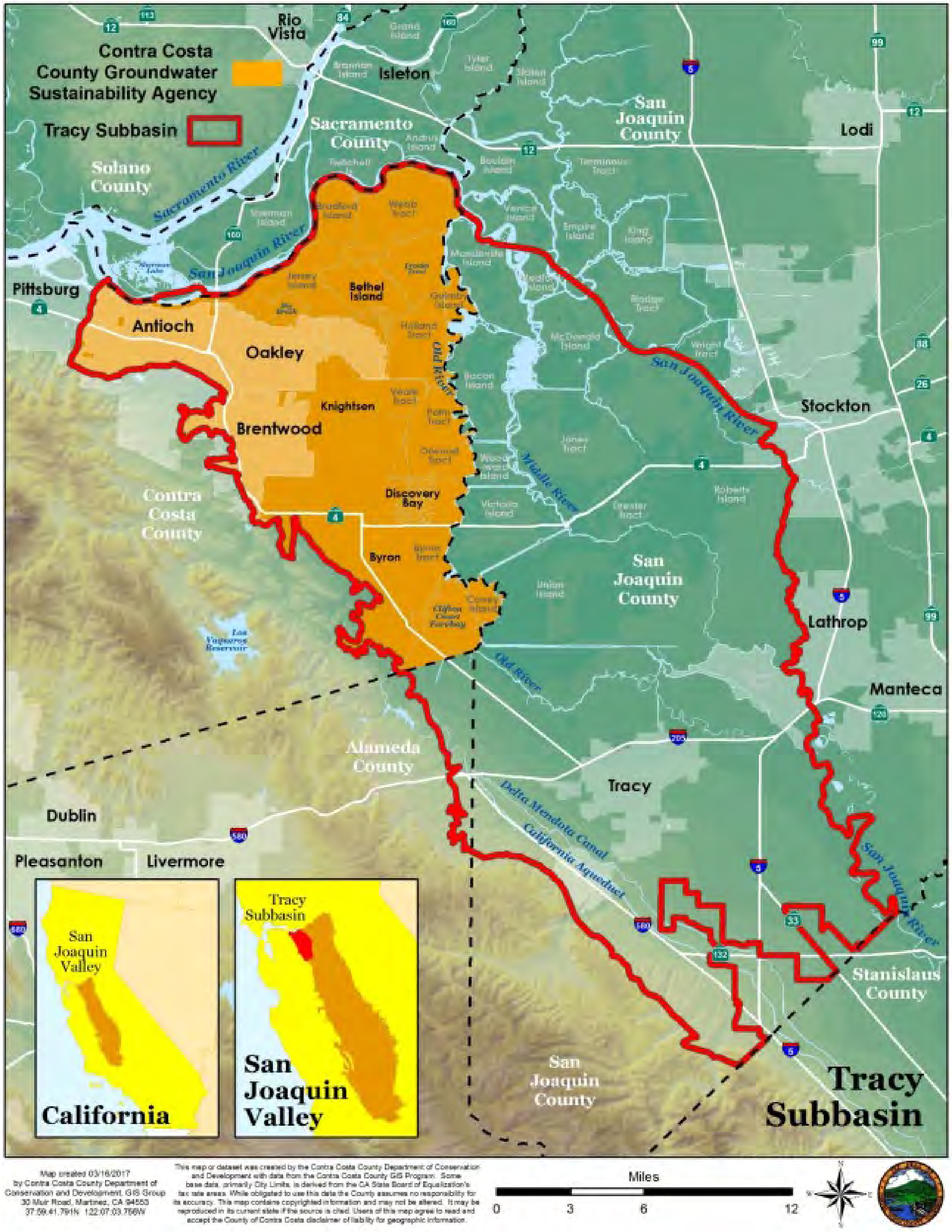
Notes:
Source: ECCGSA, 2020a
NO_3-N: nitrate as nitrogen

6.2.2 Groundwater Management

This section describes the City's activities pertaining to the California Statewide Groundwater Elevation Monitoring (CASGEM) and the Sustainable Groundwater Management Act (SGMA).

6.2.2.1 Sustainable Groundwater Management Act

In 2014 the legislature enacted SGMA, with subsequent amendments in 2015. It established a framework of priorities and requirement to facilitate sustainable groundwater management throughout the State. SGMA requires groundwater management in priority groundwater basins, which includes the formation of Groundwater Sustainability Agencies (GSAs) and the development of Groundwater Sustainability Plans (GSPs) for groundwater basins or subbasins that DWR designates as medium or high priority.



Map created 03/16/2017
by Contra Costa County Department of
Conservation and Development, GIS Group
30 Muir Road, Martinez, CA 94553
37:59:41.791N 122:07:03.756W

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Figure 6-1. East Contra Costa County portion of the Tracy Subbasin

Source: ECCGSA, 2017

The designation of priority of groundwater basins was done as part of the CASGEM Program. The CASGEM Groundwater Basin Prioritization is a statewide ranking of groundwater basin importance that incorporates groundwater reliance and focuses on basins producing greater than 90 percent of California's annual groundwater. The CASGEM Program has ranked the ECC Subbasin (5-22.19) as medium priority (ECCGSA, 2020b).

SGMA directs DWR to identify groundwater basins and subbasins in conditions of critical overdraft. The DWR identified such basins in Bulletin-118, 1980 and Bulletin 118, Update 2003. An interim update was published in 2016 that included critically overdrafted basin designations and basin boundary revisions, and information important to implementing the SGMA. The ECC Subbasin is not on that list (DWR, 2016a).

The City is one of eight local agencies that overlay the ECC Subbasin and entered into a Memorandum of Understanding on May 9th, 2017 to collaborate and develop a single GSP for the ECC Subbasin (ECCGSA, 2017). The ECC Subbasin GSP's planning area is shown in Figure 6-2. With the exception of one agency, each member agency of the ECC Subbasin became a GSA to be the local agency to manage the ECC Subbasin within their respective service area. The City (and the other GSA's in the ECC Subbasin) are currently developing the ECC Subbasin GSP and anticipate meeting the January 31, 2022 deadline for submission. Work products related to the ECC Subbasin GSP can be found in the East Contra Costa County Integrated Regional Water Management website: https://www.eccc-irwm.org/sgma

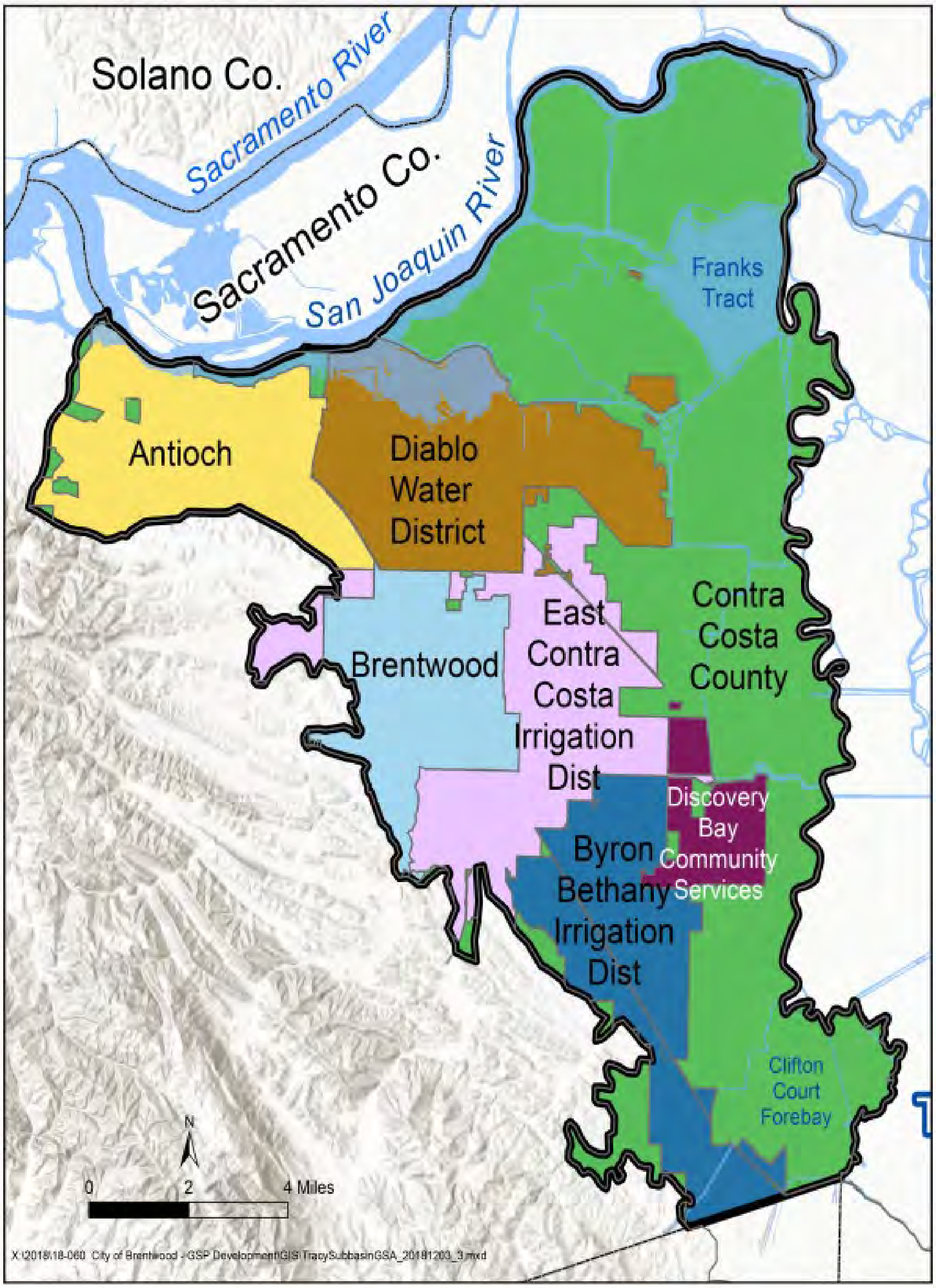

Figure 6-2. East Contra Costa Subbasin (5-22.19) boundary

Source: ECCGSA, 2019

6.2.3 Overdraft Conditions

Hydrographs for the ECC Subbasin indicate that the majority of the water levels in wells have remained relatively stable dating back to 1993 (ECCGSA, 2020a). Seasonal variation resulting from recharge and pumping was evident, but levels were stable overall. In general, historical conditions as reflected in the hydrographs and contour maps indicate that the groundwater system has no apparent overdraft, suggesting that historical extraction patterns have not exceeded the safe yield of the basin. Based on the specific yield range of 5 to 10 percent and using spring 2018 groundwater level contours, the total groundwater storage volume within the ECC Subbasin above the base of freshwater is estimated to be between 4.5 million AF and 9.0 million AF (ECCGSA, 2020a). The GSA's (which includes the City) are working on a groundwater budget for the ECC Subbasin that will estimate subbasin inflows and outflows as part of the ECC Subbasin GSP development process.

6.2.4 Historical Groundwater Pumping

The amount of groundwater pumped by the City in 2016–2020 is shown in Table 6-3. The City wells are located within the northwest part of the ECC Subbasin of the San Joaquin Valley Groundwater Basin.

Table 6-3. (DWR Table 6-1) Retail: Groundwater Volume Pumped

Groundwater Type	Location or Basin Name	2016	2017	2018	2019	2020
Alluvial basin	San Joaquin Valley Basin (ECC Subbasin)	434	678	549	649	729
	Total	434	678	549	649	729

Notes:
Source: DDW, 2016; DDW, 2017; DDW, 2018; DDW, 2019; DDW, 2020
Units: MGY

6.3 Surface Water

In 1999, the City entered into an agreement with ECCID that provides the City with a permanent entitlement to purchase 14,800 acre-feet per year (AFY) (4,823 MGY) of surplus irrigation water from the Delta. ECCID has pre-1914 water rights, which historically have not been subject to delivery reductions during water shortages, including regulatory restricted and drought years. The water purchased by the City may only be used by the City and its retail customers within the City limits or within the ECCID service area (CCLAFCO, 2007). Surface water supplies for the City originate from Rock Slough. The supply is transported through the Contra Costa Canal for treatment at the COBWTP.

The COBWTP was built in 2008 to serve the City. The City and CCWD constructed the COBWTP as a joint venture. The completed first phase of the COBWTP, which has been constructed and is in operation, can treat up to 16.5 mgd (6,023 MGY) of surface water. However, the COBWTP is designed so that it can be expanded to an ultimate capacity of 33 mgd (12,045 MGY) to serve a portion of the City's projected water demands through 2045. COBWTP processes include flocculation, sedimentation, ozonation, filtration, and disinfection.

The City also obtains raw surface water for non-potable landscape irrigation from the ECCID Canal. Water is pumped to the non-potable irrigation system via the Roddy Ranch Pump Station, located on the canal. Current users include golf courses, parks, schools, and commercial landscape areas. The City purchased 185 MG (0.51 mgd average daily use) in 2020 (DDW, 2020).

6.4 Stormwater

The City neither captures nor reuses stormwater now and has no plans to capture and reuse stormwater.

6.5 Wastewater and Recycled Water

"The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of this plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area" (CWC §§ 10633).

Municipal recycled water is municipal wastewater that has been treated to a specified quantity to enable it to be used again for a beneficial purposes. For the purpose of this UWMP, recycled water means only municipal recycled water, that is, water that has been treated and discharged from a municipal wastewater facility. This section describes the wastewater collection, treatment, and disposal and recycled water coordination within the City's water service area.

6.5.1 Recycled Water Coordination

The City's WWTP receives, treats, and discharges municipal wastewater that is generated, collected, and treated within the City's service area. The WWTP produces tertiary filtered and disinfected water suitable for non-potable reuse.

6.5.2 Wastewater Collection, Treatment, and Disposal

[Describe] the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal. (CWC §§ 10633(a)–10633(b)).

This section describes how wastewater in the City's water service area is collected, treated, and discharged.

6.5.2.1 Wastewater Collected within Service Area

Wastewater is collected by gravity in a series of mains, trunks, and interceptors that transport wastewater from its source to the WWTP. Table 6-4 summarizes key information about wastewater generated in the City sewer service area.

Table 6-4. (DWR Table 6-2) Retail: Wastewater Collected Within Service Area in 2020

N/A	There is no wastewater collection system. The supplier will not complete the table below.
100%	Percentage of 2020 service area covered by wastewater collection system (optional)
100%	Percentage of 2020 service area population covered by wastewater collection system (optional)

Wastewater collection			Recipient of collected wastewater			
Name of Wastewater Collection Agency	Wastewater Volume *Metered or estimated?*	Volume of Wastewater Collected from UWMP Service Area 2020	Name of Wastewater Treatment Agency Receiving Collected Wastewater	Treatment Plant Name	Is WWTP Located within UWMP area? *Drop down list*	Is WWTP Operation Contracted to a Third Party? (optional) *Drop down list*
City of Brentwood	Metered	1,455	City of Brentwood Wastewater Treatment Plant	City of Brentwood Wastewater Treatment Plant	Yes	No
Total Wastewater Collected from Service Area in 2020:		1,455				

Notes:
Units: MGY
N/A = not available

6.5.2.2 Wastewater Treatment and Discharge within Service Area

The City's WWTP is a tertiary treatment plant that provides recycled water for a variety of landscape and industrial uses. The WWTP has an average dry weather flow capacity of 5 mgd and is currently being expanded to accommodate an average dry weather flow capacity of 6.4 mgd. The WWTP expansion is expected to be completed in 2023. The treatment system consists of a headworks (screening and grit removal), oxidation ditches and denitrification basins providing biological treatment, secondary clarification, tertiary filtration, chlorine disinfection, dechlorination, a cascade aeration system, and belt filter press (Regional Water Quality Control Board [RWQCB], 2019). Wastewater from the City that is not reused is treated and discharged to Marsh Creek, which drains to Big Break in the Delta. Periodically, on-site percolation ponds may be used for land disposal of a limited amount of secondary treated effluent. Table 6-5 presents the City's WWTP wastewater treated volumes and the amount of water recycled for non-potable reuse.

Table 6-5. (DWR Table 6-3) Retail: Wastewater Treatment and Discharge within Service Area in 2020

N/A	No wastewater is treated or disposed of within the UWMP service area. The Supplier will not complete the table below.									
							2020 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?	Treatment Level	Wastewater Treated	Discharged Treated Wastewater	Recycled within Service Area	Instream Flow Permit Requirement
City of Brentwood Wastewater Treatment Plant	Marsh Creek	Creek, within the Sacramento San Joaquin Delta	Order R5-2019-0029	River or creek outfall	No	Tertiary	1,455	1,054	316	0
						Total	1,455	1,054	316	0

Notes:

Units: MGY

6.5.3 Recycled Water System

"[Describe] the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use" (CWC §§ 10633 (c)).

Recycled water is an important part of the City's water resources. Recycled water allows the City to conserve potable water, thereby ensuring a reliable water supply for current and future demand. Figure 6-3 presents the City's recycled water distribution system.

The City's WWTP's tertiary treatment and disinfection provides recycled water for landscaping as well as processes at the Antioch Building Materials concrete batch plant. The City is a producer and distributer of Title 22 tertiary recycled water for unrestricted reuse (i.e., unrestricted non-potable reuse) during the seasonally dry summer months. The City's recycled water is distributed through its non-potable water supply system. This system includes both recycled water and raw water supplied by ECCID. The system delivers water for irrigation and includes a network of transmission and distribution pipelines and pump stations. The production and distribution of recycled water is covered under the SWRCB Order WQ 2016-0068-DDW. City data indicates that the City's WWTP supplied 316 MG of recycled water for landscape irrigation in 2020 (DDW, 2020).

6.5.4 Recycled Water Beneficial Uses

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

[…] [Describe] the projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years" (CWC §§ 10633 (c) and (d)).

This section presents the projected potential use and planned versus actual use of recycled water in 2020.

6.5.4.1 Projected Future Use of Recycled Water

Unrestricted non-potable recycled water is defined as wastewater that has been treated to tertiary standards (via filtration and disinfection) that meet Title 22 of the California Code of Regulations (California Department of Public Health, 2018). Recycled water treated to this level can be used for all outdoor irrigation demands in a community, including parks, schools, street medians, residential front and backyard landscaping, public open space, as well as industrial uses such as cooling water. Additionally, recycled water is commonly used for environmental purposes such as wetland and habitat restoration.

The City has developed preliminary planning documents to identify uses for recycled wastewater at both existing and future sites. The recycled wastewater will be used for the irrigation of parks and landscape amenities. The City already has constructed a portion of the recycled water distribution system and will continue to expand the system as the City grows. The City has identified several parks that have the potential to be served with recycled water. Recycled water demands are estimated to be 2,111 AF (688 MGY) at buildout (City of Brentwood, 2013b). However, expansion of the recycled water system to meet the demand for some of these customers will likely come at a high cost per acre foot of demand added (City of Brentwood, 2013b). A buildout demand totaling 1,560 AF (508 MGY is deemed more feasible (City of Brentwood, 2013b).

Table 6-6 provides a summary of current and projected recycled water use within the service area.

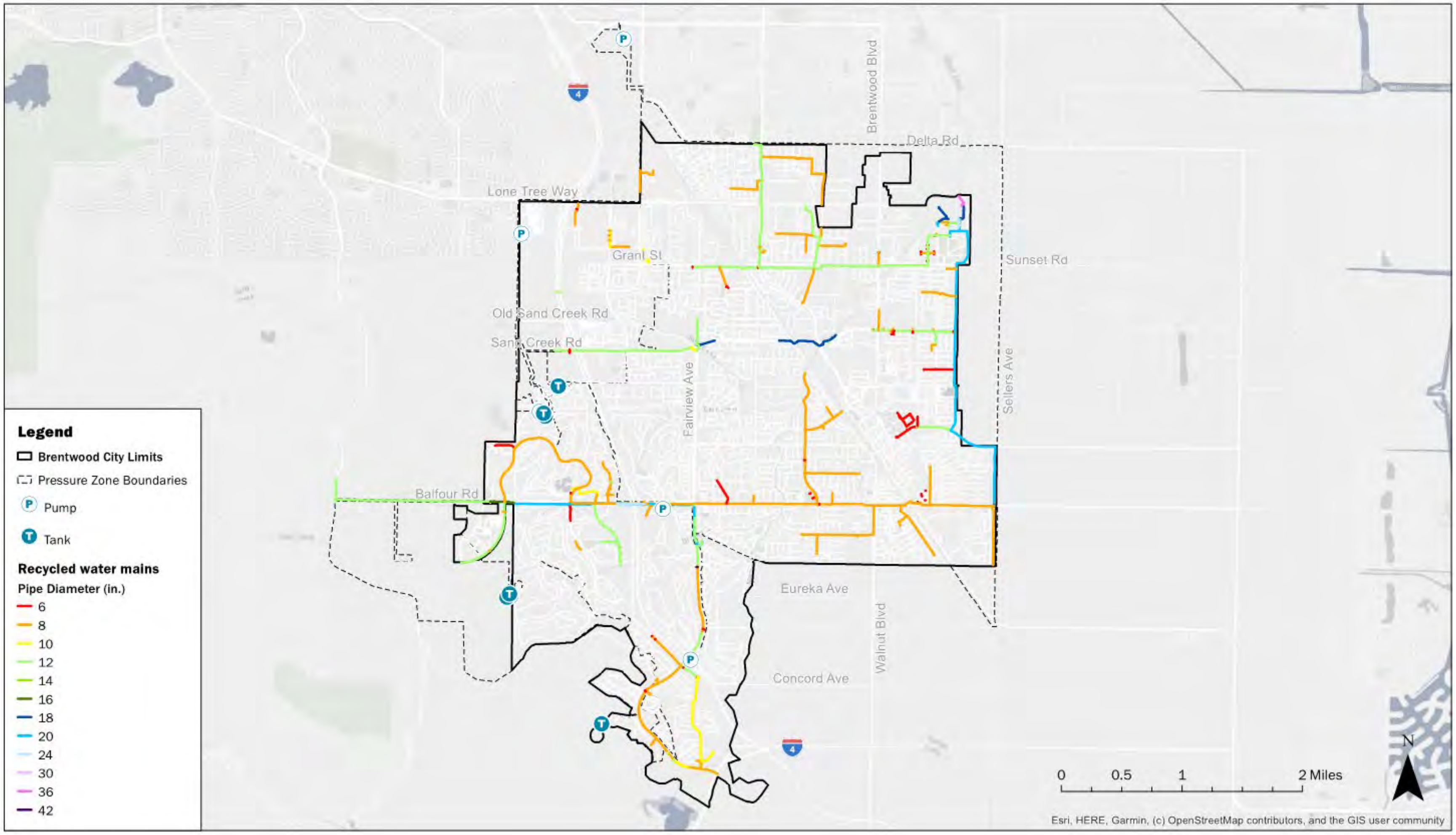

Figure 6-3. City of Brentwood recycled water distribution system

Table 6-6. (DWR Table 6-4 Retail) Recycled Water Direct Beneficial uses within Service Area								
N/A	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.							
Name of supplier producing (treating) the recycled water:		City of Brentwood						
Name of supplier operating the recycled water distribution system:		City of Brentwood						
Supplemental water added in 2020 (volume) include units		N/A						
Source of 2020 supplemental water		N/A						
Beneficial Use Type	General Description of 2020 Uses	Level of Treatment Drop Down List	2020	2025	2030	2035	2040	2045
Agricultural irrigation			--	--	--	--	--	--
Landscape irrigation (excludes golf courses)	Currently being used, has the potential for increased use	Tertiary	316	364	412	460	508	508
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			--	--	--	--	--	--
Other[a]			--	--	--	--	--	--
TOTAL (within the service area)			316	364	412	460	508	508

Notes:

Source: Projections were developed based on information included in existing City planning documents (City of Brentwood, 2013b); DDW, 2020.

IPR – Indirect Potable Reuse

Units: MGY

a. A very small portion of the total recycled water use goes into the “Other” beneficial use type, total amount could not be quantified.

6.5.4.2 Planned Versus Actual Use of Recycled Water

"[…] [Provide] a description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision" (CWC §§ 10633 (e)).

Table 6-7 provides a comparison of the recycled water use projected to occur in 2020 in the 2015 UWMP with the actual 2020 recycled water use. Actual recycled water use in 2020 was higher than what was projected in the 2015 UWMP. The recent drought led to increased efforts to conserve potable water supplies and resulted in an increase in recycled water use. Between 2015 and 2020, recycled water use increased by 143 percent (i.e., from 150 AF in 2015 to 316 AF in 2020).

Table 6-7. (DWR Table 6-5R) Retail: 2015 UWMP Recycled Water Use Projection Compared to 2020 Actual

Use Type		2015 Projection for 2020	2020 Actual Use
Agricultural irrigation		--	--
Landscape irrigation (excludes golf courses)		206	316
Golf course irrigation		--	--
Commercial use		--	--
Industrial use		--	--
Geothermal and other energy production		--	--
Seawater intrusion barrier		--	--
Recreational impoundment		--	--
Wetlands or wildlife habitat		--	--
Groundwater recharge (IPR)		--	--
Direct potable reuse		--	--
Other	--	--	--
	Total	206	316

Notes:
Source: City of Brentwood, 2016a; DWR 2020b.
Units: MGY

6.5.5 Actions to Encourage and Optimize Future Recycled Water Use

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

[…] [Provide a] plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use" (CWC §§ 10633 (f) and (g)).

The City encourages recycled water use by providing financial incentives. The City currently offers potable water at $3.05 to $7.13 per 1,000 gallons (effective July 1, 2020). This rate is almost three times that of recycled water, which is $1.51 per 1,000 gallons (effective July 1, 2020). The City plans on maintaining recycled water cost proportionally lower than of potable water in the future. The City hopes to increase recycled use among the number of large-volume customers in the future as they realize that operating costs can be reduced from the use of recycled water. Potential customers include roadway irrigation and parks.

The City currently has three projects aimed at increasing the use of recycled water. The first is a capital improvement project (CIP), the Non-Potable Water Distribution System project, which will expand the non-potable water distribution system and improve access to recycled water supplies. The second project is an automated Recycled Water Fill Station the City that opened at the WWTP in 2015. City customers may bring containers (up to 300 gallons) to fill with recycled water and take for appropriate use. The recycled water is free of charge but customers must complete a training program prior to gaining access to the resource.

The City also is considering expanding the use of recycled water during construction by encouraging local contractors to use recycled water for dust control and earth compaction when available. This change would require the addition of non-potable fire hydrants.

Table 6-8 provides a summary of the Cities ongoing actions to encourage and optimize future recycled water use.

Table 6-8. (DWR Table 6-6R) Retail: Methods to Expand Future Recycled Water Use

N/A	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**
Financial incentives	Recycled water at a decreased rate reduces potable and raw water use.	ongoing	N/A
Recycled water fill station	The City has opened a recycled water fill station at the WWTP for customers in the City. The recycled water fill station has been automated to allow 24hr self-serve access.	ongoing	N/A
Increased recycled water access opportunities	Expansion of the non-potable water distribution system.	ongoing	N/A
Regulatory incentives	City to encourage recycled water use for dust control and earth compaction for construction projects.	ongoing	N/A

Notes:
All of these actions are ongoing, as such, the year 2020 was input for the planned implementation year.
N/A – Not available

6.6 Desalinated Water Opportunities

"Describe the opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply" (CWC §§ 10631(g)).

The City has no sources of ocean water, brackish water, or groundwater that provide viable opportunities for development of desalinated water as a long term supply. The distance to the Pacific Ocean or the San Francisco Bay is a limiting factor.

6.7 Exchanges or Transfers

"Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis" (CWC §§ 10631(c)).

The City does not participate in any transfer or exchange programs and does not have any such programs planned for the future.

6.8 Future Water Projects

"[…] The urban water supplier shall include a detailed description of expected future projects and programs […] that the urban water supplier may implement to increase the amount of the water supply available to the urban water supplier in average, single-dry, and multiple-dry water years. The description shall identify specific projects and include a description of the increase in water supply that is expected to be available from each project. The description shall include an estimate with regard to the implementation timeline for each project or program" (CWC §§ 10631(f)).

The City's primary future water supply projects are described in the City's 2020/21–2024/25 Capital Improvement Program (City of Brentwood, 2020b). The projects presented in Table 6-9 also are listed in the Water Improvements and Wastewater Improvements sections of the City's capital improvement program. Table 6-9 summarizes the City's existing and future projects that will improve existing and future water supplies for the City. Potential water supply benefits during various water supply year types have not been estimated. Water improvements include items such as major transmission mains, new water sources, improvements to existing water wells, reservoirs, and treatment facilities.

Table 6-9. (DWR Table 6-7R) Retail: Expected Future Water Supply Projects or Programs

N/A	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.
N/A	Some or all of the supplier's future water supply projects or programs are not compatible with this table and are described in 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 (*Drop Down Menu)*	Expected Increase In Water Supply to Agency
Water Storage Capacity at Los Vaqueros Reservoir	Yes, CCWD	The City and CCWD will work together toward an agreement to allow the City to purchase and deliver water that has been stored in the Los Vaqueros Reservoir. It will enable the City to pump water during the wet months to store and be available for blending during the dry months when Delta water quality is at its worst.	2025	All Year Types	--
On-Site Chlorine Generation System Upgrade	No	This project will upgrade the on-site sodium hypochlorite generation systems at City well sites. This project is necessary to replace the current systems, which have been in place for more than 12 years. The existing on-site sodium hypochlorite generation systems have proven themselves unreliable, costly to maintain and have become maintenance intensive.	2022	All Year Types	--
Citywide Non-Potable Water Distribution System	No	Installation of a trunk, recycled (non-potable) water distribution system throughout the City to provide recycled water for irrigation of parks, parkways, medians, and other applicable uses. By converting to non-potable water usage, the City can reduce the cost of landscape irrigation, save on potable water usage and reduce the discharge of recycled water to Marsh Creek.	2021	All Year Types	--
Waterline Improvement - John Muir Parkway	No	This project will install a new 16" waterline on John Muir Parkway between Briones Valley Road and Person Drive providing a critical connection between the east and west halves of Zone 2.	2024	All Year Types	--
Waterline Improvement - Kent Drive	No	This project will install a new 12" waterline on Kent Drive between Grenadier Way and Tayberry Lane providing additional flow capacity on a critical connection between the east and west halves of Zone 2.	2025	All Year Types	--
Wastewater Treatment Plant Expansion—Phase II	No	The existing 5 MGD tertiary treatment facility is being expanded to accommodate up to 6.4 MGD. The project includes the addition of one diffused air oxidation basin, retrofit of existing oxidation ditches to diffused air, secondary clarifiers, converting chlorine contact facilities to free chlorine disinfection, utility pumps, new solids mechanical dryer, dried bio-solids storage building, Electrical Distribution System Upgrade and all related appurtenances.	2023	All Year Types	--

Notes:

Source: City of Brentwood, 2020b.

For projects and programs expected to be implemented during the 2021-2022 fiscal year, 2022 was input.

6.9 Summary of Existing and Planned Sources of Water

"Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision 10631(b).

[...] [Provide a] detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the urban water supplier. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records" (CWC §§ 10631(b) and (b)(4)).

Table 6-10 provides a summary of actual supply sources and quantities in 2020. Table 6-11 presents the water supplies projected from 2025 through 2045.

Table 6-10. (DWR Table 6-8) Water Supplies – Actual

Water Supply	Additional Detail on Water Supply	2020		
		Actual Volume	Water Quality	Total Right or Safe Yield
Groundwater	ECC Subbasin 5-22.19	729	Drinking Water	1,825[a]
Surface water	COBWTP Supply (ECCID)	2042	Drinking Water	2,291[b]
Purchased or Imported Water	RBWTP Supply (ECCID)	1059	Drinking Water	2,190[c]
Surface Water	ECCID Non-Potable Supply	185	Other Non-Potable Water	342[b]
Recycled Water	City WWTP Supply	316	Recycled Water	913[d]
Desalinated water		--		--
Stormwater use		--		--
Transfers		--		--
Exchanges		--		--
Total		4,331		7,561

Notes:

Source: DDW, 2020.

Units: MGY

a. The firm design capacity of the City's wells is 5.18 mgd, this total assumes wells are pumping 5 mgd.

b. The total ECCID purchase entitlement is that of 4,823 MGY (14,800 AFY). A portion of this water is treated at RBWTP (6 mgd) and the rest of the total was split between potable and non-potable supplies based on an average of actual 2018 to 2020 water use. 87 percent of the total supply was allotted for potable use and 13 percent was allotted for non-potable use.

c. The total stems from the City's permanent treatment capacity share of 6 mgd. The 6 mgd that is treated at RBWTP comes from the total ECCID purchase entitlement of 4,823 MGY.

d. It is assumed that 50% of the WWTP capacity is available for future recycled water use.

Table 6-11. (DWR Table 6-9) Water Supplies – Projected

		2025		2030		2035		2040		2045 (opt)	
Water Supply	Additional Detail on Water Supply	Reasonably Available Volume	Total Right or Safe Yield	Reasonably Available Volume	Total Right or Safe Yield	Reasonably Available Volume	Total Right or Safe Yield	Reasonably Available Volume	Total Right or Safe Yield	Reasonably Available Volume	Total Right or Safe Yield
Groundwater	ECC Subbasin 5-22.15[a]	1,825	1,825	1,825	1,825	1,825	1,825	1,825	1,825	1,825	1,825
Surface water	COBWTP Supply (ECCID)[b]	2,291	2,291	2,291	2,291	2,291	2,291	2,291	2,291	2,291	2,291
Purchased or imported water	RBWTP Supply (ECCID)[c]	2,190	2,190	2,190	2,190	2,190	2,190	2,190	2,190	2,190	2,190
Surface water	ECCID Non-Potable Supply[b]	342	342	342	342	342	342	342	342	342	342
Recycled water	City WWTP supply[d]	364	1,168	412	1,168	460	1,168	508	1,168	508	1,168
Desalinated water		--	--	--	--	--	--	--	--	--	--
Stormwater use		--	--	--	--	--	--	--	--	--	--
Transfers		--	--	--	--	--	--	--	--	--	--
Exchanges		--	--	--	--	--	--	--	--	--	--
Total		7,012	7,816	7,060	7,816	7,108	7,816	7,156	7,816	7,156	7,816

Notes:

Units: MGY

a. *The firm design capacity of the City's wells is 5.18 mgd, this total assumes wells are pumping 5 mgd.*

b. *The total ECCID purchase entitlement is that of 4,823 MGY (14,800 AFY). A portion of this water is treated at RBWTP (6mgd) and the rest of the total was split between potable and non-potable supplies based on an average of actual 2018 to 2020 water use. 87 percent of the total supply was allotted for potable use and 13 percent was allotted for non-potable use.*

c. *The total stems from the City's permanent treatment capacity share of 6 mgd. The 6 mgd that is treated at RBWTP comes from the total ECCID purchase entitlement of 4,823 MGY.*

d. *The "Reasonably Available Volume" was obtained from Table 6-6. For the "Total Right or Safe Yield", it was assumed that 50% of the WWTP capacity is available for future recycled water use. It is assumed the City will expand the WWTP capacity from 5 mgd to 6.4 mgd by 2023.*

6.10 Energy Intensity

"In addition to the requirements of Section 10631, an urban water management plan shall include any of the following information that the urban water supplier can readily obtain: [...] (7) Any other energy-related information the urban water supplier deems appropriate." (CWC §§ 10631.2(a)(1)–10631.2(a)(7)).

Water energy intensity is the total amount of energy on a per AF-foot basis associated with water management processes occurring within the City's operational control. Since the City delivers potable, non-potable, and recycled water supplies to its customers, the "Multiple Water Delivery Products" approach is being used for this analysis. Tables 6-12 and 6-13 present the energy intensity of the City's water supplies for the year 2020. Energy is used to treat raw water at the COBWTP, for well production and pumping, pumping of non-potable water supply, and to produce recycled water at the WWTP.

Table 6-12a. (DWR Table O-1C) Energy Intensity – Multiple Water Delivery Products

Urban Water Supplier: City of Brentwood

Start Date for Reporting Period: 1/1/2020	Urban Water Supplier Operational Control							
End Date: 12/31/2020	Water Management Process						Non-Consequential Hydropower (if applicable)	
	Extract and Divert	Place into Storage	Conveyance	Treatment	Distribution	Total Utility	Hydropower	Net Utility
Volume of Water Entering Process (AF)	2,806	0	0	6,266	0	--	0	--
Retail Potable Deliveries (%)	*80%*	*0%*	*0%*	*100%*	*0%*		*0%*	
Retail Non-Potable Deliveries (%)	*20%*	*0%*	*0%*	*0%*	*0%*		*0%*	
Wholesale Potable Deliveries(%)	*0%*	*0%*	*0%*	*0%*	*0%*		*0%*	
Wholesale Non-Potable Deliveries (%)	*0%*	*0%*	*0%*	*0%*	*0%*		*0%*	
Agricultural Deliveries (%)	*0%*	*0%*	*0%*	*0%*	*0%*		*0%*	
Environmental Deliveries (%)	*0%*	*0%*	*0%*	*0%*	*0%*		*0%*	
Other (%)	*0%*	*0%*	*0%*	*0%*	*0%*		*0%*	
Total Percentage [must equal 100%]	*100%*	*0%*	*0%*	*100%*	*0%*		*0%*	
Energy Consumed (kWh)	1,745,005	0	0	2,766,076	0	4,511,081	0	4,511,081
Energy Intensity (kWh/AF)	621.9	0.0	0.0	441.4	0.0	--	0	--

Table 6-12b. (DWR Table O-1C) Energy Intensity – Multiple Water Delivery Products

Water Delivery Type	Production volume (AF)	Total Utility (kWh/AF)	Net Utility (kWh/AF)
Retail Potable Deliveries	*8,504*	*489.4*	*489.4*
Retail Non-Potable Deliveries	*568*	*614.4*	*614.4*
Wholesale Potable Deliveries	*0*	*0.0*	*0.0*
Wholesale Non-Potable Deliveries	*0*	*0.0*	*0.0*
Agricultural Deliveries	*0*	*0.0*	*0.0*
Environmental Deliveries	*0*	*0.0*	*0.0*
Other	*0*	*0.0*	*0.0*
All Water Delivery Types	9,072	497.3	497.3

Quantity of Self-Generated Renewable Energy: 0 kWh

Data Quality: Combination of Estimates and Metered Data

Data Quality Narrative: Data for this analysis was provided by the City and is based on estimates and metered data.

Narrative: The analysis includes energy use from production of potable water at the COBWTP, well production and pumping, and pumping of non-potable water supply. The "Extract and Divert" water management process includes energy consumption associated with well production and pumping as well and pumping of non-potable water supply. The "Treatment" water management process includes energy consumption associated with production and pumping of potable water at the COBWTP. Treatment and pumping energy consumption could not be broken up because all energy use is metered through a single meter.

Table 6-13. (DWR Table O-2) Energy Intensity – Wastewater & Recycled Water

Urban Water Supplier: City of Brentwood				
Start Date for Reporting Period: 1/1/2020	Urban Water Supplier Operational Control			
End Date: 12/31/2020	Water Management Process			
	Collection/ Conveyance	Treatment	Discharge/ Distribution	Total
Volume of Wastewater Entering Process (AF)	*0*	*4,465*	*0*	*4,465*
Wastewater Energy Consumed (kWh)	*0*	*5,114,192*	*0*	*5,114,192*
Wastewater Energy Intensity (kWh/AF)	0.0	1,145.4	0.0	1,145.4
Volume of Recycled Water Entering Process (AF)	*0*	*971*	*0*	*0*
Recycled Water Energy Consumed (kWh)	*0*	*1,476,729*	*0*	*1,476,729*
Recycled Water Energy Intensity (kWh/AF)	0	1,520.8	0	0

Quantity of Self-Generated Renewable Energy: 0 kWh

Data Quality: Combination of Estimates and Metered Data

Data Quality Narrative: Data for this analysis was provided by the City and is based on estimates and metered data.

Narrative: The City does not specifically track energy consumption to produce recycled water. Energy consumption for recycled water production was estimated based on the amount of recycled water produced relative to the total amount of wastewater that was collected and treated at the City WWTP.

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Section 7

Water Supply Reliability Assessment

This section describes factors impacting long-term reliability of water supplies and provides a comparison of projected water supplies and demands.

7.1 Constraints on Water Sources

"[Provide a] detailed discussion of anticipated supply availability under a normal water year, single dry year, and droughts lasting at least five years, as well as more frequent and severe periods of drought, as described in the drought risk assessment. For each source of water supply, consider any information pertinent to the reliability analysis conducted pursuant to Section 10635, including changes in supply due to climate change.

[…] The plan shall include information, to the extent practicable, relating to the quality of existing sources of water available to the supplier over the same five-year increments as described in subdivision (a) of Section 10631, and the manner in which water quality affects water management strategies and supply reliability" (CWC §§ 10631(b)(1)–10634).

This section describes water quality and quantity constraints in the two water supply sources: groundwater and surface water.

7.1.1 Constraints on Surface Water Sources

The City's surface water supply is from the San Joaquin River Delta. Due to weather variations, storm events, and diurnal patterns, water quality for each of the three sources of surface water (Old River, Middle River, and Rock Slough) in the Contra Costa Canal can fluctuate from year to year, seasonally, daily, and even hourly. Raw water from the Delta is characterized by low to moderate levels of turbidity, minerals, and natural organic matter. Pathogenic organisms tend to be present in low concentrations as well (City of Brentwood, 2016). Water from the Contra Costa Canal is routinely monitored for pesticides and other contaminants (e.g., synthetic organic compounds, nitrate, radionuclides, perchlorate, arsenic). These constituents are typically not detected (City of Brentwood, 2019b). Both the COBWTP and RBWTP are amply equipped to handle the fluctuations in raw water quality and consistently produce a high quality treated water.

7.1.2 Constraints on Groundwater Sources

The San Joaquin basin is not adjudicated. While DWR has not designated the ECC Subbasin in overdraft and current groundwater levels and raw water delivery rates are assumed to be constant for the 2020 UWMP, the City is aware that future conditions may vary. Environmental factors, such as drought conditions, and water quality factors, such as groundwater contamination, have the potential to affect this resource adversely. The City is prepared to manage any changes that may occur due to extended drought or potential effects of climate change adaptively via conservation measures and an increased use of recycled water.

While water quality in the City aquifer is adequate, the water does have relatively high levels of TDS, chlorides, and nitrate as described in Section 6.2.1. The TDS concentration in the groundwater is high, with City wells registering concentrations as high as 1,100 mg/L (City of Brentwood, 2019b). The occurrence of nitrate in groundwater in this area has generally been attributed to previous agricultural influences and leaching from natural deposits, as described in Section 6.2.1. However, the occurrence is limited to the upper sequences of aquifer materials. The nitrate concentrations decline appreciably for wells 200 feet or more below the ground surface (ECCGSA, 2020a). The City's five active wells are below 20 mg/L nitrate as NO_3, with average concentrations at 3.5 mg/L (City of Brentwood, 2019b). Chloride and TDS concentrations also decline with depth but less notably than nitrate concentrations. The decline suggests local anthropogenic influences on TDS, chloride, and other constituents in addition to nitrate. As shown in Table 6-1, two of the nine permitted wells are not in use because of issues related to water quality (i.e., one does not currently have a disinfection system [Well 9], and the other has high nitrate concentrations [Well 11]).

Table 7-1 summarizes legal, water quality, and climactic factors that may affect the reliability of the water supply for the City.

Table 7-1. Factors Affecting Water Supply

Water Supply Source	Source Name (if any)	Limitation Quantification	Legal	Environmental	Water Quality	Climatic	Additional Information
Purchased treated surface water from CCWD (RBWTP)	Raw water (ECCID)	The City has purchased a permanent 6 mgd right at the RBWTP	Permanent capacity share	Catastrophic levee breach could compromise surface water supply	High chlorides, TDS, and nitrate levels could compromise supply	None	
Supplier-produced surface water (COBWTP)	Raw water (ECCID)	Portion of contracted 4,823 MGY Plant capacity = 16.5 to 33 mgd	Permanent entitlement to purchase	Catastrophic levee breach could compromise surface water supply Decreasing Delta water quality at Rock Slough Intake	High TDS and nitrate levels could compromise supply	None	
Non-potable water	Roddy Ranch Pump Station (ECCID)	Portion of contracted 4,823 MGY	Permanent entitlement to purchase	Catastrophic levee breach could compromise surface water supply	High TDS and nitrate levels could compromise supply	None	East Contra Costa Canal Irrigation shutdowns and water supply will be coordinated between the City and ECCID as required
Supplier-produced groundwater	San Joaquin Groundwater Basin (ECC Subbasin)	5.18 mgd firm capacity	Possible future limitations due to SGMA	Significant subsidence could shift basin into overdraft and trigger need to restrict withdrawals	High TDS and nitrate levels could compromise supply	None	
Recycled water	City WWTP	5 mgd (current) 6.4 mgd (future)	SWRCB Order WQ 2016-0068-DDW		If tertiary-level water quality requirements are not met, flows are sent to a lined reclamation pond	None	

7.2 Reliability by Type of Year

"[Provide a] detailed discussion of anticipated supply availability under a normal water year, single dry year, and droughts lasting at least five years, as well as more frequent and severe periods of drought, as described in the drought risk assessment. For each source of water supply, consider any information pertinent to the reliability analysis conducted pursuant to Section 10635, including changes in supply due to climate change" (CWC §§ 10631(b)(1)).

This section describes the reliability of the City's various water supply sources and their vulnerability to seasonal or climatic shortages. The definitions of the three water-year types as described by DWR are provided below.

1. **Normal year** is a year in the historical sequence that most closely represents median runoff levels and patterns. Average is defined as the median runoff over the previous 30 years or more.
2. **Single-dry year** is generally considered to be the lowest annual runoff for a watershed since the water year beginning of measurements in 1903.
3. **Five-Consecutive-year drought** period is generally considered to be the lowest average runoff for a consecutive five-year period for a watershed since 1903.

The City has always met system water demand, regardless of regional hydrology. The City expects no reductions from normal-year supply during single or multiple dry years. Appropriate base years for the City would be 2004 as an average year, 1977 as a single dry year, and 1929 to 1933 as multiple dry years. Table 7-2 presents the City's basis of water year data.

Table 7-2. (DWR Table 7-1R) Retail: Bases of Water Year Data (Reliability Assessment)

Year Type	Base Year	Volume Available, MGY	Percentage of Average Supply
Normal year	2004	-	100%
Single-dry year	1977	-	100%
Consecutive-dry years 1st year	1929	-	100%
Consecutive -dry years 2nd year	1930	-	100%
Consecutive -dry years 3rd year	1930	-	100%
Consecutive -dry years 4th year	1932	-	100%
Consecutive -dry years 5th year	1933	-	100%

Notes:
Units: MGY

7.3 Supply and Demand Comparison

"Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and multiple dry water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier" (CWC §§ 10635(a)).

This section provides a comparison of normal, single-dry, and multiple-dry water year supply and demand for the City. Section 4 previously addressed water demands and Section 6 addressed water supplies.

The comparison of current and projected water supply and demand demonstrates the ability of a supplier to accommodate a city's water demands during an average water year as well as those years with water shortages. As shown in the tables, the supply is adequate to meet the projected demand across all year types.

Data presented in Table 7-3 compares the normal water year current and projected water supplies to the current and projected demand for the City.

Table 7-3. (DWR Table 7-2R) Retail: Normal Year Supply and Demand Comparison

	2025	2030	2035	2040	2045 (opt)
Supply [a]	7,012	7,060	7,108	7,156	7,156
Demand totals[b]	4,181	4,442	4,715	5,001	5,252
Difference	2,831	2,618	2,393	2,156	1,905

Notes:
Units: MGY
a. Supply from Table 6-11
b. Demand from Table 4-4.

The current and projected water supplies are compared to the demands for a single dry year for the City in Table 7-4.

Table 7-4. (DWR Table 7-3R Retail: Single Dry Year Supply and Demand Comparison

	2025	2030	2035	2040	2045 (opt)
Supply totals	7,012	7,060	7,108	7,156	7,156
Demand totals	4,181	4,442	4,715	5,001	5,252
Difference	2,831	2,618	2,393	2,156	1,905

Notes:
Units: MGY

Table 7-5 presents projections for water supply compared to the demands for multiple dry years for the City.

Table 7-5. (DWR Table 7-4R) Retail: Multiple Dry Years Supply and Demand Comparison

		2025	2030	2035	2040	2045 (opt)
First year	Supply totals	7,012	7,060	7,108	7,156	7,156
	Demand totals	4,181	4,442	4,715	5,001	5,252
	Difference	2,831	2,618	2,393	2,156	1,905
Second year	Supply totals	7,012	7,060	7,108	7,156	7,156
	Demand totals	4,181	4,442	4,715	5,001	5,252
	Difference	2,831	2,618	2,393	2,156	1,905
Third year	Supply totals	7,012	7,060	7,108	7,156	7,156
	Demand totals	4,181	4,442	4,715	5,001	5,252
	Difference	2,831	2,618	2,393	2,156	1,905
Fourth year	Supply totals	7,012	7,060	7,108	7,156	7,156
	Demand totals	4,181	4,442	4,715	5,001	5,252
	Difference	2,831	2,618	2,393	2,156	1,905
Fifth year	Supply totals	7,012	7,060	7,108	7,156	7,156
	Demand totals	4,181	4,442	4,715	5,001	5,252
	Difference	2,831	2,618	2,393	2,156	1,905

Notes:
Units: MGY

7.4 Water Supply Reliability Management Tools and Options

"An urban water supplier shall describe in the plan water management tools and options used by that entity that will maximize resources and minimize the need to import water from other regions" (CWC §§ 10620(f)).

Sections 4 and 6 of this UWMP discuss water management tools and options that are being implemented or planned for implementation to maximize the use of local water resources and minimize the need to import water from other regions.

7.5 Drought Risk Assessment

"Every urban water supplier shall include, as part of its urban water management plan, a drought risk assessment for its water service to its customers as part of information considered in developing the demand management measures and water supply projects and programs to be included in the urban water management plan. The urban water supplier may conduct an interim update or updates to this drought risk assessment within the five-year cycle of its urban water management plan update. The drought risk assessment shall include each of the following:[…] (4) Considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change conditions, anticipated regulatory changes, and other locally applicable criteria" (CWC §§ 10635(b)(1)–10635(b)(4)).

This DRA includes a description of the data and methods used, basis for the supply shortage conditions, determination of the reliability of each source, and comparison of the total water supplies and uses during the drought.

7.5.1 Basis for Water Shortage Condition

As described in Section 6, the City's water supply consists of surface water from the Delta, groundwater from the ECC Subbasin, and recycled water. The reliability of the City's surface water supplies is relatively high since the permanent purchase entitlement from which the City's supplies stem are protected by pre-1914 water rights, which historically have not been subject to delivery reductions during water shortages, including regulatory restricted and drought years. The City's groundwater supply also appears to be fairly reliable. Historical conditions as reflected by available data for the ECC Subbasin indicate that the groundwater system has no apparent overdraft, suggesting that historical extraction patterns have not exceeded the safe yield of the basin.

As discussed in Section 3.3, climate change has the potential to lessen some of this reliability. There is concern that climate change-related sea-level rise and extreme weather can adversely impact access and the quality of surface water supplies from the Delta. For groundwater, water quality factors, such as groundwater contamination and or new pumping limitations instilled by the GSP process could alter the availability of this resource. While the City has been able to mitigate any changes to their water supplies through conservation measures and an increased use of recycled water, these are the key issues that were utilized as drivers for the shortage condition considered in this DRA. The analysis considers the following:

1. Reduction in water supplies from the Delta
2. Reduced availability of groundwater supply due to water quality concerns

The reliability assumptions of each of the City's supply sources under this drought related shortage condition scenario are described in Section 7.5.2.

7.5.2 DRA Water Source Reliability

The reliability of each supply source under the drought related shortage condition scenario for shortage conditions listed in Section 7.5.1 is summarized in Table 7-6. For the DRA, it is assumed that the shortage condition scenario would result in a reduction of the "Total Right or Safe Yield" supply that was outlined in Table 6-8.

Table 7-6. DRA Water Source Reliability

	Delta Water Supply[a]		Groundwater		Total		
DRA Scenario	Volume Available, MG	% of Average/ Normal Year Supply	Volume Available, MG	% of Average/ Normal Year Supply	Volume Available, MG	% of Average/ Normal Year Supply	Assumptions
Reduction in water supplies from the Delta combined with a reduced availability of groundwater due to water quality concerns.	3,858	80	1,168	80	6,231	83	Assumed a 20% reduction in Delta water supplies and a 20% reduction in groundwater supply. Recycled water supply was assumed to remain unchanged.

Notes:

a. Refers to all supplies stemming from the ECCID purchase entitlement of 4,823 MGY (14,800 AFY).

7.5.3 Total Water Supply and Use Comparison

Table 7-7 is the DRA total water supply and use comparison. It is based on the scenario described in Table 7-6. It calculates the potential supply shortages (or surplus), and allows the City to include shortfall mitigation from WSCP demand reduction measures and supply augmentation as necessary.

Table 7-7. 5-Year DRA (DWR Table 7-5)

2021	Total	Notes
Gross Water Use	3,981	Estimated water use was developed using population projections and assumed GPCD used to develop water use projections in Section 4
Total Supplies	6,231	Projected water supply available to the City after the water supply reductions summarized in Table 7-6.
Surplus/Shortfall without WSCP Action	2,250	Surplus
Planned WSCP Actions (use reduction and supply augmentation)		
WSCP - supply augmentation benefit	-	
WSCP - use reduction savings benefit	-	
Revised Surplus/(shortfall)	-	
Resulting % Use Reduction from WSCP action	-	
2022	**Total**	**Notes**
Gross Water Use [Use Worksheet]	4,031	Estimated water use was developed using population projections and assumed GPCD used to develop water use projections in Section 4
Total Supplies [Supply Worksheet]	6,231	Projected water supply available to the City after the water supply reductions summarized in Table 7-6.
Surplus/Shortfall without WSCP Action	2,200	Surplus
Planned WSCP Actions (use reduction and supply augmentation)		
WSCP - supply augmentation benefit	-	
WSCP - use reduction savings benefit	-	
Revised Surplus/(shortfall)	-	
Resulting % Use Reduction from WSCP action	-	
2023	**Total**	**Notes**
Gross Water Use [Use Worksheet]	4,081	Estimated water use was developed using population projections and assumed GPCD used to develop water use projections in Section 4
Total Supplies [Supply Worksheet]	6,231	Projected water supply available to the City after the water supply reductions summarized in Table 7-6.
Surplus/Shortfall without WSCP Action	2,150	Surplus
Planned WSCP Actions (use reduction and supply augmentation)		
WSCP - supply augmentation benefit	-	
WSCP - use reduction savings benefit	-	
Revised Surplus/(shortfall)	-	
Resulting % Use Reduction from WSCP action	-	

Table 7-7. 5-Year DRA (DWR Table 7-5)

2024	Total	Notes
Gross Water Use [Use Worksheet]	4,131	Estimated water use was developed using population projections and assumed GPCD used to develop water use projections in Section 4
Total Supplies [Supply Worksheet]	6,231	Projected water supply available to the City after the water supply reductions summarized in Table 7-6.
Surplus/Shortfall without WSCP Action	2,100	Surplus
Planned WSCP Actions (use reduction and supply augmentation)		
WSCP - supply augmentation benefit	-	
WSCP - use reduction savings benefit	-	
Revised Surplus/(shortfall)	-	
Resulting % Use Reduction from WSCP action	-	
2025	**Total**	**Notes**
Gross Water Use [Use Worksheet]	4,181	Estimated water use was developed using population projections and assumed GPCD used to develop water use projections in Section 4
Total Supplies [Supply Worksheet]	6,231	Projected water supply available to the City after the water supply reductions summarized in Table 7-6.
Surplus/Shortfall without WSCP Action	2,050	Surplus
Planned WSCP Actions (use reduction and supply augmentation)		
WSCP - supply augmentation benefit	-	
WSCP - use reduction savings benefit	-	
Revised Surplus/(shortfall)	-	
Resulting % Use Reduction from WSCP action	-	

The basis of the key inputs in the DRA water supply and use comparison are described below. In all DRA years the City has a surplus of supplies.

Gross water use – The City's projected water use from 2021 through 2025. These demands were developed using population projections and assumed GPCD used to develop water use projections in Section 4. The gross water use included in this DRA does not include water use reduction as a result of the implementation of any demand reduction actions by WSCP stage described in Section 8.

Total supplies – Projected water supply available to the City after the water supply reductions summarized in Table 7-6.

Surplus/shortfall without WSCP action – Total supplies minus gross water use prior to any demand reduction or supply augmentation actions from the WSCP.

WSCP–supply augmentation benefit – Sum of estimated supply augmentation benefit in the required WSCP stage.

WSCP–use reduction savings benefit – Sum of estimated water savings from demand reduction actions in the required WSCP stage.

Revised Surplus/(shortfall) – Total supplies including supply augmentation benefit minus total demands including demand reductions from relevant WSCP stage.

Resulting percent use reduction from WSCP action – WSCP–use reduction savings benefit divided by Gross Water Use.

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Section 8

Water Shortage Contingency Planning

"Every urban water supplier shall prepare and adopt a water shortage contingency plan as part of its urban water management plan that consists of each of the following elements: […]"
(CWC §§ 10632(a)).

This section describes the City's WSCP, which is a detailed plan for how the City will respond in the case of a water shortage. A water shortage means that the water supply available is insufficient to meet the normally expected customer water use at a given point in time. The WSCP provides planned guidance for managing and mitigating a potential shortage of water supply. The City's WSCP is consistent with provisions in the state regulations pertaining to water planning in Water Code Section 10632. The WSCP consists of the following elements:

- Water Supply Reliability Analysis
- Annual Water Supply and Demand Assessment Procedures
- Six Standard Water Shortage Stages
- Shortage Response Actions
- Special Water Feature Distinction
- Communication Protocols
- Compliance and Enforcement
- Legal Authorities
- Financial Consequences of WSCP
- Monitoring and Reporting
- WSCP Refinement Procedures
- Plan Adoption, Submittal, and Availability

8.1 Water Supply Reliability Analysis

"The analysis of water supply reliability conducted pursuant to Section 10635" (CWC §§ 10632(a)(1)).

The water supply reliability analysis of the City's supplies is summarized. The key issues that may create a shortage conditions relative to the City's water supply portfolio are described.

8.1.1 Water System Reliability

The City's water supply consists of surface water from the Delta, groundwater from the ECC Subbasin, and recycled water. The reliability of the City's surface water supplies is relatively high since the permanent purchase entitlement from which the City's supplies stem are protected by pre-1914 water rights, which historically have not been subject to delivery reductions during water shortages, including regulatory restricted and drought years. The City's groundwater supply also appears to be fairly reliable as available data for the ECC Subbasin indicate that historical extraction patterns have not exceeded the safe yield of the basin. The comparison of current and projected water supply and demand conducted as part of the water supply reliability assessment (Section 7) showed that the City water supply is adequate to meet the projected demand across all year types.

8.1.2 Key Issues to Potential Shortage Condition

As discussed in Section 7 of the UWMP, the reliability of the City's water supply is relatively high. However, there are issues that could result in the City declaring a water shortage stage condition. Below is a list of the key issues that could potentially result in a shortage condition for the City.

- State mandates due to drought circumstances
- Availability of Delta water supplies
    - Climate change-related sea-level rise and extreme weather
    - Water quality conditions/contamination
    - Mechanical breakdown of surface water diversion structure, intake, or WTP facilities
- Declining groundwater levels
- GSP sustainable groundwater pumping limitations (this is a future potential condition - to be defined by SGMA GSP)
- Contamination of one or more wells

Some of these issues were utilized as drivers for the shortage condition considered in the DRA that is included in Section 7 of the UWMP. In all DRA years, the City was found to have a surplus of water supplies.

8.2 Annual Water Supply and Demand Assessment Procedures

"An urban water supplier shall conduct an annual water supply and demand assessment pursuant to subdivision (a) of Section 10632 and, on or before July 1 of each year, submit an annual water shortage assessment report to the department with information for anticipated shortage, triggered shortage response actions, compliance and enforcement actions, and communication actions consistent with the supplier's water shortage contingency plan. An urban water supplier that relies on imported water from the State Water Project or the Bureau of Reclamation shall submit its annual water supply and demand assessment within 14 days of receiving its final allocations, or by July 1 of each year, whichever is later" (CWC §§ 10632.1).

The annual water supply and demand assessment (Annual Assessment) is conducted annually on or before July 1 of each year beginning with the first annual water supply and demand assessment due by July 1, 2022. The Annual Assessment report is submitted to DWR with information for anticipated shortage, triggered shortage response actions, compliance and enforcement actions, and communication actions consistent with this WSCP.

8.2.1 Evaluation Criteria

The Annual Assessment determination will be based on considerations of unconstrained water demand, available water supplies, and infrastructure considerations. Since shortages are based on the difference between expected water supplies and unconstrained demand under current year and dry year conditions, the locally-applicable evaluation criteria to be used in the Annual Assessment for determining a shortage include the following:

- Depiction of current year and subsequent dry year based on best-available data, including anticipated hydrologic conditions
- Current and subsequent dry year unconstrained demand for the City's customers considering weather, growth, and other influencing factors

- Estimation of available water supply for current and subsequent dry year

8.2.2 Decision Making Process

The City will conduct an Annual Assessment that follows the steps illustrated in Figure 8-1 and described below. Once DWR finalizes the guidelines this process may be modified.

Figure 8-1. Annual Assessment Procedure and Decision Making Process

Step 1. Estimate Unconstrained Customer Demand - Current year unconstrained demand considering weather, growth, and other influencing factors such as policies to manage current supplies to meet demand objectives in future years, as applicable is estimated. Unconstrained customer demand does not include demand reductions that may occur as a result of the City implementing any special shortage response actions that may be necessary.

Step 2. Estimate Available Water Supply - The available water supply by source is estimated for the current year and one subsequent dry year:

- Quantify each source of water supply and provide descriptive text of each source
- Quantify current year available supply by source, this includes coordinating with ECCID and CCWD and considerations for hydrological and regulatory conditions in the current year
- Quantify available supply by source for one subsequent dry year
- Considerations for water supply availability estimates by source:
  - The existing infrastructure capabilities and plausible constraints as they impact the City's ability to deliver supplies to meet expected customer water use needs in the coming year should be considered
  - Specific locally applicable factors that can influence or disrupt each supply source

Step 3. Compare Projected Water Supplies to Demands – The estimated water supplies identified in the Annual Assessment will represent the water demand that can be met after factoring in the considerations noted in Step 2.

Step 4. Identify and Quantify Anticipated Water Supply Shortages, if any – The estimated water supplies in comparison to unconstrained water demands will identify and quantify any anticipated water shortages. Depending on the extent of the projected shortage, the appropriate shortage stage will be selected.

Step 5. Develop Draft Annual Assessment Report – The City compiles the draft Annual Assessment report based on the format to be determined by DWR using the key data inputs and evaluation criteria.

Step 6. Review Draft Annual Assessment Report – The City will review and provide comment on the draft Annual Assessment report.

Step 7. Address Comments to the Draft Annual Assessment Report, Finalize Report – The City will address internal comments to the draft Annual Assessment report and will finalize the report.

Step 8. Submit Annual Assessment Report to DWR – The City will submit the Annual Assessment report to DWR.

8.3 Six Standard Water Shortage Stages

"(A) Six standard water shortage levels corresponding to progressive ranges of up to 10, 20, 30, 40, and 50 percent shortages and greater than 50 percent shortage. Urban water suppliers shall define these shortage levels based on the suppliers' […] (B) An urban water supplier with an existing water shortage contingency plan that uses different water shortage levels may comply with the requirement in subparagraph (A) by developing and including a cross-reference relating its existing categories to the six standard water shortage levels" (CWC §§ 10632(a)(3)(A)–10632(a)(3)(B)).

The City has developed a six-stage WSCP, as shown in Table 8-1, to invoke during declared water shortages. The City's WSCP stages have been standardized from four-stages to six-stages to provide a consistent regional and statewide approach to conveying the relative severity of water supply shortage conditions. The six standard water shortage levels correspond to progressively increasing estimated shortage conditions and align with the response action the City would implement to meet the severity of the impending shortages. Triggering from one stage to the next is done at the recommendation of the Director of Public Works. Factors to take into consideration include decreases in water allotments from the water supply provider such as CCWD or ECCID, from reductions in infrastructure capacity related to the water treatment plants, pipelines or water treatment plants, or climate or from state political conditions that would impact the allotment of water supply.

Table 8-1. (DWR Table 8-1) Water Shortage Contingency Plan Levels

Shortage Level	Percent Shortage Range	Water Shortage condition
1	up to 10%	Water supply conditions are sufficient to meet between 90 to 100% of projected unconstrained demand for the next two years.
2	up to 20%	Water supply conditions are sufficient to meet between 80 to 90% of projected unconstrained demand for the next two years.
3	up to 30%	Water supply conditions are sufficient to meet between 70 to 80% of projected unconstrained demand for the next two years.
4	up to 40%	Water supply conditions are sufficient to meet between 60 to 70% of projected unconstrained demand for the next two years.
5	Up to 50%	Water supply conditions are sufficient to meet between 50 to 60% of projected unconstrained demand for the next two years.
6	>50%	Water supply conditions are sufficient to meet less than 50% of projected unconstrained demand for the next two years.

8.4 Shortage Response Actions

"[Provide] shortage response actions that align with the defined shortage levels and include, at a minimum, all of the following: [...]" (CWC §§ 10632(a)(4)).

The City's shortage response actions include demand reduction actions, supply augmentation actions, operational changes, locally appropriate mandatory prohibitions against specific water use practices, and consideration of state mandated prohibitions. For each activity the extent to which the gap between supplies and demand will be reduced by each shortage response action is estimated. As the water purveyor, the City must provide the minimum health and safety water needs of the community at all times. The objective is to design the WSCP so that the demand reduction and supply augmentation activities in each stage reduce the shortage by the percent shortage range for each stage. The following is a summary of the actions to be undertaken in response to the shortage levels identified in Table 8-1.

Shortage Level 1 – During Level 1, of a water supply shortage, the shortage is minimum, up to 10 percent. Voluntary conservation is encouraged; this includes encouraging customers to limit the watering of lawn, landscape or other turf area with water supplied by the City. The City maintains an ongoing public information campaign consisting of distribution of literature, speaking engagements, bill inserts, and conversation messages printed in local newspapers and on the City's internet web page. The drought situation is explained to public and governmental bodies. The City explains other stages and forecast future actions. Also, the City requests voluntary water conservation. Educational programs in area schools are ongoing.

Shortage Level 2 – During Level 2 of a water supply shortage, the shortage is moderate, up to 20 percent, and conservation may be voluntary, consist of conservation goals, and/or include mandatory conservation rules; this includes encouraging customers to limiting the watering of lawn, landscape or other turf area with water supplied by the City to any four days per week maximum. All steps taken in prior stages are intensified and production is monitored daily for compliance with necessary reductions. The severity of actions depends upon the percent shortage. The City aggressively continues it public information and education programs. The City asks for 10 to 20 percent voluntary or mandatory water use reductions. If necessary, the City also supports passage of drought ordinances.

Shortage Level 3 to 4 – During Level 3 to 4 of a water supply shortage, the shortage is severe, 20 to 40 percent, and conservation consists of conservation goals and mandatory conservation rules. This may include limiting the watering of lawn, landscape or other turf area with water supplied by the City to any three days per week maximum. All steps taken in prior stages are intensified and production is monitored daily for compliance with necessary reductions. This phase becomes effective upon notification by the City that water usage is to be reduced by a mandatory percentage. The City would adopt drought ordinances, implement mandatory reductions, and enforce fines and penalties for water waste. Rate changes may be implemented to penalize excess usage. Drought surcharges or rates may be applied based on Council direction. The City would restrict outdoor water usage at City facilities by reducing water times or using non-potable/recycled water. The City would implement the use of recycled water fill stations at the City wastewater treatment plant to offset potable water use. Water use restrictions are put into effect; i.e., prohibited uses can include, but are not limited to, restrictions on daytime hours for watering, excessive watering resulting in gutter flooding, using hoses without a shutoff device, non-recycling fountains, washing down sidewalks or patios, and unrepaired leaks. The City monitors monthly customer billing data and production weekly for compliance with necessary reductions.

Shortage Level 5 to 6 – During these levels of a water supply shortage, the shortage is critical, greater than 40 percent. Conservation consists of conservation goals and mandatory conservation rules. This may include limiting the watering of lawn, landscape or other turf area with water supplied by the City to any two days per week maximum. All steps taken in prior stages are intensified and production is monitored daily for compliance with necessary reductions.

Sections 8.4.1 and 8.4.2 provide detailed information as to the activities and the estimated savings for each activity.

8.4.1 Demand Reduction Actions

Locally appropriate demand reduction actions to adequately respond to shortages are specified in Table 8-2. Priorities for use of available potable water during shortages are based on the difference between basic needs (e.g. drinking, toilet flushing) and discretionary uses (e.g. landscape irrigation), and legal requirements set forth in the CWC, Sections 350-359. Water allocations are established for all customers according to the following:

- Minimum health and safety allocations for interior residential needs (includes single-family, multifamily, hospitals and convalescent facilities, retirement and mobile home communities, and firefighting and public safety)
- Commercial, industrial, institutional/governmental operations (where water is used for manufacturing and for minimum health and safety allocations for employees and visitors), to maintain jobs and economic base of the community (not for landscape uses)
- Existing landscaping
- New customers, proposed projects without permits when shortage declared

In 2011, the City adopted the current Municipal Code Section 17.630, which addresses landscaping and irrigation for new construction of homes, commercial, and industrial facilities. This code is a proactive means of reducing the water demand in the City. Restrictions in Level 1 are always in place per City Municipal Code 14.01.510, *Conservation – Water waste prohibited*. Should drought conditions warrant mandatory reductions, during Level 2 of a water supply shortage, the City may adopt and implement an ordinance for mandatory conservation and water restriction plan. This ordinance may require a drought surcharge for the City to enforce the plan.

The estimated annual volume of water (as a percent) that the demand reduction action will reduce the shortage gap by is included in Table 8-2 as is any note of a penalty, charge, or other enforcement for each demand reduction action.

Table 8-2. Demand Reduction Actions (DWR Table 8-2)

Shortage Level	Demand Reduction Actions	How much is this going to reduce the shortage gap?	Additional Explanation or Reference	Penalty, Charge, or Other Enforcement?
1 – 6	Landscape - Restrict or prohibit runoff from landscape irrigation	2%	The application of potable water to outdoor 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 is prohibited.	Yes
1 – 6	Other - Require automatic shut of hoses	1%	The use of a hose that dispenses potable water to wash a motor vehicle, 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 is prohibited.	Yes
1 – 6	Other - Prohibit use of potable water for washing hard surfaces	2%	Cleaning of streets/sidewalks/walkways/parking areas/patios/porches or verandas.	Yes
1 – 6	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	4%		Yes
1 – 6	Water Features - Restrict water use for decorative water features, such as fountains	1%	The use of potable water in a fountain or other decorative water feature, except where the water is part of a recirculating system is prohibited.	Yes
1 – 6	CII - Restaurants may only serve water upon request	1%		Yes
1 – 6	Landscape - Limit landscape irrigation to specific days	5%	The application of potable water to outdoor landscapes during and up to forty-eight hours after a measurable rainfall is prohibited.	Yes
1 – 6	Landscape - Prohibit certain types of landscape irrigation	5%	The use of potable water to irrigate ornamental turf on public street medians is prohibited.	Yes
1 – 6	CII - Lodging establishment must offer opt out of linen service	1%	To promote water conservation, operators of hotels and motels shall provide guests with the option of choosing not to have towels and linens laundered daily. The hotel or motel shall prominently display notice of this option in each guestroom using clear and easily understood language.	Yes
2 – 6	Other - Prohibit vehicle washing except at facilities using recycled or recirculating water	1%		Yes
2 – 6	Landscape - Prohibit certain types of landscape irrigation	6%	Watering lawns and landscapes is prohibited at City facilities.	Yes
2 – 6	Landscape - Limit landscape irrigation to specific times	6%	Prohibitions on time and day for residential outdoor irrigation.	Yes

Table 8-2. Demand Reduction Actions (DWR Table 8-2)

Shortage Level	Demand Reduction Actions	How much is this going to reduce the shortage gap?	Additional Explanation or Reference	Penalty, Charge, or Other Enforcement?
2 – 6	Other	5%	Irrigation of non-permanent agriculture is prohibited.	Yes
2 – 6	Other	4%	Excessive watering resulting in gutter flooding is prohibited.	Yes
2 – 6	Offer water use surveys	4%	Expand the notification of the availability of free water use evaluations.	Yes
2 – 6	Water Features - Restrict water use for decorative water features, such as fountains	2%	Cleaning/filling/operating/ maintaining levels in non-recycling decorative fountains is prohibited.	Yes
3 – 6	CII - Other CII restriction or prohibition	1%	Car wash facilities must use recycled water.	Yes
3 – 6	CII - Other CII restriction or prohibition	1%	Prohibit new car washes or laundries without recirculating water systems.	Yes
3 – 6	Pools - Allow filling of swimming pools only when an appropriate cover is in place.	4%		Yes
4 – 6	Increase Water Waste Patrols	2%		Yes
4 – 6	Moratorium or Net Zero Demand Increase on New Connections	Varies		Yes

8.4.2 Supply Augmentation and Other Actions

Locally appropriate supply augmentation actions and operational changes are listed in Table 8-3. Since the City's existing water supplies have already been integrated into normal water management planning for shortage conditions as described in Section 7 of the UWMP, it is not indicated as a response triggered by a WSCP shortage level in this section, but already represented in the determination of any gap between supply and customer water use.

Table 8-3. Supply Augmentation and Other Actions (DWR Table 8-3)

Shortage Level	Supply Augmentation Methods and Other Actions by Water Supplier	How much is this going to reduce the shortage gap? *Include volume units used.*	Additional Explanation or Reference *(optional)*
All Stages	Expand Public Information Campaign	5%	Communication methods such as workshops, bill messages, Brentwood Press, or other communication methods.
3 – 6	Implement or Modify Drought Rate Structure or Surcharge	10%	Penalties and fines for excessive water use implemented.

8.4.3 Special Water Feature Distinction

"For purposes of developing the water shortage contingency plan pursuant to subdivision (a), an urban water supplier shall analyze and define water features that are artificially supplied with water,

including ponds, lakes, waterfalls, and fountains, separately from swimming pools and spas, as defined in subdivision (a) of Section 115921 of the Health and Safety Code" (CWC §§ 10632 (b)).

Water features that are not pools or spas are analyzed and defined separately from pools and spas in the WSCP. Non-pool or non-spa water features including ponds, lakes, waterfalls, and fountains that do not require the use of potable water for health and safety considerations, are defined as decorative water features and recreational water features and are included as such in the response actions and are enforced and monitored as part of the WSCP process.

Under all conditions and shortage levels the WSCP prohibits using potable water in an ornamental fountain or other decorative water feature, except where the water is part of a recirculating system. At Level 3, all decorative water features that use potable water must be drained and kept dry.

8.5 Emergency Response Plan

The City is part of and maintains a regional Emergency Response Plan (ERP) to address responding to catastrophic supply interruptions as well as other emergencies. Due to security reasons, only the ERP Table of Contents is included in this document in Appendix G.

Some of the shortage response actions included in Table 8-3 may also be utilized to respond to catastrophic water shortages. When a shortage declaration appears imminent, the Director of Public Works is in charge of managing related activities. The Director of Public Works coordinates efforts with the City Manager and other departments including fire, planning, police, parks and recreation, and the City Manager's Office.

The City has sufficient facilities and infrastructure to reroute around a temporary disruption.

Under the regional ERP, member agencies can request mutual aid for sharing resources with other water agencies including labor, materials, or potable water to facilitate rapid, short-term deployment of support prior to, during, or after an event. These mutual aid benefits are particularly useful should a shortage be caused by a power outage or other natural disaster. All existing water supply storage, treatment, and distribution infrastructure is inspected per a maintenance schedule. These same procedures apply to all wastewater treatment facilities as well. The City will coordinate with any city or county which it provides water for the possible proclamation of a local emergency.

Table 8-4 summarizes possible water supply catastrophes that could impact the City. Potential actions and responses are found in Table 8-5.

Table 8-4. Possible Catastrophes

- Earthquake
- Fire/explosion
- Medical
- Flood
- Tornado/severe weather
- Bomb threat
- Hard freeze
- Loss of normal water supply
- Hazardous material release
- Contamination of City water supplies
- Terrorist attack
- Vandalism
- Power outage

Table 8-5. Potential Actions in Response to Catastrophes

- Stretch existing water storage
- Obtain additional water supplies
- Develop alternative water supplies
- Determine where the funding will come from
- Contact and coordinate with other agencies
- Create an emergency response team/coordinator
- Implement the ERP
- Put employees/contractors on-call
- Develop methods to communicate with the public
- Develop methods to prepare for water quality interruptions

8.6 Seismic Risk Assessment and Mitigation Plan

"(a) In addition to the requirements of paragraph (3) of subdivision (a) of Section 10632, beginning January 1, 2020, the plan shall include a seismic risk assessment and mitigation plan to assess the vulnerability of each of the various facilities of a water system and mitigate those vulnerabilities. [...]

(c) An urban water supplier may comply with this section by submitting, pursuant to Section 10644, a copy of the most recent adopted local hazard mitigation plan or multihazard mitigation plan under the federal Disaster Mitigation Act of 2000 (Public Law 106-390) if the local hazard mitigation plan or multihazard mitigation plan addresses seismic risk" (CWC §§ 10632.5).

This section includes a seismic risk assessment and mitigation plan to assess the vulnerability of each of the water system's facilities and methods to mitigate those vulnerabilities. The City's seismic risk assessment will be updated every 5 years when updating the UWMP. Water suppliers may also comply with 2020 UWMP requirements by submitting a copy of the most recent adopted local hazard mitigation plan or multihazard mitigation plan under the federal Disaster Mitigation Act of 2000 (Public Law 106-390) if the local hazard mitigation plan or multihazard mitigation plan addresses seismic risk.

The City has prepared a confidential risk and resilience assessment in compliance with America's Water Infrastructure Act of 2018 (AWIA) Public Law 115-270, S. 3021. A summary of the risk of earthquake to the City's facilities is discussed below. Note that the Risk and Resilience Assessment (RRA) is not included as an appendix to this UWMP due to security concerns, but the Contra Costa County Hazard Mitigation Plan (HMP) is available in complying with 2020 UWMP requirements. Due to the large size of the HMP document only the cover and table of contents pages are included in Appendix H. The full document can be accessed at https://www.contracosta.ca.gov/6842/Draft-Local-Hazard-Mitigation-Plan-Updat, to view the plan for the entire County.

The AWIA law requires a community water system (CWS) serving more than 3,300 people to develop an RRA and an ERP. CWSs serving a population of 50,000 or more, such as the City, were required to conduct an RRA and submit certification of its completion to the US Environmental Protection Agency (EPA) by December 31, 2020. The deadline for completing and certifying the ERP is fixed at six months following the RRA certification. As part of the RRA and ERP, the City evaluated seismic risk to its facilities and mitigation measures to reduce the impacts of the earthquake threat.

In 2018, Contra Costa County developed a HMP to guide hazard mitigation planning from identified threats. The steering committee conducted a risk assessment that identified and profiled hazards that pose a risk to the Contra Costa County planning area, assessed the vulnerability of the planning area to these hazards, and examined the existing capabilities to mitigate them (Contra Costa County, 2018). Earthquake, landslide, severe weather, wildfire, dam and levee failure, flood, sea level rise, tsunami, and drought are among the hazards that can have an impact on the Contra Costa County planning area.

Earthquake damage can include structural, injury, loss of life, and infrastructure damage, and can vary in degrees based on factors such as magnitude, focal depth, distance of fault, and topography. Types of hazards related to earthquakes include the ground shaking, seismic structural safety, liquefaction, settlement, and faults.

Areas of Contra Costa County most susceptible to earthquake include those near active fault zones. There are numerous known faults in Contra Costa County, the most significant are the Hayward, Calaveras North, Concord-Green Valley, Mount Diablo, and Greenville faults, (Contra Costa County, 2018). The Hayward and Rodgers Creek Faults have high potential for experiencing major to great seismic events. There is a 72 percent likelihood that at least one earthquake with a magnitude of

6.7 or greater will occur in the San Francisco Bay area before 2043 causing widespread damage. The United States Geological Survey ground motion maps indicate the peak ground acceleration, that has a 10 percent probability of being exceeded in a 50-year period, is 0.4g. The entire County planning area is at risk to direct and indirect impacts from earthquakes according to the HMP. In the City, a total of 52 critical facilities were identified to be exposed to the earthquake hazard per the HMP.

The City's RRA went a little deeper by identifying specific assets and risks associated with seismic activity. Earthquake is estimated to be the City's costliest threat per the RRA. The cost is not as significant on an asset basis, but when added together, earthquakes have the potential to impact several assets simultaneously. It was determined that many of the City's facilities are at risk to earthquake threat including:

- COBWTP
- All pump stations
- Randall Bold Intertie

8.7 Communication Protocols

"[Describe] communication protocols and procedures to inform customers, the public, interested parties, and local, regional, and state governments, regarding, at a minimum, all of the following: [...]" (CWC §§ 10632(a)(5)).

Timely and effective communication is a key element of WSCP implementation. The City's communication protocols and procedures in the event of a water shortage are structured to be activated through authorization by the City Council. Under a water shortage condition, the actual water supply and demand information and conditions would be assessed to determine whether activating the WSCP is warranted. If so, the Director of Public Works would recommend activation of the appropriate stage alert, and request City Council authorization to initiate the measures necessary to achieve the appropriate demand reduction target. The public would be encouraged to understand and be involved in the decision-making process and provide feedback to the City Council on such an action. The WSCP is flexible and can be implemented to best match actual conditions of a particular water shortage event.

Specific communication protocols to inform customers, the public, interested parties, and local, regional, state governments of any current or projected shortage as determined by the Annual Assessment described in Section 8.2 and any shortage response actions as a result of the Annual Assessment are listed below:

- Expanded public information and awareness program by implementing workshops, distributing park signs, adding bill inserts, and increasing the number of educational programs at schools. Use of social media and e-mail blasts to customers.
- The City is in the process of fully automating their meter reading system. Once this process is complete, the City will be able to use hourly water use data to communicate with customers. The City classifies each customer in the utility billing software to ensure equitable billing for water service. A multi-year water use history is maintained in the billing software database. The City provides internet bill access capability to customers so they can easily access the past several years of their water use. This is particularly useful during a water shortage condition for both the City and its customers.

8.8 Compliance and Enforcement

"[Describe]...customer compliance, enforcement, appeal, and exemption procedures for triggered shortage response actions as determined pursuant to Section 10632.2" (CWC §§ 10632(a)(6)).

Section 10632(a)(6) of the CWC requires a water supplier to describe how it will ensure compliance with and enforce provisions of the WSCP. The City, after one written warning, may install a flow-restricting device on the service line of any customer observed by City personnel to be using water for any non-essential or unauthorized use defined in a City ordinance.

An excess use penalty per 1,000 gallons of water (sometimes referred to as one unit) used above the applicable allocation during each billing period may be charged by the City for all service rendered on and after the effective date of an ordinance. Repeated violations of unauthorized water use can result in discontinuance of water service. Table 8-6 lists penalties and charges and the stage during which they take effect.

Table 8-6. Penalties and Charges

Penalties or charges	Shortage Level when penalty takes effect
Penalties for not reducing consumption	Level 3
Charges for excess use	Level 3
Flat fine	Varies
Charge per unit over allotment	Level 3
Flow restriction	Level 3
Termination of service	Level 3

8.9 Legal Authorities

"(A) A description of the legal authorities that empower the urban water supplier to implement and enforce its shortage response actions specified in paragraph (4) that may include, but are not limited to, statutory authorities, ordinances, resolutions, and contract provisions. [...]

(C) A statement that an urban water supplier shall coordinate with any city or county within which it provides water supply services for the possible proclamation of a local emergency, as defined in Section 8558 of the Government Code" (CWC §§ 10632(a)(7)).

The relevant statutory authorities, local ordinances and resolutions and water supply contract provisions to which the City is subject are listed below:

- The City's WSCP was adopted in June of 2016 as part of the City's UWMP and updated in each five–year Urban Water Management Plan. The City Council may, by resolution and after a noticed public hearing, determine that water shortage conditions exist within the City. Based on this determination, the City Council may determine that water shortage measures become operative within the City and remain in effect until the City Council, by resolution, determines that the water shortage condition no longer exists.

The City shall declare a water shortage emergency condition in accordance with Water Code Chapter 3 (commencing with Section 350) of Division 1 as stated below:

Declaration of water shortage emergency condition. The governing body of a distributor of a public water supply, whether publicly or privately owned and including a mutual water company, shall declare a water shortage emergency condition to prevail within the area served by such distributor whenever it finds and determines that the ordinary demands and requirements of water consumers cannot be satisfied without depleting the water supply of the distributor to the extent that there would be insufficient water for human consumption, sanitation, and fire protection.

The City shall coordinate with any city or county within which it provides water supply services for the possible proclamation of a local emergency under California Government Code, California Emergency Services Act (Article 2, Section 8558). Below is a list of contacts for all cities or counties for which the City provides services in this WSCP, along with developed coordination protocols that can facilitate compliance with the Water Code in the event of a local emergency as defined in subpart (c) of Government Code Section 8558:

- City of Brentwood, Department of Public Works – Water Operations, (925) 516-6000

8.10 Financial Consequences of WSCP

"A description of the financial consequences of, and responses for, drought conditions, including, but not limited to, all of the following: […]" (CWC §§ 10632(a)(8)).

The financial consequence of implementing the WSCP include potential revenue reductions and expense increases. The City has developed mitigation actions to reduce these impacts and the cost of compliance.

8.10.1 Potential Revenue Reductions and Expense Increases

The City understands the projected ranges of water sales by shortage stage and what the impact would be on projected revenues and expenditures by each shortage stage. Revenues would decrease as consumption is decreased. Expenditures would increase as response actions are implemented. Special rates would have to be adopted to avoid severe financial hardship during a water shortage condition.

8.10.2 Mitigation Actions

In Shortage Level 1 and 2 conditions, the City would attempt to avoid rate adjustments. However if the water shortage conditions persisted and/or became more severe thereby further reducing demands, rate changes would be imperative.

- Memorandum Accounts - The City will establish memorandum accounts to track expenses and revenue shortfalls caused by both mandatory rationing and voluntary conservation efforts. The City may implement a surcharge to recover revenue shortfalls recorded in their drought memorandum accounts.
- Drought Rate Structures and Surcharges – City may implement a drought surcharge to ensure that the City can receive sufficient revenues to cover the cost of providing water service when consumption decreases due to drought conditions. The water shortage surcharge only applies to the metered water charge.
- Use of Financial Reserves - The City has financial reserves to address decreased water sales during a water shortage.
- Other Measures - The City does not have additional measures formalized such as postponement of capital improvements or reduction of agency staff.

8.10.3 Cost of Compliance

The cost of compliance with the City's drought rate structure and surcharges and compliance to address excessive residential water use includes City efforts such as additional staff focused on high consumption monitoring, additional water waste patrols as required as part of the City's WSCP, and additional expenditures and fees for providing water rebates to customers that exceed water use reductions. The City's Director of Public Works or designee will evaluate revenues and reserves monthly during a prolonged water shortage event.

8.11 Monitoring and Reporting

"[Describe] monitoring and reporting requirements and procedures that ensure appropriate data is collected, tracked, and analyzed for purposes of monitoring customer compliance and to meet state reporting requirements" (CWC §§ 10632(a)(9)).

Water production data is recorded daily. It is monitored by the Public Works Director or designee during normal and shortage water supply conditions. Totals are reported monthly and are incorporated into water supply reports. The City maintains extensive water use records on individual customer accounts. Exceptionally high usage is identified at meter reading time by the City's electronic meter reading management system. City staff investigates these accounts for potential water loss or abuse problems. During all stages of water shortages, the Public Works Director or designee receives and monitors daily production figures.

8.12 WSCP Refinement, Adoption, Submittal, and Availability

"[Describe] reevaluation and improvement procedures for systematically monitoring and evaluating the functionality of the water shortage contingency plan in order to ensure shortage risk tolerance is adequate and appropriate water shortage mitigation strategies are implemented as needed" (CWC §§ 10632(a)(10)).

The WSCP is routinely revaluated to improve functionality to ensure the shortage risk tolerance is adequate and the appropriate water shortage mitigation strategies can be implemented as needed. The updated WSCP is adopted, submitted, and available per the Water Code requirements.

8.12.1 Refinement Procedures

The WSCP may be updated independently of the UWMP. The City reviewed the prior WSCP following the latest drought and incorporated permanent restrictions on water use required by the SWCRB. Additional modifications to the WSCP were considered based upon lessons learned from the recent drought. This review and update process shall be continued at a minimum of every five years in parallel with the update of the UWMP.

8.12.2 Adoption, Submittal, and Availability

"The urban water supplier shall make available the water shortage contingency plan prepared pursuant to this article to its customers and any city or county within which it provides water supplies no later than 30 days after adoption of the water shortage contingency plan" (CWC §§ 10632 (c)).

The WSCP is typically reviewed and adopted as part of the UWMP review and adoption process. The WSCP may also be periodically amended independently of the UWMP, as needed. In either instance the public review period and adoption process following Government Code Section 6066 are followed.

The updated WSCP is made available to the City and the appropriate cities and counties no later than 30 days after it is adopted. The WSCP is available at the City's website and as part of the UWMP document, also located on the City's website and the California State Library.

Section 9

Demand Management Measures

"The narrative pursuant to this paragraph shall include descriptions of the following water demand management measures:

(i) Water waste prevention ordinances.

(ii) Metering.

(iii) Conservation pricing.

(iv) Public education and outreach.

(v) Programs to assess and manage distribution system real loss.

(vi) Water conservation program coordination and staffing support.

(vii) Other demand management measures that have a significant impact on water use as measured in gallons per capita per day including innovative measures, if implemented" (CWC §§ 10631(e)(1)(B)).

The City conducts an ongoing water conservation program and has committed to implementing water conservation measures for all customer sectors. The City is a member of the California Water Efficiency Partnership (CalWEP) (formerly the California Urban Water Conservation Council). Water conservation can be achieved through managing the water supply and water demand. Supply management is used to improve the overall system efficiency and reduce waste within the production and delivery facilities. The City uses demand management to encourage water conservation by the consumer. This section provides narrative descriptions addressing the nature and extent of each DMM implemented over the past five years, from 2015 through 2020.

9.1 Conservation Program Implementation

"For an urban retail water supplier, as defined in Section 10608.12, a narrative description that addresses the nature and extent of each water demand management measure implemented over the past five years. The narrative shall describe the water demand management measures that the supplier plans to implement to achieve its water use targets pursuant to Section 10608.20" (CWC §§ 10631(e)(1)(A)).

Over the past five years, the City has been implementing DMMs such as rebates for water use reduction during drought, free water use evaluations, a free recycled water fill station, distribution of water conserving appliances and tools, and a conversion to automatic meter reading system to continuously monitor leaks. A summary of water conservation measures and the nature and extent of their implementation over the past five years is shown in Table 9-1.

Table 9-1. Extent and Nature of DMM Implementation over the Past Five Years

DMM	2016	2017	2018	2019	2020
Water Waste Prevention Ordinance	Yes	Yes	Yes	Yes	Yes
Metering	Fully metered	Fully metered	Fully metered	Fully metered	Fully metered
Conservation Pricing	Volumetric based, uniform rate structure	Volumetric based, uniform rate structure	Volumetric based, uniform rate structure	Volumetric based, uniform rate structure	Volumetric based, uniform rate structure
Amount of water conservation public relations spent, dollars	$3,945	$3,649	$2,115	$2,115	$1,988
Number of residential leak checks	497	685	527	537	459
Number of leaks repaired	40	24	23	29	38
Public Education and Outreach					
Elementary School Assemblies[b]	11	11	11	11	1
Residential consumption checks (checks for continuous use at the meter)	425	83	86	204	180
Water waste notifications	22	9	4	7	9
Water use courtesy notices sent[c]	240	240	240	240	240
Utility bill inserts	Yes	Yes	Yes	Yes	Yes
Water conservation items in monthly City letters	Yes	Yes	Yes	Yes	Yes
Assess and Manage Distribution System Real Loss	Yes	Yes	Yes	Yes	Yes
Water Conservation Coordinator	Yes	Yes	Yes	Yes	Yes

Notes:

a. No public events in 2020 due to COVID

b. Contract for elementary school assemblies began in 2010

c. City began sending courtesy notices in 2003

9.1.1 Water Waste Prevention Ordinances

The City conducts an ongoing water conservation program and has a water waste prevention ordinance in place at all times. The ordinance is Section 14.01.510 of the City's Municipal code, "Conservation – Water waste prohibited." The water waste ordinance states:

"As a condition of service, customers of the city must use water delivered through the city's system in a manner that promotes efficiency and avoids waste. Water waste is prohibited. Water waste includes: A) Allowing water provided by the city to flow or spray off the property; B)Failure to correct a malfunctioning device or supply line, where the customer or their agent has known of the problem for more than forty-eight hours; C) Noncompliance with regulations regarding washing of vehicles, equipment, driveways, parking lots, sidewalks, streets or other surfaces or objects; D) Discharging swimming pool or spa water drainage off the property where discharge into a public sanitary sewer is available; and E) Noncompliance with watering group assignments under a declaration of water shortage emergency" (Ord. 918 § 2, 2013).

"A. As a condition of service, customers of the City must use water delivered through the City's system in a manner that promotes efficiency and avoids waste. Water waste, including, but not limited to, the following actions, is a violation of this code and prohibited, except where necessary to address an immediate health and safety need or to comply with a term or condition in a permit issued by a State or Federal agency:

1. Failure to correct a malfunctioning device or supply line where the customer or their agent has known of the problem for more than forty-eight hours.
2. Discharging swimming pool or spa water drainage off the property where discharge into a public sanitary sewer is available.
3. The application of potable water to outdoor 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.
4. Noncompliance with watering group assignments under a declaration of water shortage emergency.
5. The use of a hose that dispenses potable water to wash a motor vehicle, 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.
6. The application of potable water to driveways, sidewalks and other hardscaped surfaces.
7. The use of potable water in a fountain or other decorative water feature, except where the water is part of a recirculating system.
8. The serving of drinking water other than upon request in eating or drinking establishments, including, but not limited to, restaurants, hotels, cafés, cafeterias, bars, or other public places where food or drink are served and/or purchased.
9. Irrigation with potable water between eight A.M. and seven P.M. daily.
10. The application of potable water to outdoor landscapes during and up to forty-eight hours after a measurable rainfall.
11. The irrigation with potable water of landscapes outside of newly constructed homes and buildings in a manner inconsistent with regulations or other requirements established by the California Building Standards Commission and the Department of Housing and Community Development.
12. The use of potable water to irrigate ornamental turf on public street medians is prohibited.

B. To promote water conservation, operators of hotels and motels shall provide guests with the option of choosing not to have towels and linens laundered daily. The hotel or motel shall prominently display notice of this option in each guestroom using clear and easily understood language.

C. A violation of the regulations in subsections A through B is unlawful, and may be enforced pursuant to Section 14.01.1015 of this chapter" (Ord. 974 § 3, 2016; Ord. 918 § 2, 2013).

Additionally, the City adopted the State's Model Water-Efficient Landscape Ordinance on January 1, 2010 (see Appendix J). This ordinance requires a landscape permit, plan check, or design review for new and rehabilitated landscaped areas of 2,500 square feet or greater. The City rewrote Municipal

Code 17.630 (Landscaping and Screening ordinance adopted in 1992). The City Council adopted the rewrite on June 14, 2011 (see Appendix J).

Planned Implementation: The implementation of this DMM is ongoing. The City will continue to enforce water conservation and water waste prevention. To comply with the Model Water-Efficient Landscape Ordinance, the City will review landscape permit applications and grant permits.

Method to Estimate Expected Water Savings: The City cannot quantify water savings from this program directly. Future water savings from this DMM will likely be reflected in the landscape water sector.

9.1.2 Metering

The City of Brentwood is fully metered. All water delivered through a service connection must be metered and billed. Tampering with meters or the use of any device to allow delivery of unmetered water is prohibited.

Currently, data are collected monthly using an automated meter reading system. The City is in the process of upgrading the system to an automated meter reading/AMI fixed-base system. The new meter technology will allow meter data to be recorded on an hourly basis. This change will reduce water loss within the City because it will notify the staff of leaks, high consumption, and water theft when they occur and improve the effectiveness of the High-Usage Notification Program (See Section 9.1.3).

Planned Implementation: This program is a multi-phase project that began in 2012. The first phase, which looked to evaluate system and communications requirements, has been completed. The second phase, which consists of upgrading the water meters citywide one zone at a time, is expected to be completed by 2022.

Method to Estimate Expected Water Savings: The City will evaluate the effectiveness of this DMM by comparing prior water use with future water use. This DMM could result in savings in all water use sectors because it is a programmatic system-wide upgrade.

9.1.3 Conservation Pricing

In 2018, the City prepared a five-year water rate study and adopted the proposed water rates. The City's current water rate table is included in Appendix I in this document. The City currently implements conservation pricing for all its metered customers. The City implements tiered rates for residential and commercial customers.

Currently, the City has a High-Usage Notification Program. The City's current program notifies customers with higher than expected water use using the Abnormal Report which is generated each read cycle (4 times a month). Emails are sent to customers notifying them of the higher than expected water use and offering a free water use evaluation. New meter technology will help the City notify residents sooner about tier exceedances.

Planned Implementation: The implementation of this DMM is ongoing. The City's Water Conservation staff implements this program each quarter.

Method to Estimate Expected Water Savings: The effectiveness of this DMM is evaluated according to the percentage and type of customers typically presented in the City's annual rate studies in each tier. Nearly half of all residential bills were at the Tier 1 rate, the lowest variable consumption rate. However, non-residential usage figures show that the majority of the water sold is billed at the higher Tier 2 rate. Future savings from this DMM are likely to be consistent with the change in tier rates each year. If no rate change occurs, the changes are not anticipated to be significant. The City evaluates this DMM's effectiveness by comparing the City's water use prior to and following the implementation of conservation pricing.

9.1.4 Public Education and Outreach

Public information is an ongoing component of the City's water conservation program. The City currently produces bill inserts and news articles in the City's quarterly newsletter. The City website also includes conservation information. Some of the public education and outreach efforts that are ongoing are discussed below.

9.1.4.1 Water Survey Programs for Single-Family and Multi-Family Residential Connections

The City conducts residential water use surveys as a free service to assist residents of single-family and multi-family units with identifying possible areas of water waste inside and outside their homes and educate them about water conservation techniques. Residential water use surveys consist of annual water audits, water use reviews, and surveys of past program participants. Auditors will identify water use problems, recommend repairs, and offer instruction regarding landscape principles, irrigation timer use, and, when appropriate, meter reading.

Planned Implementation: The implementation of this program is ongoing. The City staff reviews online request forms submitted by residents and schedules a survey. Then the City conducts the survey. Results are entered into a database and provided to customers via mail.

Method to Estimate Expected Water Savings: The City will evaluate effectiveness of this DMM by analyzing program penetration and comparing an audited customer's prior water use with future water use. A 10 percent water use reduction per household has been recorded as a result of these surveys. Future surveys will result in a water use reduction in the single-family and multi-family residential sectors.

9.1.4.2 School Education Programs

School education is an ongoing component of the City's water conservation program. The program targets all grades, and includes offering Project WET (Water Education for Teachers) workshops for teachers, performing classroom demonstrations, displaying booths at science fairs, and providing assemblies. The City also promotes student participation, such as providing bus transportation for grade-schoolers to the annual Public Works Open House.

Planned Implementation: The City's school education program is an ongoing annual program.

Method to Estimate Expected Water Savings: The City cannot quantify savings from this DMM directly. The City will evaluate effectiveness of this DMM by the success of the City's water conservation program. An overall reduction in annual water use will reflect the success of this program.

9.1.5 Programs to Assess and Manage Distribution System Real Loss

The City's programs to assess and manage the system's real losses consists of ongoing leak detection and repair within the system. This program includes a meter testing and replacement program.

Planned Implementation: The implementation of this DMM is ongoing. The City's conducts this program annually.

Method to Estimate Expected Water Savings: The City will evaluate this DMM's effectiveness by tracking leak detection and repair and comparing prior water use with future water use. Future savings from this DMM are expected to be 2 percent to 5 percent of total water use. Reductions will be reflected in the "other" water use sector volumes because that sector includes system losses.

9.1.6 Water Conservation Program Coordination and Staffing Support

The City has hired a conservation specialist as an ongoing component of the City's water conservation program. The conservation coordinator is responsible for implementing and monitoring the City's water conservation activities. The City water conservation coordinator continually works with other staff and stakeholders to implement activities in the water conservation program.

Planned Implementation: The implementation of this DMM is ongoing. The City conducts this program annually.

Method to Estimate Expected Water Savings: The City cannot quantify savings from this DMM directly. The City will evaluate effectiveness of this DMM by the success of the City's water conservation program. An overall reduction in annual water use will reflect the success of this program.

9.1.7 Other Demand Management Measures

During times of declared drought, the City may offer incentives to upgrade water using fixtures; as well as landscape rebates. These programs are available to all customer types.

9.1.8 Residential Plumbing Retrofit

The City provides a free low-flow showerheads to residents who schedule a residential water use survey. The City also can provide faucet aerators and toilet leak-detection tablets to customers. Since more than 75 percent of construction in the City occurred after 1992, most plumbing fixtures are already ultra low-flow units.

Planned Implementation: The implementation of this program is ongoing.

Method to Estimate Expected Water Savings: The City will evaluate this DMM's effectiveness by taking into consideration the number of customers who install low-flow showerheads and comparing an audited customer's prior water use with future water use.

9.2 Implementation to Achieve Water Use Targets

"For an urban retail water supplier, as defined in Section 10608.12, a narrative description that addresses the nature and extent of each water demand management measure implemented over the past five years. The narrative shall describe the water demand management measures that the supplier plans to implement to achieve its water use targets pursuant to Section 10608.20" (CWC §§ 10631(e)(1)(A)).

The City implemented DMMs that helped it meet the 20 percent by 2020 water reuse reduction goals under SBX7-7. The city-wide meter replacement program is ongoing and includes the installation of an automatic meter reading system and customer water use portal to provide daily and hourly water usage. This program supports water conservation initiatives by providing real time data and the potential for leak detection and other alerts. Customers can also opt to install water conserving devices in their homes and have a trained auditor evaluate water use and provide suggestions. The City also continues to irrigate parks, streetscapes, and schools with recycled water and has made an automated recycled water fill station available to residents for irrigation at no cost.

9.3 Water Use Objectives (Future Requirements)

City staff are following the legislation for water loss and the new water use efficiency standards in order to be prepared to meet future water use objectives, once established. The City is a member of the CalWEP, which provides support to water agencies to assist in meeting current water use goals and future water use targets. The City plans to continue to review the results of the annual water loss audits to determine focus areas for reducing water loss within the distribution system, and to continue outreach on reducing irrigation use, encouraging water-wise landscaping, and information on leak detection.

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Section 10

Plan Adoption, Submittal, and Implementation

"Every urban water supplier required to prepare a plan pursuant to this part shall, at least 60 days prior to the public hearing on the plan required by Section 10642, notify any city or county within which the supplier provides water supplies that urban water supplier will be reviewing the plan and considering amendments or changes to the plan. The urban water supplier may consult with, and obtain comments from, any city or county that receives notice pursuant to this subdivision.

[…] The urban water supplier shall provide that portion of its urban water management plan prepared pursuant to this article to any city or county within which is provides water supplies no later than 60 days after the submission of its urban water management plan.

[…] Prior to adopting a plan, the urban water supplier shall make the plan available for public inspection and shall hold a public hearing thereon. Prior to the hearing, notice of the time and place of the hearing shall be published within the jurisdiction of the publicly owned water supplier pursuant to Section 6066 of the Government Code. The urban water supplier shall provide notice of the time and place of hearing to any city or county within which the supplier provides water supplies. A privately owned water supplier shall provide an equivalent notice within its own service area" (CWC §§ 10621(b)–10635(b)–10642).

This section describes actions taken by the City to address CWC requirements for a public hearing, UWMP adoption, submittal of an adopted UWMP, UWMP implementation, and the process for amending an adopted UWMP.

10.1 Inclusion of all 2020 Data

This UWMP includes the water use and planning data for the entire year of 2020, reporting on a calendar year basis.

10.2 Notice of Public Hearing

"Every urban water supplier required to prepare a plan pursuant to this part shall, at least 60 days prior to the public hearing on the plan required by Section 10642, notify any city or county within which the supplier provides water supplies that urban water supplier will be reviewing the plan and considering amendments or changes to the plan. The urban water supplier may consult with, and obtain comments from, any city or county that receives notice pursuant to this subdivision.

[…] The urban water supplier shall provide that portion of its urban water management plan prepared pursuant to this article to any city or county within which it provides water supplies no later than 60 days after the submission of its urban water management plan.

[…] Prior to adopting a plan, the urban water supplier shall make the plan available for public inspection and shall hold a public hearing thereon. Prior to the hearing, notice of the time and place of the hearing shall be published within the jurisdiction of the publicly owned water supplier pursuant to Section 6066 of the Government Code. The urban water supplier shall provide notice of the time and place of hearing to any city or county within which the supplier provides water supplies.

A privately owned water supplier shall provide an equivalent notice within its own service area" (CWC *§§ 10621(b)–10635(b)–10642).*

The Act requires the encouragement of public participation and a public hearing as part of the UWMP development and approval process. As required by the Act, the City is making the UWMP available for public inspection and held a public hearing prior to adopting this UWMP. The City notified cities and counties within the service area more than 60 days before the public hearing (see Appendix B for documentation).

10.3 Public Hearing and Adoption

As mentioned in Section 2, per the requirements of Government Code Section 6066, a Notice of Public Hearing was published twice in the local newspaper 14 days prior to the hearing to notify all customers and local governments of the public hearing, and copies of the draft UWMP were made available for public inspection at the City's administration building and on-line. A copy of the published Notice of Public Hearing is included in Appendix C.

This UWMP was adopted by the Brentwood City Council on May 25, 2021. A copy of the adoption resolution is provided in Appendix D. The adopted UWMP was provided to DWR, the State library, and the appropriate cities and counties within 30 days of adoption. The adopted UWMP is available for public review during normal business hours at the City offices and online at http://www.brentwoodca.gov/gov/pw/water/reports.asp.

Table 10-1. (DWR Table 10-1R) Retail: Notification to Cities and Counties

City name	60 day notice	Notice of public hearing
City of Brentwood	X	X
City of Antioch	X	X
Oakley Water District	X	X
Town of Discovery Bay	X	X
Contra Costa Water District	X	X
East Contra Costa Irrigation District	X	X
County name	60 day notice	Notice of public hearing
Contra Costa County	X	X

10.4 Plan Submittal and Public Availability

The adopted UWMP was provided to DWR, the State library, and the appropriate cities and counties within 30 days of adoption. Appendix D includes a notice of public availability submitted to DWR. The adopted UWMP will be available for public review during normal business hours at the City offices and online at: http://www.brentwoodca.gov/gov/pw/water/reports.asp.

10.5 Amending an Adopted UWMP

Any future amendments or changes to this UWMP will be submitted to all the appropriate agencies as specified in CWC §§ 10621(a) and (c)(1).

Section 11

Limitations

Brown and Caldwell prepared this document solely for the City of Brentwood in accordance with professional standards at the time the services were performed and in accordance with the contract between the City of Brentwood and Brown and Caldwell dated October 29, 2020. This document is governed by the specific scope of work authorized by the City of Brentwood; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by the City of Brentwood and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

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Section 12

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Appendix A: DWR Urban Water Management Plan Checklist

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Appendix A

DWR Final Checklist

2020 Urban Water Management Plan Checklist				
2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location (Optional Column for Agency Review Use)
Chapter 1	10615	A plan shall describe and evaluate sources of supply, reasonable and practical efficient uses, reclamation and demand management activities.	Introduction and Overview	Section 6, Section 4, Section 6.5, and Section 9
Chapter 1	10630.5	Each plan shall include a simple description of the supplier's plan including water availability, future requirements, a strategy for meeting needs, and other pertinent information. Additionally, a supplier may also choose to include a simple description at the beginning of each chapter.	Summary	Section 1.4
Section 2.2	10620(b)	Every person that becomes an urban water supplier shall adopt an urban water management plan within one year after it has become an urban water supplier.	Plan Preparation	Section 2.1
Section 2.6	10620(d)(2)	Coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.	Plan Preparation	Section 2.2
Section 2.6.2	10642	Provide supporting documentation that the water supplier has encouraged active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan and contingency plan.	Plan Preparation	Section 2.2 Appendix A Appendix B
Section 2.6, Section 6.1	10631(h)	Retail suppliers will include documentation that they have provided their wholesale supplier(s) - if any - with water use projections from that source.	System Supplies	Section 2.2 Appendix A Appendix B
Section 2.6	10631(h)	Wholesale suppliers will include documentation that they have provided their urban water suppliers with identification and quantification of the existing and planned sources of water available from the wholesale to the urban supplier during various water year types.	System Supplies	N/A
Section 3.1	10631(a)	Describe the water supplier service area.	System Description	Section 3.1
Section 3.3	10631(a)	Describe the climate of the service area of the supplier.	System Description	Section 3.2
Section 3.4	10631(a)	Provide population projections for 2025, 2030, 2035, 2040 and optionally 2045.	System Description	Section 3.4
Section 3.4.2	10631(a)	Describe other social, economic, and demographic factors affecting the supplier's water management planning.	System Description	Section 3.4.2
Sections 3.4 and 5.4	10631(a)	Indicate the current population of the service area.	System Description and Baselines and Targets	Section 3.4
Section 3.5	10631(a)	Describe the land uses within the service area.	System Description	Section 3.4.3

2020 Urban Water Management Plan Checklist				
2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location (Optional Column for Agency Review Use)
Section 4.2	10631(d)(1)	Quantify past, current, and projected water use, identifying the uses among water use sectors.	System Water Use	Section 4
Section 4.2.4	10631(d)(3)(C)	Retail suppliers shall provide data to show the distribution loss standards were met.	System Water Use	Appendix E
Section 4.2.6	10631(d)(4)(A)	In projected water use, include estimates of water savings from adopted codes, plans and other policies or laws.	System Water Use	Section 4.3
Section 4.2.6	10631(d)(4)(B)	Provide citations of codes, standards, ordinances, or plans used to make water use projections.	System Water Use	Section 4.3
Section 4.3.2.4	10631(d)(3)(A)	Report the distribution system water loss for each of the 5 years preceding the plan update.	System Water Use	Section 4.2
Section 4.4	10631.1(a)	Include projected water use needed for lower income housing projected in the service area of the supplier.	System Water Use	Section 4.4
Section 4.5	10635(b)	Demands under climate change considerations must be included as part of the drought risk assessment.	System Water Use	Section 3.3 and Section 4.1
Chapter 5	10608.20(e)	Retail suppliers shall provide baseline daily per capita water use, urban water use target, interim urban water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.	Baselines and Targets	Section 5 Appendix F
Chapter 5	10608.24(a)	Retail suppliers shall meet their water use target by December 31, 2020.	Baselines and Targets	Section 5.6 Appendix F
Section 5.1	10608.36	Wholesale suppliers shall include an assessment of present and proposed future measures, programs, and policies to help their retail water suppliers achieve targeted water use reductions.	Baselines and Targets	N/A
Section 5.2	10608.24(d)(2)	If the retail supplier adjusts its compliance GPCD using weather normalization, economic adjustment, or extraordinary events, it shall provide the basis for, and data supporting the adjustment.	Baselines and Targets	Section 5.6 Appendix F
Section 5.5	10608.22	Retail suppliers' per capita daily water use reduction shall be no less than 5 percent of base daily per capita water use of the 5-year baseline. This does not apply if the suppliers base GPCD is at or below 100.	Baselines and Targets	Section 5 Appendix F
Section 5.5 and Appendix E	10608.4	Retail suppliers shall report on their compliance in meeting their water use targets. The data shall be reported using a standardized form in the SBX7-7 2020 Compliance Form.	Baselines and Targets	Section 5.6 Appendix F
Sections 6.1 and 6.2	10631(b)(1)	Provide a discussion of anticipated supply availability under a normal, single dry year, and a drought lasting five years, as well as more frequent and severe periods of drought.	System Supplies	Section 7.2 and Section 3.3
Sections 6.1	10631(b)(1)	Provide a discussion of anticipated supply availability under a normal, single dry year, and a drought lasting five years, as well as more frequent and severe periods of drought, including changes in supply due to climate change.	System Supplies	Section 7.2 and Section 3.3
Section 6.1	10631(b)(2)	When multiple sources of water supply are identified, describe the management of each supply in relationship to other identified supplies.	System Supplies	Section 6
Section 6.1.1	10631(b)(3)	Describe measures taken to acquire and develop planned sources of water.	System Supplies	Section 6

2020 Urban Water Management Plan Checklist				
2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location (Optional Column for Agency Review Use)
Section 6.2.8	10631(b)	Identify and quantify the existing and planned sources of water available for 2020, 2025, 2030, 2035, 2040 and optionally 2045.	System Supplies	Section 6.9
Section 6.2	10631(b)	Indicate whether groundwater is an existing or planned source of water available to the supplier.	System Supplies	Section 6.2
Section 6.2.2	10631(b)(4)(A)	Indicate whether a groundwater sustainability plan or groundwater management plan has been adopted by the water supplier or if there is any other specific authorization for groundwater management. Include a copy of the plan or authorization.	System Supplies	Section 6.2.2
Section 6.2.2	10631(b)(4)(B)	Describe the groundwater basin.	System Supplies	Section 6.2.1
Section 6.2.2	10631(b)(4)(B)	Indicate if the basin has been adjudicated and include a copy of the court order or decree and a description of the amount of water the supplier has the legal right to pump.	System Supplies	Section 6.2.1
Section 6.2.2.1	10631(b)(4)(B)	For unadjudicated basins, indicate whether or not the department has identified the basin as a high or medium priority. Describe efforts by the supplier to coordinate with sustainability or groundwater agencies to achieve sustainable groundwater conditions.	System Supplies	Section 6.2.1
Section 6.2.2.4	10631(b)(4)(C)	Provide a detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years	System Supplies	Section 6.2.4
Section 6.2.2	10631(b)(4)(D)	Provide a detailed description and analysis of the amount and location of groundwater that is projected to be pumped.	System Supplies	Section 6.2 and Section 6.9
Section 6.2.7	10631(c)	Describe the opportunities for exchanges or transfers of water on a short-term or long- term basis.	System Supplies	Section 6.7
Section 6.2.5	10633(b)	Describe the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.	System Supplies (Recycled Water)	Section 6.5.2.1 and Section 6.5.2.2
Section 6.2.5	10633(c)	Describe the recycled water currently being used in the supplier's service area.	System Supplies (Recycled Water)	Section 6.5.3 and Section 6.5.4
Section 6.2.5	10633(d)	Describe and quantify the potential uses of recycled water and provide a determination of the technical and economic feasibility of those uses.	System Supplies (Recycled Water)	Section 6.5.4.1
Section 6.2.5	10633(e)	Describe the projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected.	System Supplies (Recycled Water)	Section 6.5.4.1
Section 6.2.5	10633(f)	Describe the actions which may be taken to encourage the use of recycled water and the projected results of these actions in terms of acre-feet of recycled water used per year.	System Supplies (Recycled Water)	Section 6.5.5
Section 6.2.5	10633(g)	Provide a plan for optimizing the use of recycled water in the supplier's service area.	System Supplies (Recycled Water)	Section 6.5.5
Section 6.2.6	10631(g)	Describe desalinated water project opportunities for long-term supply.	System Supplies	Section 6.6

2020 Urban Water Management Plan Checklist				
2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location (Optional Column for Agency Review Use)
Section 6.2.5	10633(a)	Describe the wastewater collection and treatment systems in the supplier's service area with quantified amount of collection and treatment and the disposal methods.	System Supplies (Recycled Water)	Section 6.5.2.1 and Section 6.5.2.2
Section 6.2.8, Section 6.3.7	10631(f)	Describe the expected future water supply projects and programs that may be undertaken by the water supplier to address water supply reliability in average, single-dry, and for a period of drought lasting 5 consecutive water years.	System Supplies	Section 6.8
Section 6.4 and Appendix O	10631.2(a)	The UWMP must include energy information, as stated in the code, that a supplier can readily obtain.	System Suppliers, Energy Intensity	Section 6.10
Section 7.2	10634	Provide information on the quality of existing sources of water available to the supplier and the manner in which water quality affects water management strategies and supply reliability	Water Supply Reliability Assessment	Section 7.1
Section 7.2.4	10620(f)	Describe water management tools and options to maximize resources and minimize the need to import water from other regions.	Water Supply Reliability Assessment	Section 7.4
Section 7.3	10635(a)	Service Reliability Assessment: Assess the water supply reliability during normal, dry, and a drought lasting five consecutive water years by comparing the total water supply sources available to the water supplier with the total projected water use over the next 20 years.	Water Supply Reliability Assessment	Section 7.3
Section 7.3	10635(b)	Provide a drought risk assessment as part of information considered in developing the demand management measures and water supply projects.	Water Supply Reliability Assessment	Section 7.5
Section 7.3	10635(b)(1)	Include a description of the data, methodology, and basis for one or more supply shortage conditions that are necessary to conduct a drought risk assessment for a drought period that lasts 5 consecutive years.	Water Supply Reliability Assessment	Section 7.5.1
Section 7.3	10635(b)(2)	Include a determination of the reliability of each source of supply under a variety of water shortage conditions.	Water Supply Reliability Assessment	Section 7.5.2
Section 7.3	10635(b)(3)	Include a comparison of the total water supply sources available to the water supplier with the total projected water use for the drought period.	Water Supply Reliability Assessment	Section 7.5.3
Section 7.3	10635(b)(4)	Include considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change conditions, anticipated regulatory changes, and other locally applicable criteria.	Water Supply Reliability Assessment	Section 7.2 and Section 3.3
Chapter 8	10632(a)	Provide a water shortage contingency plan (WSCP) with specified elements below.	Water Shortage Contingency Planning	Section 8
Chapter 8	10632(a)(1)	Provide the analysis of water supply reliability (from Chapter 7 of Guidebook) in the WSCP	Water Shortage Contingency Planning	Section 8.1
Section 8.10	10632(a)(10)	Describe reevaluation and improvement procedures for monitoring and evaluation the water shortage contingency plan to ensure risk tolerance is adequate and appropriate water shortage mitigation strategies are implemented.	Water Shortage Contingency Planning	Section 8.12

2020 Urban Water Management Plan Checklist				
2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location (Optional Column for Agency Review Use)
Section 8.2	10632(a)(2)(A)	Provide the written decision-making process and other methods that the supplier will use each year to determine its water reliability.	Water Shortage Contingency Planning	Section 8.2
Section 8.2	10632(a)(2)(B)	Provide data and methodology to evaluate the supplier's water reliability for the current year and one dry year pursuant to factors in the code.	Water Shortage Contingency Planning	Section 8.2
Section 8.3	10632(a)(3)(A)	Define six standard water shortage levels of 10, 20, 30, 40, 50 percent shortage and greater than 50 percent shortage. These levels shall be based on supply conditions, including percent reductions in supply, changes in groundwater levels, changes in surface elevation, or other conditions. The shortage levels shall also apply to a catastrophic interruption of supply.	Water Shortage Contingency Planning	Section 8.3
Section 8.3	10632(a)(3)(B)	Suppliers with an existing water shortage contingency plan that uses different water shortage levels must cross reference their categories with the six standard categories.	Water Shortage Contingency Planning	Section 8.3
Section 8.4	10632(a)(4)(A)	Suppliers with water shortage contingency plans that align with the defined shortage levels must specify locally appropriate supply augmentation actions.	Water Shortage Contingency Planning	Section 8.4.2
Section 8.4	10632(a)(4)(B)	Specify locally appropriate demand reduction actions to adequately respond to shortages.	Water Shortage Contingency Planning	Section 8.4.1
Section 8.4	10632(a)(4)(C)	Specify locally appropriate operational changes.	Water Shortage Contingency Planning	Section 8.4.2
Section 8.4	10632(a)(4)(D)	Specify additional mandatory prohibitions against specific water use practices that are in addition to state-mandated prohibitions are appropriate to local conditions.	Water Shortage Contingency Planning	Section 8.4
Section 8.4	10632(a)(4)(E)	Estimate the extent to which the gap between supplies and demand will be reduced by implementation of the action.	Water Shortage Contingency Planning	Section 8.4
Section 8.4.6	10632.5	The plan shall include a seismic risk assessment and mitigation plan.	Water Shortage Contingency Plan	Section 8.6
Section 8.5	10632(a)(5)(A)	Suppliers must describe that they will inform customers, the public and others regarding any current or predicted water shortages.	Water Shortage Contingency Planning	Section 8.7
Section 8.5 and 8.6	10632(a)(5)(B) 10632(a)(5)(C)	Suppliers must describe that they will inform customers, the public and others regarding any shortage response actions triggered or anticipated to be triggered and other relevant communications.	Water Shortage Contingency Planning	Section 8.7
Section 8.6	10632(a)(6)	Retail supplier must describe how it will ensure compliance with and enforce provisions of the WSCP.	Water Shortage Contingency Planning	Section 8.8
Section 8.7	10632(a)(7)(A)	Describe the legal authority that empowers the supplier to enforce shortage response actions.	Water Shortage Contingency Planning	Section 8.9
Section 8.7	10632(a)(7)(B)	Provide a statement that the supplier will declare a water shortage emergency Water Code Chapter 3.	Water Shortage Contingency Planning	Section 8.7

2020 Urban Water Management Plan Checklist				
2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location (Optional Column for Agency Review Use)
Section 8.7	10632(a)(7)(C)	Provide a statement that the supplier will coordinate with any city or county within which it provides water for the possible proclamation of a local emergency.	Water Shortage Contingency Planning	Section 8.6
Section 8.8	10632(a)(8)(A)	Describe the potential revenue reductions and expense increases associated with activated shortage response actions.	Water Shortage Contingency Planning	Section 8.10.1
Section 8.8	10632(a)(8)(B)	Provide a description of mitigation actions needed to address revenue reductions and expense increases associated with activated shortage response actions.	Water Shortage Contingency Planning	Section 8.10.2
Section 8.8	10632(a)(8)(C)	Retail suppliers must describe the cost of compliance with Water Code Chapter 3.3: Excessive Residential Water Use During Drought	Water Shortage Contingency Planning	Section 8.10.3
Section 8.9	10632(a)(9)	Retail suppliers must describe the monitoring and reporting requirements and procedures that ensure appropriate data is collected, tracked, and analyzed for purposes of monitoring customer compliance.	Water Shortage Contingency Planning	Section 8.11
Section 8.11	10632(b)	Analyze and define water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, separately from swimming pools and spas.	Water Shortage Contingency Planning	Section 8.4.3
Sections 8.12 and 10.4	10635(c)	Provide supporting documentation that Water Shortage Contingency Plan has been, or will be, provided to any city or county within which it provides water, no later than 30 days after the submission of the plan to DWR.	Plan Adoption, Submittal, and Implementation	Section 8.12.2 Appendix B
Section 8.12	10632(c)	Make available the Water Shortage Contingency Plan to customers and any city or county where it provides water within 30 after adopted the plan.	Water Shortage Contingency Planning	Section 8.12.2 Appendix D
Sections 9.1 and 9.3	10631(e)(2)	Wholesale suppliers shall describe specific demand management measures listed in code, their distribution system asset management program, and supplier assistance program.	Demand Management Measures	N/A
Sections 9.2 and 9.3	10631(e)(1)	Retail suppliers shall provide a description of the nature and extent of each demand management measure implemented over the past five years. The description will address specific measures listed in code.	Demand Management Measures	Section 9
Chapter 10	10608.26(a)	Retail suppliers shall conduct a public hearing to discuss adoption, implementation, and economic impact of water use targets (recommended to discuss compliance).	Plan Adoption, Submittal, and Implementation	Section 10.3
Section 10.2.1	10621(b)	Notify, at least 60 days prior to the public hearing, any city or county within which the supplier provides water that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. Reported in Table 10-1.	Plan Adoption, Submittal, and Implementation	Section 10.2 Appendix B
Section 10.4	10621(f)	Each urban water supplier shall update and submit its 2020 plan to the department by July 1, 2021.	Plan Adoption, Submittal, and Implementation	Section 10.4
Sections 10.2.2, 10.3, and 10.5	10642	Provide supporting documentation that the urban water supplier made the plan and contingency plan available for public inspection, published notice of the public hearing, and held a public hearing about the plan and contingency plan.	Plan Adoption, Submittal, and Implementation	Section 10.4

2020 Urban Water Management Plan Checklist				
2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location (Optional Column for Agency Review Use)
Section 10.2.2	10642	The water supplier is to provide the time and place of the hearing to any city or county within which the supplier provides water.	Plan Adoption, Submittal, and Implementation	Section 10.3 Appendix C
Section 10.3.2	10642	Provide supporting documentation that the plan and contingency plan has been adopted as prepared or modified.	Plan Adoption, Submittal, and Implementation	Section 10.3 Appendix D
Section 10.4	10644(a)	Provide supporting documentation that the urban water supplier has submitted this UWMP to the California State Library.	Plan Adoption, Submittal, and Implementation	Section 10.4 Appendix D
Section 10.4	10644(a)(1)	Provide supporting documentation that the urban water supplier has submitted this UWMP to any city or county within which the supplier provides water no later than 30 days after adoption.	Plan Adoption, Submittal, and Implementation	Section 10.4 Appendix D
Sections 10.4.1 and 10.4.2	10644(a)(2)	The plan, or amendments to the plan, submitted to the department shall be submitted electronically.	Plan Adoption, Submittal, and Implementation	Section 10.4
Section 10.5	10645(a)	Provide supporting documentation that, not later than 30 days after filing a copy of its plan with the department, the supplier has or will make the plan available for public review during normal business hours.	Plan Adoption, Submittal, and Implementation	Section 10.4 Appendix D
Section 10.5	10645(b)	Provide supporting documentation that, not later than 30 days after filing a copy of its water shortage contingency plan with the department, the supplier has or will make the plan available for public review during normal business hours.	Plan Adoption, Submittal, and Implementation	Section 8.12.2 Appendix D
Section 10.6	10621(c)	If supplier is regulated by the Public Utilities Commission, include its plan and contingency plan as part of its general rate case filings.	Plan Adoption, Submittal, and Implementation	N/A
Section 10.7.2	10644(b)	If revised, submit a copy of the water shortage contingency plan to DWR within 30 days of adoption.	Plan Adoption, Submittal, and Implementation	Section 10.5

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Appendix B: Documentation of City/County Notification

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THE CITY OF
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March 17, 2021

Dan Muelrath, General Manager
Diablo Water District
87 Carol Lane
Oakley, CA 94561

Re: Notification of Preparation of Urban Water Management Plan – 2020 Update

Dear Mr. Muelrath:

The City of Brentwood is currently in the process of updating its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan, which were last prepared in 2015. The Urban Water Management Planning Act requires every urban water supplier providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually to prepare and adopt an UWMP and periodically update that plan at least every five years. The UWMP is a planning document and a source document which reports, describes and evaluates water deliveries and uses, water supply sources and conservation efforts.

The City also plans on appending its 2015 UWMP to report reduced Delta reliance consistent with Delta Plan Policy WR P1.

As an urban water supplier, the City coordinates with water management agencies, relevant public agencies and other water suppliers on the preparation of the UWMP update. The City will be reviewing the UWMP and will make amendments and updates as appropriate.

If you wish to contact the City about the UWMP update, please direct any questions to Diana Williford, Water Conservation Specialist, at (925) 516-6045 or dwilliford@brentwoodca.gov.

Sincerely,

Casey Wichert
Assistant Director of Public Works/Operations

PUBLIC WORKS DEPARTMENT
150 City Park Way, Brentwood, CA 94513-1164
www.brentwoodca.gov

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2201 Elkins Way, Brentwood, CA 94513-7344
Phone (925) 516-6000—Fax (925) 516-6001

Solid Waste Operations
2301 Elkins Way, Brentwood, CA 94513-7350
Phone (925) 516-6090—Fax (925) 516- 6091

Wastewater Operations
2251 Elkins Way, Brentwood, CA 94513-7344
Phone (925) 516-6060—Fax (925) 516-6061

THE CITY OF
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March 17, 2021

Aaron Trott, General Manager
East Contra Costa Irrigation District
1711 Sellers Avenue
Brentwood, CA 94513

Re: Notification of Preparation of Urban Water Management Plan – 2020 Update

Dear Mr. Trott:

The City of Brentwood is currently in the process of updating its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan, which were last prepared in 2015. The Urban Water Management Planning Act requires every urban water supplier providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually to prepare and adopt an UWMP and periodically update that plan at least every five years. The UWMP is a planning document and a source document which reports, describes and evaluates water deliveries and uses, water supply sources and conservation efforts.

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Sincerely,

Casey Wichert
Assistant Director of Public Works/Operations

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THE CITY OF
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March 17, 2021

Aaron Goldsworthy, Water & Wastewater Manager
Town of Discovery Bay
1800 Willow Lake Road
Discovery Bay, CA 94505

Re: Notification of Preparation of Urban Water Management Plan – 2020 Update

Dear Mr. Goldsworthy:

The City of Brentwood is currently in the process of updating its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan, which were last prepared in 2015. The Urban Water Management Planning Act requires every urban water supplier providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually to prepare and adopt an UWMP and periodically update that plan at least every five years. The UWMP is a planning document and a source document which reports, describes and evaluates water deliveries and uses, water supply sources and conservation efforts.

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Sincerely,

Casey Wichert

Casey Wichert
Assistant Director of Public Works/Operations

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THE CITY OF
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March 17, 2021

Diane Burgis
Supervisor, District 3
3361 Walnut Blvd., Suite 140
Brentwood, CA 94513

Re: Notification of Preparation of Urban Water Management Plan – 2020 Update

Dear Ms. Burgis:

The City of Brentwood is currently in the process of updating its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan, which were last prepared in 2015. The Urban Water Management Planning Act requires every urban water supplier providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually to prepare and adopt an UWMP and periodically update that plan at least every five years. The UWMP is a planning document and a source document which reports, describes and evaluates water deliveries and uses, water supply sources and conservation efforts.

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Sincerely,

Casey Wichert
Assistant Director of Public Works/Operations

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THE CITY OF
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March 17, 2021

Stephen J Welch, General Manager
Contra Costa Water District
1331 Concord Avenue
Concord, CA 94520

Re: Notification of Preparation of Urban Water Management Plan – 2020 Update

Dear Mr. Welch:

The City of Brentwood is currently in the process of updating its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan, which were last prepared in 2015. The Urban Water Management Planning Act requires every urban water supplier providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually to prepare and adopt an UWMP and periodically update that plan at least every five years. The UWMP is a planning document and a source document which reports, describes and evaluates water deliveries and uses, water supply sources and conservation efforts.

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Sincerely,

Casey Wichert

Casey Wichert
Assistant Director of Public Works/Operations

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THE CITY OF
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March 17, 2021

John Samuelson, Public Works Director/City Engineer
City of Antioch
200 H Street
Antioch, CA 94531

Re: Notification of Preparation of Urban Water Management Plan – 2020 Update

Dear Mr. Samuelson:

The City of Brentwood is currently in the process of updating its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan, which were last prepared in 2015. The Urban Water Management Planning Act requires every urban water supplier providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually to prepare and adopt an UWMP and periodically update that plan at least every five years. The UWMP is a planning document and a source document which reports, describes and evaluates water deliveries and uses, water supply sources and conservation efforts.

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Sincerely,

Casey Wichert

Casey Wichert
Assistant Director of Public Works/Operations

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Appendix C: Notice of Public Hearing

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THE CITY OF
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NOTICE OF PUBLIC HEARING

NOTICE IS HEREBY GIVEN that the City Council of the City of Brentwood will, at 7:00 p.m., or as soon thereafter as the normal course of business permits on May 25, 2021 hold a public hearing on, and take actions on the following matter:

> "A Resolution approving the Water Shortage Contingency Plan; a Resolution approving the 2020 Urban Water Management Plan; and a Resolution approving an appendix to the 2015 Urban Water Management Plan to include Reduced Delta Reliance Reporting."

This hearing will be held virtually, and may be accessed at:

https://www.brentwoodca.gov/vcc

Consistent with Contra Costa County Health orders pertaining to COVID-19, and in line with social distancing standards, the public is invited to participate in the City Council meeting and offer comments using any of the following methods:

1. **Zoom**: www.brentwoodca.gov/vcc
   As the City Council Chamber will not be open, the public may view and participate in the meeting with this link. During the meeting, each period for public comment will be announced, and participants may use the "Raise Hand" feature on the Zoom webinar to request to speak. After speaking, please lower the "Raise Hand" feature. The meeting host will call on you, by name, and unmute your microphone when it is your turn to speak. In order to ensure the orderly administration of the meeting using this method, providing your name is encouraged, but is not required. **(*If you need instructions on how to use this feature, please contact the City Clerk by noon of the meeting date at cityclerk@brentwoodca.gov or 925.516.5182*.)**

   The public may alternatively view the meeting via one-way video feed by selecting the video option at the City Council Agendas' link on the City webpage at www.brentwoodca.gov.

2. **Telephone**
   If you wish to comment during the meeting via telephone, you may "raise your hand" virtually on most devices by pressing *9, and you will be called upon when it is your time to speak. After speaking, please press *9 again to remove the "raise your hand" feature. If that feature does not work on your device, please email cityclerk@brentwoodca.gov in advance of the meeting where possible. The request must contain in the subject line "Request to Speak – Agenda Item #" and should include name and full phone number that will be used to call in. In order to ensure the orderly administration of the meeting using this method, providing your name is encouraged, but is not required.

3. **E-mail**

Public comments can also be submitted via e-mail to cityclerk@brentwoodca.gov. Emails not sent to this email address will not be included as public comments, even if sent directly to individual Council Members. Any public comments received up until 3:00 p.m. of the meeting date will be:

- distributed to the Council via email before the meeting,
- posted online for public inspection at https://www.brentwoodca.gov/councilmeetingonline, and
- later summarized in the meeting minutes.

The City cannot guarantee that its network, website, and/or the virtual access system will be uninterrupted. To ensure the City Council receives your comments prior to taking action, you are strongly encouraged to submit them in advance of the meeting. As e-mails containing public meeting comments are part of the official record, note that personal contact information (potentially including email addresses) may be published if it is included with your e-mail.

Those wishing to solely view (and not participate in) this meeting in real time or after the meeting has ended may do so through the City Council Agendas' link on the City webpage: www.brentwoodca.gov

Information may be obtained from Diana Williford, Water Conservation Specialist [(925) 516-6045 or dwilliford@brentwoodca.gov] in the Public Works Operations Department of the City of Brentwood, 2201 Elkins Way, Brentwood, California 94513.

If you challenge the City Council's action in court, you may be limited to raising only those issues you or someone else raised at the public hearing described in this notice, or in written correspondence delivered to the Brentwood City Council, at or prior to, the public hearing.

Dated: May __, 2021

Margaret Wimberly
City Clerk

Appendix D: Adoption Resolution and Notice of Public Availability

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RESOLUTION NO. 2021-56

A RESOLUTION APPROVING THE WATER SHORTAGE CONTINGENCY PLAN FOR SUBMITTAL TO THE CALIFORNIA DEPARTMENT OF WATER.

WHEREAS, on August 14, 2001, by Resolution No. 2341, City Council adopted the 2000 Urban Water Management Plan (UWMP) as submitted by Brown and Caldwell, Environmental Engineers and Consultants; and

WHEREAS, on January 10, 2006, by Resolution No. 2006-6, City Council adopted the 2005 UWMP as submitted by Brown and Caldwell, Environmental Engineers and Consultants; and

WHEREAS, on May 24, 2011, by Resolution No. 2011-75, City Council adopted the 2010 UWMP as submitted by ICF Jones and Stokes International, Engineering Consultants; and

WHEREAS, on May 24, 2016, by Resolution No. 2016-71, City Council adopted the 2015 UWMP as submitted by Brown and Caldwell, Environmental Engineers and Consultants; and

WHEREAS, on June 23, 2020, by Resolution No, 2020-85, the City Council adopted the 2020/2021 - 2021/2022 Operating Budget; and

WHEREAS, on November 10, 2020, by Resolution No. 2020-137, City Council approved and authorized the City Manager or designee to execute an Agreement for Professional Services with Brown and Caldwell in a not-to-exceed amount of $78,228, which includes a $6,305 contingency, for the preparation of the 2020 UWMP; and

WHEREAS, UWMPs are prepared by California's urban water suppliers to support their long-term resource planning and ensure adequate water supplies are available to meet existing and future water demands; and

WHEREAS, every urban water supplier that either provides over 3,000 acre-feet of water annually or serves more than 3,000 connections is required to assess the reliability of its water sources over a 20-year planning horizon considering normal, dry, and multiple dry years and this assessment is to be included in its UWMP, which is prepared every five years and submitted to the California Department of Water Resources ("DWR"); and

WHEREAS, a Water Shortage Contingency Plan ("WSCP") is a document that stands alone—meaning it should be created separately from the UWMP and amended, as needed, without amending the corresponding UWMP. The Supplier's 2020 WSCP must be included as part of the 2020 UWMP when submitted to DWR by July 1, 2021; and

WHEREAS, DWR reviews the submitted plans to ensure the requirements identified in the Urban Water Management Planning Act (Division 6 Part 2.6 of the Water Code §10610 - 10656) are completed; and

WHEREAS, the City of Brentwood is an urban water supplier providing water for municipal purposes to more than 3,000 customers, and has prepared the 2020 UWMP, which provides the analysis of water conservation measures in accordance with the guidelines of DWR; and

WHEREAS, City staff and Brown and Caldwell, have prepared the 2020 UWMP, made it available for public review, and has held the appropriate public hearing.

NOW, THEREFORE BE IT RESOLVED that the City Council of the City of Brentwood does hereby approve a Resolution approving the Water Shortage Contingency Plan for submittal to the California Department of Water Resources.

PASSED, APPROVED AND ADOPTED by the City Council of the City of Brentwood at a regular meeting held on the 25th day of May, 2021, by the following vote:

AYES: Bryant, Mendoza, Meyer, Rarey, Rodriguez
NOES: None
ABSENT: None
RECUSE: None

Joel Bryant
Mayor

ATTEST:

Margaret

Margaret Wimberly, MMC
City Clerk

RESOLUTION NO. 2021-57

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF BRENTWOOD APPROVING THE 2020 URBAN WATER MANAGEMENT PLAN FOR SUBMITTAL TO THE CALIFORNIA DEPARTMENT OF WATER RESOURCES.

WHEREAS, on August 14, 2001, by Resolution No. 2341, City Council adopted the 2000 Urban Water Management Plan (UWMP) as submitted by Brown and Caldwell, Environmental Engineers and Consultants; and

WHEREAS, on January 10, 2006, by Resolution No. 2006-6, City Council adopted the 2005 UWMP as submitted by Brown and Caldwell, Environmental Engineers and Consultants; and

WHEREAS, on May 24, 2011, by Resolution No. 2011-75, City Council adopted the 2010 UWMP as submitted by ICF Jones and Stokes International, Engineering Consultants; and

WHEREAS, on May 24, 2016, by Resolution No. 2016-71, City Council adopted the 2015 UWMP as submitted by Brown and Caldwell, Environmental Engineers and Consultants; and

WHEREAS, on June 23, 2020, by Resolution No, 2020-85, the City Council adopted the 2020/2021 - 2021/2022 Operating Budget; and

WHEREAS, on November 10, 2020, by Resolution No. 2020-137, City Council approved and authorized the City Manager or designee to execute an Agreement for Professional Services with Brown and Caldwell in a not-to-exceed amount of $78,228, which includes a $6,305 contingency, for the preparation of the 2020 UWMP; and

WHEREAS, UWMPs are prepared by California's urban water suppliers to support their long-term resource planning and ensure adequate water supplies are available to meet existing and future water demands; and

WHEREAS, every urban water supplier that either provides over 3,000 acre-feet of water annually or serves more than 3,000 connections is required to assess the reliability of its water sources over a 20-year planning horizon considering normal, dry, and multiple dry years and this assessment is to be included in its UWMP, which is prepared every five years and submitted to the California Department of Water Resources ("DWR"); and

WHEREAS, DWR reviews the submitted plans to ensure the requirements identified in the Urban Water Management Planning Act (Division 6 Part 2.6 of the Water Code §10610 - 10656) are completed; and

WHEREAS, the City of Brentwood is an urban water supplier providing water for municipal purposes to more than 3,000 customers, and has prepared the 2020 UWMP, which provides the analysis of water conservation measures in accordance with the guidelines of DWR; and

WHEREAS, City staff and Brown and Caldwell, have prepared the 2020 UWMP, made it available for public review, and has held the appropriate public hearing.

NOW, THEREFORE BE IT RESOLVED that the City Council of the City of Brentwood does hereby approve the 2020 Urban Water Management Plan for submittal to the Department of Water Resources.

PASSED, APPROVED AND ADOPTED by the City Council of the City of Brentwood at a regular meeting held on the 25th day of May, 2021, by the following vote:

AYES:	Bryant, Mendoza, Meyer, Rarey, Rodriguez
NOES:	None
ABSENT:	None
RECUSE:	None

Joel Bryant
Mayor

ATTEST:

Margarette Wimberly

Margaret Wimberly, MMC
City Clerk

RESOLUTION NO. 2021-58

A RESOLUTION APPROVING AN APPENDIX TO THE 2015 URBAN WATER MANAGEMENT PLAN (UWMP) TO INCLUDE REDUCED DELTA RELIANCE FOR SUBMITTAL TO THE CALIFORNIA DEPARTMENT OF WATER.

WHEREAS, on August 14, 2001, by Resolution No. 2341, City Council adopted the 2000 Urban Water Management Plan (UWMP) as submitted by Brown and Caldwell, Environmental Engineers and Consultants; and

WHEREAS, on January 10, 2006, by Resolution No. 2006-6, City Council adopted the 2005 UWMP as submitted by Brown and Caldwell, Environmental Engineers and Consultants; and

WHEREAS, on May 24, 2011, by Resolution No. 2011-75, City Council adopted the 2010 UWMP as submitted by ICF Jones and Stokes International, Engineering Consultants; and

WHEREAS, on May 24, 2016, by Resolution No. 2016-71, City Council adopted the 2015 UWMP as submitted by Brown and Caldwell, Environmental Engineers and Consultants; and

WHEREAS, on June 23, 2020, by Resolution No, 2020-85, the City Council adopted the 2020/2021 - 2021/2022 Operating Budget; and

WHEREAS, on November 10, 2020, by Resolution No. 2020-137, City Council approved and authorized the City Manager or designee to execute an Agreement for Professional Services with Brown and Caldwell in a not-to-exceed amount of $78,228, which includes a $6,305 contingency, for the preparation of the 2020 UWMP; and

WHEREAS, UWMPs are prepared by California's urban water suppliers to support their long-term resource planning and ensure adequate water supplies are available to meet existing and future water demands; and

WHEREAS, every urban water supplier that either provides over 3,000 acre-feet of water annually or serves more than 3,000 connections is required to assess the reliability of its water sources over a 20-year planning horizon considering normal, dry, and multiple dry years and this assessment is to be included in its UWMP, which is prepared every five years and submitted to the California Department of Water Resources ("DWR"); and

WHEREAS, consistent with WR P1 requirements, the information contained in Appendix K of this UWMP is intended to be appended to the City's 2015 UWMP; and

WHEREAS, appending the 2015 UWMP is consistent with the Sacramento-San Joaquin Delta Reform Act of 2009 ("Delta Reform Act) that established two co-equal goals of providing a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem. As part of the Delta Reform Act, the Delta Stewardship Council (DSC) was created who then developed and adopted the Delta Plan in 2013. The Delta Plan is a comprehensive, long-term, legally enforceable plan guiding how federal, state, and local agencies manage the Delta's water and environmental resources. Included in the Delta Plan is Delta Plan Policy WR P1, *Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance* (WR P1); and

WHEREAS, DWR reviews the submitted plans to ensure the requirements identified in the Urban Water Management Planning Act (Division 6 Part 2.6 of the Water Code §10610 - 10656) are completed; and

WHEREAS, the City of Brentwood is an urban water supplier providing water for municipal purposes to more than 3,000 customers, and has prepared the 2020 UWMP, which provides the analysis of water conservation measures in accordance with the guidelines of DWR; and

WHEREAS, City staff and Brown and Caldwell, have prepared the 2020 UWMP, made it available for public review, and has held the appropriate public hearing.

NOW, THEREFORE BE IT RESOLVED that the City Council of the City of Brentwood does hereby approve a Resolution approving an appendix to the 2015 UWMP to include reduced Delta Reliance for submittal to the California Department of Water.

PASSED, APPROVED AND ADOPTED by the City Council of the City of Brentwood at a regular meeting held on the 25th day of May, 2021, by the following vote:

AYES: Bryant, Mendoza, Meyer, Rarey, Rodriguez
NOES: None
ABSENT: None
RECUSE: None

Joel Bryant
Mayor

ATTEST:

Margaret Wimberly, MMC
City Clerk

201 North Civic Drive, Suite 300
Walnut Creek, CA 94596

T: 925.937.9010

June 17, 2021

Ms. Gwen Huff
Senior Environmental Scientist
Urban Water Use Efficiency Unit
Department of Water Resources
P.O. Box 942836
Sacramento, California 94236-0001

1011-156033

Subject: 2020 Urban Water Management Plan

Dear Ms. Huff,

On behalf of Mr. James Wolfe, Water Operations Manager for the City of Brentwood, Brown and Caldwell has submitted this 2020 UWMP to the California State Library and has made this 2020 UWMP available for public review during normal business hours at the City offices.

Please let me know if you have any questions.

Very truly yours,

Brown and Caldwell

Rene Guillen

Rene Guillen, PE, ENV SP
Project Manager

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Appendix E: Distribution System Water Loss Audit

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AWWA Free Water Audit Software:
Reporting Worksheet

WAS v5.0

? Click to access definition
\+ Click to add a comment

Water Audit Report for: City of Brentwood (0710004)
Reporting Year: 2016 | 1/2016 - 12/2016

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

Master Meter and Supply Error Adjustments

WATER SUPPLIED

<----------- Enter grading in column 'E' and 'J' ---------->

					Pcnt:		Value:	
Volume from own sources:	5	2,168.256	MG/Yr	3		● ○		MG/Yr
Water imported:	5	569.028	MG/Yr	3		● ○		MG/Yr
Water exported:	n/a	0.000	MG/Yr			● ○		MG/Yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED: 2,737.284 MG/Yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

				Pcnt:		Value:	
Billed metered:	5	2,422.133	MG/Yr				
Billed unmetered:	n/a	0.000	MG/Yr				
Unbilled metered:	3	0.020	MG/Yr				
Unbilled unmetered:	5	6.843	MG/Yr		○ ●	6.843	MG/Yr

Use buttons to select percentage of water supplied **OR** value

AUTHORIZED CONSUMPTION: ? 2,428.996 MG/Yr

WATER LOSSES (Water Supplied - Authorized Consumption)

308.288 MG/Yr

Apparent Losses

				Pcnt:		Value:	
Unauthorized consumption:		6.843	MG/Yr	0.25%	● ○		MG/Yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	3	49.432	MG/Yr	2.00%	● ○		MG/Yr
Systematic data handling errors:	5	6.055	MG/Yr	0.25%	● ○		MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: ? 62.330 MG/Yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: ? 245.958 MG/Yr

WATER LOSSES: 308.288 MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: ? 315.151 MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	10	299.0	miles
Number of active AND inactive service connections:	8	22,380	
Service connection density:		75	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure: 5 | 62.2 psi

COST DATA

Total annual cost of operating water system:	10	$19,486,154	$/Year
Customer retail unit cost (applied to Apparent Losses):	8	$8.38	$/1000 gallons (US)
Variable production cost (applied to Real Losses):	5	$3,470.00	$/Million gallons

☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 55 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Unbilled metered
3: Customer metering inaccuracies

AWWA Free Water Audit Software:
Reporting Worksheet

WAS v5.0

? Click to access definition
\+ Click to add a comment

Water Audit Report for: City of Brentwood (0710004)
Reporting Year: 2017 | 1/2017 - 12/2017

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

<----------- Enter grading in column 'E' and 'J' ---------->

Master Meter and Supply Error Adjustments

WATER SUPPLIED

	Grade	Value	Unit	Grade	Pcnt:		Value:	Unit
Volume from own sources:	5	2,452.560	MG/Yr	3		● ○		MG/Yr
Water imported:	5	764.559	MG/Yr	5		● ○		MG/Yr
Water exported:	n/a	0.000	MG/Yr			● ○		MG/Yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED: **3,217.119** MG/Yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

	Grade	Value	Unit	Pcnt:		Value:	Unit
Billed metered:	5	2,848.010	MG/Yr				
Billed unmetered:	n/a	0.000	MG/Yr				
Unbilled metered:	9	1.189	MG/Yr				
Unbilled unmetered:	5	8.040	MG/Yr		○ ●	8.040	MG/Yr

Use buttons to select percentage of water supplied **OR** value

AUTHORIZED CONSUMPTION: **2,857.239** MG/Yr

WATER LOSSES (Water Supplied - Authorized Consumption)

359.880 MG/Yr

Apparent Losses

	Grade	Value	Unit	Pcnt:		Value:	Unit
Unauthorized consumption:		8.043	MG/Yr	0.25%	● ○		MG/Yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

	Grade	Value	Unit	Pcnt:		Value:	Unit
Customer metering inaccuracies:	3	58.147	MG/Yr	2.00%	● ○		MG/Yr
Systematic data handling errors:	5	7.120	MG/Yr	0.25%	● ○		MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: **73.310** MG/Yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: **286.570** MG/Yr

WATER LOSSES: **359.880** MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: **369.109** MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

	Grade	Value	Unit
Length of mains:	9	337.0	miles
Number of active AND inactive service connections:	9	22,926	
Service connection density:		68	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

	Grade	Value	Unit
Average operating pressure:	5	62.2	psi

COST DATA

	Grade	Value	Unit
Total annual cost of operating water system:	10	$15,287,973	$/Year
Customer retail unit cost (applied to Apparent Losses):	8	$8.19	$/1000 gallons (US)
Variable production cost (applied to Real Losses):	5	$3,470.00	$/Million gallons

☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

*** YOUR SCORE IS: 59 out of 100 ***

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Customer metering inaccuracies
3: Billed metered

AWWA Free Water Audit Software:
Reporting Worksheet

WAS v5.0

? Click to access definition
\+ Click to add a comment

Water Audit Report for: City of Brentwood (CA0710004)
Reporting Year: 2018 1/2018 - 12/2018

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

Master Meter and Supply Error Adjustments

WATER SUPPLIED

<----------- Enter grading in column 'E' and 'J' ---------->

									Pcnt:		Value:	
Volume from own sources:	+	?	5	2,987.264	MG/Yr	+	?	3		● ○		MG/Yr
Water imported:	+	?	5	347.405	MG/Yr	+	?	3		● ○		MG/Yr
Water exported:	+	?	n/a	0.000	MG/Yr	+	?			● ○		MG/Yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED:	**3,334.669**	MG/Yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

						Pcnt:		Value:	
Billed metered:	+	?	5	2,990.043	MG/Yr				
Billed unmetered:	+	?	n/a	0.000	MG/Yr				
Unbilled metered:	+	?	9	2.864	MG/Yr				
Unbilled unmetered:	+	?	5	8.340	MG/Yr		○ ●	8.340	MG/Yr

Use buttons to select percentage of water supplied **OR** value

AUTHORIZED CONSUMPTION:	?	**3,001.247**	MG/Yr

WATER LOSSES (Water Supplied - Authorized Consumption)	**333.422**	MG/Yr

Apparent Losses

						Pcnt:		Value:	
Unauthorized consumption:	+	?		8.337	MG/Yr	0.25%	● ○		MG/Yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	+	?	3	61.080	MG/Yr	2.00%	● ○		MG/Yr
Systematic data handling errors:	+	?	5	7.475	MG/Yr	0.25%	● ○		MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses:	?	**76.892**	MG/Yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses:	?	**256.530**	MG/Yr
WATER LOSSES:		**333.422**	MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER:	?	**344.626**	MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	+	?	10	344.0	miles
Number of active AND inactive service connections:	+	?	8	25,796	
Service connection density:		?		75	conn./mile main

Are customer meters typically located at the curbstop or property line?	Yes

Average length of customer service line: + ? (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure:	+	?	5	62.2	psi

COST DATA

Total annual cost of operating water system:	+	?	10	$10,664,555	$/Year
Customer retail unit cost (applied to Apparent Losses):	+	?	8	$8.63	$/1000 gallons (US)
Variable production cost (applied to Real Losses):	+	?	5	$3,470.00	$/Million gallons

☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

*** YOUR SCORE IS: 59 out of 100 ***

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources

2: Customer metering inaccuracies

3: Billed metered

AWWA Free Water Audit Software:
Reporting Worksheet

WAS v5.0

? Click to access definition
\+ Click to add a comment

Water Audit Report for: City of Brentwood (CA0710004)
Reporting Year: 2019 | 1/2019 - 12/2019

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

<----------- Enter grading in column 'E' and 'J' ---------->

Master Meter and Supply Error Adjustments

WATER SUPPLIED

	Grade	Value	Unit	Grade	Pcnt:		Value:	
Volume from own sources:	5	2,771.481	MG/Yr	3		● ○		MG/Yr
Water imported:	5	586.455	MG/Yr	9		● ○		MG/Yr
Water exported:	n/a	0.000	MG/Yr			● ○		MG/Yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED: 3,357.936 MG/Yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

	Grade	Value	Unit	Pcnt:		Value:	
Billed metered:	5	3,010.964	MG/Yr				
Billed unmetered:	n/a		MG/Yr				
Unbilled metered:	n/a		MG/Yr				
Unbilled unmetered:	5	8.395	MG/Yr		○ ●	8.395	MG/Yr

Use buttons to select percentage of water supplied **OR** value

AUTHORIZED CONSUMPTION: 3,019.359 MG/Yr

WATER LOSSES (Water Supplied - Authorized Consumption) 338.577 MG/Yr

Apparent Losses

	Grade	Value	Unit	Pcnt:		Value:	
Unauthorized consumption:		8.395	MG/Yr	0.25%	● ○		MG/Yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

	Grade	Value	Unit	Pcnt:		Value:	
Customer metering inaccuracies:	3	61.448	MG/Yr	2.00%	● ○		MG/Yr
Systematic data handling errors:	5	7.527	MG/Yr	0.25%	● ○		MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: 77.370 MG/Yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: 261.207 MG/Yr

WATER LOSSES: 338.577 MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: 346.972 MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

	Grade	Value	Unit
Length of mains:	9	347.0	miles
Number of active AND inactive service connections:	9	26,090	
Service connection density:		75	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure: 5 | 64.5 psi

COST DATA

	Grade	Value	Unit
Total annual cost of operating water system:	10	$17,795,498	$/Year
Customer retail unit cost (applied to Apparent Losses):	9	$4.75	$/1000 gallons (US)
Variable production cost (applied to Real Losses):	5	$3,470.00	$/Million gallons

☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

*** YOUR SCORE IS: 58 out of 100 ***

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Customer metering inaccuracies
3: Billed metered

AWWA Free Water Audit Software:
Reporting Worksheet

WAS v5.0

? Click to access definition
\+ Click to add a comment

Water Audit Report for: City of Brentwood (CA0710004)
Reporting Year: 2020 1/2020 - 12/2020

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

<----------- Enter grading in column 'E' and 'J' ---------->

Master Meter and Supply Error Adjustments

WATER SUPPLIED

				Grade	Pcnt:		Value:	
Volume from own sources:	5	2,770.983	MG/Yr	3		● ○		MG/Yr
Water imported:	5	1,058.760	MG/Yr	9		● ○		MG/Yr
Water exported:	n/a	0.000	MG/Yr			● ○		MG/Yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED: **3,829.743** MG/Yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

				Pcnt:		Value:	
Billed metered:	5	3,487.510	MG/Yr				
Billed unmetered:	n/a		MG/Yr				
Unbilled metered:	n/a		MG/Yr				
Unbilled unmetered:	5	9.570	MG/Yr		○ ●	9.570	MG/Yr

Use buttons to select percentage of water supplied **OR** value

AUTHORIZED CONSUMPTION: **3,497.080** MG/Yr

WATER LOSSES (Water Supplied - Authorized Consumption)

332.663 MG/Yr

Apparent Losses

				Pcnt:		Value:	
Unauthorized consumption:		9.574	MG/Yr	0.25%	● ○		MG/Yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	3	71.174	MG/Yr	2.00%	● ○		MG/Yr
Systematic data handling errors:	5	8.719	MG/Yr	0.25%	● ○		MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: **89.467** MG/Yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: **243.196** MG/Yr

WATER LOSSES: **332.663** MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: **342.233** MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	9	347.0	miles
Number of active AND inactive service connections:	9	27,224	
Service connection density:		78	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure: 5 64.5 psi

COST DATA

Total annual cost of operating water system:	10	$14,489,353	$/Year
Customer retail unit cost (applied to Apparent Losses):	9	$4.75	$/1000 gallons (US)
Variable production cost (applied to Real Losses):	5	$3,470.00	$/Million gallons

☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

*** YOUR SCORE IS: 58 out of 100 ***

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Customer metering inaccuracies
3: Billed metered

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Appendix F: SBx7-7 GPCD Verification and 2020 Compliance Forms

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SB X7-7 2020 Compliance Form

The SB X7-7 2020 Compliance Form **is for the calculation of 2020 compliance only. All retail suppliers must complete the SB X7-7 Compliance Form.** Baseline and target calculations are done in the SB X 7-7 Verification Form.

The SB X7-7 Verification Form is for the calculation of baselines and targets and is a separate workbook from the SB X7-7 2020 Compliance Form. Most Suppliers will have completed the SB X7-7 Verification Form with their 2015 UWMP and do not need to complete this form again in 2020. See Chapter 5 Section 5.3 of the UWMP Guidebook for more information regarding which Suppliers must, or may, complete the SB X7-7 Verification Form for their 2020 UWMP. 2020 compliance calculations are done in the SB X7-7 2020 Compliance Form.

WUE Data Portal Entry Exceptions

The data from the tables below will not be entered into WUE Data Portal tables. These tables will be submitted as separate uploads, in Excel, to WUE Data Portal.

Process Water Deduction

SB X7-7 tables 4-C, 4-C.1, 4-C.2, 4-C.3, 4-C.4 and 4-D

A supplier that will use the process water deduction will complete the appropriate tables in Excel, submit them as a separate upload to the WUE Data Portal, and include them in its UWMP.

SB X7-7 Table 0: Units of Measure Used in 2020 UWMP* *(select one from the drop down list)*
Million Gallons
**The unit of measure must be consistent throughout the UWMP, as reported in Submittal Table 2-3.*
NOTES:

SB X7-7 Table 2: Method for 2020 Population Estimate	
Method Used to Determine 2020 Population (may check more than one)	
☑	**1. Department of Finance** (DOF) or **American Community Survey** (ACS)
☐	**2. Persons-per-Connection Method**
☐	**3. DWR Population Tool**
☐	**4. Other** DWR recommends pre-review

NOTES:

SB X7-7 Table 3: 2020 Service Area Population

2020 Compliance Year Population	
2020	65,118

NOTES:

SB X7-7 Table 4: 2020 Gross Water Use

Compliance Year 2020	2020 Volume Into Distribution System *This column will remain blank until SB X7-7 Table 4-A is completed.*	2020 Deductions					2020 Gross Water Use
		Exported Water *	Change in Dist. System Storage* (+/-)	Indirect Recycled Water *This column will remain blank until SB X7-7 Table 4-B is completed.*	Water Delivered for Agricultural Use*	Process Water *This column will remain blank until SB X7-7 Table 4-D is completed.*	
	4,015			-		-	**4,015**

*** Units of measure (AF, MG , or CCF)** must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.

NOTES:

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s), Meter Error Adjustment

Complete one table for each source.

Name of Source	Wells

This water source is *(check one)* **:**

☑ The supplier's own water source

☐ A purchased or imported source

Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional (+/-)*	Corrected Volume Entering Distribution System
	729	-	729

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.*

[2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s) Meter Error Adjustment

Complete one table for each source.

Name of Source	Surface Water (ECCID)

This water source is *(check one)* **:**

☑ The supplier's own water source

☐ A purchased or imported source

Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional (+/-)*	Corrected Volume Entering Distribution System
	2,042		2,042

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.*

[2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s), Meter Error Adjustment

Complete one table for each source.

Name of Source	Surface Water (CCWD)
This water source is *(check one)* **:**	
☐	The supplier's own water source
☑	A purchased or imported source

Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional* *(+/-)*	Corrected Volume Entering Distribution System
	1,059		1,059

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.*

[2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s), Meter Error Adjustment

Complete one table for each source.

Name of Source	Untreated Water (ECCID)
This water source is *(check one)* **:**	
☑	The supplier's own water source
☐	A purchased or imported source

Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional* *(+/-)*	Corrected Volume Entering Distribution System
	185		185

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.*

[2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

SB X7-7 Table 4-B: 2020 Indirect Recycled Water Use Deduction *(For use only by agencies that are deducting indirect recycled water)*

2020 Compliance Year	2020 Surface Reservoir Augmentation					2020 Groundwater Recharge			Total Deductible Volume of Indirect Recycled Water Entering the Distribution System
	Volume Discharged from Reservoir for Distribution System Delivery[1]	Percent Recycled Water	Recycled Water Delivered to Treatment Plant	Transmission/ Treatment Loss[1]	Recycled Volume Entering Distribution System from Surface Reservoir Augmentation	Recycled Water Pumped by Utility[1,2]	Transmission/ Treatment Losses[1]	Recycled Volume Entering Distribution System from Groundwater Recharge	
			-		-			-	-

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.*

[2] *Suppliers will provide supplemental sheets to document the calculation for their input into "Recycled Water Pumped by Utility". The volume reported in this cell must be less than total groundwater pumped - See Methodology 1, Step 8, section 2.c.*

Data from this table will not be entered into WUEdata.
Instead, the entire table will be uploaded to WUEdata as a separate upload in Excel format.

SB X7-7 Table 4-C: 2020 Process Water Deduction Eligibility **(For use only by agencies that are deducting process water) Choose Only One**	
☐	**Criteria 1**- Industrial water use is equal to or greater than 12% of gross water use. Complete SB X7-7 Table 4-C.1
☐	**Criteria 2** - Industrial water use is equal to or greater than 15 GPCD. Complete SB X7-7 Table 4-C.2
☐	**Criteria 3** - Non-industrial use is equal to or less than 120 GPCD. Complete SB X7-7 Table 4-C.3
☐	**Criteria 4** - Disadvantaged Community. Complete SB x7-7 Table 4-C.4
NOTES:	

Data from this table will not be entered into WUEdata.
Instead, the entire table will be uploaded to WUEdata as a separate upload in Excel format.

SB X7-7 Table 4-C.1: 2020 Process Water Deduction Eligibility *(For use only by agencies that are deducting process water using Criteria 1)*

Criteria 1

Industrial water use is equal to or greater than 12% of gross water use

2020 Compliance Year	2020 Gross Water Use Without Process Water Deduction	2020 Industrial Water Use	Percent Industrial Water	**Eligible for Exclusion Y/N**
	4,015		0%	NO

NOTES:

Data from this table will not be entered into WUEdata.
Instead, the entire table will be uploaded to WUEdata as a separate upload in Excel format.

SB X7-7 Table 4-C.2: 2020 Process Water Deduction Eligibility

(For use only by agencies that are deducting process water using Criteria 2)

Criteria 2

Industrial water use is equal to or greater than 15 GPCD

2020 Compliance Year	2020 Industrial Water Use	2020 Population	2020 Industrial GPCD	**Eligible for Exclusion Y/N**
		65,118	-	NO

NOTES:

Data from this table will not be entered into WUEdata.
Instead, the entire table will be uploaded to WUEdata as a separate upload in Excel format.

SB X7-7 Table 4-C.3: 2020 Process Water Deduction Eligibility

(For use only by agencies that are deducting process water using Criteria 3)

Criteria 3

Non-industrial use is equal to or less than 120 GPCD

2020 Compliance Year	2020 Gross Water Use Without Process Water Deduction *Fm SB X7-7 Table 4*	2020 Industrial Water Use	2020 Non-industrial Water Use	2020 Population *Fm SB X7-7 Table 3*	Non-Industrial GPCD	**Eligible for Exclusion Y/N**
	4,015		4,015	65,118	169	NO

NOTES:

Data from this table will not be entered into WUEdata.
Instead, the entire table will be uploaded to WUEdata as a separate upload in Excel format.

SB X7-7 Table 4-C.4: 2020 Process Water Deduction Eligibility *(For use only by agencies that are deducting process water using Criteria 4)*

Criteria 4

Disadvantaged Community. A “Disadvantaged Community” (DAC) is a community with a median household income less than 80 percent of the statewide average.

SELECT ONE

"Disadvantaged Community" status was determined using one of the methods listed below:

1. IRWM DAC Mapping tool https://gis.water.ca.gov/app/dacs/

☐ If using the IRWM DAC Mapping Tool, include a screen shot from the tool showing that the service area is considered a DAC.

2. 2020 Median Income

	California Median Household Income*		Service Area Median Household Income	Percentage of Statewide Average	**Eligible for Exclusion? Y/N**
☐	**2020**	**$75,235**	$108,994	145%	NO

*California median household income 2015 -2019 as reported in US Census Bureau QuickFacts.

NOTES
City of Brentwood median household income 2015-2019 as reported in US Census Bureau QuickFacts.

Data from these tables will not be entered into WUEdata. Instead, the entire tables will be uploaded to WUEdata as a separate upload in Excel format.

This table(s) is only for Suppliers that deduct process water from their 2020 gross water use.

SB X7-7 Table 4-D: 2020 Process Water Deduction - Volume

Complete a separate table for each industrial customer with a process water exclusion

Name of Industrial Customer	*Enter Name of Industrial Customer 1*

Compliance Year 2020	Industrial Customer's Total Water Use *	Total Volume Provided by Supplier*	% of Water Provided by Supplier	Customer's Total Process Water Use*	Volume of Process Water Eligible for Exclusion for this Customer
					-

* **Units of measure (AF, MG , or CCF)** must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.

NOTES:

SB X7-7 Table 4-D: 2020 Process Water Deduction - Volume

Complete a separate table for each industrial customer with a process water exclusion

Name of Industrial Customer	*Enter Name of Industrial Customer 2*

Compliance Year 2020	Industrial Customer's Total Water Use *	Total Volume Provided by Supplier*	% of Water Provided by Supplier	Customer's Total Process Water Use*	Volume of Process Water Eligible for Exclusion for this Customer
					-

* **Units of measure (AF, MG , or CCF)** must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.

NOTES:

SB X7-7 Table 5: 2020 Gallons Per Capita Per Day (GPCD)

2020 Gross Water *Fm SB X7-7 Table 4*	2020 Population *Fm SB X7-7 Table 3*	2020 GPCD
4,015	65,118	**169**

NOTES:

SB X7-7 Table 9: 2020 Compliance

Actual 2020 GPCD[1]	Optional Adjustments to 2020 GPCD					2020 Confirmed Target GPCD [1, 2]	**Did Supplier Achieve Targeted Reduction for 2020?**
	Enter "0" if Adjustment Not Used			TOTAL Adjustments[1]	Adjusted 2020 GPCD [1] *(Adjusted if applicable)*		
	Extraordinary Events[1]	Weather Normalization[1]	Economic Adjustment[1]				
169	-	-	-	-	169	193	**YES**

[1] *All values are reported in GPCD*

[2] ***2020 Confirmed Target GPCD*** *is taken from the Supplier's SB X7-7 Verification Form Table SB X7-7, 7-F.*

NOTES:

WUEdata Entry Exceptions

The data from the tables below will not be entered into WUEdata tables (the tabs for these tables' worksheets are colored **purple**). These tables will be submitted as separate uploads, in Excel, to WUEdata.

Process Water Deduction

SB X7-7 tables 4-C, 4-C.1, 4-C.2, 4-C.3, 4-C.4 and 4-D

A supplier that will use the process water deduction will complete the appropriate tables in Excel, submit them as a separate upload to the WUE data tool, and include them in its UWMP.

Target Method 2

SB X7-7 tables 7-B, 7-C, and 7-D

A supplier that selects Target Method 2 will contact DWR (gwen.huff@water.ca.gov) for SB X7-7 tables 7-B, 7-C, and 7-D.

Target Method 4

These tables are only available online at http://www.dwr.water.ca.gov/wateruseefficiency/sb7/committees/urban/u4/ptm4.cfm A supplier that selects Target Method 4 will save the tables from the website listed above, complete the tables, submit as a separate upload to WUE data, and include them with its UWMP.

SB X7-7 Table 0: Units of Measure Used in UWMP* *(select one from the drop down list)*
Million Gallons
**The unit of measure must be consistent with Table 2-3*
NOTES:

SB X7-7 Table-1: Baseline Period Ranges

Baseline	Parameter	Value	Units
10- to 15-year baseline period	2008 total water deliveries	4,537	Million Gallons
	2008 total volume of delivered recycled water	25	Million Gallons
	2008 recycled water as a percent of total deliveries	0.55%	Percent
	Number of years in baseline period[1]	10	Years
	Year beginning baseline period range	2001	
	Year ending baseline period range[2]	2010	
5-year baseline period	Number of years in baseline period	5	Years
	Year beginning baseline period range	2005	
	Year ending baseline period range[3]	2009	

[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.*

NOTES:

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. Persons-per-Connection Method**
☐	**3. DWR Population Tool**
☐	**4. Other** DWR recommends pre-review
NOTES:	

SB X7-7 Table 3: Service Area Population

Year		Population
10 to 15 Year Baseline Population		
Year 1	2001	26,053
Year 2	2002	29,711
Year 3	2003	33,699
Year 4	2004	37,867
Year 5	2005	41,343
Year 6	2006	44,992
Year 7	2007	47,846
Year 8	2008	49,710
Year 9	2009	50,997
Year 10	2010	51,453
Year 11		
Year 12		
Year 13		
Year 14		
Year 15		
5 Year Baseline Population		
Year 1	2005	41,343
Year 2	2006	44,992
Year 3	2007	47,846
Year 4	2008	49,710
Year 5	2009	50,997
2015 Compliance Year Population		
2015		56,493

NOTES:

SB X7-7 Table 4: Annual Gross Water Use *

			Deductions					
	Baseline Year *Fm SB X7-7 Table 3*	**Volume Into Distribution System** *Fm SB X7-7 Table(s) 4-A*	Exported Water	Change in Dist. System Storage (+/-)	Indirect Recycled Water *Fm SB X7-7 Table 4-B*	Water Delivered for Agricultural Use	Process Water *Fm SB X7-7 Table(s) 4-D*	**Annual Gross Water Use**
10 to 15 Year Baseline - Gross Water Use								
Year 1	2001	2153.5			0		0	2,154
Year 2	2002	2920			0		0	2,920
Year 3	2003	3066			0		0	3,066
Year 4	2004	3403.8			0		0	3,404
Year 5	2005	3723			0		0	3,723
Year 6	2006	3942			0		0	3,942
Year 7	2007	4453			0		0	4,453
Year 8	2008	4501.8			0		0	4,502
Year 9	2009	4161			0		0	4,161
Year 10	2010	3905.5			0		0	3,906
Year 11	0	0			0		0	0
Year 12	0	0			0		0	0
Year 13	0	0			0		0	0
Year 14	0	0			0		0	0
Year 15	0	0			0		0	0
10 - 15 year baseline average gross water use								**2,415**
5 Year Baseline - Gross Water Use								
Year 1	2005	3,723			0		0	3,723
Year 2	2006	3,942			0		0	3,942
Year 3	2007	4,453			0		0	4,453
Year 4	2008	4,502			0		0	4,502
Year 5	2009	4,161			0		0	4,161
5 year baseline average gross water use								**4,156**
2015 Compliance Year - Gross Water Use								
2015		2,906			0		0	2,906

* NOTE that the units of measure must remain consistent throughout the UWMP, as reported in Table 2-3

NOTES:

SB X7-7 Table 4-A: Volume Entering the Distribution System(s)

Complete one table for each source.

Name of Source	Source 1
This water source is:	
☑	The supplier's own water source
☑	A purchased or imported source

Baseline Year *Fm SB X7-7 Table 3*		Volume Entering Distribution System	Meter Error Adjustment * *Optional (+/-)*	Corrected Volume Entering Distribution System
10 to 15 Year Baseline - Water into Distribution System				
Year 1	2001	2153.5		2,154
Year 2	2002	2920		2,920
Year 3	2003	3066		3,066
Year 4	2004	3403.8		3,404
Year 5	2005	3723		3,723
Year 6	2006	3942		3,942
Year 7	2007	4453		4,453
Year 8	2008	4501.8		4,502
Year 9	2009	4161		4,161
Year 10	2010	3905.5		3,906
Year 11	0			0
Year 12	0			0
Year 13	0			0
Year 14	0			0
Year 15	0			0
5 Year Baseline - Water into Distribution System				
Year 1	2005	3723		3,723
Year 2	2006	3942		3,942
Year 3	2007	4453		4,453
Year 4	2008	4501.8		4,502
Year 5	2009	4161		4,161
2015 Compliance Year - Water into Distribution System				
2015		2905.804		2,906

** Meter Error Adjustment - See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES: Gross water use calculated using Water Produced

SB X7-7 Table 5: Gallons Per Capita Per Day (GPCD)

Baseline Year *Fm SB X7-7 Table 3*		Service Area Population *Fm SB X7-7 Table 3*	Annual Gross Water Use *Fm SB X7-7 Table 4*	Daily Per Capita Water Use (GPCD)
10 to 15 Year Baseline GPCD				
Year 1	2001	26,053	2,154	226
Year 2	2002	29,711	2,920	269
Year 3	2003	33,699	3,066	249
Year 4	2004	37,867	3,404	246
Year 5	2005	41,343	3,723	247
Year 6	2006	44,992	3,942	240
Year 7	2007	47,846	4,453	255
Year 8	2008	49,710	4,502	248
Year 9	2009	50,997	4,161	224
Year 10	2010	51,453	3,906	208
Year 11	0	0	0	
Year 12	0	0	0	
Year 13	0	0	0	
Year 14	0	0	0	
Year 15	0	0	0	
10-15 Year Average Baseline GPCD				**241**

5 Year Baseline GPCD

Baseline Year *Fm SB X7-7 Table 3*		Service Area Population *Fm SB X7-7 Table 3*	Gross Water Use *Fm SB X7-7 Table 4*	Daily Per Capita Water Use
Year 1	2005	41,343	3,723	247
Year 2	2006	44,992	3,942	240
Year 3	2007	47,846	4,453	255
Year 4	2008	49,710	4,502	248
Year 5	2009	50,997	4,161	224
5 Year Average Baseline GPCD				**243**
2015 Compliance Year GPCD				
2015		56,493	2,906	141
NOTES:				

SB X7-7 Table 6: Gallons per Capita per Day *Summary From Table SB X7-7 Table 5*	
10-15 Year Baseline GPCD	241
5 Year Baseline GPCD	243
2015 Compliance Year GPCD	141
NOTES:	

SB X7-7 Table 7: 2020 Target Method *Select Only One*		
Target Method		Supporting Documentation
☑	Method 1	SB X7-7 Table 7A
☐	Method 2	SB X7-7 Tables 7B, 7C, and 7D *Contact DWR for these tables*
☐	Method 3	SB X7-7 Table 7-E
☐	Method 4	Method 4 Calculator
NOTES:		

SB X7-7 Table 7-A: Target Method 1

20% Reduction

10-15 Year Baseline GPCD	2020 Target GPCD
241	193

SB X7-7 Table 7-F: Confirm Minimum Reduction for 2020 Target

5 Year Baseline GPCD *From SB X7-7 Table 5*	Maximum 2020 Target*	Calculated 2020 Target *Fm Appropriate Target Table*	Confirmed 2020 Target
243	231	193	193

** Maximum 2020 Target is 95% of the 5 Year Baseline GPCD*

NOTES: Calculated target was tabulated as 80% of the City's Baseline

SB X7-7 Table 8: 2015 Interim Target GPCD

Confirmed 2020 Target *Fm SB X7-7 Table 7-F*	10-15 year Baseline GPCD *Fm SB X7-7 Table 5*	2015 Interim Target GPCD
193	241	217

NOTES:

SB X7-7 Table 9: 2015 Compliance

Actual 2015 GPCD	2015 Interim Target GPCD	Optional Adjustments *(in GPCD)*					2015 GPCD *(Adjusted if applicable)*	Did Supplier Achieve Targeted Reduction for 2015?
		Extraordinary Events	Weather Normalization	Economic Adjustment	TOTAL Adjustments	Adjusted 2015 GPCD		
141	217	*From Methodology 8 (Optional)*	*From Methodology 8 (Optional)*	*From Methodology 8 (Optional)*	0	140.9220054	140.9220054	YES

NOTES:

Appendix G: Emergency Response Plan (Cover and Table of Contents)

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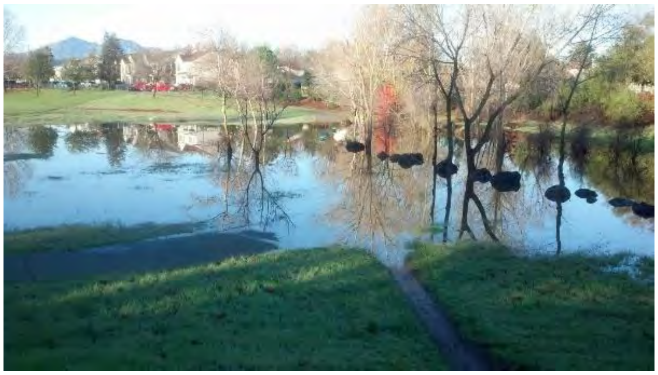
DRAFT REPORT | Prepared for
City of Brentwood, California

America's Water Infrastructure Act Emergency Response Plan

April 28, 2021



FINAL

Emergency Response Plan

Prepared for
City of Brentwood, California
April 28, 2021

Project No. 155802

Brown AND Caldwell
201 North Civic Drive, Suite 300
Walnut Creek, CA 94596
T: 925.937.9010

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Record of Revisions

Revision Log		
Description of change	**Name/ Title**	**Date**

Plan Distribution

Plan Distribution List		
Recipient/Title	Distributed By	Date

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Brown AND Caldwell

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List of Abbreviations

AP	Action Plans
AWIA	America's Water Infrastructure Act
BC	Brown and Caldwell
BSL	biosafety lab
BWO	Boil Water Order
Cal-ARP	California Accidental Release Prevention
CalWARN	California Water/Wastewater Agency Response Network
CAMAL Net	California Mutual Aid Laboratory Network
CCWD	Contra Costa Water District
CDC	Centers for Disease Control and Prevention
CDPH	California Department of Public Health
City	City of Brentwood
CST	California National guard Civilian Support Team
DDW	Division of Drinking Water
DWD	Diablo Water District
DWRLB	Drinking Water and Radiation Laboratory Branch
DWP	Drinking Water Program
ea	each
EPA	Environmental Protection Agency
ERP	Emergency Response Plan
FBI	Federal Bureau of Investigation
ft	feet
gal	gallon
gpm	gallons per minute
ICS	Incident Command System
IS	Information Systems
kW	kilowatt
LEPC	Local Emergency Planning Committee
LRN	Laboratory Response Network
MDL	Microbial Disease Laboratory
MG	million gallons
MGD	million gallons per day
NIMS	National Incident Management System
NRC	National Response Center
OES	Office of Emergency Services
OSHA	Occupational Safety and Health Administration
PG&E	Pacific Gas and Electric Company
PIO	public information officer
PPE	personal protective equipment
qty	quantity
RRA	Risk and Resilience Assessment
SCADA	supervisory control and data acquisition
SCBA	self-contained breathing apparatus
SEMS	Standardized Emergency Management System
SERC	State Emergency Response Commission
SWRCB	State Water Resources Control Board
UWA	Unsafe Water Alert
VA	Vulnerability Assessment
WMD	Weapons of Mass Destruction
WQ	water quality
WTP	water treatment plant

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Appendix H: Contra Costa Hazard Mitigation Plan (Cover and Table of Contents)

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CONTRA COSTA COUNTY HAZARD MITIGATION PLAN

Volume 1—Planning Area-Wide Elements

Draft Final
January 2018

TETRA TECH

Contra Costa County Hazard Mitigation Plan

Volume 1—Planning-Area-Wide Elements

January 2018

PREPARED FOR

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CONTRA COSTA COUNTY HAZARD MITIGATION PLAN

Volume 2—Planning Partner Annexes

Draft Final
January 2018

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Contra Costa County DraftFinal_Vol2_2018-01-31.docx

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Appendix I: City of Brentwood Water and Wastewater Cost of Service Study

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CITY OF BRENTWOOD

Water and Wastewater Cost of Service Study

Final DRAFT Report / June 26, 2018

RAFTELIS

RAFTELIS

April 3, 2018

Ms. Debra Galey
Senior Analyst
City of Brentwood
150 City Park Way
Brentwood, CA 94513

Subject: Water and Wastewater Cost of Service Study Report

Dear Ms. Galey:

Raftelis Financial Consultants, Inc. (Raftelis) is pleased to present this report on the Water and Wastewater Cost of Service Study Report (Study) to the City of Brentwood (City). We are confident that the results, developed based on cost of service analyses, will provide the City's water and wastewater users with fair and equitable rates. This report summarizes the methods, findings, and recommendations of the Study.

The Study involved a comprehensive review of the City's water and wastewater enterprises' financial plans, user classes, and rate structures. Raftelis reviewed the City's revenue requirements to determine appropriate reserve targets and revenue adjustments needed to maintain financial sufficiency and rate stability for the City's water and wastewater enterprises.

Rates were calculated using a cost of service approach that is consistent with current California standards and legislative requirements, including Proposition 218. All assumptions factored into the rate calculations are contained in this report. Various tables describing the calculation of the rates are included as well.

It was a pleasure working with you over the course of the Study, and we appreciate the assistance you and other City staff provided. If you have any questions, please do not hesitate to call us at (626) 583-1894.

Sincerely,

Hannah Phan
Charles Diamond

Sudhir D. Pardiwala, PE
Executive Vice President

Hannah Phan
Manager

Charles Diamond
Associate Consultant

150 N. Santa Anita Ave., Suite 470 Arcadia, CA 91006
626 583 1894 www.raftelis.com

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1. EXECUTIVE SUMMARY

In 2017, the City of Brentwood (City) engaged Raftelis Financial Consultants, Inc. (Raftelis) to conduct a comprehensive Water and Wastewater Cost of Service Study (Study) to determine user charges for the City's water and wastewater services that ensure proportionate recovery of costs from the various user classes. This report documents the resultant findings, analyses, and recommendations.

The major objectives of the Study include the following:

1. Develop Financial Plans for the water and wastewater funds to ensure financial sufficiency, to recover operation and maintenance (O&M) costs, meet debt coverage requirements, fund capital repairs and replacements (R&R), and ensure sufficient funding of City financial reserves.
2. Conduct a Cost of Service analysis for the water and wastewater systems to recover costs proportionate to service received.
3. Develop fair and equitable water and wastewater rates that provide revenue stability for recovering fixed costs, maintain affordable service, and are compliant with the requirements of Proposition 218.

The water cost of service study was prepared using the principles established by the American Water Works Association (AWWA). AWWA *"Principles of Water Rates, Fees, and Charges: Manual of Water Supply Practices M1* (sixth edition) (the "M1 Manual"). The wastewater cost of service study was prepared based on the principles established by the Water Environment Federation (WEF) and described in *Financing and Charges for Wastewater Systems*.

This executive summary provides an overview of the study and includes findings and recommendations for water and wastewater rates.

A fiscal year for the City is from July 1 to June 30 the following year. Therefore, July 1, 2017 through June 30, 2018 is identified as FY 2018; July 1, 2018 through June 30, 2019 is identified as FY 2019 and so on. The City bills are based on a thousand gallons (kgal), therefore one unit of water is a thousand gallons.

System Background

The City was incorporated in 1948 and provides potable water to approximately 19,500 connections serving a population of approximately 62,000. The City supplies potable water from the City's wells, as well as from surface water that is treated at the City of Brentwood Treatment Plant (Brentwood TP). The City contracts with Contra Cost Water District to receive water treated at the Randall Bold Water Treatment Plant (RBWTP) on a take or pay basis. Surface water originates in the Sierra Nevada mountains and is diverted from the Sacramento-San Joaquin Delta. The City's water distribution system includes about 300 miles of water mains. The cost of water supply has increased during the recent drought due to tightening water supplies and environmental and regulatory requirements. Water usage has not rebounded as much as anticipated since the easing of recent drought conditions.

Additionally, non-potable water is available in some areas of the City for irrigation, and is supplied with untreated water pumped from the Sacramento-San Joaquin Delta by the East Contra Costa Irrigation District. The City's Wastewater Treatment Plant (WWTP) also produces recycled water suitable for non-potable reuse. Recycled and untreated water is distributed through the City's non-potable water supply system.

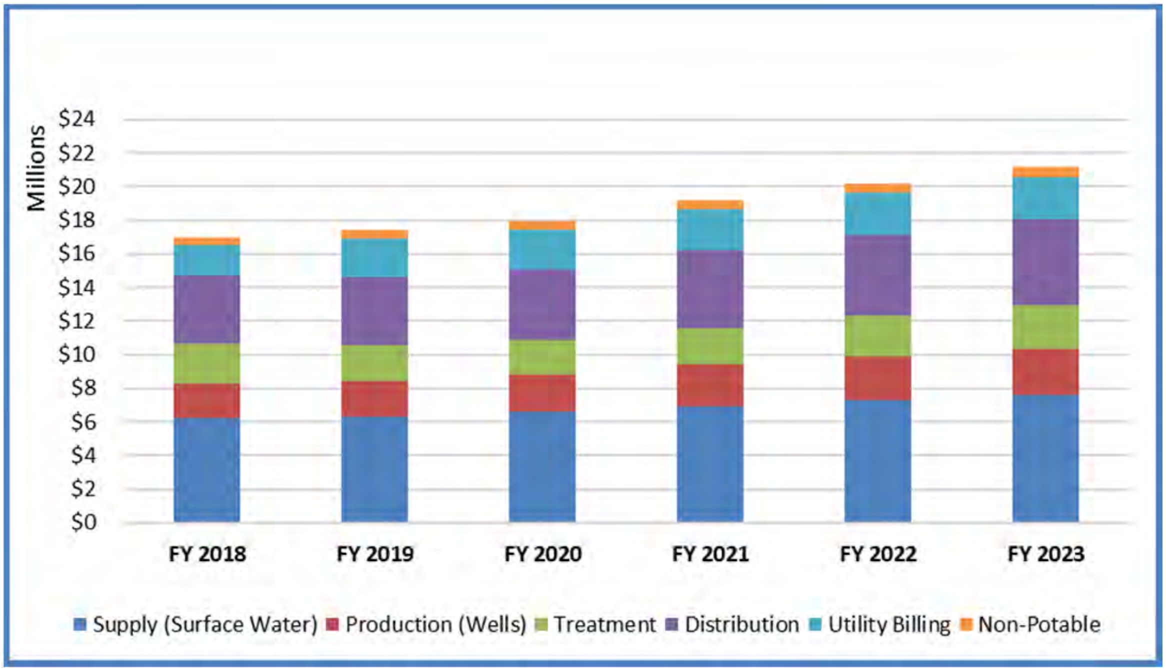
The City wastewater system collects, treats, and disposes of wastewater from over 16,800 connections. Wastewater is treated at the City's WWTP with a current capacity of 5.0 million gallons per day (MGD). The WWTP is an extended aeration/activated sludge facility. Treated effluent, if not recycled, is discharged into Marsh Creek. In addition to the treatment plant, the wastewater system includes approximately 200 miles of wastewater mains and lateral connections.

Water Enterprise Financial Plan

In order to determine the revenue adjustments needed to meet the ongoing expenses of the City's water enterprise and provide fiscal stability, Raftelis projected the revenue requirements, including operations and maintenance (O&M) expenses, capital improvement expenses, debt service costs, reserve requirements, etc., for the study period. O&M expenses include the cost of operating and maintaining water supply, treatment, storage, and distribution facilities, as well as the costs of providing technical services such as engineering services and other administrative costs of the water system such as meter reading and billing. O&M projections are based on the City's projected budgetary increases in FY 2018 and beyond. The City uses inflation factors that are indicative of industry increases for different expenditures within the budget, such as personnel, supplies, or fuel, to capture the impact of various market forces. **Figure 1-1** shows the projected water O&M expenses over the planning period.

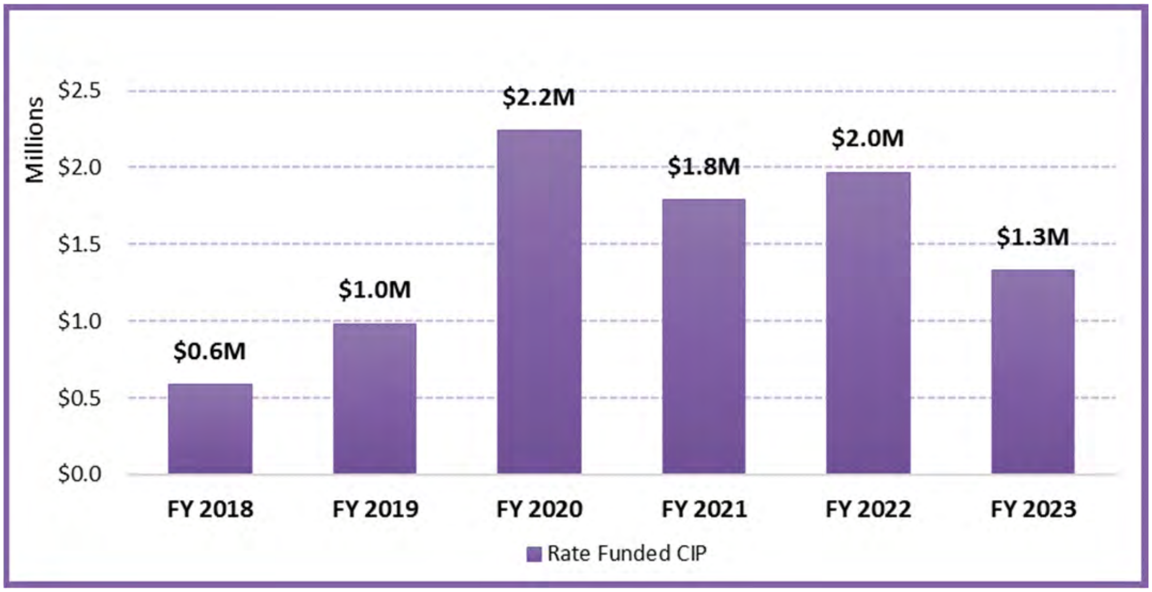
Due to the easing of recent drought conditions, potable water usage is projected to rebound by 10% in FY 2018 and remain constant thereafter (excluding usage growth due to new accounts). The proposed financial plan and water rates are based on this level of water usage.

Figure 1-1: Water Enterprise Projected O&M Expenses



In addition to operating expenses, the City is planning capital expenditures totaling about $8.9 million, to be funded by water rates from FY 2018 through 2023. Existing and anticipated annual debt service payments range from $2.8 million to $4.4 million over the planning period. **Figure 1-2** shows the water CIP that will be funded by rates over the planning period.

Figure 1-2: Water Enterprise Capital Financing Plan



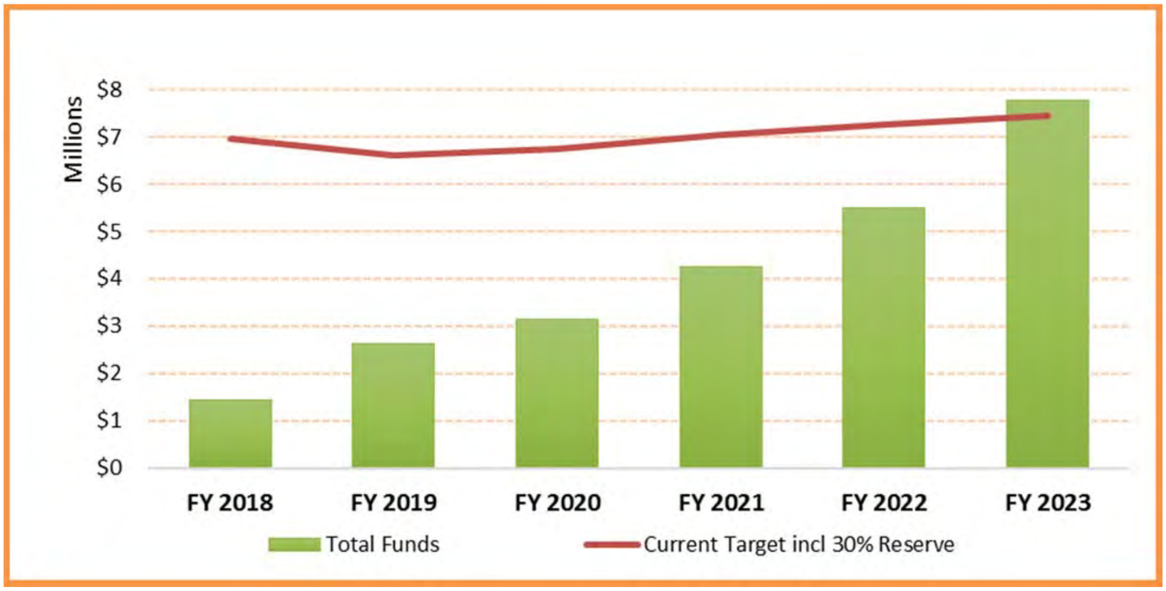
To ensure that the City will have adequate revenues to fund water operating and capital expenses and to maintain sufficient reserves, Raftelis recommends the revenue adjustments in **Table 1-1**.

Table 1-1: Annual Water Revenue Adjustments

Fiscal Year	Effective Date	Revenue Increases
FY 2019	July 2018	5.0%
FY 2020	July 2019	3.5%
FY 2021	July 2020	3.5%
FY 2022	July 2021	3.5%
FY 2023	July 2022	3.5%

Figure 1-3 shows the resulting cash balance for the water utility. The red line represents the total current target, which is equal to 30 percent of annual operating expenses and debt service payments.

Figure 1-3: Water Enterprise Total Cash Balance



Proposed Water Rates

Raftelis recommends that the City retain its current inclining rate structure, as well as current residential and non-residential tier definitions that are based upon the cost and availability of groundwater and surface water supply sources and customer usage characteristics. The current residential tiers are: Tier 1 is set at 0 to 5 thousand gallons (kgal) per month; Tier 2 is set at 6 to 14 kgal per month; Tier 3 is set at 15 to 20 kgal per month; Tier 4 is any usage above 20 kgal per month. Non-residential customers currently have two tiers, with Tier 1 set at 0 to 5 kgal per month, and Tier 2 defined as any usage 5 kgal per month. The rates are revised to be more consistent with the actual cost of service. **Table 1-2** shows the proposed rates for the next five years, effective July 1 of each year.

The City reserves the right to pass through costs that are not within the City's control, such as water purchased costs, electrical costs, chemical costs etc. to the proposed rates when such an action is deemed necessary. The financial plan has built in projected increases in these costs. However, if those costs exceed the projected amount, the additional costs may be recovered through the rates at the actual cost paid by the City.

Table 1-2: Proposed Monthly Water Rates

		Current	July 1, 2018	July 1, 2019	July 1, 2020	July 1, 2021	July 1, 2022
Monthly Base Rate							
Meter Size							
5/8" or 3/4"		$23.56	$24.03	$24.88	$25.76	$26.67	$27.61
1"		$32.52	$34.00	$35.19	$36.43	$37.71	$39.03
1 1/2"		$54.93	$58.90	$60.97	$63.11	$65.32	$67.61
2"		$81.83	$88.79	$91.90	$95.12	$98.45	$101.90
3"		$167.00	$183.44	$189.87	$196.52	$203.40	$210.52
4"		$292.65	$322.91	$292.65	$293.65	$294.65	$295.65
6"		$592.85	$656.65	$679.64	$703.43	$728.06	$753.55
Commodity Rate ($/kgal)							
Residential	Monthly (kgal)						
Tier 1	5	$2.72	$2.84	$2.94	$3.05	$3.16	$3.28
Tier 2	14	$5.41	$5.48	$5.68	$5.88	$6.09	$6.31
Tier 3	20	$6.47	$6.43	$6.66	$6.90	$7.15	$7.41
Tier 4	21+	$7.11	$6.64	$6.88	$7.13	$7.38	$7.64
Non-Residential							
Tier 1	5	$2.52	$2.93	$3.04	$3.15	$3.27	$3.39
Tier 2	6+	$5.02	$5.97	$6.18	$6.40	$6.63	$6.87
Hydrant		$5.02	$8.72	$9.03	$9.35	$9.68	$10.02
Non-Potable		$1.43	$1.43	$1.47	$1.51	$1.56	$1.60

Customer Impacts - Water

Table 1-3 below shows the impacts of the proposed rates on a typical residential customer with a 1-inch meter using an average of 9 kgal of water monthly. Actual impacts will vary per customer dependent upon water usage.

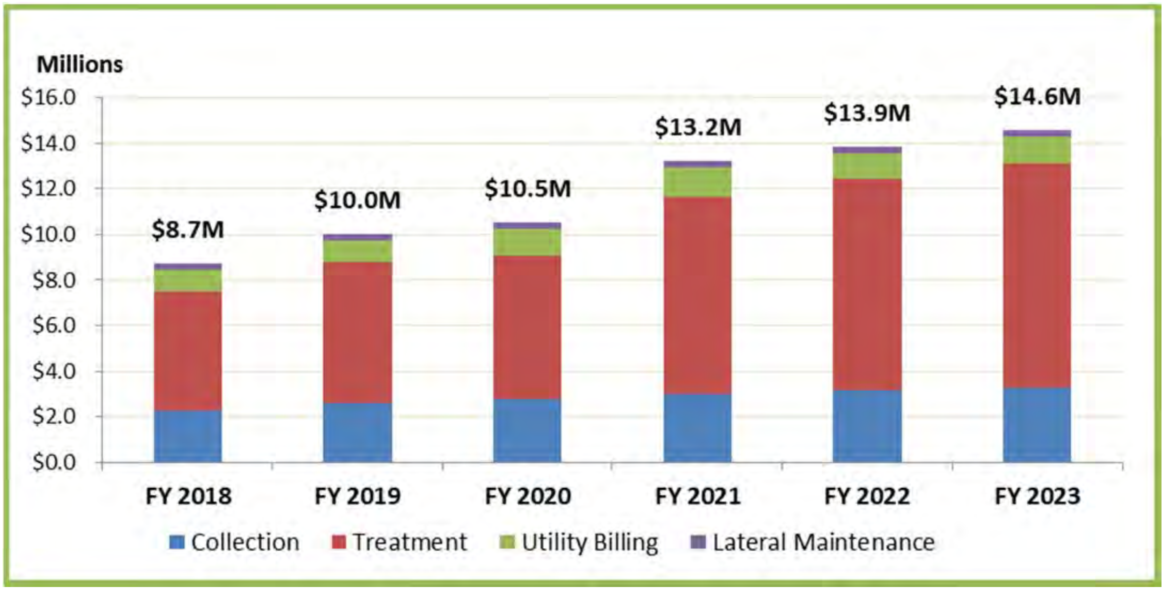
Table 1-3: Residential Water Monthly Rate Impacts

Residential	Usage (kgal)	Current Bill	Proposed Bill	Difference (%)	Difference ($)	% Bills at or below
Average	9	$67.76	$70.12	3.5%	$2.36	67.3%

Wastewater Enterprise Financial Plan

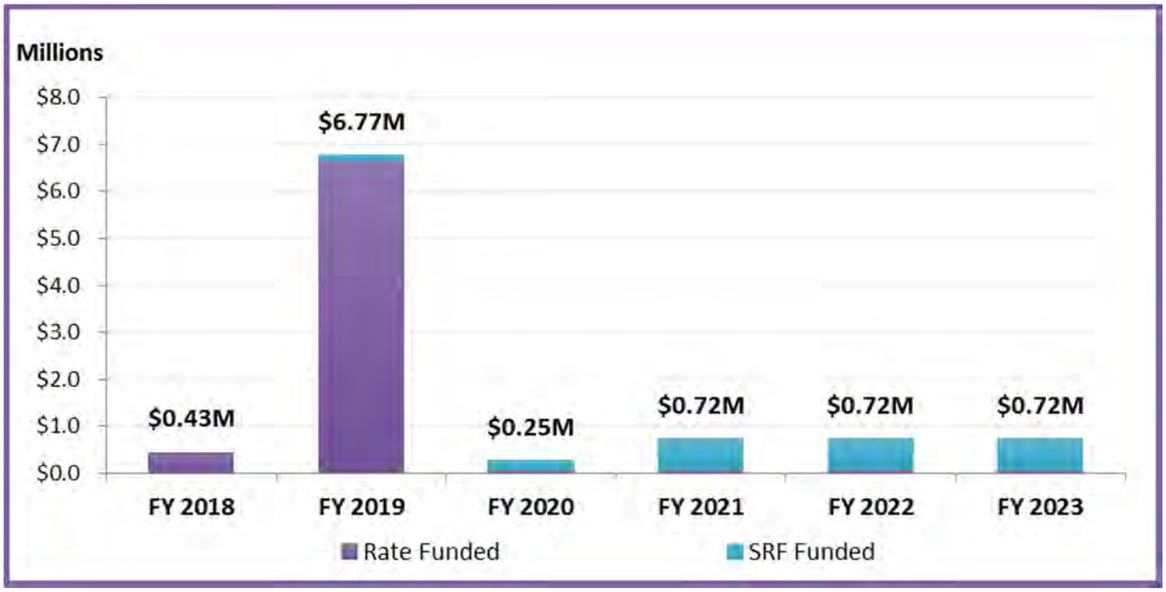
Raftelis projected the revenue requirements, including O&M expenses, capital improvement expenses, debt service costs, and reserve requirements for the wastewater enterprise over the study period. O&M expenses include wastewater collection, wastewater treatment, billing, and lateral maintenance. O&M projections are based on the City's projected budgetary increases in FY 2018 and beyond. The City uses different inflation factors for different expenditures within the budget. **Figure 1-4** shows the projected wastewater enterprise O&M expenses over the planning period.

Figure 1-4: Wastewater Enterprise Projected O&M Expenses



In addition to operating expenses, the City's wastewater enterprise is planning capital expenditures totaling about $9.6 million over the study period. Wastewater rate revenue and State Revolving Fund (SRF) loans will be used to finance planned capital expenditures. Existing and anticipated annual debt service payments range from $0.65 million to $4.39 million over the planning period. **Figure 1-5** shows the wastewater enterprise's CIP that will be funded by rates and SRF loans over the planning period. (Note FY 2019 shows an initial cash payment for Wastewater Treatment Plant Expansion to receive favorable SRF loan financing over time)

Figure 1-5: Wastewater Enterprise Capital Financing Plan



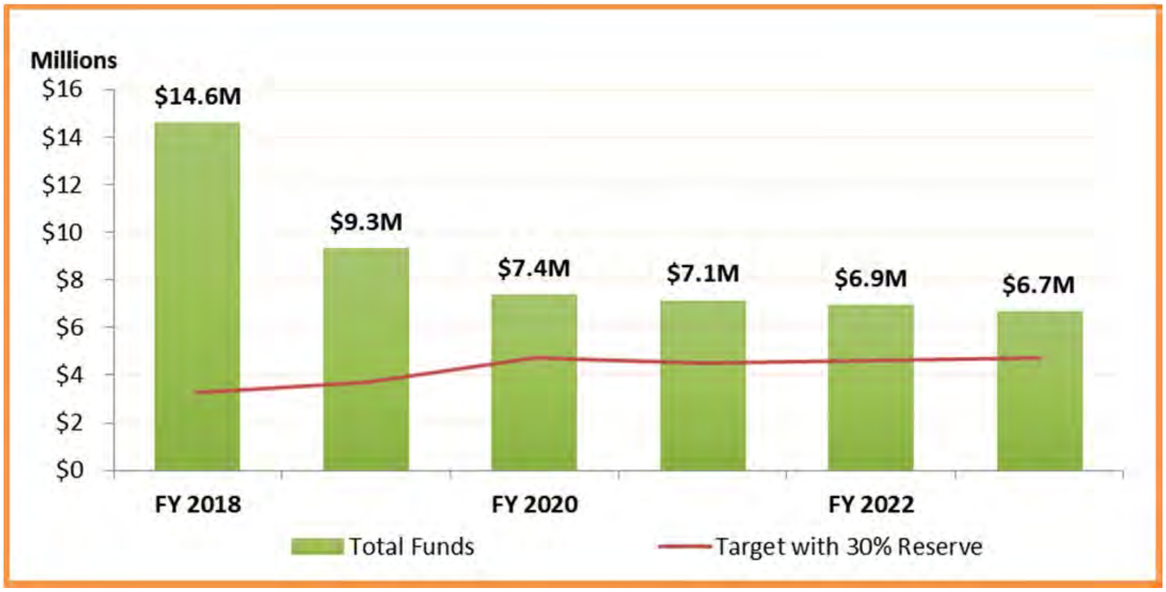
To ensure that the City will have adequate revenues to fund the wastewater enterprise's operating and capital expenses and to maintain sufficient reserves, Raftelis recommends the revenue adjustments shown in **Table 1-4**. The proposed adjustments are necessary to meet debt service coverage requirements of 110 percent for the SRF loans.

Table 1-4: Annual Wastwater Revenue Adjustments

Fiscal Year	Effective Date	Revenue Increases
FY 2019	July 2018	3.0%
FY 2020	July 2019	3.0%
FY 2021	July 2020	3.0%
FY 2022	July 2021	3.0%
FY 2023	July 2022	3.0%

Figure 1-6 shows the resulting cash balance for the wastewater enterprise. The red line represents the total current target, which is equal to 30 percent of the wastewater enterprise's annual operating expenses and debt service payments. It should be noted that while the cash balance is projected to exceed the target, SRF loan debt coverage calculations do not take into account existing cash balance when meeting coverage requirements.

Figure 1-6: Wastewater Enterprise Cash Balance



Proposed Wastewater Rates

Based on input from City staff, Raftelis recommends that the City retains the existing wastewater rate structure, but that existing non-residential customer classes be consolidated into five classes based on combined strength (BOD plus TSS). **Table 1-5** shows the proposed consolidated non-residential customer classes defined by combined strength. Many agencies choose to define customers in broader classes because wastewater strength can vary significantly from day to day and measurement of strength is not very accurate. Classifying customers into broader groups simplifies the rate structure and administration. Examples of low strength customers are retail stores and office buildings since the wastewater generated is mainly from toilets. High strength customers are usually bakeries and restaurants since the wastewater generated from these establishments require more treatment.

Table 1-5: Consolodated Non-Residential Wastewater Customer Classes

Proposed Class	Combined Strength (mg/L)
Low Strength	0-250
Medium Low Strength	251-400
Medium Strength	401-800
Medium High Strengt	801-1400
High Strength	>1,401

Table 1-6 shows the reclassification of existing non-residential wastewater customer classes into the newly proposed consolidated classes. Combined strengths for each existing customer class are based on data from the City of Los Angeles and the County Sanitation Districts of Los Angeles County (LACSD).

Table 1-6: Reclassification of Non-Residential Wastewater Customer Classes

Existing Non-Residential Customer Classes	Combined Strength (mg/L)	Proposed Consolidated Customer Class
Auto Sales and Repair	300	Medium Low Strength
Barber & Beauty Shop	300	Medium Low Strength
Bakery	1,600	High Strength
Car Washes	170	Low Strength
Gas Stations	300	Medium Low Strength
Grocery Stores	1,600	High Strength
Hotels without Restaurants	430	Medium Strength
Institutions, Churches, HOAs	375	Medium Low Strength
Laundromats	260	Medium Low Strength
Laundry, Commercial	1,350	Medium High Strength
Office Buildings, Banks	300	Medium Low Strength
Restaurants	1,600	High Strength
Retail Stores	300	Medium Low Strength
Schools	230	Low Strength
Other Commercial	375	Medium Low Strength
Mixed Use	425	Medium Strength

Table 1-7 shows proposed wastewater rates for FY 2019 through FY 2023. Revenue adjustments of 3% occur on July 1 of each fiscal year throughout the planning period. The City reserves the right to pass through costs that are not within the City's control, such as electrical costs, chemical costs etc. to the proposed rates when such an action is deemed necessary. The financial plan has built in projected increases in these costs. However, if those costs exceed the projected amount, the additional costs may be recovered through the rates at the actual cost paid by the City.

Table 1-7: Proposed Monthly Wastewater Rates

	July 1, 2018	July 1, 2019	July 1, 2020	July 1, 2021	July 1, 2022
Monthly Base Charge (per dwelling unit)	$15.01	$15.47	$15.94	$16.42	$16.92
Monthly Lateral Maintenance Fee (per account)	$2.94	$3.03	$3.13	$3.23	$3.33
Residential Variable Charge per unit ($/kgal)*	$6.00	$6.18	$6.37	$6.57	$6.77
Residential Monthly Maximum Charge	$59.95	$61.76	$63.66	$65.64	$67.64
Non-Residential Variable Charge ($/kgal of actual water use)					
Low Strength	$4.71	$4.86	$5.01	$5.17	$5.33
Medium Low Strength	$5.36	$5.53	$5.70	$5.88	$6.06
Medium Strength	$5.90	$6.08	$6.27	$6.46	$6.66
Medium High Strength	$12.10	$12.47	$12.85	$13.24	$13.64
High Strength	$13.38	$13.79	$14.21	$14.64	$15.08

*Residential users' variable charge is based on water usage during two lowest-use winter months.

Customer Impacts - Wastewater

Table 1-8 shows the monthly bill impact for residential customers with varying levels of usage. Note that residential customers are currently billed based on water use during the two lowest-production winter months.

Table 1-8: Residential Wastewater Monthly Rate Impacts

	Monthly Usage (kgal)	Current Monthly Bill	Proposed Monthly Bill	Difference ($)	Difference %	% of Bills At or Below
Average	4	$40.18	$41.95	$1.77	4.4%	44%

Table 1-9 shows the monthly impacts of the proposed rates on a typical customer in each non-residential customer class.

Table 1-9: Non-Residential Wastewater Monthly Rate Impacts

Existing Class	New Class	Average Monthly Usage (kgal)	Current Monthly Bill	Proposed Monthly Bill	Difference ($)	Difference (%)	% of Non-Residential Accounts
Auto Sales and Repair	Medium Low Strength	7.2	$61.08	$56.43	($4.66)	-7.6%	4.1%
Barber & Beauty Shop	Medium Low Strength	3.9	$37.62	$39.00	$1.38	3.7%	2.3%
Bakery	High Strength	11.2	$189.91	$167.36	($22.55)	-11.9%	0.4%
Car Washes	Low Strength	111.5	$594.22	$542.96	($51.26)	-8.6%	1.0%
Gas Stations	Medium Low Strength	79.4	$480.13	$443.61	($36.52)	-7.6%	3.1%
Grocery Stores	High Strength	96.6	$1,284.25	$1,310.34	$26.09	2.0%	2.2%
Hotels without Restaurants	Medium Strength	111.5	$686.94	$676.92	($10.03)	-1.5%	0.6%
Institutions, Churches, HOAs	Medium Low Strength	23.2	$140.90	$142.30	$1.40	1.0%	10.1%
Laundromats	Medium Low Strength	197.7	$1,097.43	$1,077.67	($19.76)	-1.8%	0.4%
Laundry, Commercial	Medium High Strength	13.3	$111.62	$178.41	$66.79	59.8%	0.2%
Office Buildings, Banks	Medium Low Strength	17.2	$110.10	$109.93	($0.16)	-0.1%	23.4%
Restaurants	High Strength	45.9	$685.00	$631.79	($53.21)	-7.8%	15.9%
Retail Stores	Medium Low Strength	17.2	$111.93	$110.21	($1.71)	-1.5%	18.5%
Schools	Low Strength	71.2	$374.63	$353.28	($21.35)	-5.7%	6.2%
Other Commercial	Medium Low Strength	18.0	$118.73	$114.59	($4.14)	-3.5%	11.4%
Mixed Use	Medium Strength	80.8	$609.64	$495.68	($113.97)	-18.7%	0.2%

Drought Surcharge

Although the State mandated drought restrictions on water usage are no longer in effect, the City is selling less water now than it sold before the recent drought. It is expected that the sales may increase slightly under normal conditions as time passes. However, in case of another drought and further sales reductions, the City would lose revenue and fail to cover its expenses. Raftelis has developed drought rates to supplement reduced revenue due to drought. Since the level of conservation demanded will vary with water conditions and state mandates, Raftelis developed a drought surcharge of $0.06 per each unit of water used, to be assessed per each percent of required water usage reduction.

2. OVERVIEW

INTRODUCTION

In 2017, the City engaged Raftelis Financial Consultants, Inc. (Raftelis) to conduct a comprehensive Water and Wastewater Cost of Service Study (Study) that could be utilized to evaluate and optimize user charges for the City's water and wastewater services, while ensuring a proportionate recovery of costs from the various user classes. This report documents the resultant findings, analyses, and recommendations.

The major objectives of the study include the following:

1. Develop Financial Plans for the water and wastewater enterprises to ensure financial sufficiency, meet operation and maintenance (O&M) costs, ensure sufficient funding of City financial reserves, meet debt coverage requirements, and fund capital repairs and replacements (R&R).
2. Conduct a Cost of Service analysis for the water and wastewater systems.
3. Develop fair and equitable water and wastewater rates that adequately recover costs, provide revenue stability for recovering fixed costs, and maintain affordable service, while compliant with the requirements of Proposition 218.

LEGAL REQUIREMENTS AND RATE-SETTING METHODOLODY

The water cost of service study was prepared using the principles established by the American Water Works Association (AWWA). AWWA *"Principles of Water Rates, Fees, and Charges: Manual of Water Supply Practices M1* (sixth edition) (the "M1 Manual"). The wastewater cost of service study was prepared based on the principles established by the Water Environment Federation and described in *Financing and Charges for Wastewater Systems*. The general principles of rate structure design and the objectives of the Study are described below.

According to the M1 Manual, the first step in the ratemaking process is to determine the adequate and appropriate level of funding for a given utility. This is referred to as determining the "revenue requirement." This analysis considers the short-term and long-term service objectives of the utility over a given planning horizon, including capital facilities, system operations and maintenance, and financial reserve policies, to determine the adequacy of a utility's existing rates to recover its costs. A number of factors may affect these projections, including the number of customers served, water-use trends, extraordinary gains or expenses, weather, conservation, use restrictions, inflation, interest rates, capital finance needs, changes in tax laws, and other changes in operating and economic conditions.

After determining a utility's revenue requirements, the next step is determining the cost of service. Utilizing a public agency's approved budget, financial reports, operating data, and capital improvement plans, a cost of service study generally categorizes the operating system costs by function (e.g., treatment, storage, pumping, distribution/collection, etc.). Asset costs are similarly functionalized to determine the cost of service.

After the assets and the costs of operating those assets are properly categorized by function, these "functionalized costs" are allocated first to cost causation components, and then to the various customer classes (e.g., single-family residential, multi-family residential, and commercial) by determining the characteristics of those classes and the contribution of each to incurred costs such as base costs, peaking costs, delivery costs, service characteristics, and demand patterns for water and flow and strength for wastewater.

Rate design is the final part of the rate-making procedure and uses the revenue requirement and cost of service analysis to determine appropriate rates for each customer class. Rates utilize "rate components" that build-up to rates for commodity charges, and rates for fixed charges, for the various customer classes and meter sizes servicing customers. In the case of inclining tier water rates, the rate components define the cost of service *within* each class of customer, effectively treating each tier as a sub-class and determining the cost to serve each tier.

California Constitution - Article XIII D, Section 6 (Proposition 218)

Proposition 218, reflected in the California Constitution as Article XIII D, was enacted in 1996 to ensure that rates and fees are reasonable and proportional to the cost of providing service. The principal requirements, as they relate to public water service are as follows:

1. A property-related charge (such as water rates) imposed by a public agency on a parcel shall not exceed the costs required to provide the property related service.
2. Revenues derived by the charge shall not be used for any purpose other than that for which the charge was imposed.
3. The amount of the charge imposed upon any parcel shall not exceed the proportional cost of service attributable to the parcel.
4. No charge may be imposed for a service unless that service is actually used or immediately available to the owner of property.
5. A written notice of the proposed charge shall be mailed to the record owner of each parcel at least 45 days prior to the public hearing, when the agency considers all written protests against the charge.

As stated in AWWA's *M1 Manual*, "water rates and charges should be recovered from classes of customers in proportion to the cost of serving those customers." Raftelis follows industry standard rate setting methodologies set forth by the AWWA *M1 Manual* to ensure this Study meets Proposition 218 requirements and creates rates that do not exceed the proportionate cost of providing water services on a parcel basis. The methodology in the M1 Manual is a nationally recognized industry ratemaking standard which courts have recognized is consistent with Proposition 218.

California Constitution Article X, section 2 mandates that water resources be put to beneficial use and that the waste or unreasonable use of water be prevented through conservation. Section 106 of the Water Code declares that the highest priority use of water is for domestic purposes, with irrigation secondary. Thus, management of water resources is part of the property-related service provided by public water suppliers to ensure the resource is available over time. The City established inclining tiered (also known as inclining block) water rates to incentivize customers to conserve water. The inclining tier rates (as well as rates for uniform rate classes) need to be based on the proportionate costs incurred to provide water to customers to achieve compliance with Proposition 218.

Tiered Rates – "Inclining" tier rate structures (which are synonymous with "increasing" tier rate structures and "tiered" rates) when properly designed and differentiated by customer class, allow a water utility to send conservation price signals to customers. Due to heightened interest in water conservation and efficiency of water use, inclining tier water rates have gained widespread use, especially in relatively water-scarce regions like Southern California. Tiered rates meet the requirements of Proposition 218 as long as the tiered rates reasonably reflect the proportionate cost of providing service in each tier.

3. WATER RATES

This section describes the long-range financial plan for the water utility, findings and results of the water rate study, and a detailed discussion of the proposed water rates, the customer impacts resulting from the proposed rates, and proposed drought surcharge. It also includes a description of the water system, the determination of annual revenues required from rates, and a detailed discussion of the Cost of Service, which includes allocation of costs to water cost causation parameters and the determination of unit costs.

WATER SYSTEM BACKGROUND

The City provides potable water to approximately 19,500 connections serving a population of approximately 62,000. In calendar year 2017 the City supplied approximately 0.67 billion gallons of water from the City's wells, as well as an additional 2.5 billion gallons of water from the City of Brentwood Treatment Plant (Brentwood TP) and the Randall Bold Water Treatment Plant (RBWTP). The City has a take or pay contract with Contra Costa Water District to receive water from the RBWTP. Potable water delivered to customers is a blend of City well water and treated surface water. Surface water originates in the Sierra Nevada mountains and is diverted from the Sacramento-San Joaquin Delta. The City's water distribution system includes about 300 miles of water mains. Based on the City's records, the cost of supplying water has increased during the recent drought due to reduced water usage and environmental and regulatory requirements. To meet water quality requirements it has been necessary for the City to reduce its supply from ground water wells and increase supply through the Brentwood TP, which is a more extensive and costly process. Potable water usage has not rebounded as much as anticipated since the easing of recent drought conditions, which further adds pressure on the revenue generated from rates.

Additionally, non-potable water is available in some areas of the City for irrigation. The City's non-potable supply is untreated water pumped from the Sacramento-San Joaquin Delta by the East Contra Costa Irrigation District, as well as recycled water produced at the City's Wastewater Treatment Plant (WWTP).

WATER ACCOUNT AND USAGE ASSUMPTIONS

Table 3-1 shows the estimated number of water accounts by meter size for FY 2018 through 2023. Raftelis estimated the number of accounts by tabulating FY 2017 (actual) account data provided by the City and escalating the number of accounts based on account growth rates shown in **Table 3-2**. Account growth rates are based on the City's General Plan population growth rates and are typically driven by new residential and nonresidential development. The number of accounts (meters) are used to forecast the amount of fixed revenue the City will receive from the meter service charge.

Table 3-1: Projected Water Accounts by Meter Size

	Actual FY 2017	*Projected* FY 2018	*Projected* FY 2019	*Projected* FY 2020	*Projected* FY 2021	*Projected* FY 2022	*Projected* FY 2023
5/8" or 3/4"	7,964	8,080	8,190	8,310	8,509	8,671	8,818
1"	10,702	10,858	11,006	11,166	11,434	11,651	11,848
1 1/2"	216	219	222	225	230	234	238
2"	392	398	403	409	418	426	433
3"	36	37	37	37	38	39	39
4"	33	33	34	34	35	36	36
6"	10	10	10	10	11	11	11
TOTAL METERS	**19,353**	**19,636**	**19,903**	**20,192**	**20,676**	**21,067**	**21,424**

Table 3-2: Water Account Growth

Fiscal Year	Account Growth
FY 2018	1.5%
FY 2019	1.4%
FY 2020	1.5%
FY 2021	2.4%
FY 2022	1.9%
FY 2023	1.7%

Table 3-3 shows actual water use in FY 2017 and projected water use for FY 2018 through FY 2023 by customer class. The revenue calculated in each fiscal year in the Water Enterprise Financial Plan is a function of the number of meters, meter size, account growth, water use, and existing rates. The rate study is designed to determine water rates for the next five years based on usage assumptions for FY 2018 through FY 2023. Due to the easing of recent drought conditions, and the analysis of water production volume and consumption habits, potable water usage is projected to rebound by 10 percent in FY 2018 and remain constant thereafter (excluding usage growth due to new accounts).

Table 3-3: Projected Water Use by Customer Class

Water Use (KGAL)	Tier Limit (KGAL)	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Residential								
Tier 1	5	1,004,587	1,121,179	1,136,427	1,153,019	1,180,691	1,203,124	1,223,578
Tier 2	14	690,073	770,163	780,637	792,034	811,043	826,453	840,502
Tier 3	20	146,232	163,203	165,423	167,838	171,866	175,132	178,109
Tier 4	21+	134,451	150,055	152,096	154,317	158,020	161,023	163,760
Subtotal Residential		**1,975,342**	**2,204,600**	**2,234,583**	**2,267,208**	**2,321,621**	**2,365,731**	**2,405,949**
Non-Residential								
Tier 1	5	40,173	44,835	45,445	46,109	47,215	48,112	48,930
Tier 2	6+	512,441	571,915	579,693	588,157	602,272	613,715	624,149
Subtotal Non-Residential		**552,614**	**616,750**	**625,138**	**634,265**	**649,488**	**661,828**	**673,079**
Hydrant		4,715	5,187	5,187	5,187	5,187	5,187	5,187
Non-Potable		314,679	351,010	355,606	358,130	362,339	365,752	368,864
TOTAL USAGE		**2,847,350**	**3,177,547**	**3,220,513**	**3,264,789**	**3,338,634**	**3,398,498**	**3,453,078**

INFLATIONARY AND OTHER ASSUMPTIONS

This subsection describes the assumptions used in projecting operating and capital expenses as well as reserve coverage requirements that determine the overall revenue adjustments required to ensure the financial stability of the City's water enterprise. Revenue adjustments represent the average increase in rates for the City as a whole. Note that rate changes for individual classes will depend upon the cost of service and actual volume of water used.

To ensure that future costs are reasonably projected, it is necessary to make informed assumptions about inflationary factors and water costs and use. Non-rate revenue and O&M projections are based on the City's FY 2018 projections and projected budgetary increases in FY 2019 through FY 2023. The City uses inflation factors that are indicative of industry increases for different expenditures within the budget, such as personnel, supplies or fuel, to capture the impact of market forces over time.

WATER ENTERPRISE FINANCIAL PLAN

The assumptions discussed above were incorporated into the Water Enterprise Financial Plan. To develop the Water Enterprise Financial Plan, Raftelis projected annual expenses and revenues and modeled reserve balances, capital expenditures and calculated debt service coverage ratios to estimate the amount of additional rate revenue needed per year. This section of the report provides a discussion of O&M expenses, the Capital Improvement Plan (CIP), reserve funding, projected revenue under existing rates, and the revenue adjustments needed to ensure the fiscal sustainability and solvency of the City.

Revenue Requirement

A utility's yearly revenue requirement is the amount of yearly revenue needed to operate, maintain, and ensure fiscal solvency. The revenue requirement includes O&M expenses, rate funded capital expenditures, debt service payments and reserve requirements (funding for reserves). Basis of the expenses are the City's Fiscal Model, Operating Budget and 5-year Capital Improvement Program.

O&M Expenses

The water enterprise's projected O&M expenses are shown in **Table 3-4**. The Water Enterprise Financial Plan study period is from FY 2018 to 2023. O&M expenses include the cost of purchased surface water, operating and maintaining groundwater wells, treatment, distribution facilities, meter reading and billing, and providing non-potable water service. **Table 3-4** summarizes the projected O&M expenses in two different ways: by function and by type of expenditures.

Table 3-4: Projected Water Enterprise O&M Expenses

	Projected FY 2018	Projected FY 2019	Projected FY 2020	Projected FY 2021	Projected FY 2022	Projected FY 2023
Supply (Surface Water)	$6,232,651	$6,341,080	$6,611,543	$6,959,131	$7,290,806	$7,626,263
Production (Wells)	$2,060,245	$2,123,786	$2,203,683	$2,447,163	$2,580,858	$2,758,922
Treatment	$2,351,787	$2,123,278	$2,039,913	$2,192,296	$2,419,107	$2,532,309
Distribution	$4,012,701	$4,055,770	$4,234,815	$4,615,718	$4,831,177	$5,090,240
Utility Billing	$1,840,695	$2,290,323	$2,314,437	$2,409,355	$2,488,302	$2,568,320
Non-Potable	$479,571	$506,739	$525,905	$547,119	$567,604	$588,263
TOTAL O&M EXPENSES	**$16,977,650**	**$17,440,975**	**$17,930,296**	**$19,170,782**	**$20,177,854**	**$21,164,316**

	Projected FY 2018	Projected FY 2019	Projected FY 2020	Projected FY 2021	Projected FY 2022	Projected FY 2023
Personnel Services	$4,285,576	$4,635,608	$4,866,107	$5,227,581	$5,440,594	$5,650,286
Supplies and Services	$8,699,539	$8,340,240	$8,515,876	$8,975,052	$9,357,942	$9,715,674
Other Supplies and Services	$2,382,092	$2,564,280	$2,810,383	$3,167,001	$3,524,091	$3,887,763
Internal Service	$849,303	$884,670	$949,994	$989,377	$1,020,324	$1,052,359
Capital Outlay	$281,568	$509,437	$262,031	$264,652	$267,298	$269,971
Non-Potable	$479,571	$506,739	$525,905	$547,119	$567,604	$588,263
TOTAL O&M EXPENSES	**$16,977,650**	**$17,440,975**	**$17,930,296**	**$19,170,782**	**$20,177,854**	**$21,164,316**

Capital Improvement Plan

Table 3-5 shows the City's CIP for FY 2018 through FY 2023, which totals approximately $8.9 million. The projects will be funded through rates.

Table 3-5: Detailed Water Enterprise Capital Improvement Plan – Inflated

	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Fund #560 - Water						
Reservoir Painting and Coating	$282,979	$422,820	$422,820	$422,820	$422,820	$0
WTP Water Master Plan (shared funding with DFP)	$0	$56,000	$8,400	$28,000	$150,080	$155,680
Water Storage Capacity at Los Vaqueros	$100,000	$200,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000
Municipal Service Center	$201,988	$205,159	$194,688	$186,292	$178,022	$173,654
O'Hara Ave/Lone Tree Way water upgrade	$0	$0	$295,000	$0	$0	$0
Security Improvements	$0	$0	$0	$153,000	$219,000	$0
Underground Water System Corrosion	$0	$100,000	$0	$0	$0	$0
Zone 2 Reduced Pressure Value	$0	$0	$319,000	$0	$0	$0
Total Water CIP	**$584,967**	**$983,979**	**$2,239,908**	**$1,790,112**	**$1,969,922**	**$1,329,334**

Debt Service

The City is not planning to issue any additional debt during this planning period. **Table 3-6** shows the existing debt service payments for the Brentwood Water Treatment Plant through FY 2023. Annual debt service payments for the planning period range from $2.8 million to $4.4 million.

Table 3-6: Water Enterprise Debt Service Payments

Fund 560 Only	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Water Revenue Bonds Series 2008						
Principal	$1,090,750	$0	$0	$0	$0	$0
Interest	$47,025	$0	$0	$0	$0	$0
Total Debt Service	**$1,137,775**	**$0**	**$0**	**$0**	**$0**	**$0**
Water Revenue Refunding Bonds Series 2014						
Principal	$1,306,346	$997,096	$1,077,096	$1,162,096	$1,247,096	$1,337,096
Interest	$1,941,735	$1,842,810	$1,762,310	$1,677,810	$1,589,060	$1,496,060
Total Debt Service	**$3,248,081**	**$2,839,906**	**$2,839,406**	**$2,839,906**	**$2,836,156**	**$2,833,156**
TOTAL EXISTING DEBT SERVICE	**$4,385,856**	**$2,839,906**	**$2,839,406**	**$2,839,906**	**$2,836,156**	**$2,833,156**

Proposed Financial Plan and Revenue Adjustments

The proposed revenue adjustments help ensure adequate revenue to fund operating expenses, capital expenditures and compliance with bond covenants. The Financial Plan model assumes the revenue adjustments occurs on July 1 of each year. The proposed revenue adjustments would enable the City to execute the CIP shown in **Table 3-5** and comply with its debt service coverage requirements over the study period.

Table 3-7 shows the proposed revenue adjustments for FY 2019[1] through FY 2023. These increases are needed to finance the operating and capital expenses and reserves funding.

Table 3-7: Proposed Water Revenue Adjustments

Fiscal Year	Effective Date	Revenue Increases
FY 2019	July 2018	5.0%
FY 2020	July 2019	3.5%
FY 2021	July 2020	3.5%
FY 2022	July 2021	3.5%
FY 2023	July 2022	3.5%

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[1] *Note that the revenue adjustment for FY 2019 occurs on July 1, 2018.*

Table 3-8 shows the cash flow detail over the next five years.

Table 3-8: Proposed Water Enterprise Cash Flow

Potable Water			FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Revenue at Current Rates			$19,676,926	$19,944,067	$20,233,953	$20,717,433	$21,109,375	$21,466,723
Additional Revenue:								
Fiscal Year	**Revenue Adjustments**	**Month Effective**						
2018	0.0%	July	$0	$0	$0	$0	$0	$0
2019	5.0%	July		$997,203	$1,011,698	$1,035,872	$1,055,469	$1,073,336
2020	3.5%	July			$743,598	$761,366	$775,770	$788,902
2021	3.5%	July				$788,013	$802,921	$816,514
2022	3.5%	July					$831,024	$845,092
2023	3.5%	July						$874,670
Additional Rate Revenue			$0	$997,203	$1,755,295	$2,585,251	$3,465,183	$4,398,513
Total Rate Revenue			$19,676,926	$20,941,271	$21,989,248	$23,302,684	$24,574,558	$25,865,236
Current Services			$253,358	$264,076	$275,519	$289,991	$303,832	$317,758
Other Revenue			$270,501	$270,501	$270,501	$270,501	$270,501	$270,501
Standby Charges			$70,509	$69,804	$69,106	$68,415	$67,731	$67,053
Operating Transfers			$53,155	$350,000	$350,000	$350,000	$350,000	$350,000
Interest Income			$7,946	$40,319	$57,208	$73,338	$96,587	$131,341
TOTAL REVENUE			**$20,332,395**	**$21,935,972**	**$23,011,581**	**$24,354,928**	**$25,663,208**	**$27,001,890**
O&M Expenses								
Supply (Surface Water)			$6,232,651	$6,341,080	$6,611,543	$6,959,131	$7,290,806	$7,626,263
Production (Wells)			$2,060,245	$2,123,786	$2,203,683	$2,447,163	$2,580,858	$2,758,922
Treatment			$2,351,787	$2,123,278	$2,039,913	$2,192,296	$2,419,107	$2,532,309
Distribution			$4,012,701	$4,055,770	$4,234,815	$4,615,718	$4,831,177	$5,090,240
Utility Billing			$1,840,695	$2,290,323	$2,314,437	$2,409,355	$2,488,302	$2,568,320
Existing Debt Service			$4,385,856	$2,839,906	$2,839,406	$2,839,906	$2,836,156	$2,833,156
Proposed Debt Service			$0	$0	$0	$0	$0	$0
Rate Funded Capital Projects*			$584,967	$983,979	$2,239,908	$1,790,112	$1,969,922	$1,329,334
Reserve Funding			$0	$0	$0	$0	$0	$0
TOTAL EXPENSES			**$21,468,902**	**$20,758,121**	**$22,483,705**	**$23,253,681**	**$24,416,328**	**$24,738,543**
Net Cash Flow			**($1,136,506)**	**$1,177,850**	**$527,877**	**$1,101,247**	**$1,246,881**	**$2,263,346**

**Non-potable water is responsible for a portion of the capital costs. Potable capital costs, in addition to non-potable capital costs, represent the total Capital Improvement Plan.*

Table 3-9 shows the calculated debt coverage calculations for primary and secondary debt coverage requirements. The City's debt service payments are shared proportionately between the water enterprise fund and the development impact fee fund when the funded capital project or facility provides service to both existing rate payers and new development. To calculate the City's primary debt coverage ratios, the total revenue, including the development impact fee revenue, is included, as well as the total debt service payments. The City's primary debt coverage requirement is 125 percent for the water utility. To calculate the City's secondary debt coverage ratios, total debt service payments are included, but development impact facilities fees revenue is excluded from total revenue. The City's secondary debt coverage requirement is 100 percent for the water utility. The City meets and exceeds its primary and secondary debt coverage requirements throughout the study period.

Table 3-9: Water Enterprise Debt Coverage Calculation

Debt Coverage Calculation	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Projected Development Impact Fees Revenue	$1,373,770	$1,464,122	$2,338,413	$1,510,757	$2,213,877	$1,168,657
Projected Non-Potable Revenue	$479,571	$506,739	$525,905	$547,119	$567,604	$588,263
Projected Water Revenue	$20,332,395	$21,935,972	$23,011,581	$24,354,928	$25,663,208	$27,001,890
Non-Potable O&M Expenses	$479,571	$506,739	$525,905	$547,119	$567,604	$588,263
Water O&M Expenses, less depreciation	$15,687,895	$15,989,022	$16,261,646	$17,174,329	$17,855,356	$18,510,564
Total Debt Service (for coverage calculation)	$5,060,050	$3,514,100	$3,513,600	$3,514,100	$3,510,350	$3,507,350
Primary Requirement						
Calculated Debt Coverage	119%	211%	259%	247%	285%	275%
Required Debt Coverage	125%	125%	125%	125%	125%	125%
Secondary Requirement						
Calculated Debt Coverage	92%	169%	192%	204%	222%	242%
Required Debt Coverage	100%	100%	100%	100%	100%	100%

Figure 3-1 through **Figure** 3-4 display the Financial Plan in graphical format. **Figure 3-1** shows the modeled revenue adjustments (blue bars) for the next five years on the left-hand axis. The calculated and required primary debt coverage requirements are shown by the green and red lines respectively on the right-hand axis. The solid lines pertain to the primary debt coverage requirement, the dashed lines to the secondary requirement.

Figure 3-1: Proposed Water Enterprise Revenue Adjustments and Debt Coverage Ratio

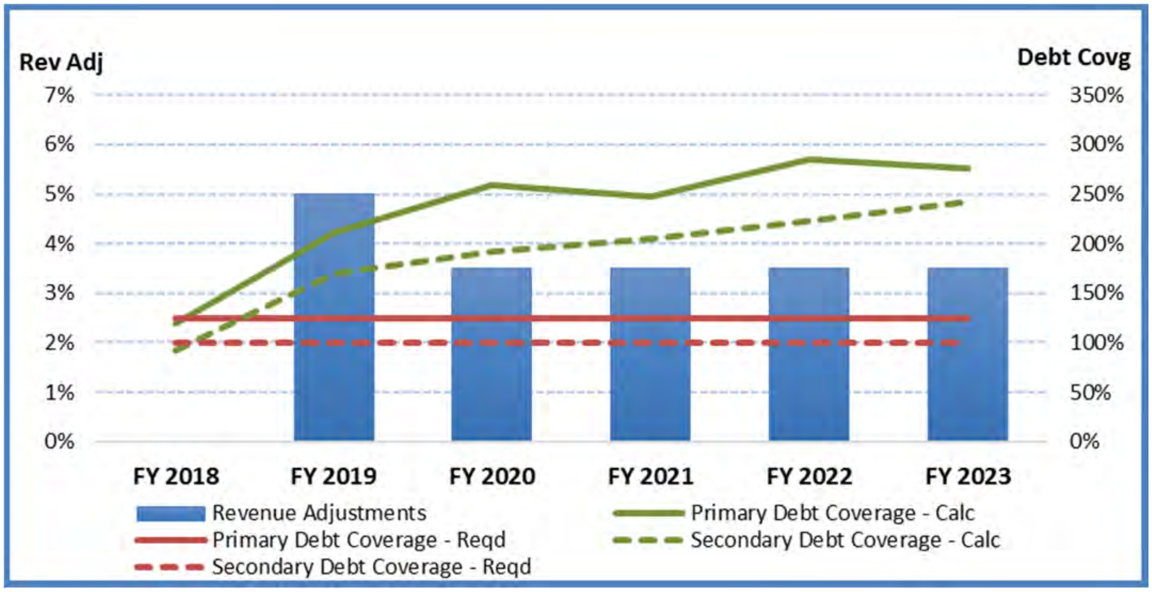

Figure 3-2 graphically illustrates the Water Enterprise Financial Plan – it compares existing and proposed revenues with projected expenses. The expenses include water supply, O&M, debt service, capital costs, and reserves transfers shown by the stacked bars. Total revenues at existing and proposed rates are shown by the horizontal orange and blue lines respectively. Current revenue from existing rates, in orange, does not meet future total expenses, and clearly demonstrates the need for revenue adjustments.

Figure 3-2: Proposed Potable Water Financial Plan

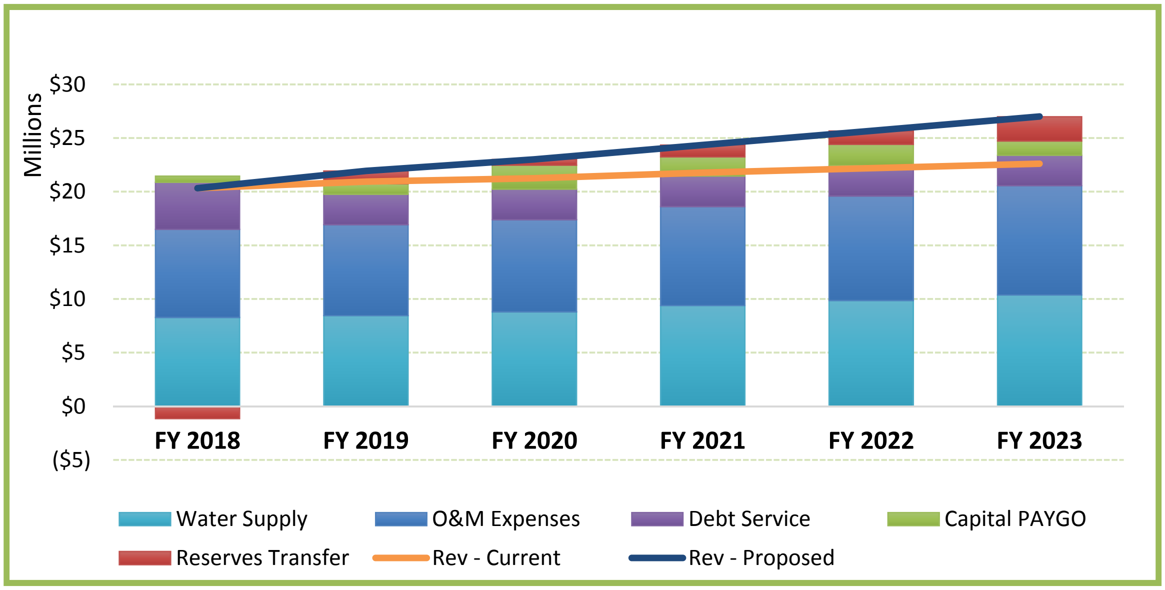

Figure 3-3 summarizes the projected CIP to be funded by water rates, from the City of Brentwood Capital Improvement Program 2018/19-2022/23 document adopted May 22, 2018.

Figure 3-3: Projected Water Enterprise Capital Projects

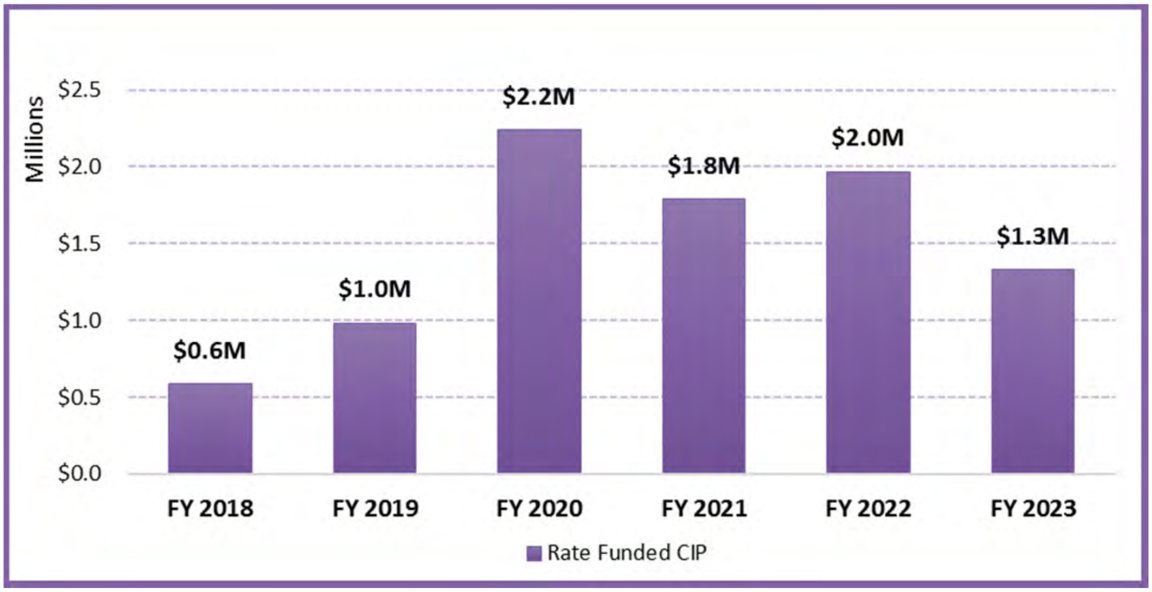

Figure 3-4 displays the resulting fund balance for the water utility. The red line represents the total current target, which is equal to 30 percent of annual operating expenses and debt service payments, based on Budget and Fiscal Policy 2.7.3, adopted April 25, 2017.

Figure 3-4: Water Enterprise Total Cash Balance

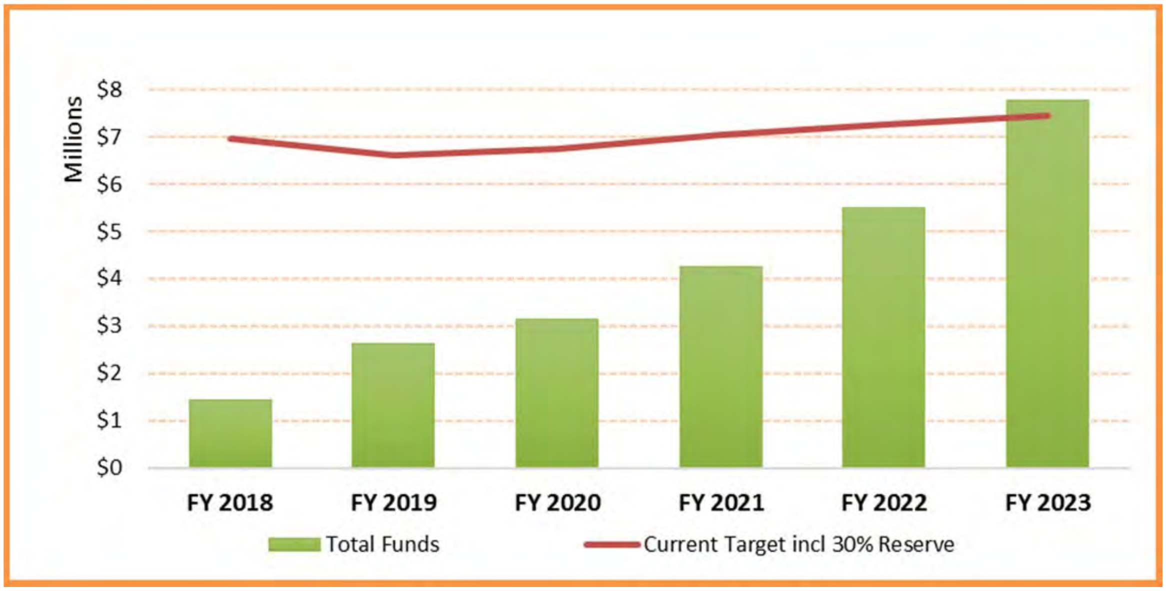

Table 3-10 shows the projected cash balance for the water enterprise. This table corresponds with **Figure 3-4**.

Table 3-10: Projected Water Enterprise Cash Balance

Water Fund	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Beginning Balance	$2,583,715	$1,447,209	$2,625,059	$3,152,935	$4,254,183	$5,501,063
Net Cash Flow	($1,136,506)	$1,177,850	$527,877	$1,101,247	$1,246,881	$2,263,346
Ending Balance	**$1,447,209**	**$2,625,059**	**$3,152,935**	**$4,254,183**	**$5,501,063**	**$7,764,410**
Interest Income	*$20,115*	*$40,319*	*$57,208*	*$73,338*	*$96,587*	*$131,341*

WATER COST OF SERVICE ANALYSIS

A cost of service analysis distributes a utility's revenue requirements (costs) to each customer class in proportion to the service received. After determining a utility's revenue requirements, the next step in a cost of service analysis is to functionalize its O&M costs as follows:

1. Supply – represents the cost of purchasing surface water and production from groundwater wells
2. Treatment – represents the cost of treating the water
3. Storage – represents the cost of the reservoirs
4. Distribution – represents the operating and maintenance cost of the water distribution system
5. Utility Billing – represents the costs associated with meter reading, billing and customer service
6. Non-Potable – represents the cost of operating and maintaining the non-potable water system

The functionalization of costs allows us to better allocate the functionalized costs to the **cost causation components**. The cost causation components include:

1. Supply – costs that are associated with providing water supply to all customers
2. Base Delivery costs – costs that are associated with providing service under average conditions
3. Peaking costs (maximum day and maximum hour) – costs that are associated with meeting the peak demand in excess of the average rate of use
4. Fire flow capacity – costs that are associated with providing capacity within the water system to supply water flow to fire sprinkler systems. Fire sprinkler systems are required for all new residential and nonresidential structures per California Building Standards Codes.
5. Meter service – costs that are associated with maintenance and capital costs of meters and services
6. Billing and customer service – costs that are incurred to provide meter reading, billing and customer service
7. General and administrative costs – costs that cannot be specifically allocated to one of the other cost causation components

Peaking costs are further divided into maximum day and maximum hour demand. The maximum day demand is the maximum amount of water used in a single day in a year. The maximum hour demand is the maximum usage in an hour on the maximum usage day. Different facilities, such as distribution and storage facilities (and the O&M costs associated with those facilities), are designed to meet the peaking demands of customers. Therefore, extra capacity[2] costs include the O&M and capital costs associated with meeting peak customer demand. This method is consistent with the AWWA M1 Manual, and is widely used in the water industry to perform cost of service analyses.

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[2] *The terms extra capacity, peaking and capacity costs are used interchangeably.*

Allocation of Functionalized Expenses to Cost Components

After functionalizing expenses, the next step is to allocate the functionalized expenses to cost causation components. To do so we must identify system wide peaking factors which were provided by the City and are shown in **Table 3-11**. The system-wide peaking factors, based on the City Water Master Plan, are used to derive the cost component allocation bases (i.e., percentages) shown in **Table 3-11**. Functionalized expenses are then allocated to the cost components using these allocation bases. To understand the interpretation of the percentages, we must first establish the base use as the average daily demand during the year.

To determine the relative proportion of costs to assign to Base Delivery, Max Day and Max Hour, allocations are calculated based on these factors. Cost components that are related to the provision of average day demand (ADD), such as source of supply, are allocated 100 percent to Base Delivery. Cost components that are designed to meet Max Day peaks, such as reservoirs and transmission facilities, are allocated to Base Delivery and Max Day factors. Since facilities such as reservoirs and distribution systems are also designed to provide capacity for fire supply, an allocation is also provided for fire flow, which is subtracted from the Base Delivery and Max Day components. The Max Day allocation is as follows:

Base Delivery: 43% = (1.00/2.10) x 100 – 5% (half the fire allocation)
Max Day: 47% = (2.10-1.00)/2.10 x 100 – 5% (half the fire allocation)
Fire Supply: 10%

Cost components such as those related to the distribution system that are designed for Max Hour peaks are allocated similarly. The allocation of Max Hour facilities is shown below:

Base Delivery: 22% = (1.00/4.00) x 100 – 3.33% (1/3 fire allocation)
Max Day: 24% = (2.10-1.00)/4.00 x 100 – 3.33% (1/3 fire allocation)
Max Hour: 44% = (4.00-2.10)/4.00 x 100 – 3.33% (1/3 fire allocation)
Fire Supply: 10%

Collectively the maximum day and hour cost components are known as peaking costs. These allocation bases are used to assign the functionalized costs to the cost causation components.

Table 3-11: System-Wide Peaking Factors and Allocation to Cost Causation Components

	Factor	Base Delivery	Max Day	Max Hour	Fire
Base	1.00	100%	0%	0%	0%
Max Day	2.10	43%	47%	0%	10%
Max Hour	4.00	22%	24%	44%	10%

Source: City of Brentwood Water Master Plan

In the absence of daily and hourly peaking factors, we use monthly peaks for the different customer classes. For the analysis to spread the costs among the different classes equitably it is important to get the relative ratios of the peaks, which is provided by the monthly peaks. **Table 3-12** shows the derivation of the peaking factors by customer class and tier by dividing the total maximum monthly usage by the average monthly usage for each customer class and tier based on monthly water usage records provided by the City. These peaking factors are used to allocate the peaking costs to each customer class and tier in the rate derivation section.

Table 3-12: Peaking Factors by Customer Class

Customer Class	Proposed Tiers (kgal)	Max Monthly (kgal)	Average Monthly (kgal)	Peaking Factor
Residential		255,152	164,612	1.55
Tier 1	5	92,990	83,737	1.11
Tier 2	14	101,724	57,484	1.77
Tier 3	20	29,681	12,186	2.44
Tier 4	21+	30,757	11,204	2.75
Non-Residential		83,806	46,051	1.82
Tier 1	5	4,123	3,330	1.24
Tier 2	6+	79,683	42,721	1.87
Hydrant		2,331	393	5.93

To allocate meter-related costs appropriately, the concept of equivalent meters needs to be understood. By using equivalent meters instead of a straight meter count, the analysis accounts for the fact that larger meters impose larger demands and are more expensive to install, maintain, and replace than smaller meters and commit a greater capacity in the system. Equivalent meters are used in calculating meter service costs.

Equivalent meters are based on meter hydraulic capacity. Equivalent meters represent the potential demand on the water system in terms of the base or smallest meter size. A ratio of hydraulic capacity is calculated by dividing large meter capacities by the base meter capacity. The base meter is the smallest meter, in our case, a 3/4-inch meter. The actual number of meters by size is multiplied by the corresponding capacity ratio to calculate equivalent meters. The capacity ratio is calculated using the meter capacity in gallons per minute (gpm) provided in the AWWA M22 Manual. **Table 3-13** shows the equivalent meters for FY 2019.

Table 3-13: Equivalent Meters

Meter Size	Capacity (gpm)	AWWA Ratio	Number of Meters	Equivalent Meters
5/8" or 3/4"	30	1.00	8,190	8,190
1"	50	1.67	11,006	18,343
1 1/2"	100	3.33	222	740
2"	160	5.33	403	2,150
3"	350	11.67	37	432
4"	630	21.00	34	713
6"	1,300	43.33	10	446
TOTAL			**19,903**	**31,014**

Table 3-14 allocates the O&M and capital expenses to each cost component. The functional costs are allocated according to industry standards based on the nature of the water function. For example: water supply and production costs are allocated 100 percent to the Supply component. Treatment costs are allocated on the basis of Max Day because plants are designed to meet Max Day demand. Distribution costs are allocated on the basis of Max Hour and fire supply because distribution systems are designed to meet instantaneous peaks (Max hour) and fire flow requirements. Utility billing costs are allocated 100 percent to the Customer component. Some costs which cannot be readily classified into one of the functions are allocated to General and then spread amongst all the other cost causation components proportionate to the overall cost allocation.

Table 3-14 shows the total resulting cost causation component allocation for O&M expenses. This resulting allocation is used to allocate the City's operating revenue requirement to the cost causation components.

Table 3-14 also shows the total allocation for the City's assets. The resulting total asset allocation is derived in a similar manner as the O&M allocation - first, Raftelis functionalized the City's assets and then allocated them to the cost causation components based upon asset function and utilization resulting in the asset total allocation shown at the bottom of **Table 3-14**.

Table 3-14: Allocation of Functionalized O&M and Capital Expenses to Cost Causation Components – Water

O&M Allocation	Supply	Base Delivery	Max Day	Max Hour	Fire	Pumping	Meter	Customer	General	TOTAL
Supply (Surface Water)	100%									100%
Production (Wells)	100%									100%
Treatment		48%	52%							100%
Distribution		22%	24%	44%	10%					100%
Utility Billing								100%		100%

O&M Allocation	Supply	Base Delivery	Max Day	Max Hour	Fire	Pumping	Meter	Customer	General	TOTAL
Supply (Surface Water)	$6,341,080	$0	$0	$0	$0	$0	$0	$0	$0	$6,341,080
Production (Wells)	$2,123,786	$0	$0	$0	$0	$0	$0	$0	$0	$2,123,786
Treatment	$0	$1,011,085	$1,112,193	$0	$0	$0	$0	$0	$0	$2,123,278
Distribution	$0	$878,750	$980,144	$1,791,298	$405,577	$0	$0	$0	$0	$4,055,770
Utility Billing	$0	$0	$0	$0	$0	$0	$0	$2,290,323	$0	$2,290,323
TOTAL O&M EXPENSES	**$8,464,866**	**$1,889,835**	**$2,092,338**	**$1,791,298**	**$405,577**	**$0**	**$0**	**$2,290,323**	**$0**	**$16,934,236**
TOTAL O&M Allocation, %	50%	11%	12%	11%	2%	0%	0%	14%	0%	100%

Capital Allocation	Supply	Base Delivery	Max Day	Max Hour	Fire	Pumping	Meter	Customer	General	TOTAL
Land									100%	100%
Well		100%								100%
Reservoir		43%	47%	0%	10%					100%
Distribution		22%	24%	44%	10%					100%
Transmission		43%	47%	0%	10%					100%
Buildings									100%	100%
Machinery & Equipment							100%			100%
Vehicles									100%	100%
Pumps		48%	52%							100%
Treatment Plant		48%	52%							100%

Capital Allocation	Supply	Base Delivery	Max Day	Max Hour	Fire	Pumping	Meter	Customer	General	TOTAL
Land	$0	$0	$0	$0	$0	$0	$0	$0	$62,556	$62,556
Well	$0	$5,513,697	$0	$0	$0	$0	$0	$0	$0	$5,513,697
Reservoir	$0	$5,034,309	$5,596,802	$0	$1,181,235	$0	$0	$0	$0	$11,812,346
Distribution	$0	$13,114,915	$14,628,174	$26,734,250	$6,053,038	$0	$0	$0	$0	$60,530,377
Transmission	$0	$3,505,242	$3,896,889	$0	$822,459	$0	$0	$0	$0	$8,224,591
Buildings	$0	$0	$0	$0	$0	$0	$0	$0	$765,954	$765,954
Machinery & Equipment	$0	$0	$0	$0	$0	$0	$1,363,907	$0	$0	$1,363,907
Vehicles	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Pumps	$0	$1,319,204	$1,451,124	$0	$0	$0	$0	$0	$0	$2,770,328
Treatment Plant	$0	$30,151,414	$33,166,555	$0	$0	$0	$0	$0	$0	$63,317,969
TOTAL ASSETS	**$0**	**$58,638,782**	**$58,739,545**	**$26,734,250**	**$8,056,731**	**$0**	**$1,363,907**	**$0**	**$828,510**	**$154,361,725**
Total Asset Allocation, %	0%	38%	38%	17%	5%	0%	1%	0%	1%	100%

Revenue Requirement Determination

Table 3-15 shows the revenue requirement derivation with the total revenue required from rates. The totals shown in the "Operating" and "Capital" columns are the total O&M and capital revenue requirements, respectively, that are allocated to the cost causation components using the allocation percentages shown in **Table 3-14**.

Raftelis calculated the revenue requirement using FY 2019 expenses, which include O&M expenses, rate funded capital expenses and existing and proposed debt service. To arrive at the rate revenue requirement, we subtract revenue offsets from other expenses and adjust for annual cash balances (transfers to or from reserves). The adjustments are added to arrive at the total revenue requirement from rates. This is the amount that fixed charge and commodity rates are designed to collect.

Table 3-15: Water Revenue Requirement Determination

FY 2019	Operating	Capital	Total
Revenue Requirements			
O&M Expenses	$16,934,236		$16,934,236
Existing Debt Service		$2,839,906	$2,839,906
Proposed Debt Service		$0	$0
Rate Funded Capital Projects		$983,979	$983,979
Reserve Funding		$0	$0
Total Revenue Requirements	**$16,934,236**	**$3,823,885**	**$20,758,121**
Less: Revenue Offsets			
Current Services	$264,076		$264,076
Other Revenue	$270,501		$270,501
Standby Charges		$69,804	$69,804
Operating Transfers	$350,000		$350,000
Interest Income	$40,319		$40,319
Total Revenue Offsets	**$924,897**	**$69,804**	**$994,701**
Adjustments			
Transfer to (from) Reserves		$1,177,850	$1,177,850
Adjustment for Midyear Increase	$0		$0
Total Adjustments	**$0**	**$1,177,850**	**$1,177,850**
Revenue Requirement from Rates	**$16,009,339**	**$4,931,931**	**$20,941,271**

Unit Cost Component Derivation

Our end goal is to proportionately distribute the cost causation components to each user class. To do so we must calculate the cost causation component unit costs, which starts by assessing the total service units demanded by each class for each cost causation component. This is shown in **Table 3-16**. The capacity or peaking factor for each customer class is taken from **Table 3-12**. The total equivalent meters are from **Table 3-13**.

Table 3-16: Derivation of Service Units - Water

				Maximum Day Requirements			Maximum Hour Requirements				
	Monthly Tiers (kgal)	Annual Use (kgal)	Average Daily Use (kgal/day)	Capacity Factor	Total Capacity (kgal/day)	Extra Capacity (kgal/day)	Capacity Factor	Total Capacity (kgal/day)	Extra Capacity (kgal/day)	No. of Meters (Equiv.)	No. of Bills (No.)
Residential											
Tier 1	5	1,136,427	3,113	1.11	3,456	342	2.11	6,583	3,127		
Tier 2	14	780,637	2,139	1.77	3,786	1,647	3.37	7,211	3,425		
Tier 3	20	165,423	453	2.44	1,106	653	4.65	2,106	1,001		
Tier 4	21+	152,096	417	2.75	1,146	729	5.24	2,183	1,037		
Non-Residential											
Tier 1	5	45,445	125	1.24	154	30	2.36	294	140		
Tier 2	6+	579,693	1,588	1.87	2,970	1,382	3.56	5,657	2,687		
Hydrant		5,187	14	5.93	84	70	11.30	161	76		
TOTAL		**2,864,907**				**4,853**			**11,492**	**31,014**	**238,831**

Table 3-17 shows the cost causation component unit cost derivation. The operating revenue requirement shown in **Table 3-15** is allocated to the cost causation components using the total O&M allocation from **Table 3-14**. Similarly, the capital revenue requirement in **Table 3-15** is allocated to the cost causation components using the total asset allocation from **Table 3-14**. General and Administrative costs, which cannot be tied to a specific function, are redistributed in proportion to the resulting allocation of the other cost causation components, except Supply. The Fire cost component represents capacity available in the water system to supply water flow to fire sprinkler systems that are required in all new residential and nonresidential structures per California Building Code, not actual fire protection services, and are reallocated to the meter component since all customers share in this capacity cost. To provide revenue stability a portion of the extra capacity costs are allocated to the meter component in order to collect approximately 36 percent of the rate revenue from fixed charges. This also covers the City's fixed costs that are not dependent upon water volume. The total adjusted cost of service is divided by the units of service to calculate the unit cost. For example, the unit cost for the base component is determined by dividing the total base cost by total water use in kgal, annual billing and customer service costs are divided by the estimated number of annual monthly bills. The unit costs are used to distribute the cost causation components to the customer classes. **Table 3-16** through **Table 3-18** are reproduced in **APPENDIX A**: WATER COST OF SERVICE TABLES in a larger font format.

Table 3-17: Unit Cost Calculation - Water

	Supply	Base Delivery	Max Day	Max Hour	Fire	Pumping	Meter	Customer	General	TOTAL
Operating Expenses	$8,002,540	$1,786,618	$1,978,060	$1,693,463	$383,426	$0	$0	$2,165,232	$0	$16,009,339
Capital Expenses	$0	$1,873,537	$1,876,757	$854,172	$257,416	$0	$43,577	$0	$26,471	$4,931,931
Total Cost of Service	**$8,002,540**	**$3,660,155**	**$3,854,817**	**$2,547,635**	**$640,842**	**$0**	**$43,577**	**$2,165,232**	**$26,471**	**$20,941,271**
Allocation of General Cost		$7,504	$7,903	$5,223	$1,314	$0	$89	$4,439	($26,471)	$0
Fire Flow/Supply Capacity					($642,156)		$642,156			$0
Allocation of Peaking Cost to Meter			($2,935,667)	($1,940,172)			$4,875,839			$0
Total Adjusted Cost of Servic	**$8,002,540**	**$3,667,659**	**$927,053**	**$612,686**	**$0**	**$0**	**$5,561,662**	**$2,169,671**	**$0**	**$20,941,271**
Unit of Service	2,864,907	2,864,907	4,853	11,492			31,014	238,831		
Unit	kgal	kgal	kgal/day	kgal/day			equiv meters	bills		
Unit Cost	$2.79	$1.28	$191.03	$53.31			$14.94	$9.08		

Distribution of Cost Causation Components to Customer Classes

The final step in a cost of service analysis is to distribute the cost causation components to the user classes using the unit costs derived in **Table 3-17** to arrive at the cost to serve each customer class. The classes are categorized based upon similar land use and water usage habits. **Table 3-18** shows the derivation of the cost to serve (i.e., cost of service for) each class. The Supply, Base Delivery, Max Day, and Max Hour cost components are collected through the commodity (volumetric) rates ($/kgal) for potable water. The Meter and Customer cost components are collected through the City's monthly meter service charge, thereby providing fixed revenue. The proposed fixed revenue from rates is retained at approximately 36 percent, to match the current fixed revenue and provide budget stability.

To derive the variable cost to serve each class, the unit costs from Table 3-17 are multiplied by the corresponding service units shown in **Table 3-16** for each customer class. For example, the supply cost for the residential class is calculated by multiplying the supply unit cost ($2.79 per kgal) by the annual residential use in each tier (**Table 3-16**). Similar calculations for each of the remaining user classes and tiers and cost components yield the total variable cost to serve each user class shown in **Table 3-18**. Costs charged to meters including meter and customer costs are applied to customers based on their meter size. Note that the total cost of service is equal to the revenue requirement in **Table 3-15** as intended. We have now calculated the cost to serve each user class and can proceed to design rates to collect the cost to serve each class.

Table 3-18: Allocation of Variable Cost to Customer Class - Water

	Supply	Base Delivery	Max Day	Max Hour	Fire	Meter	Customer	General	TOTAL
Residential									
Tier 1	$3,174,379	$1,454,855	$65,426	$166,702					$4,861,363
Tier 2	$2,180,551	$999,372	$314,598	$182,599					$3,677,121
Tier 3	$462,075	$211,775	$124,674	$53,341					$851,865
Tier 4	$424,850	$194,714	$139,307	$55,275					$814,145
Non-Residential									
Tier 1	$126,942	$58,179	$5,708	$7,447					$198,276
Tier 2	$1,619,255	$742,124	$263,957	$143,257					$2,768,594
Hydrant	$14,487	$6,640	$13,383	$4,064					$38,574
Base Meters						$5,561,662	$2,169,671		$7,731,333
TOTAL	**$8,002,540**	**$3,667,659**	**$927,053**	**$612,686**	**$0**	**$5,561,662**	**$2,169,671**	**$0**	**$20,941,271**

WATER RATE DESIGN

Existing Rate Structure and Rates

The City's existing rate structure consists of a monthly base charge, which is a fixed charge determined on the basis of the size of the meter serving a property. In addition, the City has a four-tiered commodity rate structure for residential customers, and a two-tiered rate structure for non-residential customers. Non-potable water customers and customers using water from hydrants, typically for construction purposes, have a uniform rate. **Table 3-19** shows the existing rate structure and rates.

Table 3-19: Existing Monthly Water Rates

		Existing Rates
Monthly Base Rate		
Meter Size		
5/8" or 3/4"		$23.56
1"		$32.52
1 1/2"		$54.93
2"		$81.83
3"		$167.00
4"		$292.65
6"		$592.85
Commodity Rate ($/kgal)		
Residential	Monthly (kgal)	
Tier 1	5	$2.72
Tier 2	14	$5.41
Tier 3	20	$6.47
Tier 4	21+	$7.11
Non-Residential		
Tier 1	5	$2.52
Tier 2	6+	$5.02
Hydrant		$6.59
Non-Potable		$1.43

Proposed Monthly Fixed Charge

Table 3-20 shows the derivation of the monthly base charge. The cost of service analysis derived in **Table 3-18** feeds into the meter charge derivation, as the meter charge is designed to collect the amount of revenue shown in the "Meter" and "Customer" columns of **Table 3-20**.

Fixed Meter Charge Components

There are two components that comprise the fixed meter charges: meter capacity and customer service (or billing), both which are described below. This charge recognizes the fact that even when a customer does not use any water, the City incurs fixed costs in connection with maintaining the ability or readiness to serve each connection.

Meter Capacity Component

The meter capacity component collects capacity (also known as peaking) related costs. Capacity related costs can be allocated to and collected through the meter service charge by meter size. This reflects the fact that larger meters have the potential to demand more capacity compared to smaller meters. The potential capacity demanded is proportional to the potential flow through each meter size as established by the AWWA hydraulic capacity ratios, discussed earlier in **Table 3-13**, and shown in the “Meter Ratio” column of **Table 3-20**. The ratios show the potential flow through each meter size compared to the flow through a 3/4-inch meter. For example, the “Meter Ratio” column in **Table 3-20** shows that the flow through a 2-inch meter is 5.33 times that of a 3/4-inch and therefore the meter capacity component of the base charge is 5.33 times that of the 3/4-inch meter. The meter capacity component for a 3/4-inch meter is derived in the “Meter” column of **Table 3-20** and the capacity component for larger meters is scaled up using the AWWA capacity ratios shown in the “Meter Ratio” column of **Table 3-20**.

Allocating capacity costs by meter size is a common way to ensure capacity costs are passed on to customers requiring greater capacity in the system. Meter charges provide revenue stability, especially in light of decreasing revenues during a drought or other water shortage.

Customer/Billing Component

The customer/billing component recovers costs associated with meter reading, customer billing and collection as well as customer service costs. These costs are the same for all meter sizes as it costs the same to provide billing and customer services to a small meter as it does a larger meter. The customer/billing component is derived in the “Customer/Billing” column of **Table 3-20.**

Table 3-20: Derivation of the Monthly Fixed Charge

Meter Size	Meter Ratio	Meter	Customer/ Billing	Total Charges	Current Charges	Difference
5/8" or 3/4"	1.00	$14.94	$9.08	**$24.03**	$23.56	2%
1"	1.67	$24.91	$9.08	**$34.00**	$32.52	5%
1 1/2"	3.33	$49.81	$9.08	**$58.90**	$54.93	7%
2"	5.33	$79.70	$9.08	**$88.79**	$81.83	9%
3"	11.67	$174.35	$9.08	**$183.44**	$167.00	10%
4"	21.00	$313.82	$9.08	**$322.91**	$292.65	10%
6"	43.33	$647.57	$9.08	**$656.65**	$592.85	11%

Proposed Commodity Rates

Residential Tier Definitions

- The City's current rate structure includes four tiers for residential customers. Tier 1 is from 0 to 5 kgal per month, Tier 2 is 6 to 14 kgal per month, Tier 3 is 15 to 20 kgal per month, and Tier 4 is 21 kgal per month or more. Based on the previous rate study, using the last normal consumption patterns, the first tier provided water from the lowest cost source. Tier 2 (6 to 14 kgal per month) represents the FY 2013 and 2014 average monthly water usage for residential customers. Tier 3 (15 to 20 kgal per month) represents the FY 2013 and 2014 average summer water usage between June and September for residential customers. This allocation provides sufficient outdoor water for an average residential customer. Tier 4 represents usage over 20 kgal per month.

Raftelis is proposing that the City retain its existing residential tier definitions to minimize customer impacts and provide rate stability.

Non-Residential Tier Definitions

The City's current rate structure includes two tiers for non-residential customers. Tier 1 is from 0 to 5 kgal per month. Tier 2 is 6 kgal per month or more. Raftelis is proposing that the City retains its existing non-residential tier definitions.

The first tier for both residential and non-residential customers was based on the available local ground water during the last rate study. The total groundwater production spread on all the users resulted in an allocation of five kgal per month per residential dwelling unit and non-residential account.

Unit Cost Definitions

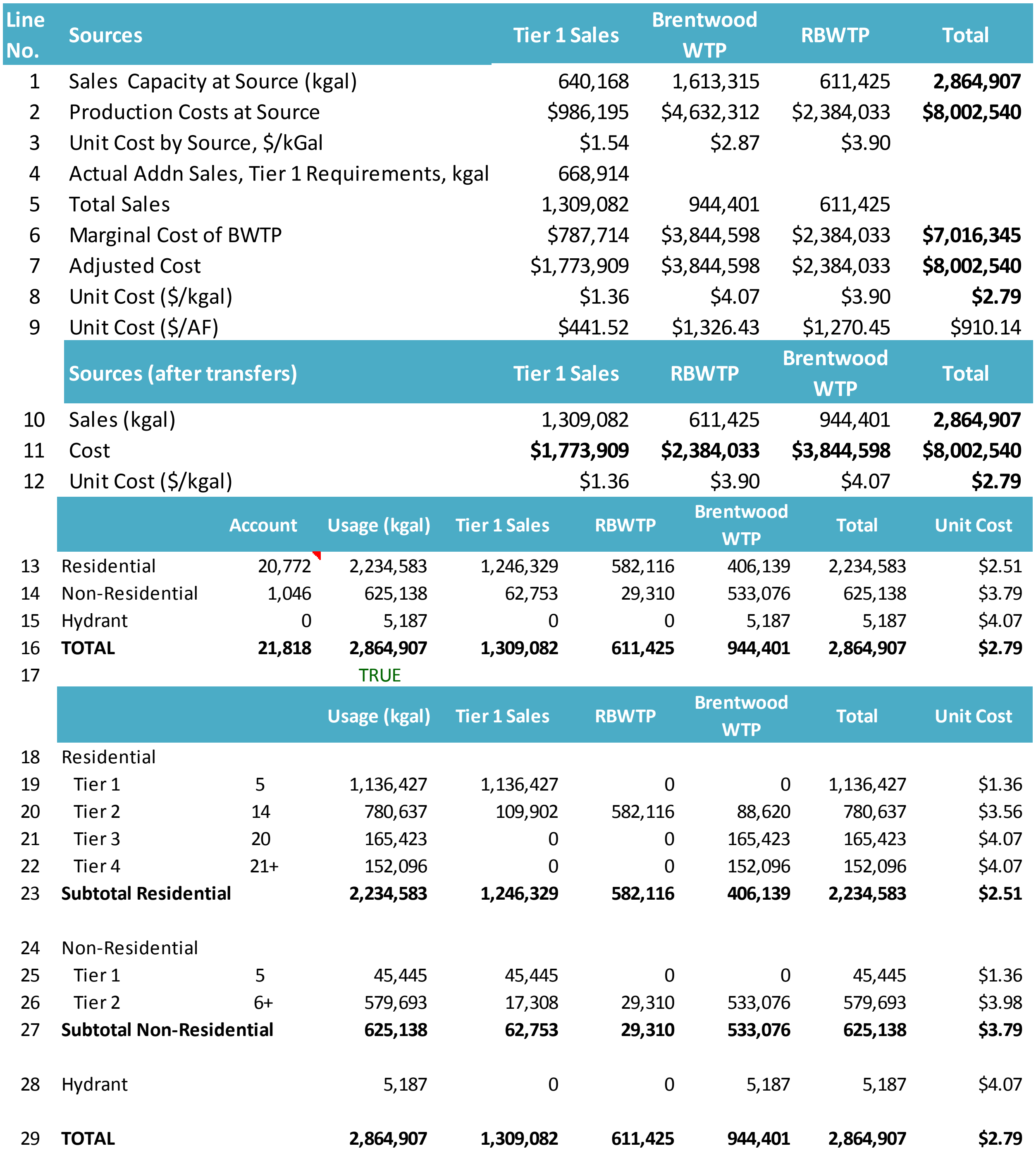
The commodity rates for each class and tier are derived by summing the unit rates ($/kgal) for:

1. Supply
2. Base Delivery
3. Peaking

Supply costs are costs related to the cost of purchasing and producing water. The City has three sources of water, each incurring different costs, as shown in **Table 3-21**. The City wishes to provide the minimum 5 kgal of water to each residential unit and non-residential account for essential use, however, because of quality considerations, groundwater alone cannot provide the 5 kgal per account. Water from the BWTP will be used to meet this requirement. Since this is incremental water required from BWTP, only the incremental operating cost is considered along with the fixed cost based on the treatment capacity at BWTP. The incremental variable cost of BWTP is $223per ac-ft and the fixed cost of $3.8 million based on the treatment capacity of 16 mgd results is $149 per ac-ft for a net cost of $372/ac-ft or $0.85 per kgal. The resultant unit cost shown on Line 8 of **Table 3-21** is $1.36 per kgal. It should be noted that every single account benefits from this water in Tier 1.

Each source of supply is allocated to each customer class based on the proportional amount of water usage in each class. Within each customer class, each available supply is allocated to each tier based on the usage in each tier, with priority given to the lower tiers. For example, the residential class is allocated 1,246,329 kgal of Tier 1 water. This principle applies to the non-residential customer class as well.

Table 3-21: Allocation of Water Supply



Line No.	Sources	Tier 1 Sales	Brentwood WTP	RBWTP	Total
1	Sales Capacity at Source (kgal)	640,168	1,613,315	611,425	**2,864,907**
2	Production Costs at Source	$986,195	$4,632,312	$2,384,033	**$8,002,540**
3	Unit Cost by Source, $/kGal	$1.54	$2.87	$3.90	
4	Actual Addn Sales, Tier 1 Requirements, kgal	668,914			
5	Total Sales	1,309,082	944,401	611,425	
6	Marginal Cost of BWTP	$787,714	$3,844,598	$2,384,033	**$7,016,345**
7	Adjusted Cost	$1,773,909	$3,844,598	$2,384,033	**$8,002,540**
8	Unit Cost ($/kgal)	$1.36	$4.07	$3.90	**$2.79**
9	Unit Cost ($/AF)	$441.52	$1,326.43	$1,270.45	$910.14

	Sources (after transfers)	Tier 1 Sales	RBWTP	Brentwood WTP	Total
10	Sales (kgal)	1,309,082	611,425	944,401	**2,864,907**
11	Cost	**$1,773,909**	**$2,384,033**	**$3,844,598**	**$8,002,540**
12	Unit Cost ($/kgal)	$1.36	$3.90	$4.07	**$2.79**

		Account	Usage (kgal)	Tier 1 Sales	RBWTP	Brentwood WTP	Total	Unit Cost
13	Residential	20,772	2,234,583	1,246,329	582,116	406,139	2,234,583	$2.51
14	Non-Residential	1,046	625,138	62,753	29,310	533,076	625,138	$3.79
15	Hydrant	0	5,187	0	0	5,187	5,187	$4.07
16	**TOTAL**	**21,818**	**2,864,907**	**1,309,082**	**611,425**	**944,401**	**2,864,907**	**$2.79**
17			TRUE					

			Usage (kgal)	Tier 1 Sales	RBWTP	Brentwood WTP	Total	Unit Cost
18	Residential							
19	Tier 1	5	1,136,427	1,136,427	0	0	1,136,427	$1.36
20	Tier 2	14	780,637	109,902	582,116	88,620	780,637	$3.56
21	Tier 3	20	165,423	0	0	165,423	165,423	$4.07
22	Tier 4	21+	152,096	0	0	152,096	152,096	$4.07
23	**Subtotal Residential**		**2,234,583**	**1,246,329**	**582,116**	**406,139**	**2,234,583**	**$2.51**
24	Non-Residential							
25	Tier 1	5	45,445	45,445	0	0	45,445	$1.36
26	Tier 2	6+	579,693	17,308	29,310	533,076	579,693	$3.98
27	**Subtotal Non-Residential**		**625,138**	**62,753**	**29,310**	**533,076**	**625,138**	**$3.79**
28	Hydrant		5,187	0	0	5,187	5,187	$4.07
29	**TOTAL**		**2,864,907**	**1,309,082**	**611,425**	**944,401**	**2,864,907**	**$2.79**

Base Delivery costs are the operating and capital costs associated with delivering water to all customers at a constant average rate of use – also known as serving customers under average daily demand conditions. Therefore, base delivery costs are spread over all units of water irrespective of customer class or tiers. Based on **Table 3-17,** the delivery or base unit cost is $1.28 per kgal.

Peaking costs, or extra-capacity costs, represent costs incurred to meet customer peak demands in excess of base use (or average daily demand). Total extra capacity costs are comprised of maximum day and maximum hour demands. The peaking costs are distributed to each tier and class using peaking factors derived from customer use data. **Table 3-22** shows the peaking unit cost for each customer class and tier, which is calculated by dividing the total peaking (max day plus max hour) costs for each class and tier, from **Table 3-18**, by the total usage in each class and tier, from **Table 3-16**.

Table 3-22: Peaking Cost Calculation

Customer Class	Monthly Tier (kgal)	Peaking Costs	Usage (kgal)	Unit Cost
Residential				
Tier 1	5	$232,128	1,136,427	$0.20
Tier 2	14	$497,197	780,637	$0.64
Tier 3	20	$178,015	165,423	$1.08
Tier 4	21+	$194,582	152,096	$1.28
Non-Residential				
Tier 1	5	$13,155	45,445	$0.29
Tier 2	6+	$407,214	579,693	$0.70
Hydrant		$17,447	5,187	$3.36

Table 3-23 shows the proposed commodity rate for FY 2019, which is the sum of the three previously discussed rate components, for each customer class. The Supply component is from **Table 3-21**; the Delivery component is from **Table 3-17**; and the Peaking component is from **Table 3-22**. The non-potable water rate is based on the calculation shown in **Table 3-24**.

Table 3-23: Proposed Commodity Rates

Customer Class	Monthly Tier (kgal)	Supply	Delivery	Peaking	Total Rate
Residential					
Tier 1	5	$1.36	$1.28	$0.20	**$2.84**
Tier 2	14	$3.56	$1.28	$0.64	**$5.48**
Tier 3	20	$4.07	$1.28	$1.08	**$6.43**
Tier 4	21+	$4.07	$1.28	$1.28	**$6.64**
Subtotal Residential					
Non-Residential					
Tier 1	5	$1.36	$1.28	$0.29	**$2.93**
Tier 2	6+	$3.98	$1.28	$0.70	**$5.97**
Subtotal Non-Residential					
Hydrant		$4.07	$1.28	$3.36	**$8.72**
Non-Potable					**$1.43**

Non-Potable Water

Non-potable water rates are calculated to recover costs associated with providing non-potable water service. **Table 3-24** shows the calculation for the City's retail non-potable water customers.

Table 3-24: Non-Potable Water Rate Calculation

Non-Potable Water	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
O&M Expenses	$506,739	$525,905	$547,119	$567,604	$588,263
Capital Expenses	$0	$0	$0	$0	$0
Total Expenses	**$506,739**	**$525,905**	**$547,119**	**$567,604**	**$588,263**
Non-Potable Usage	355,606	358,130	362,339	365,752	368,864
Non-Potable Rate ($/kgal)	$1.43	$1.47	$1.51	$1.56	$1.60

Table 3-25 shows the proposed rates for the next five years. These rates are effective on July 1 of each fiscal year. The City reserves the right to pass through costs that are not within the City's control, such as water purchased costs, electrical costs, chemical costs etc. to the proposed rates when such an action is deemed necessary. The financial plan has built in projected increases in these costs. However, if those increases exceed the projected amount, the additional costs may be recovered through the rates at the actual cost paid by the City.

Table 3-25: Proposed Monthly Water Rates

		Current	July 1, 2018	July 1, 2019	July 1, 2020	July 1, 2021	July 1, 2022
Monthly Base Rate							
Meter Size							
5/8" or 3/4"		$23.56	$24.03	$24.88	$25.76	$26.67	$27.61
1"		$32.52	$34.00	$35.19	$36.43	$37.71	$39.03
1 1/2"		$54.93	$58.90	$60.97	$63.11	$65.32	$67.61
2"		$81.83	$88.79	$91.90	$95.12	$98.45	$101.90
3"		$167.00	$183.44	$189.87	$196.52	$203.40	$210.52
4"		$292.65	$322.91	$292.65	$293.65	$294.65	$295.65
6"		$592.85	$656.65	$679.64	$703.43	$728.06	$753.55
Commodity Rate ($/kgal)							
Residential	Monthly (kgal)						
Tier 1	5	$2.72	$2.84	$2.94	$3.05	$3.16	$3.28
Tier 2	14	$5.41	$5.48	$5.68	$5.88	$6.09	$6.31
Tier 3	20	$6.47	$6.43	$6.66	$6.90	$7.15	$7.41
Tier 4	21+	$7.11	$6.64	$6.88	$7.13	$7.38	$7.64
Non-Residential							
Tier 1	5	$2.52	$2.93	$3.04	$3.15	$3.27	$3.39
Tier 2	6+	$5.02	$5.97	$6.18	$6.40	$6.63	$6.87
Hydrant		$5.02	$8.72	$9.03	$9.35	$9.68	$10.02
Non-Potable		$1.43	$1.43	$1.47	$1.51	$1.56	$1.60

WATER BILL IMPACTS

Table 3-26 shows the impacts of an average residential customer with a 1-inch meter using an average 9 kgal of water monthly.

Table 3-26: Residential Water Monthly Rate Impacts

Residential	Usage (kgal)	Current Bill	Proposed Bill	Difference (%)	Difference ($)	% Bills at or below
Average	9	$67.76	$70.12	3.5%	$2.36	67.3%

4. WASTEWATER RATES

The following subsections present the findings and recommendations of the wastewater rate study, including system background information, study assumptions, financial plan, cost of service analysis, rate design, and projected customer impacts.

WASTEWATER SYSTEM BACKGROUND

The City wastewater system collects, treats, and disposes of wastewater from over 16,800 connections as of FY 2017. Wastewater is treated at the City's Wastewater Treatment Plant (WWTP) with a current capacity of 5.0 million gallons per day (MGD). The WWTP is an extended aeration/activated sludge facility. Its treatment system includes preliminary screening and grit removal, oxidation ditches and denitrification basins providing biological treatment, secondary clarification, tertiary filtration, chlorine disinfection, dechlorination, and a cascade aeration system.[3] Treated effluent, if not recycled, is discharged into Marsh Creek. In addition to the treatment plant, the wastewater system includes approximately 200 miles of sewer mains and lateral connections.

WASTEWATER ACCOUNT AND USAGE ASSUMPTIONS

Table 4-1 shows that the majority of the City's wastewater accounts are residential customers. Both number of accounts and dwelling units are shown for multi-family residential customers, as residential customers are assessed a base and variable charge per dwelling unit but are charged a lateral maintenance fee per account. For single-family residential customers, each dwelling unit typically corresponds to a single account. The wastewater accounts are projected to increase by approximately 1,500 accounts from FY 2019 to 2023, based on the City's General Plan population growth rates and are typically driven by new residential and nonresidential development, shown in **Table 4-2**.

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[3] *2015 Urban Water Management Plan.*

Table 4-1: Projected Wastewater Accounts by existing Customer Class

Line No.		FY 2017 *Actual*	FY 2018 *Projected*	FY 2019 *Projected*	FY 2020 *Projected*	FY 2021 *Projected*	FY 2022 *Projected*	FY 2023 *Projected*
1	Single-Family Residential	18,128	18,392	18,642	18,915	19,369	19,737	20,072
2	Multi-Family Residential (accounts)	56	57	58	59	60	61	62
3	Multi-Family Residential (units)	1,880	1,907	1,933	1,962	2,009	2,047	2,082
4	Auto Sales and Repair	20	20	21	21	21	22	22
5	Barber & Beauty Shop	12	12	12	12	12	13	13
6	Bakery	2	2	2	2	2	2	2
7	Car Washes	5	5	5	5	5	5	6
8	Gas Stations	15	15	16	16	16	16	17
9	Grocery Stores	11	11	11	11	12	12	12
10	Hotels without Restaurants	3	3	3	3	3	3	3
11	Institutions, Churches, HOAs	50	50	51	52	53	54	55
12	Laundromats	2	2	2	2	2	2	2
13	Laundry, Commercial	1	1	1	1	1	1	1
14	Office Buildings, Banks	115	117	119	120	123	125	128
15	Restaurants	78	79	80	82	84	85	87
16	Retail Stores	91	92	93	95	97	99	101
17	Schools	31	31	32	32	33	33	34
18	Other Commercial	56	57	58	59	60	61	62
19	Mixed Use	1	1	1	1	1	1	1
20	**Total Accounts**	**18,677**	**18,949**	**19,207**	**19,487**	**19,955**	**20,334**	**20,680**

Table 4-2: Wastewater Account Growth

Fiscal Year	Account Growth
FY 2018	1.5%
FY 2019	1.4%
FY 2020	1.5%
FY 2021	2.4%
FY 2022	1.9%
FY 2023	1.7%

Table 4-3 shows the projected billed wastewater flow over the study period by customer class. The revenue calculated for each of the fiscal years in the Financial Plan is a function of the number of dwelling units/accounts, billed wastewater flow, and existing rates. Note that billed wastewater flow for residential customers is based on monthly water usage during the two lowest water production winter months, when irrigation water is typically not used and indoor water makes its way to the treatment plant, and is capped at 7 kgal per dwelling unit per month. Non-residential billed wastewater flow is based on actual monthly water use since nonresidential customers typically have separate “irrigation only” water service and water usage does not fluctuate seasonally. Although billed wastewater flow is projected to increase due to account growth, wastewater generation per account is assumed to stay constant throughout the study period since

wastewater flow is generated by “indoor” use and does not tend to fluctuate as would “outdoor” or irrigation usage.

Table 4-3: Projected Billed Wastewater Flow by existing Customer Class

Billed Wastewater Flow (kgal)	Actual FY 2017	Projected FY 2018	Projected FY 2019	Projected FY 2020	Projected FY 2021	Projected FY 2022	Projected FY 2023
SFR	914,276	927,624	940,240	953,968	976,863	995,423	1,012,345
MFR	81,942	83,139	84,269	85,500	87,552	89,215	90,732
Auto Sales and Repair, (actual water use)	1,730	1,755	1,779	1,805	1,848	1,884	1,916
Barber & Beauty Shop	542	550	557	566	579	590	600
Bakery	268	272	276	280	286	292	297
Car Washes	6,688	6,786	6,878	6,978	7,146	7,282	7,405
Gas Stations	14,374	14,584	14,782	14,998	15,358	15,650	15,916
Grocery Stores	12,750	12,936	13,112	13,304	13,623	13,882	14,118
Hotels without Restaurants	4,014	4,073	4,128	4,188	4,289	4,370	4,445
Institutions, Churches, HOAs	13,850	14,052	14,243	14,451	14,798	15,079	15,336
Laundromats	4,745	4,814	4,880	4,951	5,070	5,166	5,254
Laundry, Commercial	159	161	164	166	170	173	176
Office Buildings, Banks	23,734	24,081	24,408	24,764	25,359	25,841	26,280
Restaurants	43,079	43,708	44,302	44,949	46,028	46,903	47,700
Retail Stores	18,780	19,054	19,313	19,595	20,066	20,447	20,794
Schools	26,200	26,583	26,944	27,337	27,994	28,525	29,010
Other Commercial	12,170	12,348	12,516	12,698	13,003	13,250	13,475
Mixed Use	970	984	998	1,012	1,036	1,056	1,074
TOTAL BILLED FLOW	**1,180,271**	**1,197,503**	**1,213,789**	**1,231,511**	**1,261,067**	**1,285,027**	**1,306,873**

INFLATIONARY AND OTHER ASSUMPTIONS

This subsection describes the assumptions used in projecting operating and capital expenses as well as reserve coverage requirements that determine the overall revenue adjustments required to ensure the financial stability of the City’s wastewater enterprise. Revenue adjustments represent the average increase in wastewater rates for the City as a whole. Note that rate changes for individual classes will depend on the cost of service.

As with the water rate study, non-rate revenue and O&M projections are based on the City’s FY 2018 projections and projected budgetary increases in FY 2019 through FY 2023. The City uses different inflation factors that are indicative of industry increases for different expenditures within the budget, such as personnel, supplies, or fuel, to capture the impact of market forces over time.

WASTEWATER ENTERPRISE FINANCIAL PLAN

This subsection of the report provides a discussion of the O&M and capital expenditures, capital improvement financing plan, debt service requirements, and revenue adjustments required to ensure the financial stability of the wastewater enterprise.

Revenue Requirement

A utility's yearly revenue requirement is the amount of yearly revenue needed to operate, maintain, and ensure fiscal solvency. The revenue requirement includes O&M expenses, rate funded capital expenditures, debt service payments, and reserve funding.

O&M Expenses

The City wastewater enterprise's projected O&M expenses are shown in **Table 3-4**. The Wastewater Financial Plan study period is from FY 2018 to 2023. O&M expenses include the cost of wastewater collection, wastewater treatment, billing, and providing lateral maintenance. **Table 4-4** summarizes the projected O&M expenses by function.

Table 4-4: Projected Wastewater Enterprise O&M Expenses

	Projected FY 2018	Projected FY 2019	Projected FY 2020	Projected FY 2021	Projected FY 2022	Projected FY 2023
Collection	$2,246,228	$2,600,573	$2,753,275	$2,994,039.33	$3,136,896	$3,279,995
Treatment	$5,251,328	$6,160,728	$6,310,684	$8,685,195	$9,286,450	$9,829,779
Utility Billing	$957,649	$973,604	$1,182,704	$1,267,853	$1,142,586	$1,184,881
Lateral Maintenance	$260,617	$270,392	$282,279	$294,563	$306,195	$317,809
TOTAL O&M EXPENSES	**$8,715,823**	**$10,005,297**	**$10,528,942**	**$13,241,650**	**$13,872,127**	**$14,612,464**

Capital Improvement Plan

Table 4-5 shows the City's wastewater enterprise CIP for FY 2018 through FY 2023, which totals approximately $9.6 million. The majority of CIP costs over the planning period are associated with a second phase of WWTP expansion as well as expansion of the non-potable water storage and distribution system. The projects will be funded through rates and State Revolving Fund (SRF) loans.

Table 4-5: Detailed Wastewater Enterprise Capital Improvement Plan – Inflated

Capital Improvement Plan (CIP)	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Fund #590 - Wastewater						
WWTP Effluent Chloride	$0	$160,000	$0	$0	$0	$0
WWTP Groundwater Well Abandonment	$170,000	$0	$0	$0	$0	$0
WWTP Security	$200,000	$0	$0	$0	$0	$0
Wastewater Treatment Plant Expansion II	$0	$6,420,395	$0	$416,409	$416,409	$416,409
Non-Potable Storage Facility	$0	$112,825	$112,825	$112,825	$112,825	$112,825
Citywide Non-Potable Water Distribution System	$0	$0	$65,136	$65,136	$65,136	$65,136
Secondary Non-Potable Water Storage Facility	$0	$0	$0	$55,265	$55,264	$55,264
Municipal Service Center	$62,116	$75,746	$76,860	$72,933	$69,785	$66,683
Total Wastewater CIP	**$432,116**	**$6,768,966**	**$254,821**	**$722,568**	**$719,419**	**$716,317**

Debt Service

In addition to debt service associated with an existing SRF loan used to finance an initial WWTP expansion, the City plans to utilize new SRF loan funding to finance a second phase of WWTP expansion as well as three recycled water projects. **Table 4-6** shows the City's debt service payments associated with the wastewater enterprise through FY 2023. Annual debt service payments for the planning period range from $0.65 million to $4.39 million.

Table 4-6: Wastewater Enterprise Debt Service Payments

	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Wastewater Treatment Plant Note						
Principal	$895,049	$911,206	$3,812,300	$0	$0	$0
Interest	$232,191	$195,202	$397,388	$0	$0	$0
Total Wastewater Treatment Plant Note	**$1,127,240**	**$1,106,408**	**$4,209,688**	**$0**	**$0**	**$0**
Wastewater Treatment Plant Expansion II						
Principal	$0	$0	$0	$416,409	$416,409	$416,409
Interest	$0	$0	$0	$0	$0	$0
Total Wastewater Treatment Plant Expansion II	**$0**	**$0**	**$0**	**$416,409**	**$416,409**	**$416,409**
Non-Potable Storage Facility						
Principal	$0	$83,707	$84,544	$85,390	$86,244	$87,106
Interest	$0	$29,118	$28,280	$27,435	$26,581	$25,719
Total Non-Potable Storage Facility	**$0**	**$112,825**	**$112,825**	**$112,825**	**$112,825**	**$112,825**
Citywide Non-Potable Water Distribution System						
Principal	$0	$0	$48,326	$48,809	$49,297	$49,790
Interest	$0	$0	$16,810	$16,327	$15,839	$15,346
Total Citywide Non-Potable Water Distribution System	**$0**	**$0**	**$65,136**	**$65,136**	**$65,136**	**$65,136**
Secondary Non-Potable Water Storage Facility						
Principal	$0	$0	$0	$41,002	$41,412	$41,826
Interest	$0	$0	$0	$14,263	$13,852	$13,438
Total Secondary Non-Potable Water Storage Facility	**$0**	**$0**	**$0**	**$55,265**	**$55,264**	**$55,264**
TOTAL EXISTING & PROPOSED DEBT SERVICE	**$1,127,240**	**$1,219,233**	**$4,387,648**	**$649,634**	**$649,633**	**$649,633**

Proposed Financial Plan and Revenue Adjustments

The proposed wastewater revenue adjustments help ensure adequate revenue to fund operating expenses, capital expenditures and compliance with bond covenants. The Financial Plan model assumes the revenue adjustment occurs on July 1 of each year. The proposed revenue adjustments would enable the City to execute the CIP shown in **Table 4-5** and meet its debt service coverage requirements over the study period. Debt coverage would not be met by the existing rate schedule and without the proposed increase, the necessary capital projects would not be funded.

Table 4-7 shows the proposed wastewater enterprise revenue adjustments for FY 2019 through FY 2023. These increases are needed to finance the operating and capital expenses and reserve funding, as well as meeting the debt coverage requirements for the SRF loans.

Table 4-7: Proposed Wastewater Revenue Adjustments

Fiscal Year	Effective Date	Revenue Increases
FY 2019	July 2018	3%
FY 2020	July 2019	3%
FY 2021	July 2020	3%
FY 2022	July 2021	3%
FY 2023	July 2022	3%

Table 4-8 shows the City's wastewater enterprise cash flow detail over the next five years.

Table 4-8: Proposed Wastewater Enterprise Cash Flow

			FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Revenue from Existing Rates			$11,722,785	$11,893,938	$12,179,393	$12,410,801	$12,621,785
Additional Revenue Required from Rates							
Fiscal Year	**Revenue Adjustment**	**Month Effective**					
FY 2019	3.0%	July	$351,684	$356,818	$365,382	$372,324	$378,654
FY 2020	3.0%	July		$367,523	$376,343	$383,494	$390,013
FY 2021	3.0%	July			$387,634	$394,999	$401,714
FY 2022	3.0%	July				$406,849	$413,765
FY 2023	3.0%	July					$426,178
Total Additional Revenue from Rates			$351,684	$724,341	$1,129,359	$1,557,665	$2,010,323
Total Rate Revenue			$12,074,469	$12,618,279	$13,308,751	$13,968,466	$14,632,108
Current Services			$32,376	$33,800	$35,606	$37,330	$39,063
Other Revenue			$137,609	$142,753	$149,266	$155,491	$161,752
Standby Charges			$96,990	$96,020	$95,060	$94,110	$93,168
Operating Transfers			$0	$0	$0	$0	$0
Interest Income			$236,478	$164,789	$143,304	$139,053	$134,446
TOTAL REVENUES			**$12,577,922**	**$13,055,642**	**$13,731,986**	**$14,394,449**	**$15,060,538**
O&M Expenses							
Collection			$2,600,573	$2,753,275	$2,994,039	$3,136,896	$3,279,995
Treatment			$6,160,728	$6,310,684	$8,685,195	$9,286,450	$9,829,779
Utility Billing			$973,604	$1,182,704	$1,267,853	$1,142,586	$1,184,881
Lateral Maintenance			$270,392	$282,279	$294,563	$306,195	$317,809
Existing and Proposed Debt Service			$1,219,233	$4,387,648	$649,634	$649,633	$649,633
Rate Funded Capital Projects			$6,656,141	$76,860	$72,933	$69,785	$66,683
TOTAL EXPENSES			**$17,880,671**	**$14,993,451**	**$13,964,217**	**$14,591,545**	**$15,328,780**
Net Income			**($5,302,749)**	**($1,937,809)**	**($232,231)**	**($197,096)**	**($268,242)**

Table 4-9 shows the calculated debt coverage for the City's wastewater enterprise. The City's debt service payments associated with the wastewater enterprise are split between the wastewater rate fund and the development impact fee fund. To calculate debt coverage ratios for the wastewater enterprise, total revenue (including development impact fee revenue) and total debt service payments are included. The wastewater enterprise's debt coverage requirement is 110 percent. With the proposed increases, the City meets and exceeds its debt coverage requirement throughout the study period.

Table 4-9: Wastewater Enterprise Debt Coverage Calculation

	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Projected Wastewater Revenue	$12,577,922	$13,055,642	$13,731,986	$14,394,449	$15,060,538
Development Impact Fee Revenue	$1,139,941	$1,933,357	$970,671	$1,912,851	$758,764
Projected O&M Expenses, less depreciation	$9,310,221	$9,610,869	$11,589,319	$11,926,121	$12,388,457
Total Debt Service (for coverage)	$2,506,945	$2,637,206	$2,300,849	$2,300,849	$2,300,847
Calculated Debt Coverage	176%	204%	135%	190%	149%
Required Debt Coverage	110%	110%	110%	110%	110%

Figure 4-1 through **Figure 4-4** display the Wastewater Enterprise Financial Plan in graphical format. **Figure 4-1** shows the modeled revenue adjustments (blue bars) for the next five years on the left-hand axis and the calculated and required debt coverage requirements shown by the green and red lines respectively on the right-hand axis. The green line, representing debt coverage calculations with proposed increases is above the required debt coverage as shown by the red line. Without the proposed increases, the calculated coverage would be below the requirement.

Figure 4-1: Proposed Wastewater Enterprise Revenue Adjustments and Debt Coverage Ratio

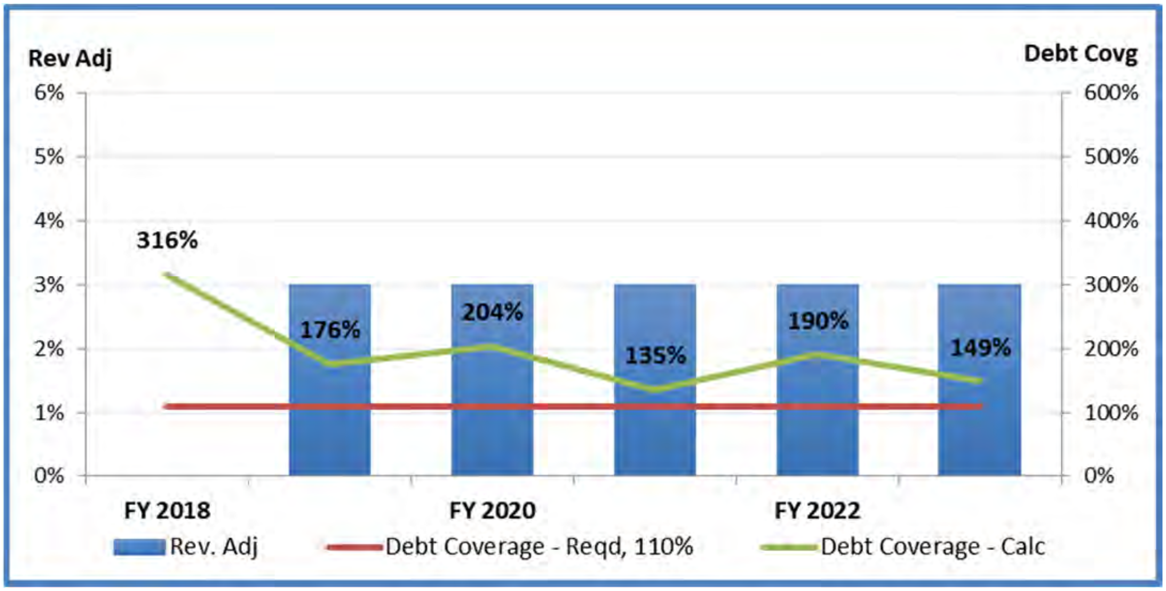

Figure 4-2 graphically illustrates the Wastewater Enterprise Financial Plan – it compares existing and proposed revenues with projected expenses. The expenses include O&M, debt service, capital costs, and reserves transfer are shown by the stacked bars; and total revenues at existing and proposed rates are shown by the horizontal orange and blue lines, respectively. Current revenue from existing rates (in orange) does not meet future total expenses, and clearly demonstrates the need for revenue adjustments.

Figure 4-2: Proposed Wastewater Enterprise Financial Plan

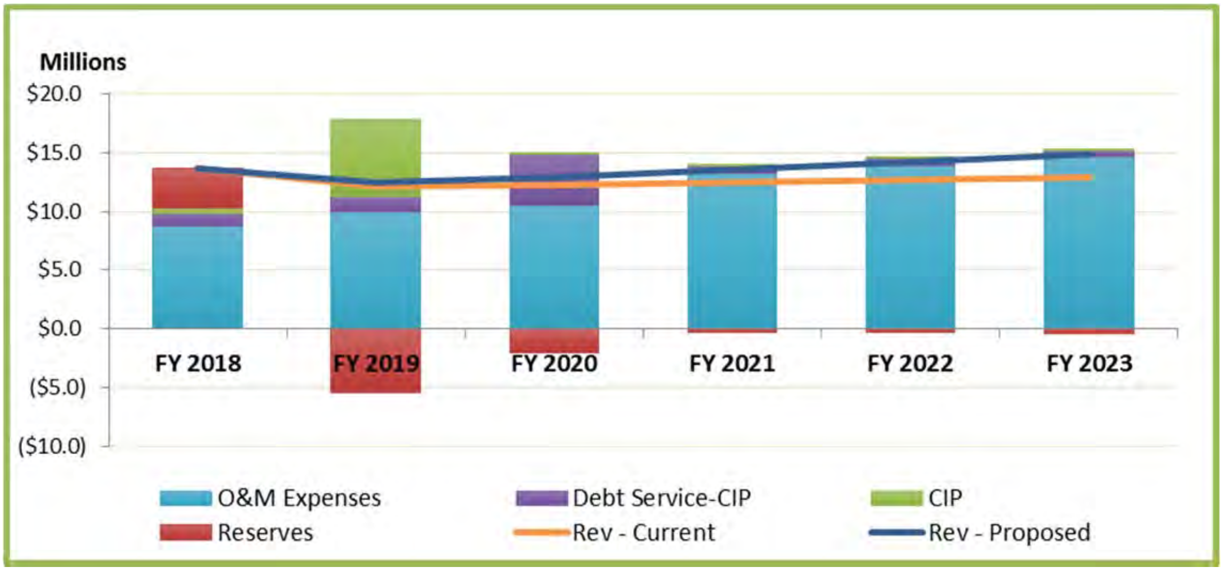

Figure 4-3 summarizes the projected CIP to be funded by wastewater rates and SRF loans. Rate-funded CIP is shown in purple. SRF-funded CIP is shown in light blue. (Note FY 2019 shows an initial cash payment for Wastewater Treatment Plant Expansion to receive favorable SRF loan financing over time)

Figure 4-3: Projected Wastewater Enterprise CIP and Funding Sources

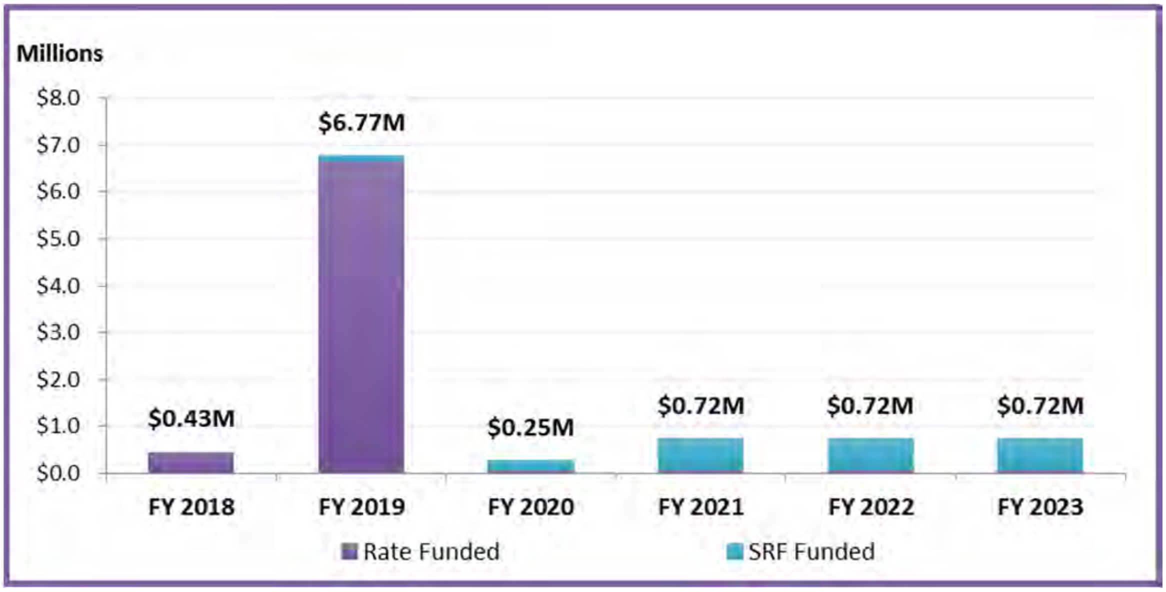

Figure 4-4 displays the resulting fund balance for the wastewater utility. The red line represents the total current target, which is equal to 30 percent of annual operating expenses and debt service payments, based on Budget and Fiscal Policy 2.7.3, adopted April 25, 2017.

Figure 4-4: Wastewater Enterprise Total Cash Balance

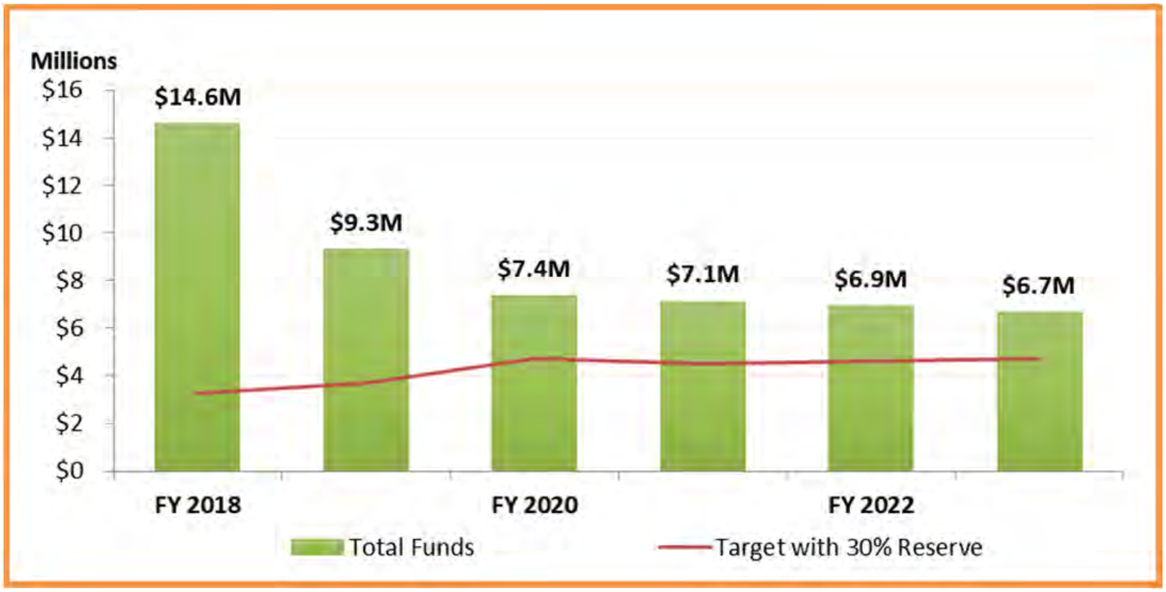

Table 4-10 shows the projected cash balance for the wastewater enterprise. This table corresponds with **Figure 4-4**.

Table 4-10: Wastewater Enterprise Projected Cash Balance

WW Fund	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Beginning Balance	$11,099,505	$14,593,506	$9,290,757	$7,352,948	$7,120,717	$6,923,621
Net Cash Flow	$3,494,001	($5,302,749)	($1,937,809)	($232,231)	($197,096)	($268,242)
Ending Balance	**$14,593,506**	**$9,290,757**	**$7,352,948**	**$7,120,717**	**$6,923,621**	**$6,655,379**
Interest Income	*$127,826*	*$236,478*	*$164,789*	*$143,304*	*$139,053*	*$134,446*

WASTEWATER COST OF SERVICE ANALYSIS

The total revenue requirement is, by definition, the net cost of providing service. This cost of service is then used as the basis to develop unit rates for the wastewater parameters and to allocate costs to the various user classes. The concept of proportionate allocation to user classes implies that allocations should take into consideration the quantity of wastewater a user contributes as well as the strength (i.e., treatment requirements) of the wastewater.

The cost of service analysis and rate calculations consist of the following steps:

1. Determination of the total costs to be recovered from rates (cost of service)
2. Determination of the wastewater loadings for each customer class, to ensure costs are allocated to each class proportionately
3. Allocation of the cost of service to the loading parameters- Flow, Biochemical Oxygen Demand (BOD) and Total Suspended Solids (TSS)
4. Calculation of unit costs for the three parameters, and the costs to serve the various user classes based on their loadings
5. Calculation of rates for each user class

This section of the report discusses the allocation of operating and capital costs to the Flow, BOD, and TSS parameters, the determination of unit rates, and the calculation of user class cost responsibility.

In this study, wastewater rates were calculated for FY 2019, and accordingly FY 2019 revenue requirements are used in the cost allocation process.

Costs of Service to Be Allocated

The annual cost of service to be recovered from wastewater rates (i.e., revenue requirement) includes O&M expenses (**Table 4-4**), costs associated with annual renewal and replacements, and other capital-related costs (**Table 4-5**). O&M expenses include costs directly related to the collection, treatment, and disposal of wastewater and maintenance of system facilities. Renewals and replacements represent the annual recurring capital outlay for minor system improvements and purchase of equipment.

The total FY 2019 net cost of service to be recovered from the City's wastewater users, as shown on the last line in **Table 4-11**, is estimated at $12.1 million, of which $9.6 million are operating costs and the remaining $2.5 million are net capital costs including debt service costs. The cost of service analysis is based on the need to generate revenues adequate to meet this estimated revenue requirement. As part of the cost of service analysis, revenues from sources other than wastewater rates and charges are deducted from the appropriate cost elements. Additional deductions are made for interest income and other non-operating income during FY 2019. Adjustments are also made for transfers from reserves.

Table 4-11: Allocation of Wastewater Revenue Requirements

	FY 2019		
	Operating	**Capital**	**Total**
Revenue Requirements			
O&M Expenses	$10,005,297		$10,005,297
Transfers to Water Fund	$0		$0
Existing and Proposed Debt Service		$1,219,233	$1,219,233
Rate Funded Capital Projects		$6,656,141	$6,656,141
Total Revenue Requirements	**$10,005,297**	**$7,875,374**	**$17,880,671**
Revenue Offsets			
Current Services	$32,376		$32,376
Other Revenue	$137,609		$137,609
Standby Charges	$96,990		$96,990
Operating Transfers	$0		$0
Interest Income	$236,478		$236,478
Total Revenue Offsets	**$503,453**	**$0**	**$503,453**
Adjustments			
Transfer to (from) reserves	$0	($5,302,749)	($5,302,749)
Midyear Increase	$0		$0
Total Adjustments	**$0**	**($5,302,749)**	**($5,302,749)**
Cost of Service to be Recovered from Rate	**$9,501,844**	**$2,572,625**	**$12,074,469**

To allocate the cost of service to the various user classes in proportion to their flow and strength contributions, costs first need to be allocated to selected wastewater cost causation parameters. The following subsection describes the allocation of the operating and capital cost of service amounts to the parameters of Flow, BOD, and TSS.

Cost Allocation to Wastewater Cost Causation Parameters

The cost of service allocations in this study are based on Raftelis' experience with secondary/tertiary treatment plants and are consistent with the revenue program guidelines of the State Water Resources Control Board (SWRCB) and the Water Environment Federation (WEF).

The three main cost causation parameters are Flow, BOD, and TSS. BOD and TSS constitute the strength components of the wastewater discharge. Additional parameters include infiltration and inflow, customers and laterals. Costs are assigned based on the parameters which dictate the design of each process. The allocation of costs to the three main parameters involves:

- Detailed breakdown and functionalization of O&M costs.
- Itemization of the capital costs by functions such as collection, treatment, outfall, etc.
- Allocation of the functional costs to the wastewater cost causation parameters.

In the absence of a detailed breakdown of fixed assets by process, the WWTP costs are allocated to flow, BOD, and TSS at 50 percent, 25 percent, and 25 percent, respectively. This allocation is representative of other similar treatment plants. Pipelines, outfall, and pumping stations costs are all allocated to flow. Similarly, operating costs identified with the collection system are allocated to infiltration and inflow (I&I) and wastewater flow, and operating treatment costs are allocated in the same manner as the fixed asset costs. Costs that could not be specifically identified were allocated as general costs. General costs are ultimately reallocated based on the proportions of other costs (see **Table 4-13** below). Costs of lateral maintenance are allocated to laterals and costs of utility billing to customers. The allocation of O&M and capital costs is shown in **Appendix B**.

Unit Cost of Service

The next step of the cost of service analysis is to calculate unit costs for Flow, BOD, and TSS. The unit costs of service are developed by dividing the total annual costs allocated to each parameter by the total annual loadings for each parameter. Raftelis determined the total billed residential wastewater flow based on City data for the lowest two winter water production months, when most usage is typically "indoor" and generates wastewater to be treated, and estimated the non-residential flow at 100 percent of the water use since separate irrigation meters measure the "outdoor" use that does not generate wastewater. The remaining influent was assumed to be infiltration and inflow (I&I) that comes from storm or irrigation runoff or groundwater leakage into the pipes. Raftelis calculated an I&I of just under 10 percent of the total plant influent, based on the estimated wastewater flow from customers. The net plant loadings (total influent less I&I) provide a basis for determining unit costs.

The strength of different types of non-residential customers is based on data from the City of Los Angeles and the County Sanitation Districts of Los Angeles County (LACSD). **Table 4-12** shows the calculation of the units of service for I&I, residential and non-residential customers using the method described above.

Table 4-12: Mass Balance

		Flow (MG/yr)	BOD (lbs/yr)	TSS (lbs/yr)
Total Plant Influent		1,309.36	3,472,863	3,579,075
Less: I&I	9.9%	129.09	739,900	1,668,788
Net Plant Influent		1,180.27	2,732,964	1,910,287
Total Non-Residential		184.05	612,933	455,364
Residential		996.22	2,120,030	1,454,923

To verify the validity of the assumptions made, the net calculated strength for a residential account is compared against the expected flow and strength from a residential customer. There are 20,008 residential units served by the City in FY 2017. The calculated loading for each residential unit is:

Flow	44 gal/capita/day*
BOD	255mg/L
TSS	175 mg/L

**Based on an average density of 3.1 persons per household from the 2011-2015 American Community Survey for the City of Brentwood*

The calculated strengths for a residential customer are reasonable given the emphasis on conservation and reductions in water usage achieved by residential customers in recent years.

The residential and non-residential wastewater loadings are used in **Table 4-13** to develop the FY 2019 unit costs for each of the wastewater parameters. These unit costs are then used along with the loadings to develop the cost to be collected from the different customer classes. Note that general costs are reallocated based on the proportions of the other costs. Since the majority of the collection system costs are fixed, to ensure fairness and revenue stability, a portion of the costs allocated to flow are moved to the fixed category under customers. The resultant fixed revenue, which also covers the City's fixed costs that are not dependent upon water volume, is 37 percent of the total rate revenue which compares with the current fixed rate revenue of 38 percent.

Table 4-13: Development of Unit Costs

	I&I	Flow	BOD	TSS	Customer	Laterals	General	TOTAL
Operating Expenses	$243,487	$5,151,593	$1,462,682	$1,462,682	$924,613	$256,786	$0	$9,501,844
Capital Expenses	$115,129	$1,664,229	$334,991	$334,991	$0	$58,388	$64,897	$2,572,625
Total Cost of Service	**$358,616**	**$6,815,822**	**$1,797,673**	**$1,797,673**	**$924,613**	**$315,174**	**$64,897**	**$12,074,469**
Allocation of General Cost	$1,938	$36,831	$9,714	$9,714	$4,996	$1,703	($64,897)	$0
Allocated Cost of Service	**$360,554**	**$6,852,653**	**$1,807,387**	**$1,807,387**	**$929,610**	**$316,877**	**$0**	**$12,074,469**
Adjustments to Fixed Charges	$0	($2,867,330)			$2,867,330			$0
Adjusted Cost of Service	**$360,554**	**$3,985,323**	**$1,807,387**	**$1,807,387**	**$3,796,940**	**$316,877**	**$0**	**$12,074,469**
Unit of Service	19,207	1,213,789	2,810,576	1,964,536	252,990	19,207		
Units	accounts	kgal	lbs/yr	lbs/yr	bills/yr	Accounts		
Unit Cost	$1.56	$3.283	$0.643	$0.920	$15.01	$1.37		
	per month	per kgal	per lb	per lb	per month	per month		

WASTEWATER RATE DERIVATION

Existing Rate Structure and Rates

The current wastewater rate structure consists of a base charge, a variable charge, and a lateral maintenance fee. Customers are currently billed monthly. The base charge is levied per dwelling unit for residential customers and per account for non-residential customers. The lateral maintenance fee is levied per account for residential customers only.

Residential customers are subject to a monthly variable charge per unit (kgal) of the water used in the two lowest winter water production months subject to a cap of 7 kgal/mo. Variable charges for new residential customers in new construction are based on the citywide residential average wastewater usage. Variable charges for new residential customers in existing dwellings are based on the previous wastewater usage at the service address. Residential monthly billed flow is recalculated each July. A maximum charge currently caps monthly residential wastewater bills at $56.86 per month.

Non-residential customers are subject to a monthly variable charge per unit (kgal) of monthly water usage. There are currently 16 non-residential customer classes, each with a unique uniform variable charge. Existing rates and fees are shown in **Table 4-14**.

Table 4-14: Existing Monthly Wastewater Rates

	FY 2018
Monthly Base Charge (per dwelling unit)	$15.97
Monthly Lateral Maintenance Fee (per account)	$1.97
Residential Variable Charge per unit ($/kgal)*	$5.56
Residential Monthly Maximum Charge	$56.86
Non-Residential Variable Charge ($/kgal of actual water use)	
Auto Sales and Repair	$6.01
Barber & Beauty Shop	$5.01
Bakery	$15.40
Car Washes	$5.17
Gas Stations	$5.82
Grocery Stores	$13.11
Hotels without Restaurants	$6.00
Institutions, Churches, HOAs	$5.30
Laundromats	$5.46
Laundry, Commercial	$7.07
Office Buildings, Banks	$5.37
Restaurants	$14.54
Retail Stores	$5.46
Schools	$5.01
Other Commercial	$5.59
Mixed Use	$7.32

*Residential users' variable charge is based on water usage during two lowest-use winter months.

Proposed Rate Structure and Rates

Based on input and direction from City staff, Raftelis recommends that the City's existing wastewater rate structure be retained, but that non-residential customer classes be consolidated into five categories based on strength and similarity of treatment costs – higher strength wastewater requires more treatment to remove the contaminants, which results in higher costs. Many agencies choose to define customers in broader classes as defined here because wastewater strength can vary significantly from day to day and measurement of strength is not very accurate. Classifying customers into broader groups simplifies the rate structure and administration. **Table 4-15** shows each of the five consolidated non-residential customer classes defined by combined strength (the sum of BOD and TSS in mg/L).

Table 4-15: Consolodated Non-Residential Wastewater Customer Classes

Proposed Class	Combined Strength (mg/L)
Low Strength	0-250
Medium Low Strength	251-400
Medium Strength	401-800
Medium High Strengt	801-1400
High Strength	>1,401

Table 4-16 shows the reclassification of existing non-residential wastewater customer classes into the newly proposed consolidated strength-based classes. Combined strengths for each existing customer class are based on data from the City of Los Angeles and LACSD.

Table 4-16: Reclassification of Non-Residential Wastewater Customer Classes

Existing Non-Residential Customer Classes	Combined Strength (mg/L)	Proposed Consolidated Customer Class
Auto Sales and Repair	300	Medium Low Strength
Barber & Beauty Shop	300	Medium Low Strength
Bakery	1,600	High Strength
Car Washes	170	Low Strength
Gas Stations	300	Medium Low Strength
Grocery Stores	1,600	High Strength
Hotels without Restaurants	430	Medium Strength
Institutions, Churches, HOAs	375	Medium Low Strength
Laundromats	260	Medium Low Strength
Laundry, Commercial	1,350	Medium High Strength
Office Buildings, Banks	300	Medium Low Strength
Restaurants	1,600	High Strength
Retail Stores	300	Medium Low Strength
Schools	230	Low Strength
Other Commercial	375	Medium Low Strength
Mixed Use	425	Medium Strength

Table 4-17 shows the proposed wastewater rates for the next five years. Rates are increased by three percent on July 1 of each fiscal year throughout the five-year planning period.

Table 4-17: Proposed Monthly Wastewater Rates

	July 1, 2018	July 1, 2019	July 1, 2020	July 1, 2021	July 1, 2022
Monthly Base Charge (per dwelling unit)	$15.01	$15.47	$15.94	$16.42	$16.92
Monthly Lateral Maintenance Fee (per account)	$2.94	$3.03	$3.13	$3.23	$3.33
Residential Variable Charge per unit ($/kgal)*	$6.00	$6.18	$6.37	$6.57	$6.77
Residential Monthly Maximum Charge	$59.95	$61.76	$63.66	$65.64	$67.64
Non-Residential Variable Charge ($/kgal of actual water use)					
Low Strength	$4.71	$4.86	$5.01	$5.17	$5.33
Medium Low Strength	$5.36	$5.53	$5.70	$5.88	$6.06
Medium Strength	$5.90	$6.08	$6.27	$6.46	$6.66
Medium High Strength	$12.10	$12.47	$12.85	$13.24	$13.64
High Strength	$13.38	$13.79	$14.21	$14.64	$15.08

*Residential users' variable charge is based on water usage during two lowest-use winter months.

WASTEWATER BILL IMPACTS

Table 4-18 shows the monthly bill impact of the proposed rates on a residential customer billed the residential average of 4 kgal per month.

Table 4-18: Average Residential Wastewater Monthly Rate Impact

	Monthly Usage (kgal)	Current Monthly Bill	Proposed Monthly Bill	Difference ($)	Difference %	% of Bills At or Below
Average	4	$40.18	$41.95	$1.77	4.4%	44%

Table 4-19 shows the monthly impacts of the proposed rates on a typical customer based on average monthly usage in each non-residential customer class.

Table 4-19: Non-Residential Wastewater Monthly Rate Impacts

Existing Class	New Class	Average Monthly Usage (kgal)	Current Monthly Bill	Proposed Monthly Bill	Difference ($)	Difference (%)	% of Non-Residential Accounts
Auto Sales and Repair	Medium Low Strength	7.2	$61.08	$56.43	($4.66)	-7.6%	4.1%
Barber & Beauty Shop	Medium Low Strength	3.9	$37.62	$39.00	$1.38	3.7%	2.3%
Bakery	High Strength	11.2	$189.91	$167.36	($22.55)	-11.9%	0.4%
Car Washes	Low Strength	111.5	$594.22	$542.96	($51.26)	-8.6%	1.0%
Gas Stations	Medium Low Strength	79.4	$480.13	$443.61	($36.52)	-7.6%	3.1%
Grocery Stores	High Strength	96.6	$1,284.25	$1,310.34	$26.09	2.0%	2.2%
Hotels without Restaurants	Medium Strength	111.5	$686.94	$676.92	($10.03)	-1.5%	0.6%
Institutions, Churches, HOAs	Medium Low Strength	23.2	$140.90	$142.30	$1.40	1.0%	10.1%
Laundromats	Medium Low Strength	197.7	$1,097.43	$1,077.67	($19.76)	-1.8%	0.4%
Laundry, Commercial	Medium High Strength	13.3	$111.62	$178.41	$66.79	59.8%	0.2%
Office Buildings, Banks	Medium Low Strength	17.2	$110.10	$109.93	($0.16)	-0.1%	23.4%
Restaurants	High Strength	45.9	$685.00	$631.79	($53.21)	-7.8%	15.9%
Retail Stores	Medium Low Strength	17.2	$111.93	$110.21	($1.71)	-1.5%	18.5%
Schools	Low Strength	71.2	$374.63	$353.28	($21.35)	-5.7%	6.2%
Other Commercial	Medium Low Strength	18.0	$118.73	$114.59	($4.14)	-3.5%	11.4%
Mixed Use	Medium Strength	80.8	$609.64	$495.68	($113.97)	-18.7%	0.2%

5. DROUGHT SURCHARGE

As part of the Study, Raftelis calculated the demand reduction surcharge to recover the revenue shortfall that occurs as a result of demand reduction during water shortage situations.

A Drought Surcharge may be imposed during times of a declared drought when a certain level of reduction from the base usage has been mandated. A Drought Surcharge is charged on each unit of water used and is calculated to recover costs resulting from loss of revenue due to reduced water use. The amount of the Drought Surcharge at different levels of usage reduction is based upon the City's projected revenue shortfall adjusted for changes in costs.

To determine the demand reduction surcharge, the first step is to project the water demand reduction for each customer class under different levels of shortage. **Table 5-1** shows the projected water demand for each customer class and tier at different levels of reduction. Raftelis analyzed individual customer usage data, assuming that customers using more water are expected to reduce more since they have more discretionary water use. The analysis shows the increase in commodity rates that need to be applied to all usage including the tiers for each percentage reduction in usage.

Table 5-1: Projected Water Demand by Percent Usage Reduction

Usage Data (kgal)	Monthly Tier	Proposed Rates	FY 2019	% Reduction	1% Reduction	% Reduction	7% Reduction	% Reduction	10% Reduction
Residential									
Tier 1	5	$2.84	1,136,427	0%	1,136,427	-3%	1,102,334	-5%	1,079,606
Tier 2	14	$5.48	780,637	0%	780,637	-7%	725,992	-10%	702,573
Tier 3	20	$6.43	165,423	-4%	158,806	-15%	140,609	-20%	132,338
Tier 4	21+	$6.64	152,096	-7%	141,449	-30%	106,467	-40%	91,258
Subtotal Residential			**2,234,583**	**-1%**	**2,217,319**	**-7%**	**2,075,403**	**-10%**	**2,005,775**
Non-Residential									
Tier 1	5	$2.93	45,445	0%	45,565	0%	45,565	-1%	45,158
Tier 2	6+	$5.97	579,693	-2%	568,099	-5%	550,708	-10%	521,724
Subtotal Non-Residential			**625,138**	**-2%**	**613,664**	**-5%**	**596,273**	**-9%**	**566,882**
Hydrant		$8.72	5,187	0%	5,187	0%	5,187	0%	5,187
Total Potable Water (kgal)			**2,864,907**		**2,836,170**		**2,676,863**		**2,577,843**
Total Potable Water (AF)			8,793		8,704		8,216		7,912
% Total Reduction					-1.00%		-7%		-10%

The next step is to estimate the water supply cost savings that result when there is a reduction in demand. The City has a take or pay contract with CCWD; therefore, the City would continue to take its full allotment from CCWD. Proportional reduction in supply from BWTP and groundwater is used to ensure water quality. The variable costs associated with each supply are used to determine the cost savings. Almost all other costs are fixed and will not vary based on water demand.

Table 5-2 shows the estimated cost savings in the water supply costs for each Stage due to the reduction in usage. The total supply assumes a five percent water loss from the water usage shown in **Table 5-1**.

For each water supply source, there are some fixed costs, which do not vary by the amount of water purchased but remain constant, as shown in the middle section of **Table 5-2**. The variable unit cost for each source is assumed to remain the same at all levels of demand reduction. Since the amount of water purchased or produced decreases, the total variable cost decreases. This results in a cost saving, shown in the last line of **Table 5-2**, for different levels of demand compared to the normal year cost.

Table 5-2: Estimated Cost Savings by Percent Usage Reduction

	FY 2019	1% Reduction	7% Reductkion	10% Reduction
SUPPLY (AF)				
Groundwater Wells	2,068	2,047	1,932	1,842
CCWD Randall-Bold Treatment Plant	1,975	1,975	1,975	1,975
Surface Water	5,212	5,140	4,741	4,511
Total Potable Supply	**9,255**	**9,163**	**8,648**	**8,328**
FIXED COST ($)				
Groundwater Wells	$0			
CCWD Randall-Bold Treatment Plant	$1,969,602			
Surface Water	$2,663,128			
TOTAL FIXED COSTS	**$4,632,730**	**$4,632,730**	**$4,632,730**	**$4,632,730**
VARIABLE COST ($/AF)				
Groundwater Wells	$394	$394	$394	$394
CCWD Randall-Bold Treatment Plant				
Surface Water	$223	$223	$223	$223
TOTAL VARIABLE COSTS	**$1,978,824**	**$1,954,550**	**$1,819,986**	**$1,733,160**
TOTAL WATER SUPPLY COSTS	**$6,611,554**	**$6,587,280**	**$6,452,716**	**$6,365,890**
Cost Savings		$24,274	$158,838	$245,663

The final step is to calculate the drought surcharge, shown in **Table 5-3**. First, the projected potable water revenue is calculated by multiplying the demand projections from **Table 5-1** for each level of reduction in use or scenario and the proposed water rates in FY 2019. The revenue shortfall is determined by comparing this revenue for each scenario with the FY 2019 revenues. Next, we add the estimated cost savings from **Table 5-2** for each scenario. The total shortfall is divided by the projected demand in each scenario to arrive at a uniform dollar increase per unit of water for each scenario. To provide flexibility, we have calculated the increase in rate for 1 percent reduction in water usage at the different levels of cutbacks. Using the conservative figure of $0.06 per kgal figure means that for a 20 percent reduction, each rate would need to increase by $1.20 per kgal. **Table 5-3** shows the proposed surcharge that would be effective July 1, 2018. Surcharges for subsequent years would increase by the overall revenue percentage increase shown in **Table 3-7.**

Table 5-3: Drought Surcharge by Percent Usage Reduction

	FY 2019	1% Reduction	7% Reductkion	10% Reduction
Projected Potable Revenue	**$13,218,078**	**$13,035,973**	**$12,186,589**	**$11,665,297**
Revenue Shortfall		($182,105)	($1,031,489)	($1,552,781)
Cost Savings		$24,274	$158,838	$245,663
Net Drought Related Expenses		$0	$0	$0
Net Revenue Shortfall to be Recovered		**($157,831)**	**($872,651)**	**($1,307,117)**
% Increase per unit		1%	7%	11%
$ Increase per unit - July 1, 2018		$0.06	$0.33	$0.51
Surcharge per each 1% Water Usage Reduction		**$0.06**	**$0.05**	**$0.05**

6. APPENDIX A: WATER COST OF SERVICE TABLES

Table 6-1: Allocation of Functionalized O&M and Capital Expenses to Cost Causation Components – WaterTable 3-14: Allocation of Functionalized O&M and Capital Expenses to Cost Causation Components

O&M Allocation	Supply	Base Delivery	Max Day	Max Hour	Fire	Pumping	Meter	Customer	General	TOTAL
Supply (Surface Water)	100%									100%
Production (Wells)	100%									100%
Treatment		48%	52%							100%
Distribution		22%	24%	44%	10%					100%
Utility Billing								100%		100%

O&M Allocation	Supply	Base Delivery	Max Day	Max Hour	Fire	Pumping	Meter	Customer	General	TOTAL
Supply (Surface Water)	$6,341,080	$0	$0	$0	$0	$0	$0	$0	$0	$6,341,080
Production (Wells)	$2,123,786	$0	$0	$0	$0	$0	$0	$0	$0	$2,123,786
Treatment	$0	$1,011,085	$1,112,193	$0	$0	$0	$0	$0	$0	$2,123,278
Distribution	$0	$878,750	$980,144	$1,791,298	$405,577	$0	$0	$0	$0	$4,055,770
Utility Billing	$0	$0	$0	$0	$0	$0	$0	$2,290,323	$0	$2,290,323
TOTAL O&M EXPENSES	**$8,464,866**	**$1,889,835**	**$2,092,338**	**$1,791,298**	**$405,577**	**$0**	**$0**	**$2,290,323**	**$0**	**$16,934,236**
TOTAL O&M Allocation, %	50%	11%	12%	11%	2%	0%	0%	14%	0%	100%

Table 6-1: Allocation of Functionalized O&M and Capital Expenses to Cost Causation Components – Water (cont'd)

Capital Allocation	Supply	Base Delivery	Max Day	Max Hour	Fire	Pumping	Meter	Customer	General	TOTAL
Land									100%	100%
Well		100%								100%
Reservoir		43%	47%	0%	10%					100%
Distribution		22%	24%	44%	10%					100%
Transmission		43%	47%	0%	10%					100%
Buildings									100%	100%
Machinery & Equipment							100%			100%
Vehicles									100%	100%
Pumps		48%	52%							100%
Treatment Plant		48%	52%							100%

Capital Allocation	Supply	Base Delivery	Max Day	Max Hour	Fire	Pumping	Meter	Customer	General	TOTAL
Land	$0	$0	$0	$0	$0	$0	$0	$0	$62,556	$62,556
Well	$0	$5,513,697	$0	$0	$0	$0	$0	$0	$0	$5,513,697
Reservoir	$0	$5,034,309	$5,596,802	$0	$1,181,235	$0	$0	$0	$0	$11,812,346
Distribution	$0	$13,114,915	$14,628,174	$26,734,250	$6,053,038	$0	$0	$0	$0	$60,530,377
Transmission	$0	$3,505,242	$3,896,889	$0	$822,459	$0	$0	$0	$0	$8,224,591
Buildings	$0	$0	$0	$0	$0	$0	$0	$0	$765,954	$765,954
Machinery & Equipment	$0	$0	$0	$0	$0	$0	$1,363,907	$0	$0	$1,363,907
Vehicles	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Pumps	$0	$1,319,204	$1,451,124	$0	$0	$0	$0	$0	$0	$2,770,328
Treatment Plant	$0	$30,151,414	$33,166,555	$0	$0	$0	$0	$0	$0	$63,317,969
TOTAL ASSETS	**$0**	**$58,638,782**	**$58,739,545**	**$26,734,250**	**$8,056,731**	**$0**	**$1,363,907**	**$0**	**$828,510**	**$154,361,725**
Total Asset Allocation, %	0%	38%	38%	17%	5%	0%	1%	0%	1%	100%

Table 6-2: Derivation of Service Units - Water

				Maximum Day Requirements			Maximum Hour Requirements					
	Monthl Tiers (kg	Annual Use (kgal)	Average Daily Use (kgal/day)	Capacity Factor	Total Capacity (kgal/day)	Extra Capacity (kgal/day)	Capacity Factor	Total Capacity (kgal/day)	Extra Capacity (kgal/day)	No. of Fire Meters (Equiv.)	No. of Meters (Equiv.)	No. of Bills (No.)
Residential												
Tier 1	5	1,136,427	3,113	1.11	3,456	342	2.11	6,583	3,127			
Tier 2	14	780,637	2,139	1.77	3,786	1,647	3.37	7,211	3,425			
Tier 3	20	165,423	453	2.44	1,106	653	4.65	2,106	1,001			
Tier 4	21+	152,096	417	2.75	1,146	729	5.24	2,183	1,037			
Non-Residential												
Tier 1	5	45,445	125	1.24	154	30	2.36	294	140			
Tier 2	6+	579,693	1,588	1.87	2,970	1,382	3.56	5,657	2,687			
Hydrant		5,187	14	5.93	84	70	11.30	161	76			
TOTAL		**2,864,907**				**4,853**			**11,492**	**0**	**31,014**	**238,831**

Table 6-3: Unit Cost Calculation - Water

	Supply	Base Delivery	Max Day	Max Hour	Fire	Pumping	Meter	Customer	General	TOTAL
Operating Expenses	$8,002,540	$1,786,618	$1,978,060	$1,693,463	$383,426	$0	$0	$2,165,232	$0	$16,009,339
Capital Expenses	$0	$1,873,537	$1,876,757	$854,172	$257,416	$0	$43,577	$0	$26,471	$4,931,931
Total Cost of Service	**$8,002,540**	**$3,660,155**	**$3,854,817**	**$2,547,635**	**$640,842**	**$0**	**$43,577**	**$2,165,232**	**$26,471**	**$20,941,271**
Allocation of General Cost		$7,504	$7,903	$5,223	$1,314	$0	$89	$4,439	($26,471)	$0
Allocation of Public Fire Protection Cost					($642,156)		$642,156			$0
Allocation of Peaking Cost to Meter			($2,935,667)	($1,940,172)			$4,875,839			$0
Total Adjusted Cost of Service	**$8,002,540**	**$3,667,659**	**$927,053**	**$612,686**	**$0**	**$0**	**$5,561,662**	**$2,169,671**	**$0**	**$20,941,271**
Unit of Service	2,864,907	2,864,907	4,853	11,492			31,014	238,831		
Unit	kgal	kgal	kgal/day	kgal/day			equiv meters	bills		
Unit Cost	$2.79	$1.28	$191.03	$53.31			$14.94	$9.08		

Table 6-4: Allocation of Cost to Customer Class - Water

	Supply	Base Delivery	Max Day	Max Hour	Fire	Pumping	Meter	Customer	General	TOTAL
Residential										
Tier 1	$3,174,379	$1,454,855	$65,426	$166,702						$4,861,363
Tier 2	$2,180,551	$999,372	$314,598	$182,599						$3,677,121
Tier 3	$462,075	$211,775	$124,674	$53,341						$851,865
Tier 4	$424,850	$194,714	$139,307	$55,275						$814,145
Non-Residential										
Tier 1	$126,942	$58,179	$5,708	$7,447						$198,276
Tier 2	$1,619,255	$742,124	$263,957	$143,257						$2,768,594
Hydrant	$14,487	$6,640	$13,383	$4,064						$38,574
Base Meters							$5,561,662	$2,169,671		$7,731,333
TOTAL (less WW Transfer)	**$8,002,540**	**$3,667,659**	**$927,053**	**$612,686**	**$0**	**$0**	**$5,561,662**	**$2,169,671**	**$0**	**$20,941,271**

7. APPENDIX B: WASTEWATER COST OF SERVICE TABLES

Table 7-1: Allocation of Functionalized O&M and Capital Expenses to Cost Causation Components – Wastewater

O&M Allocation	I&I	Flow	BOD	TSS	Customer	Laterals	General	TOTAL
Collection	9.9%	90.1%						100.0%
Treatment		50.0%	25.0%	25.0%				100.0%
Utility Billing					100.0%			100.0%
Lateral Maintenance						100.0%		100.0%

O&M Allocation	I&I	Flow	BOD	TSS	Customer	Laterals	General	TOTAL
Collection	$256,388	$2,344,184	$0	$0	$0	$0	$0	$2,600,573
Treatment	$0	$3,080,364	$1,540,182	$1,540,182	$0	$0	$0	$6,160,728
Utility Billing	$0	$0	$0	$0	$973,604	$0	$0	$973,604
Lateral Maintenance	$0	$0	$0	$0	$0	$270,392	$0	$270,392
TOTAL O&M EXPENSES	**$256,388**	**$5,424,549**	**$1,540,182**	**$1,540,182**	**$973,604**	**$270,392**	**$0**	**$10,005,297**
% allocation	2.6%	54.2%	15.4%	15.4%	9.7%	2.7%	0.0%	100.0%

Capital Allocation	I&I	Flow	BOD	TSS	Customer	Laterals	General	TOTAL
Land							100.0%	100.0%
Treatment		50.0%	25.0%	25.0%				100.0%
Collection	9.9%	85.1%				5.0%		100.0%
Buildings							100.0%	100.0%
Machinery & Equipment							100.0%	100.0%
Recycled Water							100.0%	100.0%

Capital Allocation	I&I	Flow	BOD	TSS	Customer	Laterals	General	TOTAL
Land	$0	$0	$0	$0	$0	$0	$97,376	$97,376
Treatment	$0	$20,288,244	$10,144,122	$10,144,122	$0	$0	$0	$40,576,488
Collection	$3,486,312	$30,107,587	$0	$0	$0	$1,768,100	$0	$35,361,999
Buildings	$0	$0	$0	$0	$0	$0	$19,242	$19,242
Machinery & Equipment	$0	$0	$0	$0	$0	$0	$27,485	$27,485
Recycled Water	$0	$0	$0	$0	$0	$0	$1,821,088	$1,821,088
TOTAL ASSETS	**$3,486,312**	**$50,395,831**	**$10,144,122**	**$10,144,122**	**$0**	**$1,768,100**	**$1,965,192**	**$77,903,678**
% allocation	4.5%	64.7%	13.0%	13.0%	0.0%	2.3%	2.5%	100.0%

Table 7-2: Derivation of Service Units - Wastewater

Customer Class		Flow (kgal)	BOD (lbs/yr)	TSS (lbs/yr)	Units	Accounts	Bills/Year
Residential		**1,024,509**	**2,180,236**	**1,496,240**	**20,576**	**18,700**	**246,909**
SFR	(cap at 7 kgal/mo)	945,995	2,013,151	1,381,574	18,642	18,642	223,709
MFR	(cap at 7 kgal/mo)	78,515	167,085	114,666	1,933	58	23,201
						6084	
Non-Residential Alternative Rate Classes							
Low Strength		33,822	30,380	31,096	37	37	440
Medium Low Strength		92,479	126,932	119,720	371	371	4,453
Medium Strength		5,126	12,553	5,799	4	4	49
Medium High Strength		164	914	928	1	1	12
High Strength		57,690	459,562	310,753	94	94	1,126

Table 7-3: Unit Cost Calculation - Wastewater

	I&I	Flow	BOD	TSS	Customer	Laterals	General	TOTAL
Operating Expenses	$243,487	$5,151,593	$1,462,682	$1,462,682	$924,613	$256,786	$0	$9,501,844
Capital Expenses	$115,129	$1,664,229	$334,991	$334,991	$0	$58,388	$64,897	$2,572,625
Total Cost of Service	**$358,616**	**$6,815,822**	**$1,797,673**	**$1,797,673**	**$924,613**	**$315,174**	**$64,897**	**$12,074,469**
Allocation of General Cost	$1,938	$36,831	$9,714	$9,714	$4,996	$1,703	($64,897)	$0
Allocated Cost of Service	**$360,554**	**$6,852,653**	**$1,807,387**	**$1,807,387**	**$929,610**	**$316,877**	**$0**	**$12,074,469**
Adjustments to Fixed Charges	$0	($2,867,330)			$2,867,330			$0
Adjusted Cost of Service	**$360,554**	**$3,985,323**	**$1,807,387**	**$1,807,387**	**$3,796,940**	**$316,877**	**$0**	**$12,074,469**
Unit of Service	19,207	1,213,789	2,810,576	1,964,536	252,990	19,207		
Units	accounts	kgal	lbs/yr	lbs/yr	bills/yr	Accounts		
Unit Cost	$1.56	$3.283	$0.643	$0.920	$15.01	$1.37		
	per month	per kgal	per lb	per lb	per month	per month		

Table 7-4: Allocation of Cost to Customer Class - Wastewater

Customer Class	I&I	Flow	BOD	TSS	Customer	Laterals	General	TOTAL
Residential	$351,042	$3,363,847	$1,402,037	$1,376,552	$3,705,676	$308,517		$10,507,670
SFR	$349,957	$3,106,054	$1,294,590	$1,271,058	$3,357,474	$307,564		$9,686,697
MFR	$1,084	$257,793	$107,447	$105,494	$348,202	$953		$820,972
Non-Residential Alternative Rate Classes								
Low Strength	$689	$111,050	$19,536	$28,608	$6,606	$605		$167,094
Medium Low Strength	$6,966	$303,642	$81,625	$110,143	$66,831	$6,122		$575,330
Medium Strength	$77	$16,829	$8,072	$5,335	$741	$68		$31,122
Medium High Strength	$19	$537	$588	$854	$185	$17		$2,200
High Strength	$1,762	$189,418	$295,529	$285,895	$16,901	$1,548		$791,053

Appendix J: Model Water Efficient Landscape Ordinance and Municipal Landscape and Screening Ordinance

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California Code of Regulations
Title 23. Waters
Division 2. Department of Water Resources
Chapter 2.7. Model Water Efficient Landscape Ordinance

§ 490. Purpose.

(a) The State Legislature has found:

(1) that the waters of the state are of limited supply and are subject to ever increasing demands;

(2) that the continuation of California’s economic prosperity is dependent on the availability of adequate supplies of water for future uses;

(3) that it is the policy of the State to promote the conservation and efficient use of water and to prevent the waste of this valuable resource;

(4) that landscapes are essential to the quality of life in California by providing areas for active and passive recreation and as an enhancement to the environment by cleaning air and water, preventing erosion, offering fire protection, and replacing ecosystems lost to development; and

(5) that landscape design, installation, maintenance and management can and should be water efficient; and

(6) that Section 2 of Article X of the California Constitution specifies that the right to use water is limited to the amount reasonably required for the beneficial use to be served and the right does not and shall not extend to waste or unreasonable method of use.

(b) Consistent with these legislative findings, the purpose of this model ordinance is to:

(1) promote the values and benefits of landscapes while recognizing the need to invest water and other resources as efficiently as possible;

(2) establish a structure for planning, designing, installing, maintaining and managing water efficient landscapes in new construction and rehabilitated projects;

(3) establish provisions for water management practices and water waste prevention for existing landscapes;

(4) use water efficiently without waste by setting a Maximum Applied Water Allowance as an upper limit for water use and reduce water use to the lowest practical amount;

(5) promote the benefits of consistent landscape ordinances with neighboring local and regional agencies;

(6) encourage local agencies and water purveyors to use economic incentives that promote the efficient use of water, such as implementing a tiered-rate structure; and

(7) encourage local agencies to designate the necessary authority that implements and enforces the provisions of the Model Water Efficient Landscape Ordinance or its local landscape ordinance.

Note: Authority cited: Section 65593, Government Code. Reference: Sections 65591, 65593, 65596, Government Code.

§ 490.1 Applicability

(a) After January 1, 2010, this ordinance shall apply to all of the following landscape projects:

(1) new construction and rehabilitated landscapes for public agency projects and private development projects with a landscape area equal to or greater than 2,500 square feet requiring a building or landscape permit, plan check or design review;

(2) new construction and rehabilitated landscapes which are developer-installed in single-family and multi-family projects with a landscape area equal to or greater than 2,500 square feet requiring a building or landscape permit, plan check, or design review;

(3) new construction landscapes which are homeowner-provided and/or homeowner-hired in single-family and multi-family residential projects with a total project landscape area equal to or greater than 5,000 square feet requiring a building or landscape permit, plan check or design review;

(4) existing landscapes limited to Sections 493, 493.1 and 493.2; and
(5) cemeteries. Recognizing the special landscape management needs of cemeteries, new and rehabilitated cemeteries are limited to Sections 492.4, 492.11 and 492.12; and existing cemeteries are limited to Sections 493, 493.1 and 493.2.
(b) This ordinance does not apply to:
(1) registered local, state or federal historical sites;
(2) ecological restoration projects that do not require a permanent irrigation system;
(3) mined-land reclamation projects that do not require a permanent irrigation system; or
(4) plant collections, as part of botanical gardens and arboretums open to the public.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 491. Definitions.

The terms used in this ordinance have the meaning set forth below:
(a) “applied water” means the portion of water supplied by the irrigation system to the landscape.
(b) “automatic irrigation controller” means an automatic timing device used to remotely control valves that operate an irrigation system. Automatic irrigation controllers schedule irrigation events using either evapotranspiration (weather-based) or soil moisture data.
(c) “backflow prevention device” means a safety device used to prevent pollution or contamination of the water supply due to the reverse flow of water from the irrigation system.
(d) “Certificate of Completion” means the document required under Section 492.9.
(e) “certified irrigation designer” means a person certified to design irrigation systems by an accredited academic institution a professional trade organization or other program such as the US Environmental Protection Agency’s WaterSense irrigation designer certification program and Irrigation Association’s Certified Irrigation Designer program.
(f) “certified landscape irrigation auditor” means a person certified to perform landscape irrigation audits by an accredited academic institution, a professional trade organization or other program such as the US Environmental Protection Agency’s WaterSense irrigation auditor certification program and Irrigation Association’s Certified Landscape Irrigation Auditor program.
(g) “check valve” or “anti-drain valve” means a valve located under a sprinkler head, or other location in the irrigation system, to hold water in the system to prevent drainage from sprinkler heads when the sprinkler is off.
(h) “common interest developments” means community apartment projects, condominium projects, planned developments, and stock cooperatives per Civil Code Section 1351.
(i) “conversion factor (0.62)” means the number that converts acre-inches per acre per year to gallons per square foot per year
(j) “drip irrigation” means any non-spray low volume irrigation system utilizing emission devices with a flow rate measured in gallons per hour. Low volume irrigation systems are specifically designed to apply small volumes of water slowly at or near the root zone of plants.
(k) “ecological restoration project” means a project where the site is intentionally altered to establish a defined, indigenous, historic ecosystem.
(l)“effective precipitation” or “usable rainfall” (Eppt) means the portion of total precipitation which becomes available for plant growth.
(m) “emitter” means a drip irrigation emission device that delivers water slowly from the system to the soil.
(n) “established landscape” means the point at which plants in the landscape have developed significant root growth into the soil. Typically, most plants are established after one or two years of growth.
(o) “establishment period of the plants” means the first year after installing the plant in the landscape or the first two years if irrigation will be terminated after establishment. Typically, most plants are established after one or two years of growth.

(p) “Estimated Total Water Use” (ETWU) means the total water used for the landscape as described in Section 492.4.

(q) “ET adjustment factor” (ETAF) means a factor of 0.7, that, when applied to reference evapotranspiration, adjusts for plant factors and irrigation efficiency, two major influences upon the amount of water that needs to be applied to the landscape.

A combined plant mix with a site-wide average of 0.5 is the basis of the plant factor portion of this calculation. For purposes of the ETAF, the average irrigation efficiency is 0.71. Therefore, the ET Adjustment Factor is (0.7)=(0.5/0.71). ETAF for a Special Landscape Area shall not exceed 1.0. ETAF for existing non-rehabilitated landscapes is 0.8.

(r) “evapotranspiration rate” means the quantity of water evaporated from adjacent soil and other surfaces and transpired by plants during a specified time.

(s) “flow rate” means the rate at which water flows through pipes, valves and emission devices, measured in gallons per minute, gallons per hour, or cubic feet per second.

(t) “hardscapes” means any durable material (pervious and non-pervious).

(u) “homeowner-provided landscaping” means any landscaping either installed by a private individual for a single family residence or installed by a licensed contractor hired by a homeowner. A homeowner, for purposes of this ordinance, is a person who occupies the dwelling he or she owns. This excludes speculative homes, which are not owner-occupied dwellings.

(v) “hydrozone” means a portion of the landscaped area having plants with similar water needs. A hydrozone may be irrigated or non-irrigated.

(w) “infiltration rate” means the rate of water entry into the soil expressed as a depth of water per unit of time (e.g., inches per hour).

(x)“invasive plant species” means species of plants not historically found in California that spread outside cultivated areas and can damage environmental or economic resources. Invasive species may be regulated by county agricultural agencies as noxious species. “Noxious weeds” means any weed designated by the Weed Control Regulations in the Weed Control Act and identified on a Regional District noxious weed control list. Lists of invasive plants are maintained at the California Invasive Plant Inventory and USDA invasive and noxious weeds database.

(y) “irrigation audit” means an in-depth evaluation of the performance of an irrigation system conducted by a Certified Landscape Irrigation Auditor. An irrigation audit includes, but is not limited to: inspection, system tune-up, system test with distribution uniformity or emission uniformity, reporting overspray or runoff that causes overland flow, and preparation of an irrigation schedule.

(z) “irrigation efficiency” (IE) means the measurement of the amount of water beneficially used divided by the amount of water applied. Irrigation efficiency is derived from measurements and estimates of irrigation system characteristics and management practices. The minimum average irrigation efficiency for purposes of this ordinance is 0.71. Greater irrigation efficiency can be expected from well designed and maintained systems.

(aa) “irrigation survey” means an evaluation of an irrigation system that is less detailed than an irrigation audit. An irrigation survey includes, but is not limited to: inspection, system test, and written recommendations to improve performance of the irrigation system.

(bb) “irrigation water use analysis” means an analysis of water use data based on meter readings and billing data.

(cc) “landscape architect” means a person who holds a license to practice landscape architecture in the state of California Business and Professions Code, Section 5615.

(dd) “landscape area” means all the planting areas, turf areas, and water features in a landscape design plan subject to the Maximum Applied Water Allowance calculation. The landscape area does not include footprints of buildings or structures, sidewalks, driveways, parking lots, decks, patios, gravel or stone walks, other pervious or non-pervious hardscapes, and other non-irrigated areas designated for non-development (e.g., open spaces and existing native vegetation).

(ee) “landscape contractor” means a person licensed by the state of California to construct, maintain, repair, install, or subcontract the development of landscape systems.
(ff) “Landscape Documentation Package” means the documents required under Section 492.3.
(gg) “landscape project” means total area of landscape in a project as defined in “landscape area” for the purposes of this ordinance, meeting requirements under Section 490.1.
(hh) “lateral line” means the water delivery pipeline that supplies water to the emitters or sprinklers from the valve.
(ii) “local agency” means a city or county, including a charter city or charter county, that is responsible for adopting and implementing the ordinance. The local agency is also responsible for the enforcement of this ordinance, including but not limited to, approval of a permit and plan check or design review of a project.
(jj) “local water purveyor” means any entity, including a public agency, city, county, or private water company that provides retail water service.
(kk) “low volume irrigation” means the application of irrigation water at low pressure through a system of tubing or lateral lines and low-volume emitters such as drip, drip lines, and bubblers. Low volume irrigation systems are specifically designed to apply small volumes of water slowly at or near the root zone of plants.
(ll) “main line” means the pressurized pipeline that delivers water from the water source to the valve or outlet.
(mm) “Maximum Applied Water Allowance” (MAWA) means the upper limit of annual applied water for the established landscaped area as specified in Section 492.4. It is based upon the area’s reference evapotranspiration, the ET Adjustment Factor, and the size of the landscape area. The Estimated Total Water Use shall not exceed the Maximum Applied Water Allowance. Special Landscape Areas, including recreation areas, areas permanently and solely dedicated to edible plants such as orchards and vegetable gardens, and areas irrigated with recycled water are subject to the MAWA with an ETAF not to exceed 1.0.
(nn) “microclimate” means the climate of a small, specific area that may contrast with the climate of the overall landscape area due to factors such as wind, sun exposure, plant density, or proximity to reflective surfaces.
(oo) “mined-land reclamation projects” means any surface mining operation with a reclamation plan approved in accordance with the Surface Mining and Reclamation Act of 1975.
(pp) “mulch” means any organic material such as leaves, bark, straw, compost, or inorganic mineral materials such as rocks, gravel, and decomposed granite left loose and applied to the soil surface for the beneficial purposes of reducing evaporation, suppressing weeds, moderating soil temperature, and preventing soil erosion.
(qq) “new construction” means, for the purposes of this ordinance, a new building with a landscape or other new landscape, such as a park, playground, or greenbelt without an associated building.
(rr) “operating pressure” means the pressure at which the parts of an irrigation system are designed by the manufacturer to operate.
(ss) “overhead sprinkler irrigation systems” means systems that deliver water through the air (e.g., spray heads and rotors).
(tt) “overspray” means the irrigation water which is delivered beyond the target area.
(uu) “permit” means an authorizing document issued by local agencies for new construction or rehabilitated landscapes.
(vv) “pervious” means any surface or material that allows the passage of water through the material and into the underlying soil.
(ww) “plant factor” or “plant water use factor” is a factor , when multiplied by ETo, estimates the amount of water needed by plants. For purposes of this ordinance, the plant factor range for low water use plants is 0 to 0.3, the plant factor range for moderate water use plants is 0.4 to 0.6, and the plant

factor range for high water use plants is 0.7 to 1.0. Plant factors cited in this ordinance are derived from the Department of Water Resources 2000 publication “Water Use Classification of Landscape Species”.

(xx) “precipitation rate” means the rate of application of water measured in inches per hour.

(yy) “project applicant” means the individual or entity submitting a Landscape Documentation Package required under Section 492.3, to request a permit, plan check, or design review from the local agency. A project applicant may be the property owner or his or her designee.

(zz) “rain sensor” or “rain sensing shutoff device” means a component which automatically suspends an irrigation event when it rains.

(aaa) “record drawing” or “as-builts” means a set of reproducible drawings which show significant changes in the work made during construction and which are usually based on drawings marked up in the field and other data furnished by the contractor.

(bbb) “recreational area” means areas dedicated to active play such as parks, sports fields, and golf courses where turf provides a playing surface.

(ccc) “recycled water”, “reclaimed water”, or “treated sewage effluent water” means treated or recycled waste water of a quality suitable for non-potable uses such as landscape irrigation and water features. This water is not intended for human consumption.

(ddd) “reference evapotranspiration” or “ETo” means a standard measurement of environmental parameters which affect the water use of plants. ETo is expressed in inches per day, month, or year as represented in Section 495.1, and is an estimate of the evapotranspiration of a large field of four- to seven-inch tall, cool-season grass that is well watered. Reference evapotranspiration is used as the basis of determining the Maximum Applied Water Allowance so that regional differences in climate can be accommodated.

(eee) “rehabilitated landscape” means any re-landscaping project that requires a permit , plan check, or design review, meets the requirements of Section 490.1, and the modified landscape area is equal to or greater than 2,500 square feet, is 50% of the total landscape area, and the modifications are completed within one year.

(fff) “runoff” means water which is not absorbed by the soil or landscape to which it is applied and flows from the landscape area. For example, runoff may result from water that is applied at too great a rate (application rate exceeds infiltration rate) or when there is a slope.

(ggg) “soil moisture sensing device” or “soil moisture sensor” means a device that measures the amount of water in the soil. The device may also suspend or initiate an irrigation event.

(hhh) “soil texture” means the classification of soil based on its percentage of sand, silt, and clay.

(iii)“Special Landscape Area” (SLA) means an area of the landscape dedicated solely to edible plants, areas irrigated with recycled water, water features using recycled water and areas dedicated to active play such as parks, sports fields, golf courses, and where turf provides a playing surface.

(jjj) “sprinkler head” means a device which delivers water through a nozzle.

(kkk) “static water pressure” means the pipeline or municipal water supply pressure when water is not flowing.

(lll) “station” means an area served by one valve or by a set of valves that operate simultaneously.

(mmm) “swing joint” means an irrigation component that provides a flexible, leak-free connection between the emission device and lateral pipeline to allow movement in any direction and to prevent equipment damage.

(nnn) “turf” means a ground cover surface of mowed grass. Annual bluegrass, Kentucky bluegrass, Perennial ryegrass, Red fescue, and Tall fescue are cool-season grasses. Bermudagrass, Kikuyugrass, Seashore Paspalum, St. Augustinegrass, Zoysiagrass, and Buffalo grass are warm-season grasses.

(ooo) “valve” means a device used to control the flow of water in the irrigation system.

(ppp) “water conserving plant species” means a plant species identified as having a low plant factor.

(qqq) “water feature” means a design element where open water performs an aesthetic or recreational function. Water features include ponds, lakes, waterfalls, fountains, artificial streams, spas, and swimming pools (where water is artificially supplied). The surface area of water features is included in the high water use hydrozone of the landscape area. Constructed wetlands used for on-site wastewater treatment or stormwater best management practices that are not irrigated and used solely for water treatment or stormwater retention are not water features and, therefore, are not subject to the water budget calculation.

(rrr) “watering window” means the time of day irrigation is allowed.

(sss) “WUCOLS” means the Water Use Classification of Landscape Species published by the University of California Cooperative Extension, the Department of Water Resources and the Bureau of Reclamation, 2000.

Note: Authority Cited: Section 65595, Government Code. Reference: Sections 65592, 65596, Government Code.

§ 492. Provisions for New Construction or Rehabilitated Landscapes.

(a) A local agency may designate another agency, such as a water purveyor, to implement some or all of the requirements contained in this ordinance. Local agencies may collaborate with water purveyors to define each entity’s specific responsibilities relating to this ordinance.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.1 Compliance with Landscape Documentation Package.

(a) Prior to construction, the local agency shall:

(1) provide the project applicant with the ordinance and procedures for permits, plan checks, or design reviews;

(2) review the Landscape Documentation Package submitted by the project applicant;

(3) approve or deny the Landscape Documentation Package;

(4) issue a permit or approve the plan check or design review for the project applicant; and

(5) upon approval of the Landscape Documentation Package, submit a copy of the Water Efficient Landscape Worksheet to the local water purveyor.

(b) Prior to construction, the project applicant shall:

(1) submit a Landscape Documentation Package to the local agency.

(c) Upon approval of the Landscape Documentation Package by the local agency, the project applicant shall:

(1) receive a permit or approval of the plan check or design review and record the date of the permit in the Certificate of Completion;

(2) submit a copy of the approved Landscape Documentation Package along with the record drawings, and any other information to the property owner or his/her designee; and

(3) submit a copy of the Water Efficient Landscape Worksheet to the local water purveyor.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.2 Penalties.

(a) A local agency may establish and administer penalties to the project applicant for non-compliance with the ordinance to the extent permitted by law.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.3 Elements of the Landscape Documentation Package.

(a) The Landscape Documentation Package shall include the following six (6) elements:
(1) project information;
(A) date
(B) project applicant
(C) project address (if available, parcel and/or lot number(s))
(D) total landscape area (square feet)
(E) project type (e.g., new, rehabilitated, public, private, cemetery, homeowner-installed)
(F) water supply type (e.g., potable, recycled, well) and identify the local retail water purveyor if the applicant is not served by a private well
(G) checklist of all documents in Landscape Documentation Package
(H) project contacts to include contact information for the project applicant and property owner
(I) applicant signature and date with statement, "I agree to comply with the requirements of the water efficient landscape ordinance and submit a complete Landscape Documentation Package".
(2) Water Efficient Landscape Worksheet;
(A) hydrozone information table
(B) water budget calculations
1. Maximum Applied Water Allowance (MAWA)
2. Estimated Total Water Use (ETWU)
(3) soil management report;
(4) landscape design plan;
(5) irrigation design plan; and
(6) grading design plan.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.4 Water Efficient Landscape Worksheet.

(a) A project applicant shall complete the Water Efficient Landscape Worksheet which contains two sections (see sample worksheet in Appendix B):
(1) a hydrozone information table (see Appendix B, Section A) for the landscape project; and
(2) a water budget calculation (see Appendix B, Section B) for the landscape project. For the calculation of the Maximum Applied Water Allowance and Estimated Total Water Use, a project applicant shall use the ETo values from the Reference Evapotranspiration Table in Appendix A. For geographic areas not covered in Appendix A, use data from other cities located nearby in the same reference evapotranspiration zone, as found in the CIMIS Reference Evapotranspiration Zones Map, Department of Water Resources, 1999.
(b) Water budget calculations shall adhere to the following requirements:
(1) The plant factor used shall be from WUCOLS. The plant factor ranges from 0 to 0.3 for low water use plants, from 0.4 to 0.6 for moderate water use plants, and from 0.7 to 1.0 for high water use plants.
(2) All water features shall be included in the high water use hydrozone and temporarily irrigated areas shall be included in the low water use hydrozone.
(3) All Special Landscape Areas shall be identified and their water use calculated as described below.
(4) ETAF for Special Landscape Areas shall not exceed 1.0.
(c) Maximum Applied Water Allowance
The Maximum Applied Water Allowance shall be calculated using the equation:

$$MAWA = (ETo) (0.62) [(0.7 \times LA) + (0.3 \times SLA)]$$

The example calculations below are hypothetical to demonstrate proper use of the equations and do not represent an existing and/or planned landscape project. The ETo values used in these calculations are from the Reference Evapotranspiration Table in Appendix A, for planning purposes only. For actual irrigation scheduling, automatic irrigation controllers are required and shall use current reference evapotranspiration data, such as from the California Irrigation Management Information System (CIMIS), other equivalent data, or soil moisture sensor data.

(1) Example MAWA calculation: a hypothetical landscape project in Fresno, CA with an irrigated landscape area of 50,000 square feet without any Special Landscape Area (SLA= 0, no edible plants, recreational areas, or use of recycled water). To calculate MAWA, the annual reference evapotranspiration value for Fresno is 51.1 inches as listed in the Reference Evapotranspiration Table in Appendix A.

MAWA = (ETo) (0.62) [(0.7 x LA) + (0.3 x SLA)]
MAWA = Maximum Applied Water Allowance (gallons per year)
ETo = Reference Evapotranspiration (inches per year)
0.62 = Conversion Factor (to gallons)
0.7 = ET Adjustment Factor (ETAF)
LA = Landscape Area including SLA (square feet)
0.3 = Additional Water Allowance for SLA
SLA = Special Landscape Area (square feet)
MAWA = (51.1 inches) (0.62) [(0.7 x 50,000 square feet) + (0.3 x 0)]
= 1,108,870 gallons per year
To convert from gallons per year to hundred-cubic-feet per year:
= 1,108,870/748 = 1,482 hundred-cubic-feet per year
(100 cubic feet = 748 gallons)

(2) In this next hypothetical example, the landscape project in Fresno, CA has the same ETo value of 51.1 inches and a total landscape area of 50,000 square feet. Within the 50,000 square foot project, there is now a 2,000 square foot area planted with edible plants. This 2,000 square foot area is considered to be a Special Landscape Area.

MAWA = (ETo) (0.62) [(0.7 x LA) + (0.3 x SLA)]
MAWA = (51.1 inches) (0.62) [(0.7 x 50,000 square feet) + (0.3 x 2,000 square feet)]
= 31.68 x [35,000 + 600] gallons per year
= 31.68 x 35,600 gallons per year
=1,127,808 gallons per year or 1,508 hundred-cubic-feet per year

(d) Estimated Total Water Use.

The Estimated Total Water Use shall be calculated using the equation below. The sum of the Estimated Total Water Use calculated for all hydrozones shall not exceed MAWA.

$$ETWU = (ETo)(0.62)\left(\frac{PF\ x\ HA}{IE} + SLA\right)$$

Where:

ETWU = Estimated Total Water Use per year (gallons)
ETo = Reference Evapotranspiration (inches)
PF = Plant Factor from WUCOLS (see Section 491)
HA = Hydrozone Area [high, medium, and low water use areas] (square feet)
SLA = Special Landscape Area (square feet)
0.62 = Conversion Factor
IE = Irrigation Efficiency (minimum 0.71)

(1) Example ETWU calculation: landscape area is 50,000 square feet; plant water use type, plant factor, and hydrozone area are shown in the table below. The ETo value is 51.1 inches per year. There are no Special Landscape Areas (recreational area, area permanently and solely dedicated to edible plants, and area irrigated with recycled water) in this example.

Hydrozone	Plant Water Use Type(s)	Plant Factor (PF)*	Hydrozone Area (HA) (square feet)	PF x HA (square feet)
1	High	0.8	7,000	5,600
2	High	0.7	10,000	7,000
3	Medium	0.5	16,000	8,000
4	Low	0.3	7,000	2,100
5	Low	0.2	10,000	2,000
			Sum	24,700

*Plant Factor from WUCOLS

$$ETWU = (51.1)(0.62)\left(\frac{24{,}700}{0.71} + 0\right)$$

= 1,102,116 gallons per year

Compare ETWU with MAWA: For this example MAWA = (51.1) (0.62) [(0.7 x 50,000) + (0.3 x 0)] = 1,108,870 gallons per year. The ETWU (1,102,116 gallons per year) is less than MAWA (1,108,870 gallons per year). In this example, the water budget complies with the MAWA.

(2) Example ETWU calculation: total landscape area is 50,000 square feet, 2,000 square feet of which is planted with edible plants. The edible plant area is considered a Special Landscape Area (SLA). The reference evapotranspiration value is 51.1 inches per year. The plant type, plant factor, and hydrozone area are shown in the table below.

Hydrozone	Plant Water Use Type(s)	Plant Factor (PF)*	Hydrozone Area (HA) (square feet)	PF x HA (square feet)
1	High	0.8	7,000	5,600
2	High	0.7	9,000	6,300
3	Medium	0.5	15,000	7,500
4	Low	0.3	7,000	2,100
5	Low	0.2	10,000	2,000
			Sum	23,500
6	SLA	1.0	2,000	2,000

*Plant Factor from WUCOLS

$$ETWU = (51.1)(0.62)\left(\frac{23{,}500}{0.71} + 2{,}000\right)$$

= (31.68) (33,099 + 2,000)
= 1,111,936 gallons per year

Compare ETWU with MAWA. For this example:
MAWA = (51.1) (0.62) [(0.7 x 50,000) + (0.3 x 2,000)]
= 31.68 x [35,000 + 600]
= 31.68 x 35,600
=1,127,808 gallons per year

The ETWU (1,111,936 gallons per year) is less than MAWA (1,127,808 gallons per year). For this example, the water budget complies with the MAWA.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.5 Soil Management Report.

(a) In order to reduce runoff and encourage healthy plant growth, a soil management report shall be completed by the project applicant, or his/her designee, as follows:
(1) Submit soil samples to a laboratory for analysis and recommendations.
(A) Soil sampling shall be conducted in accordance with laboratory protocol, including protocols regarding adequate sampling depth for the intended plants.
(B) The soil analysis may include:
1. soil texture;
2. infiltration rate determined by laboratory test or soil texture infiltration rate table;
3. pH;
4. total soluble salts;
5. sodium;
6. percent organic matter; and
7. recommendations.
(2) The project applicant, or his/her designee, shall comply with one of the following:
(A) If significant mass grading is not planned, the soil analysis report shall be submitted to the local agency as part of the Landscape Documentation Package; or
(B) If significant mass grading is planned, the soil analysis report shall be submitted to the local agency as part of the Certificate of Completion.
(3) The soil analysis report shall be made available, in a timely manner, to the professionals preparing the landscape design plans and irrigation design plans to make any necessary adjustments to the design plans.
(4) The project applicant, or his/her designee, shall submit documentation verifying implementation of soil analysis report recommendations to the local agency with Certificate of Completion.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.6 Landscape Design Plan.

(a) For the efficient use of water, a landscape shall be carefully designed and planned for the intended function of the project. A landscape design plan meeting the following design criteria shall be submitted as part of the Landscape Documentation Package.
(1) Plant Material
(A) Any plant may be selected for the landscape, providing the Estimated Total Water Use in the landscape area does not exceed the Maximum Applied Water Allowance. To encourage the efficient use of water, the following is highly recommended:
1. protection and preservation of native species and natural vegetation;
2. selection of water-conserving plant and turf species;

3. selection of plants based on disease and pest resistance;
4. selection of trees based on applicable local tree ordinances or tree shading guidelines; and
5. selection of plants from local and regional landscape program plant lists.

(B) Each hydrozone shall have plant materials with similar water use, with the exception of hydrozones with plants of mixed water use, as specified in Section 492.7(a)(2)(D).

(C) Plants shall be selected and planted appropriately based upon their adaptability to the climatic, geologic, and topographical conditions of the project site. To encourage the efficient use of water, the following is highly recommended:

1. use the Sunset Western Climate Zone System which takes into account temperature, humidity, elevation, terrain, latitude, and varying degrees of continental and marine influence on local climate;
2. recognize the horticultural attributes of plants (i.e., mature plant size, invasive surface roots) to minimize damage to property or infrastructure [e.g., buildings, sidewalks, power lines]; and
3. consider the solar orientation for plant placement to maximize summer shade and winter solar gain.

(D) Turf is not allowed on slopes greater than 25% where the toe of the slope is adjacent to an impermeable hardscape and where 25% means 1 foot of vertical elevation change for every 4 feet of horizontal length (rise divided by run x 100 = slope percent).

(E) A landscape design plan for projects in fire-prone areas shall address fire safety and prevention. A defensible space or zone around a building or structure is required per Public Resources Code Section 4291(a) and (b). Avoid fire-prone plant materials and highly flammable mulches.

(F) The use of invasive and/or noxious plant species is strongly discouraged.

(G) The architectural guidelines of a common interest development, which include community apartment projects, condominiums, planned developments, and stock cooperatives, shall not prohibit or include conditions that have the effect of prohibiting the use of low-water use plants as a group.

(2) Water Features

(A) Recirculating water systems shall be used for water features.

(B) Where available, recycled water shall be used as a source for decorative water features.

(C) Surface area of a water feature shall be included in the high water use hydrozone area of the water budget calculation.

(D) Pool and spa covers are highly recommended.

(3) Mulch and Amendments

(A) A minimum two inch (2″) layer of mulch shall be applied on all exposed soil surfaces of planting areas except in turf areas, creeping or rooting groundcovers, or direct seeding applications where mulch is contraindicated.

(B) Stabilizing mulching products shall be used on slopes.

(C) The mulching portion of the seed/mulch slurry in hydro-seeded applications shall meet the mulching requirement.

(D) Soil amendments shall be incorporated according to recommendations of the soil report and what is appropriate for the plants selected (see Section 492.5).

(b) The landscape design plan, at a minimum, shall:

(1) delineate and label each hydrozone by number, letter, or other method;
(2) identify each hydrozone as low, moderate, high water, or mixed water use. Temporarily irrigated areas of the landscape shall be included in the low water use hydrozone for the water budget calculation;
(3) identify recreational areas;
(4) identify areas permanently and solely dedicated to edible plants;
(5) identify areas irrigated with recycled water;
(6) identify type of mulch and application depth;
(7) identify soil amendments, type, and quantity;
(8) identify type and surface area of water features;
(9) identify hardscapes (pervious and non-pervious);

(10) identify location and installation details of any applicable stormwater best management practices that encourage on-site retention and infiltration of stormwater. Stormwater best management practices are encouraged in the landscape design plan and examples include, but are not limited to:
(A) infiltration beds, swales, and basins that allow water to collect and soak into the ground;
(B) constructed wetlands and retention ponds that retain water, handle excess flow, and filter pollutants; and
(C) pervious or porous surfaces (e.g., permeable pavers or blocks, pervious or porous concrete, etc.) that minimize runoff.
(11) identify any applicable rain harvesting or catchment technologies (e.g., rain gardens, cisterns, etc.);
(12) contain the following statement: “I have complied with the criteria of the ordinance and applied them for the efficient use of water in the landscape design plan”; and
(13) bear the signature of a licensed landscape architect, licensed landscape contractor, or any other person authorized to design a landscape. (See Sections 5500.1, 5615, 5641, 5641.1, 5641.2, 5641.3, 5641.4, 5641.5, 5641.6, 6701, 7027.5 of the Business and Professions Code, Section 832.27 of Title16 of the California Code of Regulations, and Section 6721 of the Food and Agriculture Code.)

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code and Section 1351, Civil Code.

§ 492.7 Irrigation Design Plan.

(a) For the efficient use of water, an irrigation system shall meet all the requirements listed in this section and the manufacturers’ recommendations. The irrigation system and its related components shall be planned and designed to allow for proper installation, management, and maintenance. An irrigation design plan meeting the following design criteria shall be submitted as part of the Landscape Documentation Package.
(1) System
(A) Dedicated landscape water meters are highly recommended on landscape areas smaller than 5,000 square feet to facilitate water management.
(B) Automatic irrigation controllers utilizing either evapotranspiration or soil moisture sensor data shall be required for irrigation scheduling in all irrigation systems.
(C) The irrigation system shall be designed to ensure that the dynamic pressure at each emission device is within the manufacturer’s recommended pressure range for optimal performance.
1. If the static pressure is above or below the required dynamic pressure of the irrigation system, pressure-regulating devices such as inline pressure regulators, booster pumps, or other devices shall be installed to meet the required dynamic pressure of the irrigation system.
2. Static water pressure, dynamic or operating pressure. and flow reading of the water supply shall be measured at the point of connection. These pressure and flow measurements shall be conducted at the design stage. If the measurements are not available at the design stage, the measurements shall be conducted at installation.
(D) Sensors (rain, freeze, wind, etc.), either integral or auxiliary, that suspend or alter irrigation operation during unfavorable weather conditions shall be required on all irrigation systems, as appropriate for local climatic conditions. Irrigation should be avoided during windy or freezing weather or during rain.
(E) Manual shut-off valves (such as a gate valve, ball valve, or butterfly valve) shall be required, as close as possible to the point of connection of the water supply, to minimize water loss in case of an emergency (such as a main line break) or routine repair.

(F) Backflow prevention devices shall be required to protect the water supply from contamination by the irrigation system. A project applicant shall refer to the applicable local agency code (i.e., public health) for additional backflow prevention requirements.
(G) High flow sensors that detect and report high flow conditions created by system damage or malfunction are recommended.
(H) The irrigation system shall be designed to prevent runoff, low head drainage, overspray, or other similar conditions where irrigation water flows onto non-targeted areas, such as adjacent property, non-irrigated areas, hardscapes, roadways, or structures.
(I) Relevant information from the soil management plan, such as soil type and infiltration rate, shall be utilized when designing irrigation systems.
(J) The design of the irrigation system shall conform to the hydrozones of the landscape design plan.
(K) The irrigation system must be designed and installed to meet, at a minimum, the irrigation efficiency criteria as described in Section 492.4 regarding the Maximum Applied Water Allowance.
(L) It is highly recommended that the project applicant or local agency inquire with the local water purveyor about peak water operating demands (on the water supply system) or water restrictions that may impact the effectiveness of the irrigation system.
(M) In mulched planting areas, the use of low volume irrigation is required to maximize water infiltration into the root zone.
(N) Sprinkler heads and other emission devices shall have matched precipitation rates, unless otherwise directed by the manufacturer’s recommendations.
(O) Head to head coverage is recommended. However, sprinkler spacing shall be designed to achieve the highest possible distribution uniformity using the manufacturer’s recommendations.
(P) Swing joints or other riser-protection components are required on all risers subject to damage that are adjacent to high traffic areas.
(Q) Check valves or anti-drain valves are required for all irrigation systems.
(R) Narrow or irregularly shaped areas, including turf, less than eight (8) feet in width in any direction shall be irrigated with subsurface irrigation or low volume irrigation system.
(S) Overhead irrigation shall not be permitted within 24 inches of any non-permeable surface. Allowable irrigation within the setback from non-permeable surfaces may include drip, drip line, or other low flow non-spray technology. The setback area may be planted or unplanted. The surfacing of the setback may be mulch, gravel, or other porous material. These restrictions may be modified if:
1. the landscape area is adjacent to permeable surfacing and no runoff occurs; or
2. the adjacent non-permeable surfaces are designed and constructed to drain entirely to landscaping; or
3. the irrigation designer specifies an alternative design or technology, as part of the Landscape Documentation Package and clearly demonstrates strict adherence to irrigation system design criteria in Section 492.7 (a)(1)(H). Prevention of overspray and runoff must be confirmed during the irrigation audit.
(T) Slopes greater than 25% shall not be irrigated with an irrigation system with a precipitation rate exceeding 0.75 inches per hour. This restriction may be modified if the landscape designer specifies an alternative design or technology, as part of the Landscape Documentation Package, and clearly demonstrates no runoff or erosion will occur. Prevention of runoff and erosion must be confirmed during the irrigation audit.
(2) Hydrozone
(A) Each valve shall irrigate a hydrozone with similar site, slope, sun exposure, soil conditions, and plant materials with similar water use.
(B) Sprinkler heads and other emission devices shall be selected based on what is appropriate for the plant type within that hydrozone.
(C) Where feasible, trees shall be placed on separate valves from shrubs, groundcovers, and turf.
(D) Individual hydrozones that mix plants of moderate and low water use, or moderate and high water use, may be allowed if:

1. plant factor calculation is based on the proportions of the respective plant water uses and their plant factor; or
2. the plant factor of the higher water using plant is used for calculations.
(E) Individual hydrozones that mix high and low water use plants shall not be permitted.
(F) On the landscape design plan and irrigation design plan, hydrozone areas shall be designated by number, letter, or other designation. On the irrigation design plan, designate the areas irrigated by each valve, and assign a number to each valve. Use this valve number in the Hydrozone Information Table (see Appendix B Section A). This table can also assist with the irrigation audit and programming the controller.
(b) The irrigation design plan, at a minimum, shall contain:
(1) location and size of separate water meters for landscape;
(2) location, type and size of all components of the irrigation system, including controllers, main and lateral lines, valves, sprinkler heads, moisture sensing devices, rain switches, quick couplers, pressure regulators, and backflow prevention devices;
(3) static water pressure at the point of connection to the public water supply;
(4) flow rate (gallons per minute), application rate (inches per hour), and design operating pressure (pressure per square inch) for each station;
(5) recycled water irrigation systems as specified in Section 492.14;
(6) the following statement: “I have complied with the criteria of the ordinance and applied them accordingly for the efficient use of water in the irrigation design plan”; and
(7) the signature of a licensed landscape architect, certified irrigation designer, licensed landscape contractor, or any other person authorized to design an irrigation system. (See Sections 5500.1, 5615, 5641, 5641.1, 5641.2, 5641.3, 5641.4, 5641.5, 5641.6, 6701, 7027.5 of the Business and Professions Code, Section 832.27 of Title 16 of the California Code of Regulations, and Section 6721 of the Food and Agricultural Code.)

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.8 Grading Design Plan.

(a) For the efficient use of water, grading of a project site shall be designed to minimize soil erosion, runoff, and water waste. A grading plan shall be submitted as part of the Landscape Documentation Package. A comprehensive grading plan prepared by a civil engineer for other local agency permits satisfies this requirement.
(1) The project applicant shall submit a landscape grading plan that indicates finished configurations and elevations of the landscape area including:
(A) height of graded slopes;
(B) drainage patterns;
(C) pad elevations;
(D) finish grade; and
(E) stormwater retention improvements, if applicable.
(2) To prevent excessive erosion and runoff, it is highly recommended that project applicants:
(A) grade so that all irrigation and normal rainfall remains within property lines and does not drain on to non-permeable hardscapes;
(B) avoid disruption of natural drainage patterns and undisturbed soil; and
(C) avoid soil compaction in landscape areas.
(3) The grading design plan shall contain the following statement: “I have complied with the criteria of the ordinance and applied them accordingly for the efficient use of water in the grading design plan” and shall bear the signature of a licensed professional as authorized by law.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.9 Certificate of Completion.

(a) The Certificate of Completion (see Appendix C for a sample certificate) shall include the following six (6) elements:
(1) project information sheet that contains:
(A) date;
(B) project name;
(C) project applicant name, telephone, and mailing address;
(D) project address and location; and
(E) property owner name, telephone, and mailing address;
(2) certification by either the signer of the landscape design plan, the signer of the irrigation design plan, or the licensed landscape contractor that the landscape project has been installed per the approved Landscape Documentation Package;
(A) where there have been significant changes made in the field during construction, these "as-built" or record drawings shall be included with the certification;
(3) irrigation scheduling parameters used to set the controller (see Section 492.10);
(4) landscape and irrigation maintenance schedule (see Section 492.11);
(5) irrigation audit report (see Section 492.12); and
(6) soil analysis report, if not submitted with Landscape Documentation Package, and documentation verifying implementation of soil report recommendations (see Section 492.5).
(b) The project applicant shall:
(1) submit the signed Certificate of Completion to the local agency for review;
(2) ensure that copies of the approved Certificate of Completion are submitted to the local water purveyor and property owner or his or her designee.
(c) The local agency shall:
(1) receive the signed Certificate of Completion from the project applicant;
(2) approve or deny the Certificate of Completion. If the Certificate of Completion is denied, the local agency shall provide information to the project applicant regarding reapplication, appeal, or other assistance.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.10 Irrigation Scheduling.

(a) For the efficient use of water, all irrigation schedules shall be developed, managed, and evaluated to utilize the minimum amount of water required to maintain plant health. Irrigation schedules shall meet the following criteria:
(1) Irrigation scheduling shall be regulated by automatic irrigation controllers.
(2) Overhead irrigation shall be scheduled between 8:00 p.m. and 10:00 a.m. unless weather conditions prevent it. If allowable hours of irrigation differ from the local water purveyor, the stricter of the two shall apply. Operation of the irrigation system outside the normal watering window is allowed for auditing and system maintenance.
(3) For implementation of the irrigation schedule, particular attention must be paid to irrigation run times, emission device, flow rate, and current reference evapotranspiration, so that applied water meets the Estimated Total Water Use. Total annual applied water shall be less than or equal to Maximum Applied Water Allowance (MAWA). Actual irrigation schedules shall be regulated by automatic irrigation controllers using current reference evapotranspiration data (e.g., CIMIS) or soil moisture sensor data.
(4) Parameters used to set the automatic controller shall be developed and submitted for each of the following:
(A) the plant establishment period;

(B) the established landscape; and
(C) temporarily irrigated areas.
(5) Each irrigation schedule shall consider for each station all of the following that apply:
(A) irrigation interval (days between irrigation);
(B) irrigation run times (hours or minutes per irrigation event to avoid runoff);
(C) number of cycle starts required for each irrigation event to avoid runoff;
(D) amount of applied water scheduled to be applied on a monthly basis;
(E) application rate setting;
(F) root depth setting;
(G) plant type setting;
(H) soil type;
(I) slope factor setting;
(J) shade factor setting; and
(K) irrigation uniformity or efficiency setting.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.11 Landscape and Irrigation Maintenance Schedule.

(a) Landscapes shall be maintained to ensure water use efficiency. A regular maintenance schedule shall be submitted with the Certificate of Completion.
(b) A regular maintenance schedule shall include, but not be limited to, routine inspection; adjustment and repair of the irrigation system and its components; aerating and dethatching turf areas; replenishing mulch; fertilizing; pruning; weeding in all landscape areas, and removing and obstruction to emission devices. Operation of the irrigation system outside the normal watering window is allowed for auditing and system maintenance.
(c) Repair of all irrigation equipment shall be done with the originally installed components or their equivalents.
(d) A project applicant is encouraged to implement sustainable or environmentally-friendly practices for overall landscape maintenance.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.12 Irrigation Audit, Irrigation Survey, and Irrigation Water Use Analysis.

(a) All landscape irrigation audits shall be conducted by a certified landscape irrigation auditor.
(b) For new construction and rehabilitated landscape projects installed after January 1, 2010, as described in Section 490.1:
(1) the project applicant shall submit an irrigation audit report with the Certificate of Completion to the local agency that may include, but is not limited to: inspection, system tune-up, system test with distribution uniformity, reporting overspray or run off that causes overland flow, and preparation of an irrigation schedule;
(2) the local agency shall administer programs that may include, but not be limited to, irrigation water use analysis, irrigation audits, and irrigation surveys for compliance with the Maximum Applied Water Allowance.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.13 Irrigation Efficiency.

(a) For the purpose of determining Maximum Applied Water Allowance, average irrigation efficiency is assumed to be 0.71. Irrigation systems shall be designed, maintained, and managed to meet or exceed an average landscape irrigation efficiency of 0.71.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.14 Recycled Water.

(a) The installation of recycled water irrigation systems shall allow for the current and future use of recycled water, unless a written exemption has been granted as described in Section 492.14(b).
(b) Irrigation systems and decorative water features shall use recycled water unless a written exemption has been granted by the local water purveyor stating that recycled water meeting all public health codes and standards is not available and will not be available for the foreseeable future.
(c) All recycled water irrigation systems shall be designed and operated in accordance with all applicable local and State laws.
(d) Landscapes using recycled water are considered Special Landscape Areas. The ET Adjustment Factor for Special Landscape Areas shall not exceed 1.0.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.15 Stormwater Management.

(a) Stormwater management practices minimize runoff and increase infiltration which recharges groundwater and improves water quality. Implementing stormwater best management practices into the landscape and grading design plans to minimize runoff and to increase on-site retention and infiltration are encouraged.
(b) Project applicants shall refer to the local agency or Regional Water Quality Control Board for information on any applicable stormwater ordinances and stormwater management plans.
(c) Rain gardens, cisterns, and other landscapes features and practices that increase rainwater capture and create opportunities for infiltration and/or onsite storage are recommended.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.16 Public Education.

(a) Publications. Education is a critical component to promote the efficient use of water in landscapes. The use of appropriate principles of design, installation, management and maintenance that save water is encouraged in the community.
(1) A local agency shall provide information to owners of new, single-family residential homes regarding the design, installation, management, and maintenance of water efficient landscapes.
(b) Model Homes. All model homes that are landscaped shall use signs and written information to demonstrate the principles of water efficient landscapes described in this ordinance.
(1) Signs shall be used to identify the model as an example of a water efficient landscape featuring elements such as hydrozones, irrigation equipment, and others that contribute to the overall water efficient theme.
(2) Information shall be provided about designing, installing, managing, and maintaining water efficient landscapes.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.17 Environmental Review.

(a) The local agency must comply with the California Environmental Quality Act (CEQA), as appropriate.

Note: Authority cited: Section 21082, Public Resources Code. Reference: Sections 21080, 21082, Public Resources Code.

§ 493. Provisions for Existing Landscapes.

(a) A local agency may designate another agency, such as a water purveyor, to implement some or all of the requirements contained in this ordinance. Local agencies may collaborate with water purveyors to define each entity's specific responsibilities relating to this ordinance.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 493.1 Irrigation Audit, Irrigation Survey, and Irrigation Water Use Analysis.

(a) This section, 493.1, shall apply to all existing landscapes that were installed before January 1, 2010 and are over one acre in size.
(1) For all landscapes in 493.1(a) that have a water meter, the local agency shall administer programs that may include, but not be limited to, irrigation water use analyses, irrigation surveys, and irrigation audits to evaluate water use and provide recommendations as necessary to reduce landscape water use to a level that does not exceed the Maximum Applied Water Allowance for existing landscapes. The Maximum Applied Water Allowance for existing landscapes shall be calculated as: MAWA = (0.8)(ETo)(LA)(0.62).
(2) For all landscapes in 493.1(a), that do not have a meter, the local agency shall administer programs that may include, but not be limited to, irrigation surveys and irrigation audits to evaluate water use and provide recommendations as necessary in order to prevent water waste.
(b) All landscape irrigation audits shall be conducted by a certified landscape irrigation auditor.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 493.2 Water Waste Prevention.

(a) Local agencies shall prevent water waste resulting from inefficient landscape irrigation by prohibiting runoff from leaving the target landscape due to low head drainage, overspray, or other similar conditions where water flows onto adjacent property, non-irrigated areas, walks, roadways, parking lots, or structures. Penalties for violation of these prohibitions shall be established locally.
(b) Restrictions regarding overspray and runoff may be modified if:
(1) the landscape area is adjacent to permeable surfacing and no runoff occurs; or
(2) the adjacent non-permeable surfaces are designed and constructed to drain entirely to landscaping.

Note: Authority cited: Section 65594, Government Code. Reference: Section 65596, Government Code.

§ 494. Effective Precipitation.

(a) A local agency may consider Effective Precipitation (25% of annual precipitation) in tracking water use and may use the following equation to calculate Maximum Applied Water Allowance:
MAWA= (ETo - Eppt) (0.62) [(0.7 x LA) + (0.3 x SLA)].

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

Appendices.

Appendix A. Reference Evapotranspiration (ETo) Table.

Appendix A - Reference Evapotranspiration (ETo) Table*

County and City	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual ETo
ALAMEDA													
Fremont	1.5	1.9	3.4	4.7	5.4	6.3	6.7	6.0	4.5	3.4	1.8	1.5	47.0
Livermore	1.2	1.5	2.9	4.4	5.9	6.6	7.4	6.4	5.3	3.2	1.5	0.9	47.2
Oakland	1.5	1.5	2.8	3.9	5.1	5.3	6.0	5.5	4.8	3.1	1.4	0.9	41.8
Oakland Foothills	1.1	1.4	2.7	3.7	5.1	6.4	5.8	4.9	3.6	2.6	1.4	1.0	39.6
Pleasanton	0.8	1.5	2.9	4.4	5.6	6.7	7.4	6.4	4.7	3.3	1.5	1.0	46.2
Union City	1.4	1.8	3.1	4.2	5.4	5.9	6.4	5.7	4.4	3.1	1.5	1.2	44.2
ALPINE													
Markleeville	0.7	0.9	2.0	3.5	5.0	6.1	7.3	6.4	4.4	2.6	1.2	0.5	40.6
AMADOR													
Jackson	1.2	1.5	2.8	4.4	6.0	7.2	7.9	7.2	5.3	3.2	1.4	0.9	48.9
Shanandoah Valley	1.0	1.7	2.9	4.4	5.6	6.8	7.9	7.1	5.2	3.6	1.7	1.0	48.8
BUTTE													
Chico	1.2	1.8	2.9	4.7	6.1	7.4	8.5	7.3	5.4	3.7	1.7	1.0	51.7
Durham	1.1	1.8	3.2	5.0	6.5	7.4	7.8	6.9	5.3	3.6	1.7	1.0	51.1
Gridley	1.2	1.8	3.0	4.7	6.1	7.7	8.5	7.1	5.4	3.7	1.7	1.0	51.9
Oroville	1.2	1.7	2.8	4.7	6.1	7.6	8.5	7.3	5.3	3.7	1.7	1.0	51.5
CALAVERAS													
San Andreas	1.2	1.5	2.8	4.4	6.0	7.3	7.9	7.0	5.3	3.2	1.4	0.7	48.8
COLUSA													
Colusa	1.0	1.7	3.4	5.0	6.4	7.6	8.3	7.2	5.4	3.8	1.8	1.1	52.8
Williams	1.2	1.7	2.9	4.5	6.1	7.2	8.5	7.3	5.3	3.4	1.6	1.0	50.8
CONTRA COSTA													
Benicia	1.3	1.4	2.7	3.8	4.9	5.0	6.4	5.5	4.4	2.9	1.2	0.7	40.3
Brentwood	1.0	1.5	2.9	4.5	6.1	7.1	7.9	6.7	5.2	3.2	1.4	0.7	48.3
Concord	1.1	1.4	2.4	4.0	5.5	5.9	7.0	6.0	4.8	3.2	1.3	0.7	43.4
Courtland	0.9	1.5	2.9	4.4	6.1	6.9	7.9	6.7	5.3	3.2	1.4	0.7	48.0
Martinez	1.2	1.4	2.4	3.9	5.3	5.6	6.7	5.6	4.7	3.1	1.2	0.7	41.8
Moraga	1.2	1.5	3.4	4.2	5.5	6.1	6.7	5.9	4.6	3.2	1.6	1.0	44.9
Pittsburg	1.0	1.5	2.8	4.1	5.6	6.4	7.4	6.4	5.0	3.2	1.3	0.7	45.4
Walnut Creek	0.8	1.5	2.9	4.4	5.6	6.7	7.4	6.4	4.7	3.3	1.5	1.0	46.2
DEL NORTE													
Crescent City	0.5	0.9	2.0	3.0	3.7	3.5	4.3	3.7	3.0	2.0	0.9	0.5	27.7
EL DORADO													
Camino	0.9	1.7	2.5	3.9	5.9	7.2	7.8	6.8	5.1	3.1	1.5	0.9	47.3
FRESNO													
Clovis	1.0	1.5	3.2	4.8	6.4	7.7	8.5	7.3	5.3	3.4	1.4	0.7	51.4
Coalinga	1.2	1.7	3.1	4.6	6.2	7.2	8.5	7.3	5.3	3.4	1.6	0.7	50.9
Firebaugh	1.0	1.8	3.7	5.7	7.3	8.1	8.2	7.2	5.5	3.9	2.0	1.1	55.4
FivePoints	1.3	2.0	4.0	6.1	7.7	8.5	8.7	8.0	6.2	4.5	2.4	1.2	60.4
FRESNO													
Fresno	0.9	1.7	3.3	4.8	6.7	7.8	8.4	7.1	5.2	3.2	1.4	0.6	51.1
Fresno State	0.9	1.6	3.2	5.2	7.0	8.0	8.7	7.6	5.4	3.6	1.7	0.9	53.7
Friant	1.2	1.5	3.1	4.7	6.4	7.7	8.5	7.3	5.3	3.4	1.4	0.7	51.3
Kerman	0.9	1.5	3.2	4.8	6.6	7.7	8.4	7.2	5.3	3.4	1.4	0.7	51.2
Kingsburg	1.0	1.5	3.4	4.8	6.6	7.7	8.4	7.2	5.3	3.4	1.4	0.7	51.6
Mendota	1.5	2.5	4.6	6.2	7.9	8.6	8.8	7.5	5.9	4.5	2.4	1.5	61.7
Orange Cove	1.2	1.9	3.5	4.7	7.4	8.5	8.9	7.9	5.9	3.7	1.8	1.2	56.7
Panoche	1.1	2.0	4.0	5.6	7.8	8.5	8.3	7.3	5.6	3.9	1.8	1.2	57.2
Parlier	1.0	1.9	3.6	5.2	6.8	7.6	8.1	7.0	5.1	3.4	1.7	0.9	52.0
Reedley	1.1	1.5	3.2	4.7	6.4	7.7	8.5	7.3	5.3	3.4	1.4	0.7	51.3
Westlands	0.9	1.7	3.8	6.3	8.0	8.6	8.6	7.8	5.9	4.3	2.1	1.1	58.8

Appendix A - Reference Evapotranspiration (ETo) Table*													
County and City	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual ETo**
GLENN													
Orland	1.1	1.8	3.4	5.0	6.4	7.5	7.9	6.7	5.3	3.9	1.8	1.4	52.1
Willows	1.2	1.7	2.9	4.7	6.1	7.2	8.5	7.3	5.3	3.6	1.7	1.0	51.3
HUMBOLDT													
Eureka	0.5	1.1	2.0	3.0	3.7	3.7	3.7	3.7	3.0	2.0	0.9	0.5	27.5
Ferndale	0.5	1.1	2.0	3.0	3.7	3.7	3.7	3.7	3.0	2.0	0.9	0.5	27.5
Garberville	0.6	1.2	2.2	3.1	4.5	5.0	5.5	4.9	3.8	2.4	1.0	0.7	34.9
Hoopa	0.5	1.1	2.1	3.0	4.4	5.4	6.1	5.1	3.8	2.4	0.9	0.7	35.6
IMPERIAL													
Brawley	2.8	3.8	5.9	8.0	10.4	11.5	11.7	10.0	8.4	6.2	3.5	2.1	84.2
Calipatria/Mulberry	2.4	3.2	5.1	6.8	8.6	9.2	9.2	8.6	7.0	5.2	3.1	2.3	70.7
El Centro	2.7	3.5	5.6	7.9	10.1	11.1	11.6	9.5	8.3	6.1	3.3	2.0	81.7
Holtville	2.8	3.8	5.9	7.9	10.4	11.6	12.0	10.0	8.6	6.2	3.5	2.1	84.7
Meloland	2.5	3.2	5.5	7.5	8.9	9.2	9.0	8.5	6.8	5.3	3.1	2.2	71.6
Palo Verde II	2.5	3.3	5.7	6.9	8.5	8.9	8.6	7.9	6.2	4.5	2.9	2.3	68.2
Seeley	2.7	3.5	5.9	7.7	9.7	10.1	9.3	8.3	6.9	5.5	3.4	2.2	75.4
Westmoreland	2.4	3.3	5.3	6.9	8.7	9.6	9.6	8.7	6.9	5.0	3.0	2.2	71.4
Yuma	2.5	3.4	5.3	6.9	8.7	9.6	9.6	8.7	6.9	5.0	3.0	2.2	71.6
INYO													
Bishop	1.7	2.7	4.8	6.7	8.2	10.9	7.4	9.6	7.4	4.8	2.5	1.6	68.3
Death Valley Jct	2.2	3.3	5.4	7.7	9.8	11.1	11.4	10.1	8.3	5.4	2.9	1.7	79.1
Independence	1.7	2.7	3.4	6.6	8.5	9.5	9.8	8.5	7.1	3.9	2.0	1.5	65.2
Lower Haiwee Res.	1.8	2.7	4.4	7.1	8.5	9.5	9.8	8.5	7.1	4.2	2.6	1.5	67.6
Oasis	2.7	2.8	5.9	8.0	10.4	11.7	11.6	10.0	8.4	6.2	3.4	2.1	83.1
KERN													
Arvin	1.2	1.8	3.5	4.7	6.6	7.4	8.1	7.3	5.3	3.4	1.7	1.0	51.9
Bakersfield	1.0	1.8	3.5	4.7	6.6	7.7	8.5	7.3	5.3	3.5	1.6	0.9	52.4
Bakersfield/Bonanza	1.2	2.2	3.7	5.7	7.4	8.2	8.7	7.8	5.7	4.0	2.1	1.2	57.9
Bakersfield/Greenlee	1.2	2.2	3.7	5.7	7.4	8.2	8.7	7.8	5.7	4.0	2.1	1.2	57.9
KERN													
Belridge	1.4	2.2	4.1	5.5	7.7	8.5	8.6	7.8	6.0	3.8	2.0	1.5	59.2
Blackwells Corner	1.4	2.1	3.8	5.4	7.0	7.8	8.5	7.7	5.8	3.9	1.9	1.2	56.6
Buttonwillow	1.0	1.8	3.2	4.7	6.6	7.7	8.5	7.3	5.4	3.4	1.5	0.9	52.0
China Lake	2.1	3.2	5.3	7.7	9.2	10.0	11.0	9.8	7.3	4.9	2.7	1.7	74.8
Delano	0.9	1.8	3.4	4.7	6.6	7.7	8.5	7.3	5.4	3.4	1.4	0.7	52.0
Famoso	1.3	1.9	3.5	4.8	6.7	7.6	8.0	7.3	5.5	3.5	1.7	1.3	53.1
Grapevine	1.3	1.8	3.1	4.4	5.6	6.8	7.6	6.8	5.9	3.4	1.9	1.0	49.5
Inyokern	2.0	3.1	4.9	7.3	8.5	9.7	11.0	9.4	7.1	5.1	2.6	1.7	72.4
Isabella Dam	1.2	1.4	2.8	4.4	5.8	7.3	7.9	7.0	5.0	3.2	1.7	0.9	48.4
Lamont	1.3	2.4	4.4	4.6	6.5	7.0	8.8	7.6	5.7	3.7	1.6	0.8	54.4
Lost Hills	1.6	2.2	3.7	5.1	6.8	7.8	8.7	7.8	5.7	4.0	2.1	1.6	57.1
McFarland/Kern	1.2	2.1	3.7	5.6	7.3	8.0	8.3	7.4	5.6	4.1	2.0	1.2	56.5
Shafter	1.0	1.7	3.4	5.0	6.6	7.7	8.3	7.3	5.4	3.4	1.5	0.9	52.1
Taft	1.3	1.8	3.1	4.3	6.2	7.3	8.5	7.3	5.4	3.4	1.7	1.0	51.2
Tehachapi	1.4	1.8	3.2	5.0	6.1	7.7	7.9	7.3	5.9	3.4	2.1	1.2	52.9
KINGS													
Caruthers	1.6	2.5	4.0	5.7	7.8	8.7	9.3	8.4	6.3	4.4	2.4	1.6	62.7
Corcoran	1.6	2.2	3.7	5.1	6.8	7.8	8.7	7.8	5.7	4.0	2.1	1.6	57.1
Hanford	0.9	1.5	3.4	5.0	6.6	7.7	8.3	7.2	5.4	3.4	1.4	0.7	51.5
Kettleman	1.1	2.0	4.0	6.0	7.5	8.5	9.1	8.2	6.1	4.5	2.2	1.1	60.2
Lemoore	0.9	1.5	3.4	5.0	6.6	7.7	8.3	7.3	5.4	3.4	1.4	0.7	51.7
Stratford	0.9	1.9	3.9	6.1	7.8	8.6	8.8	7.7	5.9	4.1	2.1	1.0	58.7

Appendix A - Reference Evapotranspiration (ETo) Table*

County and City	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual ETo
LAKE													
Lakeport	1.1	1.3	2.6	3.5	5.1	6.0	7.3	6.1	4.7	2.9	1.2	0.9	42.8
Lower Lake	1.2	1.4	2.7	4.5	5.3	6.3	7.4	6.4	5.0	3.1	1.3	0.9	45.4
LASSEN													
Buntingville	1.0	1.7	3.5	4.9	6.2	7.3	8.4	7.5	5.4	3.4	1.5	0.9	51.8
Ravendale	0.6	1.1	2.3	4.1	5.6	6.7	7.9	7.3	4.7	2.8	1.2	0.5	44.9
Susanville	0.7	1.0	2.2	4.1	5.6	6.5	7.8	7.0	4.6	2.8	1.2	0.5	44.0
LOS ANGELES													
Burbank	2.1	2.8	3.7	4.7	5.1	6.0	6.6	6.7	5.4	4.0	2.6	2.0	51.7
Claremont	2.0	2.3	3.4	4.6	5.0	6.0	7.0	7.0	5.3	4.0	2.7	2.1	51.3
El Dorado	1.7	2.2	3.6	4.8	5.1	5.7	5.9	5.9	4.4	3.2	2.2	1.7	46.3
Glendale	2.0	2.2	3.3	3.8	4.7	4.8	5.7	5.6	4.3	3.3	2.2	1.8	43.7
Glendora	2.0	2.5	3.6	4.9	5.4	6.1	7.3	6.8	5.7	4.2	2.6	2.0	53.1
Gorman	1.6	2.2	3.4	4.6	5.5	7.4	7.7	7.1	5.9	3.6	2.4	1.1	52.4
Hollywood Hills	2.1	2.2	3.8	5.4	6.0	6.5	6.7	6.4	5.2	3.7	2.8	2.1	52.8
Lancaster	2.1	3.0	4.6	5.9	8.5	9.7	11.0	9.8	7.3	4.6	2.8	1.7	71.1
Long Beach	1.8	2.1	3.3	3.9	4.5	4.3	5.3	4.7	3.7	2.8	1.8	1.5	39.7
Los Angeles	2.2	2.7	3.7	4.7	5.5	5.8	6.2	5.9	5.0	3.9	2.6	1.9	50.1
LOS ANGELES													
Monrovia	2.2	2.3	3.8	4.3	5.5	5.9	6.9	6.4	5.1	3.2	2.5	2.0	50.2
Palmdale	2.0	2.6	4.6	6.2	7.3	8.9	9.8	9.0	6.5	4.7	2.7	2.1	66.2
Pasadena	2.1	2.7	3.7	4.7	5.1	6.0	7.1	6.7	5.6	4.2	2.6	2.0	52.3
Pearblossom	1.7	2.4	3.7	4.7	7.3	7.7	9.9	7.9	6.4	4.0	2.6	1.6	59.9
Pomona	1.7	2.0	3.4	4.5	5.0	5.8	6.5	6.4	4.7	3.5	2.3	1.7	47.5
Redondo Beach	2.2	2.4	3.3	3.8	4.5	4.7	5.4	4.8	4.4	2.8	2.4	2.0	42.6
San Fernando	2.0	2.7	3.5	4.6	5.5	5.9	7.3	6.7	5.3	3.9	2.6	2.0	52.0
Santa Clarita	2.8	2.8	4.1	5.6	6.0	6.8	7.6	7.8	5.8	5.2	3.7	3.2	61.5
Santa Monica	1.8	2.1	3.3	4.5	4.7	5.0	5.4	5.4	3.9	3.4	2.4	2.2	44.2
MADERA													
Chowchilla	1.0	1.4	3.2	4.7	6.6	7.8	8.5	7.3	5.3	3.4	1.4	0.7	51.4
Madera	0.9	1.4	3.2	4.8	6.6	7.8	8.5	7.3	5.3	3.4	1.4	0.7	51.5
Raymond	1.2	1.5	3.0	4.6	6.1	7.6	8.4	7.3	5.2	3.4	1.4	0.7	50.5
MARIN													
Black Point	1.1	1.7	3.0	4.2	5.2	6.2	6.6	5.8	4.3	2.8	1.3	0.9	43.0
Novato	1.3	1.5	2.4	3.5	4.4	6.0	5.9	5.4	4.4	2.8	1.4	0.7	39.8
Point San Pedro	1.1	1.7	3.0	4.2	5.2	6.2	6.6	5.8	4.3	2.8	1.3	0.9	43.0
San Rafael	1.2	1.3	2.4	3.3	4.0	4.8	4.8	4.9	4.3	2.7	1.3	0.7	35.8
MARIPOSA													
Coulterville	1.1	1.5	2.8	4.4	5.9	7.3	8.1	7.0	5.3	3.4	1.4	0.7	48.8
Mariposa	1.1	1.5	2.8	4.4	5.9	7.4	8.2	7.1	5.0	3.4	1.4	0.7	49.0
Yosemite Village	0.7	1.0	2.3	3.7	5.1	6.5	7.1	6.1	4.4	2.9	1.1	0.6	41.4
MENDOCINO													
Fort Bragg	0.9	1.3	2.2	3.0	3.7	3.5	3.7	3.7	3.0	2.3	1.2	0.7	29.0
Hopland	1.1	1.3	2.6	3.4	5.0	5.9	6.5	5.7	4.5	2.8	1.3	0.7	40.9
Point Arena	1.0	1.3	2.3	3.0	3.7	3.9	3.7	3.7	3.0	2.3	1.2	0.7	29.6
Sanel Valley	1.0	1.6	3.0	4.6	6.0	7.0	8.0	7.0	5.2	3.4	1.4	0.9	49.1
Ukiah	1.0	1.3	2.6	3.3	5.0	5.8	6.7	5.9	4.5	2.8	1.3	0.7	40.9
MERCED													
Kesterson	0.9	1.7	3.4	5.5	7.3	8.2	8.6	7.4	5.5	3.8	1.8	0.9	55.1
Los Banos	1.0	1.5	3.2	4.7	6.1	7.4	8.2	7.0	5.3	3.4	1.4	0.7	50.0
Merced	1.0	1.5	3.2	4.7	6.6	7.9	8.5	7.2	5.3	3.4	1.4	0.7	51.5

Appendix A - Reference Evapotranspiration (ETo) Table*

County and City	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual ETo
MODOC													
Modoc/Alturas	0.9	1.4	2.8	3.7	5.1	6.2	7.5	6.6	4.6	2.8	1.2	0.7	43.2
MONO													
Bridgeport	0.7	0.9	2.2	3.8	5.5	6.6	7.4	6.7	4.7	2.7	1.2	0.5	43.0
MONTEREY													
Arroyo Seco	1.5	2.0	3.7	5.4	6.3	7.3	7.2	6.7	5.0	3.9	2.0	1.6	52.6
Castroville	1.4	1.7	3.0	4.2	4.6	4.8	4.0	3.8	3.0	2.6	1.6	1.4	36.2
Gonzales	1.3	1.7	3.4	4.7	5.4	6.3	6.3	5.9	4.4	3.4	1.9	1.3	45.7
MONTEREY													
Greenfield	1.8	2.2	3.4	4.8	5.6	6.3	6.5	6.2	4.8	3.7	2.4	1.8	49.5
King City	1.7	2.0	3.4	4.4	4.4	5.6	6.1	6.7	6.5	5.2	2.2	1.3	49.6
King City-Oasis Rd.	1.4	1.9	3.6	5.3	6.5	7.3	7.4	6.8	5.1	4.0	2.0	1.5	52.7
Long Valley	1.5	1.9	3.2	4.1	5.8	6.5	7.3	6.7	5.3	3.6	2.0	1.2	49.1
Monterey	1.7	1.8	2.7	3.5	4.0	4.1	4.3	4.2	3.5	2.8	1.9	1.5	36.0
Pajaro	1.8	2.2	3.7	4.8	5.3	5.7	5.6	5.3	4.3	3.4	2.4	1.8	46.1
Salinas	1.6	1.9	2.7	3.8	4.8	4.7	5.0	4.5	4.0	2.9	1.9	1.3	39.1
Salinas North	1.2	1.5	2.9	4.1	4.6	5.2	4.5	4.3	3.2	2.8	1.5	1.2	36.9
San Ardo	1.0	1.7	3.1	4.5	5.9	7.2	8.1	7.1	5.1	3.1	1.5	1.0	49.0
San Juan	1.8	2.1	3.4	4.6	5.3	5.7	5.5	4.9	3.8	3.2	2.2	1.9	44.2
Soledad	1.7	2.0	3.4	4.4	5.5	5.4	6.5	6.2	5.2	3.7	2.2	1.5	47.7
NAPA													
Angwin	1.8	1.9	3.2	4.7	5.8	7.3	8.1	7.1	5.5	4.5	2.9	2.1	54.9
Carneros	0.8	1.5	3.1	4.6	5.5	6.6	6.9	6.2	4.7	3.5	1.4	1.0	45.8
Oakville	1.0	1.5	2.9	4.7	5.8	6.9	7.2	6.4	4.9	3.5	1.6	1.2	47.7
St Helena	1.2	1.5	2.8	3.9	5.1	6.1	7.0	6.2	4.8	3.1	1.4	0.9	44.1
Yountville	1.3	1.7	2.8	3.9	5.1	6.0	7.1	6.1	4.8	3.1	1.5	0.9	44.3
NEVADA													
Grass Valley	1.1	1.5	2.6	4.0	5.7	7.1	7.9	7.1	5.3	3.2	1.5	0.9	48.0
Nevada City	1.1	1.5	2.6	3.9	5.8	6.9	7.9	7.0	5.3	3.2	1.4	0.9	47.4
ORANGE													
Irvine	2.2	2.5	3.7	4.7	5.2	5.9	6.3	6.2	4.6	3.7	2.6	2.3	49.6
Laguna Beach	2.2	2.7	3.4	3.8	4.6	4.6	4.9	4.9	4.4	3.4	2.4	2.0	43.2
Santa Ana	2.2	2.7	3.7	4.5	4.6	5.4	6.2	6.1	4.7	3.7	2.5	2.0	48.2
PLACER													
Auburn	1.2	1.7	2.8	4.4	6.1	7.4	8.3	7.3	5.4	3.4	1.6	1.0	50.6
Blue Canyon	0.7	1.1	2.1	3.4	4.8	6.0	7.2	6.1	4.6	2.9	0.9	0.6	40.5
Colfax	1.1	1.5	2.6	4.0	5.8	7.1	7.9	7.0	5.3	3.2	1.4	0.9	47.9
Roseville	1.1	1.7	3.1	4.7	6.2	7.7	8.5	7.3	5.6	3.7	1.7	1.0	52.2
Soda Springs	0.7	0.7	1.8	3.0	4.3	5.3	6.2	5.5	4.1	2.5	0.7	0.7	35.4
Tahoe City	0.7	0.7	1.7	3.0	4.3	5.4	6.1	5.6	4.1	2.4	0.8	0.6	35.5
Truckee	0.7	0.7	1.7	3.2	4.4	5.4	6.4	5.7	4.1	2.4	0.8	0.6	36.2
PLUMAS													
Portola	0.7	0.9	1.9	3.5	4.9	5.9	7.3	5.9	4.3	2.7	0.9	0.5	39.4
Quincy	0.7	0.9	2.2	3.5	4.9	5.9	7.3	5.9	4.4	2.8	1.2	0.5	40.2
RIVERSIDE													
Beaumont	2.0	2.3	3.4	4.4	6.1	7.1	7.6	7.9	6.0	3.9	2.6	1.7	55.0
Blythe	2.4	3.3	5.3	6.9	8.7	9.6	9.6	8.7	6.9	5.0	3.0	2.2	71.4
Cathedral City	1.6	2.2	3.7	5.1	6.8	7.8	8.7	7.8	5.7	4.0	2.1	1.6	57.1
Coachella	2.9	4.4	6.2	8.4	10.5	11.9	12.3	10.1	8.9	6.2	3.8	2.4	88.1

Appendix A - Reference Evapotranspiration (ETo) Table*													
County and City	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual ETo**
RIVERSIDE													
Desert Center	2.9	4.1	6.4	8.5	11.0	12.1	12.2	11.1	9.0	6.4	3.9	2.6	90.0
Elsinore	2.1	2.8	3.9	4.4	5.9	7.1	7.6	7.0	5.8	3.9	2.6	1.9	55.0
Indio	**3.1**	3.6	6.5	8.3	10.5	11.0	10.8	9.7	8.3	5.9	3.7	2.7	83.9
La Quinta	2.4	2.8	5.2	6.5	8.3	8.7	8.5	7.9	6.5	4.5	2.7	2.2	66.2
Mecca	2.6	3.3	5.7	7.2	8.6	9.0	8.8	8.2	6.8	5.0	3.2	2.4	70.8
Oasis	2.9	3.3	5.3	6.1	8.5	8.9	8.7	7.9	6.9	4.8	2.9	2.3	68.4
Palm Deser	2.5	3.4	5.3	6.9	8.7	9.6	9.6	8.7	6.9	5.0	3.0	2.2	71.6
Palm Springs	2.0	2.9	4.9	7.2	8.3	8.5	11.6	8.3	7.2	5.9	2.7	1.7	71.1
Rancho California	1.8	2.2	3.4	4.8	5.6	6.3	6.5	6.2	4.8	3.7	2.4	1.8	49.5
Rancho Mirage	2.4	3.3	5.3	6.9	8.7	9.6	9.6	8.7	6.9	5.0	3.0	2.2	71.4
Ripley	2.7	3.3	5.6	7.2	8.7	8.7	8.4	7.6	6.2	4.6	2.8	2.2	67.8
Salton Sea North	2.5	3.3	5.5	7.2	8.8	9.3	9.2	8.5	6.8	5.2	3.1	2.3	71.7
Temecula East II	2.3	2.4	4.1	4.9	6.4	7.0	7.8	7.4	5.7	4.1	2.6	2.2	56.7
Thermal	2.4	3.3	5.5	7.6	9.1	9.6	9.3	8.6	7.1	5.2	3.1	2.1	72.8
Riverside UC	2.5	2.9	4.2	5.3	5.9	6.6	7.2	6.9	5.4	4.1	2.9	2.6	56.4
Winchester	2.3	2.4	4.1	4.9	6.4	6.9	7.7	7.5	6.0	3.9	2.6	2.1	56.8
SACRAMENTO													
Fair Oaks	1.0	1.6	3.4	4.1	6.5	7.5	8.1	7.1	5.2	3.4	1.5	1.0	50.5
Sacramento	1.0	1.8	3.2	4.7	6.4	7.7	8.4	7.2	5.4	3.7	1.7	0.9	51.9
Twitchell Island	1.2	1.8	3.9	5.3	7.4	8.8	9.1	7.8	5.9	3.8	1.7	1.2	57.9
SAN BENITO													
Hollister	1.5	1.8	3.1	4.3	5.5	5.7	6.4	5.9	5.0	3.5	1.7	1.1	45.1
San Benito	1.2	1.6	3.1	4.6	5.6	6.4	6.9	6.5	4.8	3.7	1.7	1.2	47.2
San Juan Valley	1.4	1.8	3.4	4.5	6.0	6.7	7.1	6.4	5.0	3.5	1.8	1.4	49.1
SAN BERNARDINO													
Baker	2.7	3.9	6.1	8.3	10.4	11.8	12.2	11.0	8.9	6.1	3.3	2.1	86.6
Barstow NE	2.2	2.9	5.3	6.9	9.0	10.1	9.9	8.9	6.8	4.8	2.7	2.1	71.7
Big Bear Lake	1.8	2.6	4.6	6.0	7.0	7.6	8.1	7.4	5.4	4.1	2.4	1.8	58.6
Chino	2.1	2.9	3.9	4.5	5.7	6.5	7.3	7.1	5.9	4.2	2.6	2.0	54.6
Crestline	1.5	1.9	3.3	4.4	5.5	6.6	7.8	7.1	5.4	3.5	2.2	1.6	50.8
Lake Arrowhead	1.8	2.6	4.6	6.0	7.0	7.6	8.1	7.4	5.4	4.1	2.4	1.8	58.6
Lucerne Valley	2.2	2.9	5.1	6.5	9.1	11.0	11.4	9.9	7.4	5.0	3.0	1.8	75.3
Needles	3.2	4.2	6.6	8.9	11.0	12.4	12.8	11.0	8.9	6.6	4.0	2.7	92.1
Newberry Springs	2.1	2.9	5.3	8.4	9.8	10.9	11.1	9.9	7.6	5.2	3.1	2.0	78.2
San Bernardino	2.0	2.7	3.8	4.6	5.7	6.9	7.9	7.4	5.9	4.2	2.6	2.0	55.6
Twentynine Palms	2.6	3.6	5.9	7.9	10.1	11.2	11.2	10.3	8.6	5.9	3.4	2.2	82.9
Victorville	2.0	2.6	4.6	6.2	7.3	8.9	9.8	9.0	6.5	4.7	2.7	2.1	66.2
SAN DIEGO													
Chula Vista	2.2	2.7	3.4	3.8	4.9	4.7	5.5	4.9	4.5	3.4	2.4	2.0	44.2
Escondido SPV	2.4	2.6	3.9	4.7	5.9	6.5	7.1	6.7	5.3	3.9	2.8	2.3	54.2
SAN DIEGO													
Miramar	2.3	2.5	3.7	4.1	5.1	5.4	6.1	5.8	4.5	3.3	2.4	2.1	47.1
Oceanside	2.2	2.7	3.4	3.7	4.9	4.6	4.6	5.1	4.1	3.3	2.4	2.0	42.9
Otay Lake	2.3	2.7	3.9	4.6	5.6	5.9	6.2	6.1	4.8	3.7	2.6	2.2	50.4
Pine Valley	1.5	2.4	3.8	5.1	6.0	7.0	7.8	7.3	6.0	4.0	2.2	1.7	54.8
Ramona	2.1	2.1	3.4	4.6	5.2	6.3	6.7	6.8	5.3	4.1	2.8	2.1	51.6
San Diego	2.1	2.4	3.4	4.6	5.1	5.3	5.7	5.6	4.3	3.6	2.4	2.0	46.5
Santee	2.1	2.7	3.7	4.5	5.5	6.1	6.6	6.2	5.4	3.8	2.6	2.0	51.1
Torrey Pines	2.2	2.3	3.4	3.9	4.0	4.1	4.6	4.7	3.8	2.8	2.0	2.0	39.8
Warner Springs	1.6	2.7	3.7	4.7	5.7	7.6	8.3	7.7	6.3	4.0	2.5	1.3	56.0

Appendix A - Reference Evapotranspiration (ETo) Table*

County and City	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual ETo
SAN FRANCISCO													
San Francisco	1.5	1.3	2.4	3.0	3.7	4.6	4.9	4.8	4.1	2.8	1.3	0.7	35.1
SAN JOAQUIN													
Farmington	1.5	1.5	2.9	4.7	6.2	7.6	8.1	6.8	5.3	3.3	1.4	0.7	50.0
Lodi West	1.0	1.6	3.3	4.3	6.3	6.9	7.3	6.4	4.5	3.0	1.4	0.8	46.7
Manteca	0.9	1.7	3.4	5.0	6.5	7.5	8.0	7.1	5.2	3.3	1.6	0.9	51.2
Stockton	0.8	1.5	2.9	4.7	6.2	7.4	8.1	6.8	5.3	3.2	1.4	0.6	49.1
Tracy	1.0	1.5	2.9	4.5	6.1	7.3	7.9	6.7	5.3	3.2	1.3	0.7	48.5
SAN LUIS OBISPO													
Arroyo Grande	2.0	2.2	3.2	3.8	4.3	4.7	4.3	4.6	3.8	3.2	2.4	1.7	40.0
Atascadero	1.2	1.5	2.8	3.9	4.5	6.0	6.7	6.2	5.0	3.2	1.7	1.0	43.7
Morro Bay	2.0	2.2	3.1	3.5	4.3	4.5	4.6	4.6	3.8	3.5	2.1	1.7	39.9
Nipomo	2.2	2.5	3.8	5.1	5.7	6.2	6.4	6.1	4.9	4.1	2.9	2.3	52.1
Paso Robles	1.6	2.0	3.2	4.3	5.5	6.3	7.3	6.7	5.1	3.7	2.1	1.4	49.0
San Luis Obispo	2.0	2.2	3.2	4.1	4.9	5.3	4.6	5.5	4.4	3.5	2.4	1.7	43.8
San Miguel	1.6	2.0	3.2	4.3	5.0	6.4	7.4	6.8	5.1	3.7	2.1	1.4	49.0
San Simeon	2.0	2.0	2.9	3.5	4.2	4.4	4.6	4.3	3.5	3.1	2.0	1.7	38.1
SAN MATEO													
Hal Moon Bay	1.5	1.7	2.4	3.0	3.9	4.3	4.3	4.2	3.5	2.8	1.3	1.0	33.7
Redwood City	1.5	1.8	2.9	3.8	5.2	5.3	6.2	5.6	4.8	3.1	1.7	1.0	42.8
Woodside	1.8	2.2	3.4	4.8	5.6	6.3	6.5	6.2	4.8	3.7	2.4	1.8	49.5
SANTA BARBARA													
Betteravia	2.1	2.6	4.0	5.2	6.0	5.9	5.8	5.4	4.1	3.3	2.7	2.1	49.1
Carpenteria	2.0	2.4	3.2	3.9	4.8	5.2	5.5	5.7	4.5	3.4	2.4	2.0	44.9
Cuyama	2.1	2.4	3.8	5.4	6.9	7.9	8.5	7.7	5.9	4.5	2.6	2.0	59.7
Goleta	2.1	2.5	3.9	5.1	5.7	5.7	5.4	5.4	4.2	3.2	2.8	2.2	48.1
Goleta Foothills	2.3	2.6	3.7	5.4	5.3	5.6	5.5	5.7	4.5	3.9	2.8	2.3	49.6
Guadalupe	2.0	2.2	3.2	3.7	4.9	4.6	4.5	4.6	4.1	3.3	2.4	1.7	41.1
Lompoc	2.0	2.2	3.2	3.7	4.8	4.6	4.9	4.8	3.9	3.2	2.4	1.7	41.1
Los Alamos	1.8	2.0	3.2	4.1	4.9	5.3	5.7	5.5	4.4	3.7	2.4	1.6	44.6
Santa Barbara	2.0	2.5	3.2	3.8	4.6	5.1	5.5	4.5	3.4	2.4	1.8	1.8	40.6
SANTA BARBARA													
Santa Maria	1.8	2.3	3.7	5.1	5.7	5.8	5.6	5.3	4.2	3.5	2.4	1.9	47.4
Santa Ynez	1.7	2.2	3.5	5.0	5.8	6.2	6.4	6.0	4.5	3.6	2.2	1.7	48.7
Sisquoc	2.1	2.5	3.8	4.1	6.1	6.3	6.4	5.8	4.7	3.4	2.3	1.8	49.2
Solvang	2.0	2.0	3.3	4.3	5.0	5.6	6.1	5.6	4.4	3.7	2.2	1.6	45.6
SANTA CLARA													
Gilroy	1.3	1.8	3.1	4.1	5.3	5.6	6.1	5.5	4.7	3.4	1.7	1.1	43.6
Los Gatos	1.5	1.8	2.8	3.9	5.0	5.6	6.2	5.5	4.7	3.2	1.7	1.1	42.9
Morgan Hill	1.5	1.8	3.4	4.2	6.3	7.0	7.1	6.0	5.1	3.7	1.9	1.4	49.5
Palo Alto	1.5	1.8	2.8	3.8	5.2	5.3	6.2	5.6	5.0	3.2	1.7	1.0	43.0
San Jose	1.5	1.8	3.1	4.1	5.5	5.8	6.5	5.9	5.2	3.3	1.8	1.0	45.3
SANTA CRUZ													
De Laveaga	1.4	1.9	3.3	4.7	4.9	5.3	5.0	4.8	3.6	3.0	1.6	1.3	40.8
Green Valley Rd	1.2	1.8	3.2	4.5	4.6	5.4	5.2	5.0	3.7	3.1	1.6	1.3	40.6
Santa Cruz	1.5	1.8	2.6	3.5	4.3	4.4	4.8	4.4	3.8	2.8	1.7	1.2	36.6
Watsonville	1.5	1.8	2.7	3.7	4.6	4.5	4.9	4.2	4.0	2.9	1.8	1.2	37.7
Webb	1.8	2.2	3.7	4.8	5.3	5.7	5.6	5.3	4.3	3.4	2.4	1.8	46.2

Appendix A - Reference Evapotranspiration (ETo) Table*

County and City	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual ETo
SHASTA													
Burney	0.7	1.0	2.1	3.5	4.9	5.9	7.4	6.4	4.4	2.9	0.9	0.6	40.9
Fall River Mills	0.6	1.0	2.1	3.7	5.0	6.1	7.8	6.7	4.6	2.8	0.9	0.5	41.8
Glenburn	0.6	1.0	2.1	3.7	5.0	6.3	7.8	6.7	4.7	2.8	0.9	0.6	42.1
McArthur	0.7	1.4	2.9	4.2	5.6	6.9	8.2	7.2	5.0	3.0	1.1	0.6	46.8
Redding	1.2	1.4	2.6	4.1	5.6	7.1	8.5	7.3	5.3	3.2	1.4	0.9	48.8
SIERRA													
Downieville	0.7	1.0	2.3	3.5	5.0	6.0	7.4	6.2	4.7	2.8	0.9	0.6	41.3
Sierraville	0.7	1.1	2.2	3.2	4.5	5.9	7.3	6.4	4.3	2.6	0.9	0.5	39.6
SISKIYOU													
Happy Camp	0.5	0.9	2.0	3.0	4.3	5.2	6.1	5.3	4.1	2.4	0.9	0.5	35.1
MacDoel	1.0	1.7	3.1	4.5	5.9	7.2	8.1	7.1	5.1	3.1	1.5	1.0	49.0
Mt Shasta	0.5	0.9	2.0	3.0	4.5	5.3	6.7	5.7	4.0	2.2	0.7	0.5	36.0
Tule lake FS	0.7	1.3	2.7	4.0	5.4	6.3	7.1	6.4	4.7	2.8	1.0	0.6	42.9
Weed	0.5	0.9	2.0	2.5	4.5	5.3	6.7	5.5	3.7	2.0	0.9	0.5	34.9
Yreka	0.6	0.9	2.1	3.0	4.9	5.8	7.3	6.5	4.3	2.5	0.9	0.5	39.2
SOLANO													
Dixon	0.7	1.4	3.2	5.2	6.3	7.6	8.2	7.2	5.5	4.3	1.6	1.1	52.1
Fairfield	1.1	1.7	2.8	4.0	5.5	6.1	7.8	6.0	4.8	3.1	1.4	0.9	45.2
Hastings Tract	1.6	2.2	3.7	5.1	6.8	7.8	8.7	7.8	5.7	4.0	2.1	1.6	57.1
Putah Creek	1.0	1.6	3.2	4.9	6.1	7.3	7.9	7.0	5.3	3.8	1.8	1.2	51.0
Rio Vista	0.9	1.7	2.8	4.4	5.9	6.7	7.9	6.5	5.1	3.2	1.3	0.7	47.0
Suisun Valley	0.6	1.3	3.0	4.7	5.8	7.0	7.7	6.8	5.3	3.8	1.4	0.9	48.3
Winters	0.9	1.7	3.3	5.0	6.4	7.5	7.9	7.0	5.2	3.5	1.6	1.0	51.0
SONOMA													
Bennett Valley	1.1	1.7	3.2	4.1	5.5	6.5	6.6	5.7	4.5	3.1	1.5	0.9	44.4
Cloverdale	1.1	1.4	2.6	3.4	5.0	5.9	6.2	5.6	4.5	2.8	1.4	0.7	40.7
Fort Ross	1.2	1.4	2.2	3.0	3.7	4.5	4.2	4.3	3.4	2.4	1.2	0.5	31.9
Healdsburg	1.2	1.5	2.4	3.5	5.0	5.9	6.1	5.6	4.5	2.8	1.4	0.7	40.8
Lincoln	1.2	1.7	2.8	4.7	6.1	7.4	8.4	7.3	5.4	3.7	1.9	1.2	51.9
Petaluma	1.2	1.5	2.8	3.7	4.6	5.6	4.6	5.7	4.5	2.9	1.4	0.9	39.6
Santa Rosa	1.2	1.7	2.8	3.7	5.0	6.0	6.1	5.9	4.5	2.9	1.5	0.7	42.0
Valley of the Moon	1.0	1.6	3.0	4.5	5.6	6.6	7.1	6.3	4.7	3.3	1.5	1.0	46.1
Windsor	0.9	1.6	3.0	4.5	5.5	6.5	6.5	5.9	4.4	3.2	1.4	1.0	44.2
Denair	1.0	1.9	3.6	4.7	7.0	7.9	8.0	6.1	5.3	3.4	1.5	1.0	51.4
La Grange	1.2	1.5	3.1	4.7	6.2	7.7	8.5	7.3	5.3	3.4	1.4	0.7	51.2
Modesto	0.9	1.4	3.2	4.7	6.4	7.7	8.1	6.8	5.0	3.4	1.4	0.7	49.7
Newman	1.0	1.5	3.2	4.6	6.2	7.4	8.1	6.7	5.0	3.4	1.4	0.7	49.3
STANISLAUS													
Oakdale	1.2	1.5	3.2	4.7	6.2	7.7	8.1	7.1	5.1	3.4	1.4	0.7	50.3
Patterson	1.3	2.1	4.2	5.4	7.9	8.6	8.2	6.6	5.8	4.0	1.9	1.3	57.3
Turlock	0.9	1.5	3.2	4.7	6.5	7.7	8.2	7.0	5.1	3.4	1.4	0.7	50.2
SUTTER													
Nicolaus	0.9	1.6	3.2	4.9	6.3	7.5	8.0	6.9	5.2	3.4	1.5	0.9	50.2
Yuba City	1.3	2.1	2.8	4.4	5.7	7.2	7.1	6.1	4.7	3.2	1.2	0.9	46.7
TEHAMA													
Corning	1.2	1.8	2.9	4.5	6.1	7.3	8.1	7.2	5.3	3.7	1.7	1.1	50.7
Gerber	1.0	1.8	3.5	5.0	6.6	7.9	8.7	7.4	5.8	4.1	1.8	1.1	54.7
Gerber Dryland	0.9	1.6	3.2	4.7	6.7	8.4	9.0	7.9	6.0	4.2	2.0	1.0	55.5
Red Bluff	1.2	1.8	2.9	4.4	5.9	7.4	8.5	7.3	5.4	3.5	1.7	1.0	51.1

Appendix A - Reference Evapotranspiration (ETo) Table*

County and City	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual ETo
TRINITY													
Hay Fork	0.5	1.1	2.3	3.5	4.9	5.9	7.0	6.0	4.5	2.8	0.9	0.7	40.1
Weaverville	0.6	1.1	2.2	3.3	4.9	5.9	7.3	6.0	4.4	2.7	0.9	0.7	40.0
TULARE													
Alpaugh	0.9	1.7	3.4	4.8	6.6	7.7	8.2	7.3	5.4	3.4	1.4	0.7	51.6
Badger	1.0	1.3	2.7	4.1	6.0	7.3	7.7	7.0	4.8	3.3	1.4	0.7	47.3
Delano	1.1	1.9	4.0	4.9	7.2	7.9	8.1	7.3	5.4	3.2	1.5	1.2	53.6
Dinuba	1.1	1.5	3.2	4.7	6.2	7.7	8.5	7.3	5.3	3.4	1.4	0.7	51.2
Lindcove	0.9	1.6	3.0	4.8	6.5	7.6	8.1	7.2	5.2	3.4	1.6	0.9	50.6
Porterville	1.2	1.8	3.4	4.7	6.6	7.7	8.5	7.3	5.3	3.4	1.4	0.7	52.1
Visalia	0.9	1.7	3.3	5.1	6.8	7.7	7.9	6.9	4.9	3.2	1.5	0.8	50.7
TUOLUMNE													
Groveland	1.1	1.5	2.8	4.1	5.7	7.2	7.9	6.6	5.1	3.3	1.4	0.7	47.5
Sonora	1.1	1.5	2.8	4.1	5.8	7.2	7.9	6.7	5.1	3.2	1.4	0.7	47.6
VENTURA													
Camarillo	2.2	2.5	3.7	4.3	5.0	5.2	5.9	5.4	4.2	3.0	2.5	2.1	46.1
Oxnard	2.2	2.5	3.2	3.7	4.4	4.6	5.4	4.8	4.0	3.3	2.4	2.0	42.3
Piru	2.8	2.8	4.1	5.6	6.0	6.8	7.6	7.8	5.8	5.2	3.7	3.2	61.5
Port Hueneme	2.0	2.3	3.3	4.6	4.9	4.9	4.9	5.0	3.7	3.2	2.5	2.2	43.5
Thousand Oaks	2.2	2.6	3.4	4.5	5.4	5.9	6.7	6.4	5.4	3.9	2.6	2.0	51.0
Ventura	2.2	2.6	3.2	3.8	4.6	4.7	5.5	4.9	4.1	3.4	2.5	2.0	43.5
YOLO													
Bryte	0.9	1.7	3.3	5.0	6.4	7.5	7.9	7.0	5.2	3.5	1.6	1.0	51.0
Davis	1.0	1.9	3.3	5.0	6.4	7.6	8.2	7.1	5.4	4.0	1.8	1.0	52.5
Esparto	1.0	1.7	3.4	5.5	6.9	8.1	8.5	7.5	5.8	4.2	2.0	1.2	55.8
Winters	1.7	1.7	2.9	4.4	5.8	7.1	7.9	6.7	5.3	3.3	1.6	1.0	49.4
Woodland	1.0	1.8	3.2	4.7	6.1	7.7	8.2	7.2	5.4	3.7	1.7	1.0	51.6
Zamora	1.1	1.9	3.5	5.2	6.4	7.4	7.8	7.0	5.5	4.0	1.9	1.2	52.8
YUBA													
Browns Valley	1.0	1.7	3.1	4.7	6.1	7.5	8.5	7.6	5.7	4.1	2.0	1.1	52.9
Brownsville	1.1	1.4	2.6	4.0	5.7	6.8	7.9	6.8	5.3	3.4	1.5	0.9	47.4

* The values in this table were derived from:

1) California Irrigation Management Information System (CIMIS);

2) Reference EvapoTranspiration Zones Map, UC Dept. of Land, Air & Water Resources and California Dept of Water Resources 1999; and

3) Reference Evapotranspiration for California, University of California, Department of Agriculture and Natural Resources (1987) Bulletin 1922 4) Determining Daily Reference Evapotranspiration, Cooperative Extension UC Division of Agriculture and Natural Resources (1987), Publication Leaflet 21426

Appendix B – Sample Water Efficient Landscape Worksheet.

WATER EFFICIENT LANDSCAPE WORKSHEET

This worksheet is filled out by the project applicant and it is a required element of the Landscape Documentation Package.
Please complete all sections (A and B) of the worksheet.

SECTION A. HYDROZONE INFORMATION TABLE

Please complete the hydrozone table(s) for each hydrozone. Use as many tables as necessary to provide the square footage of landscape area per hydrozone.

Hydrozone*	Zone or Valve	Irrigation Method**	Area (Sq. Ft.)	% of Landscape Area
	Total			**100%**

**** Hydrozone***
HW = High Water Use Plants
MW = Moderate Water Use Plants
LW = Low Water Use Plants

*****Irrigation Method***
MS = Micro-spray
S = Spray
R = Rotor
B= Bubbler
D= Drip
O = Other

SECTION B. WATER BUDGET CALCULATIONS

Section B1. Maximum Applied Water Allowance (MAWA)

The project's Maximum Applied Water Allowance shall be calculated using this equation:

MAWA = (ETo) (0.62) [(0.7 x LA) + (0.3 x SLA)]

where:

MAWA = Maximum Applied Water Allowance (gallons per year)
ETo = Reference Evapotranspiration from Appendix A (inches per year)
0.7 = ET Adjustment Factor (ETAF)
LA = Landscaped Area includes Special Landscape Area (square feet)
0.62 = Conversion factor (to gallons per square foot)
SLA = Portion of the landscape area identified as Special Landscape Area (square feet)
0.3 = the additional ET Adjustment Factor for Special Landscape Area (1.0 - 0.7 = 0.3)

Maximum Applied Water Allowance = ________________________**gallons per year**

Show calculations.

Effective Precipitation (Eppt)

If considering Effective Precipitation, use 25% of annual precipitation. Use the following equation to calculate Maximum Applied Water Allowance:

MAWA= (ETo – Eppt) (0.62) [(0.7 x LA) + (0.3 x SLA)]

Maximum Applied Water Allowance = ________________________**gallons per year**

Show calculations.

Section B2. Estimated Total Water Use (ETWU)

The project’s Estimated Total Water Use is calculated using the following formula:

$$ETWU = (ETo)(0.62)\left(\frac{PF\,x\,HA}{IE} + SLA\right)$$

where:

ETWU = Estimated total water use per year (gallons per year)
ETo = Reference Evapotranspiration (inches per year)
PF = Plant Factor from WUCOLS (see Definitions)
HA = Hydrozone Area [high, medium, and low water use areas] (square feet)
SLA = Special Landscape Area (square feet)
0.62 = Conversion Factor (to gallons per square foot)
IE = Irrigation Efficiency (minimum 0.71)

Hydrozone Table for Calculating ETWU

Please complete the hydrozone table(s). Use as many tables as necessary.

Hydrozone	Plant Water Use Type(s)	Plant Factor (PF)	Area (HA) (square feet)	PF x HA (square feet)
			Sum	
	SLA			

Estimated Total Water Use = __________________________**gallons**

Show calculations.

Appendix C – Sample Certificate of Completion.

CERTIFICATE OF COMPLETION

This certificate is filled out by the project applicant upon completion of the landscape project.

PART 1. PROJECT INFORMATION SHEET

Date		
Project Name		
Name of Project Applicant	Telephone No.	
	Fax No.	
Title	Email Address	
Company	Street Address	
City	State	Zip Code

Project Address and Location:

Street Address		Parcel, tract or lot number, if available.
City		Latitude/Longitude (optional)
State	Zip Code	

Property Owner or his/her designee:

Name	Telephone No.	
	Fax No.	
Title	Email Address	
Company	Street Address	
City	State	Zip Code

Property Owner

"I/we certify that I/we have received copies of all the documents within the Landscape Documentation Package and the Certificate of Completion and that it is our responsibility to see that the project is maintained in accordance with the Landscape and Irrigation Maintenance Schedule."

____

Property Owner Signature Date

Please answer the questions below:

1. Date the Landscape Documentation Package was submitted to the local agency_____________
2. Date the Landscape Documentation Package was approved by the local agency_____________
3. Date that a copy of the Water Efficient Landscape Worksheet (including the Water Budget Calculation) was submitted to the local water purveyor_____________

PART 2. CERTIFICATION OF INSTALLATION ACCORDING TO THE LANDSCAPE DOCUMENTATION PACKAGE

“I/we certify that based upon periodic site observations, the work has been substantially completed in accordance with the ordinance and that the landscape planting and irrigation installation conform with the criteria and specifications of the approved Landscape Documentation Package.”

Signature*	Date	
Name (print)	Telephone No.	
	Fax No.	
Title	Email Address	
License No. or Certification No.		
Company	Street Address	
City	State	Zip Code

*****Signer of the landscape design plan, signer of the irrigation plan, or a licensed landscape contractor.

PART 3. IRRIGATION SCHEDULING

Attach parameters for setting the irrigation schedule on controller per ordinance Section 492.10.

PART 4. SCHEDULE OF LANDSCAPE AND IRRIGATION MAINTENANCE

Attach schedule of Landscape and Irrigation Maintenance per ordinance Section 492.11.

PART 5. LANDSCAPE IRRIGATION AUDIT REPORT

Attach Landscape Irrigation Audit Report per ordinance Section 492.12.

PART 6. SOIL MANAGEMENT REPORT

Attach soil analysis report, if not previously submitted with the Landscape Documentation Package per ordinance Section 492.5.

Attach documentation verifying implementation of recommendations from soil analysis report per ordinance Section 492.5.

Chapter 17.630 LANDSCAPING AND SCREENING

17.630.001 Title and purpose of provisions.

A. Title. The provisions of this chapter shall be known as the "landscaping and screening regulations" of this title.

B. Purpose. The purpose of the landscape and screening regulations is to provide for the general welfare and convenience of the public by:

1. Increasing the compatibility between different intensities of land uses, by providing visual barriers, visually interrupting the barren expanse of paved parking lots, screening undesirable views which have a blighting impact on surrounding properties, and providing a visual separation and physical buffer between varying intensities of abutting land uses;

2. Implementing the comprehensive plan;

3. Encouraging the retention of significant existing vegetation to the extent feasible;

4. Reducing erosion and water runoff;

5. Conserving energy;

6. Preserving and promoting urban wildlife habitats;

7. Minimizing impacts of noise, light and glare. (Ord. 408 (part), 1987)

17.630.002 Applicability of provisions— General.

A. Landscaping shall be required within all yards, off-street parking lots and open land uses that are visible to and/or accessible to the public.

B. Shade trees shall be required within required landscaping, off-street parking lots and open land uses.

C. Screening shall be required as a buffer between activities having a different intensity of use and between certain zoning districts so as to mitigate the impacts of noise, light and glare and human activity.

D. All ornamental uses of water in the common areas of a development project, such as ponds, lakes and fountains shall be supplied, operated and maintained with alternative sources of water if they are available.

E. Exceptions to the specific requirements may be granted on a case-by-case basis due to either unusual site conditions or other extenuating circumstances.

F. The requirements are applicable to:

1. All landscaping for new construction, including:

a. All residential development greater than one unit,

b. Model homes or temporary development,

c. Commercial,

d. Industrial,

e. Public authorities.

G. The requirements shall be used as a guideline for landscaping and irrigation for a single-family residence.

H. The requirements does not apply to that portion of a site irrigating edible crops or using nonpotable water. (Ord. 523 § 2, 1992; Ord. 408 (part), 1987)

17.630.003 Definitions.

For the purposes of this chapter, unless otherwise apparent from the context, certain works and phrases used in this chapter are defined as follows:

A. "Landscaping" means vegetative plantings such as grass, trees, shrubs and vines and related improvements such as pools, walkways, rock work and sculpture which is of a design that will beautify and enhance a property and control erosion and reduce glare.

B. "Screening" means a masonry wall, board fence, screened chain link fence, hedge, berm or vegetative planting or combination thereof which is of a design that will provide a visual and audible barrier between land uses having different intensities of use.

C. "Shade tree" means trees of a variety approved by the city that will, under ordinary circumstances and growing conditions, provide shade upon reaching maturity.

D. "Automatic controller" means a mechanical or solid state timer, capable of operating valve stations to set the days and length of time of a water application.

E. "Check valve" means a valve located under a sprinkler head to hold water in the system so it minimizes drainage from the lower elevation sprinkler heads.

F. "Conversion factor (0.62)" means a number that converts the estimated total water use from acres-inches per acre per year to gallons per square foot per year. The conversion factor is calculated as follows:

(325,851 gallons/43,560 square feet)/12 inches = (0.62)

325,851 gallons = one acre foot

43,560 square feet = one acre

12 inches = one foot

To convert gallons per year to one hundred-cubic-feet per year, another common billing unit for water, divide gallons per year by seven hundred forty-eight. (Seven hundred forty-eight gallons equal one hundred cubic feet.)

G. "Estimated total water use" means the annual total amount of water estimated to be needed to keep the plants in the landscaped area healthy. It is based upon such factors as the local evapotrans-piration rate, the size of the landscaped area, the type of plants, and the efficiency of the irrigation system.

H. "Evapotranspiration" means the quantity of water evaporated from adjacent soil surfaces and transpired by plants during a specific time.

I. "Flowrate" means a portion of the landscaped area having plants with similar water needs that are served by a valve or set of valves with the same schedule. A hydro-zone may be irrigated or nonirrigated. For example, a naturalized area planted with native vegetation that will not need supplemental irrigation once established is a nonirrigated hydrozone.

J. "Hydrozone" means a portion of the landscaped area having plants with similar water needs that are served by a valve or set of valves with the same schedule. A hydrozone may be irrigated or nonirrigated. For example, a naturalized area planted with native vegetation that will not need supplemental irrigation once established is a nonirrigated hydrozone.

K. “Irrigation efficiency” means the measurement of the amount of water beneficially used divided by the amount of water applied. Irrigation efficiency is derived from measurements and estimates of irrigation system characteristics and management practices. For the purpose of this chapter the following factors shall be used:

Spray heads (pop-up or riser)	0.60
Rotor or impact heads	0.70
Bubbler	0.70
Drip	0.76

L. “Landscape irrigation audit” means a process to perform site inspections, evaluate irrigation systems and develop efficient irrigation schedules.

M. “Landscaped area” means the entire parcel less the building(s) footprint, driveways, nonirrigated portions of the parking lots, hardscapes such as decks and patios and other nonporous areas. Water features are included in the calculation of the landscaped area. Areas dedicated to edible plants, such as orchards or vegetable gardens, are not included.

N. “Mulch” means any material such as leaves, bark, straw or other materials left loose and applied to the soil surface to reduce evaporation.

O. “Nonpotable water” means water unfit for human consumption, such as treated or recycled waste water, untreated irrigation water or untreated groundwater.

P. “Overspray” means the water which is delivered beyond the landscaped area, wetting pavements, walks, structures or other nonlandscaped areas.

Q. “Plant factor” means a factor that when multiplied by reference evapotranspiration, estimates the amount of water used by plants. For purposes of this ordinance, use the following plant factors:

Low water using:	0.1 - 0.3
Medium water using:	0.4 - 0.6
High water using:	0.7 - 0.9

These plant factors are based on the Water Use Classification Of Landscape Species project (WUCOLS). The project list is intended solely as a guide to help landscape professional identify irrigation water needs of landscape species. It is not intended to be used as a required, mandatory, approved or master list. The WUCOLS Project is available from the California Department of Water Resources or from the Contra Costa water district.

R. “Reference evapotranspiration” or “ETo” means a standard measurement of environmental parameters which affect the water use of plants. ETo is given in inches per day, month or year and is an estimate of the evapotranspiration of a large field of four-to-seven-inch tall, cool season grasses that is well watered. Reference evapotranspiration is used as the basis of determining the estimated total water use so that regional differences in climate can be accommodated. (For historical ETo rates see Exhibit B attached to the ordinance codified in this chapter.)

S. “Runoff” means water which is not absorbed by the soil or landscape to which it is applied and flows from the area. For example, runoff may result from water that is applied at too great a rate (application rate exceeds infiltration rate) or when there is a severe slope.

T. “Soil composition” means the classification of soil based on the percentage of sand, silt and clay in the soil.

U. “Sprinkler” means a device which sprays water through a nozzle.

V. “Station” means an area served by one valve or by a set of valves that operate simultaneously.

W. “Turf” means a surface layer of earth containing mowed grass and its roots. This can be either a cool season or warm season grass. For example, Red Fescue and Tall Fescue are cool season grasses; Bermuda grass, Kikuyu grass, St. Augustine, Zoysia grass, and Buffalo grass are warm season grasses.

X. “Valve” means a device used to control the flow of water in the irrigation systems. (Ord. 523 § 3, 1992; Ord. 408 (part), 1987)

17.630.004 Landscaping required.

Landscaping in conformance with Section 17.630.008 shall be required as follows:

A. Residential uses: Within any front yard or side yard adjacent to a street;

B. Public and quasi-public uses: Within any parking lot, front yard, side yards adjacent to a street or interior open space that is visible from a public right-of-way or accessible to the public;

C. Commercial and industrial uses: Within any parking lot, front yard, side yard adjacent to a street or open land use that is visible from a public right-of-way or accessible to the public;

D. Where a parking lot abuts a public right-of-way there shall be required a landscaped strip of not less than five feet in width contiguous to and parallel to such right-of-way;

E. Except for single-family residential uses landscaping shall be subject to design and site development review. (Ord. 408 (part), 1987)

17.630.005 Screening required.

Screening in conformance with Section 17.630.009 shall be required as follows:

A. Along the interior boundaries between any R, A, or OS zone and any C, IC, PEC, PF or SPF zone.

B. Parking lots for more than six vehicles shall be enclosed, except for necessary driveway openings, by screening where contiguous to or within two hundred feet of any property in any R zone, any A zone or the OS zone.

C. Where a parking lot abuts a public right-of-way across from property in any R zone, any A zone or the OS zone, such lot shall be screened along that right-of-way to a height of forty-eight inches.

D. The following specific uses shall be screened:

1. Multiple residential projects having four or more dwellings;

2. Public and quasi-public uses such as churches, schools and similar uses;

3. The boundaries of new subdivisions upon development;

4. Mobile home parks. (Ord. 408 (part), 1987)

17.630.006 Shade trees required.

Shade trees in conformance with Section 17.630.008 shall be required as follows:

A. Within any public parking lot;

B. Within any area of required landscaping;

C. Within any area of open land use. (Ord. 408 (part), 1987)

17.630.007 Exceptions—Landscaping and screening.

The exception to the landscape and screening requirements are as follows:

A. The standards set forth in this chapter for location and height of landscaping or screening may be modified by the city when such landscaping or screening would constitute a danger to traffic by reason of impairment of vision at a street or driveway intersection.

B. Screening shall not be required along a lot line where a building wall, solid fence or freestanding wall of the required height exists immediately abutting and on the other side of the lot line. (Ord. 408 (part), 1987)

17.630.008 Landscape standards.

Required landscaping, to include shade trees, shall be installed in accordance with the following minimum standards. These standards may be exceeded voluntarily by the developer and greater standards may be imposed as a condition of an approved permit:

A. Parking lots and other open land uses which are visible to, or accessible to the public shall be landscaped at the following rate:

Parking Lot Size (Spaces)	Open Space Area (Acres)	Percent of Lot In Landscaping
6 or less	.1 AC	4%
7 to 15	.2 AC	7%
16 to 30	.3 AC	10%
31 to 70	.4 AC	13%
71 or more	.5 AC	16%

B. Landscaped areas, parking lots and other open land uses shall be required to have shade trees at the rate of sixteen trees per acre or fraction thereof.

C. Shade trees generally shall be of a fifteen-gallon can size having a minimum height of six feet and a one-inch caliper. Modification of these standards for equivalent quality of tree may be permitted by the city depending on tree species and quality of stock.

D. Shade trees shall be scattered within a parking lot approximately thirty feet apart and may be clustered within landscaped areas.

E. Landscaped areas and tree wells shall be contained by pavement, fences or walls, or shall be contained in planters and tree wells bordered by a minimum six-inch-high concrete curb or equivalent approved by the city.

F. Planters and tree wells shall have a width of not less than five feet and shall be protected from automobile overhang where necessary through the provision of tire stops or other barriers approved by the city.

G. Landscaped areas and planters shall be watered by an automatic irrigation system approved by the city and designed to maximize water conservation.

H. All landscaping shall be maintained in good growing condition. Maintenance shall include, where appropriate, pruning, mowing, weeding, cleaning, fertilizing and regular watering. Whenever necessary, planting shall be replaced with other plant materials to insure continued compliance with applicable landscaping requirements.

I. Paved and graveled walkways and the use of gravel or similar materials as a landscape feature shall not exceed twenty percent of the landscape area.

J. Vegetive materials shall be selected from among those known to be suitable to the climate of the city of Brentwood area.

K. In order to foster water conservation programs the use of native plants or other plant material proven to require minimal watering shall be permitted and encouraged.

L. Except for shade trees, landscaping or screening shall not exceed three feet in height within thirty-five feet of the street corner on any corner lots.

M. Within overhead utility line easements trees shall be of a type that customarily grow to a height not exceeding fifteen feet.

N. Within underground utility line easements the planting of trees shall be prohibited. (Ord. 408 (part), 1987)

17.630.009 Screening standards.

Required screening shall be installed in accordance with the following minimum standards;

A. Except where a greater height is required by the city for noise abatement, fences and walls shall not exceed a height of six feet.

B. Walls shall be constructed in conformance with the requirements of the city director of public works.

C. Fence supports should be on a maximum of six-foot centers and cemented in place and may be four-by-four wood posts, pipe or masonry piers.

D. Fence covering shall be masonry, wood boards of not less than one-inch thickness or a chain link type fence with slats, vegetative or other durable screening.

E. Fences or walls shall be maintained in good repair, including painting if required, without any signs or advertising thereon except in conformance with the city sign ordinance.

F. Vegetive screening may include an evergreen hedge or a mix of evergreen shrubs and trees of a type, density and spacing so that sight and illumination will be obscured through the screening within three years of planting.

G. Except for trees, vegetative screening shall be maintained at a height of not less than six feet nor more than ten feet.

H. An earth berm may be used in combination with any of the above types of screening, but not more than two-thirds of the required height of such screening may be provided by the berm.

I. All screening shall follow the lot line of the lot to be screened, or the inside edge of the sidewalks or shall be so arranged within the boundaries of the lot as to substantially screen, from adjoining properties the building, facility or activity required to be screened. (Ord. 408 (part), 1987)

17.630.010 Landscaping for new development.

A. Plant Selection. At least ninety percent of the plants selected in nonturf areas shall be well-suited to the climate of Brentwood and require minimal water once established. Up to ten percent of the plants may be of a non-drought tolerant variety as long as they are grouped together and can be irrigated separately.

B. Turf Selection and Limitations.

1. The combined turf and/or water area (i.e., pools, ponds and fountains) shall be limited to twenty-five percent of landscape areas. Turf limitation is excluded for public parks, golf courses, cemeteries, school and recreation areas;

2. No turf shall be allowed:

a. In median strips,

b. In areas less than eight feet wide,

c. On slopes greater than 4:1.

C. Soil Conditioning and Mulching.

1. A soil analysis shall be submitted with the landscape plans, showing general suitability, soluble salts, available micronutrients, plus gypsum requirement and applicable recommendations;

2. A minimum of two inches of mulch shall be added in nonturf areas to the soil surface after planting. Nonporous material shall not be placed under the mulch.

D. Irrigation.

1. Sprinklers and sprays shall not be used in areas less than eight feet wide. Micro-irrigation devices and/or bubblers shall be used that do not exceed 1.5 gallons per minute per device;

2. Sprinkler heads with a precipitation rate of .85 inches per hour or less shall be used on slopes exceeding fifteen percent to minimize runoff, or exceeding ten percent within ten feet of hardscape;

3. Valves and circuits shall be separated based on water use (hydrozoning);

4. Bubbler irrigation systems are required for newly installed trees;

5. Sprinkler heads must have matched precipitation rates within each control valve circuit;

6. Serviceable check valves are required where elevation differential may cause low head drainage;

7. Sprinkler head spacing shall be designed for head-to-head coverage. The system should be designed for minimum runoff and overspray onto nonirrigated areas;

8. All irrigation systems shall be equipped with an automatic controller capable of multiple programming. Controllers must have multiple cycle start capacity and a flexible calendar program;

9. Pop-up sprinklers in lawn areas shall have at least a four inch pop-up height;

10. All irrigation systems shall be equipped with automatic rain shutoff devices and high-flow shutoff valves at heads adjacent to walks, curbs or other high-traffic areas, or other flow sensor devices;

11. Irrigation plans shall include:

a. Irrigated turf area (in square feet),

b. Irrigated nonturf area (in square feet),

c. Flow rate in gallons per minute per valve,

d. Estimated annual water use per hydrozone in gallons (see Exhibit A attached to the ordinance codified in this chapter for formula),

e. Estimated total annual water use in gallons (sum of all hydrozones;)

12. Upon completing the installation of the landscaping and irrigation system, during the maintenance period, an irrigation audit shall be performed by a certified landscape irrigation auditor.

E. Certification. A licensed contractor and a licensed landscape architect and/or certified irrigation designer and/or other licensed or certified professional in a related field shall conduct a final field observation and shall provide a certificate of substantial completion to the city. (See Exhibit C attached to the ordinance codified in this chapter for the certificate of substantial completion.) (Ord. 523 § 4, 1992: Ord. 408 (part), 1987)

17.630.011 Installation.

All landscaping, shade trees and screening required pursuant to this chapter shall be installed prior to granting of any occupancy permit(s) approval. Except upon submittal of a bond or other surety acceptable to the city, installation may be deferred for a period not to exceed six months from the date of occupancy. (Ord. 523 § 5, 1992)

Appendix K: Reduced Delta Reliance Reporting

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Appendix K

City of Brentwood's Reduced Delta Reliance Reporting

K.1 Background

The Sacramento-San Joaquin Delta Reform Act of 2009 (Delta Reform Act) established two co-equal goals of providing a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem. As part of the Delta Reform Act, the Delta Stewardship Council (DSC) was created who then developed and adopted the Delta Plan in 2013. The Delta Plan is a comprehensive, long-term, legally enforceable plan guiding how federal, state, and local agencies manage the Delta's water and environmental resources. Included in the Delta Plan is Delta Plan Policy WR P1, *Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance* (WR P1). WR P1 is relevant to any state or local public agency that anticipate participating in or receiving water from a proposed covered action such as a multi-year water transfer, conveyance facility, or new diversion that involves transferring water through, exporting water from, or using water in the Delta. Prior to initiating the implementation of that action, agencies must prepare a written certification of consistency with detailed findings as to whether the covered action is consistent with applicable Delta Plan policies and submit that certification to the DSC. WR P1 identifies UWMPs as the tool to demonstrate consistency with state policy to reduce reliance on the Delta for an agency that carries out or takes part in a covered action.

K.2 Demonstrating Reduced Reliance on the Delta

The analysis and documentation provided below includes all of the elements described in WR P1, namely subdivisions (c)(1)(B) and (c)(1)(C), that need to be included in a water supplier's UWMP to document and quantify supplies contributing to reduced reliance on the Delta watershed and improved self-reliance. The approach is consistent with what is included in Appendix C of the DWR Guidebook. Some of the key assumptions that went into the City's reduced reliance analysis include:

- All data were obtained from the current 2020 UWMP or previously adopted UWMPs and represent average or normal water year conditions.
- No projects or programs that are described in the UWMPs as "Future Water Supply Projects or Programs" were included in the accounting of supplies.
- This analysis uses a normal water year representation of 2010 as the baseline. Data for the 2010 baseline was taken from the City's 2005 UWMP as the UWMPs generally do not provide normal water year data for the year that they are adopted (i.e., 2005 UWMP forecasts begin in 2010, 2010 UWMP forecasts begin in 2015, and so on). This approach was used for 2015 and 2020 data as well, in that it was retrieved from the City's 2010 and 2015 UWMPs, respectively. Data for 2025-2045 are from the current 2020 UWMP.

K.2.1 Water Use without Water Use Efficiency

WR P1 considers water use efficiency savings as a source of supply. Because the City does not explicitly estimate water use efficiency as a supply, the water demand data from the current and past UWMPs that was used for this assessment needed to be adjusted to properly reflect normal water year demands in the calculation of reduced reliance. The suggested approach included in Appendix C of the DWR Guidebook was utilized to make these adjustments. The approach assumes that the embedded water use efficiency savings can be calculated based on changes in forecasted per capita water use since the baseline. Once calculated, the embedded water use efficiency savings can be added to the expected outcome of water supplies that contribute to reduced reliance on Delta water. Supporting narratives and documentation for all the data shown in the tables are provided below.

The first step in the analysis involved adjusting total service area demands to reflect only demands that can implement water use efficiency measures (i.e., residential, agricultural, and commercial, industrial and institutional demands) but still include the embedded water use efficiency supply. Demands for non-potable supplies, such as recycling for the City, are subtracted from the total service area demands; this is done to reflect the demand hardening aspects of non-potable supplies. Table 1a presents the results of this adjustment.

Table 1a. Water Use for the City of Brentwood

	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
Service Area Water Demands with Water Use Efficiency Accounted For	3,696	3,768	4,509	4,181	4,442	4,715	5,000	5,251
Non-Potable Water Demands	18	18	206	364	412	460	508	508
Potable Service Area Demands with Water Use Efficiency Accounted For	3,678	3,750	4,303	3,817	4,030	4,255	4,492	4,743

Notes:
Baseline (2010) values – City's 2005 UWMP, Table 5-5; Non-Potable water demand value was from the City's 2010 UWMP, Table 4-13.
2015 values – City's 2010 UWMP, Table 4-4
2020 values – City's 2015 UWMP, Table 4-4
2025-2045 values – City's 2020 UWMP, Table 4-4
Units: MG

Table 1b. Service Area Population

	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
Service Area Population	51,453	56,493	65,118	68,752	72,589	76,640	80,917	85,433

Notes:
Baseline (2010) values – City's 2015 UWMP, SB X7-7 Tale 5 in Appendix F
2015 values – City's 2015 UWMP, Table 3-2
2020 values – City's 2020 UWMP, Table 3-2
2025-2045 values – City's 2020 UWMP, Table 3-2

Once the total service area water demands were adjusted, these were divided by the service area population numbers shown in Table 1b to obtain the per capita water use in GPCD, as shown in Table 1c. By calculating the incremental change in per capita water use relative to the 2010 baseline and applying those back to the population numbers from Table 1b, the estimated water use efficiency supply can be calculated. These supply totals are shown in Table 1c.

Table 1c. Water Use Efficiency Since Baseline

	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
Per Capita Water Use (GPCD)	196	182	181	152	152	152	152	152
Change in Per Capita Water Use from Baseline (GPCD)	--	(14)	(15)	(44)	(44)	(44)	(44)	(44)
Estimated Water Use Efficiency Since Baseline	--	288	352	1,098	1,159	1,223	1,292	1,364

Notes:
Units: MG

This estimated water use efficiency supply can be considered an additional supply that may be used to show reduced reliance on Delta water supplies. Table 1d provides a summary of the data that were utilized in the next steps of the analysis.

Table 1d. Water Use without Water Use Efficiency Accounted For

	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
Service Area Water Demands with Water Use Efficiency Accounted For	3,696	3,768	4,509	4,181	4,442	4,715	5,000	5,251
Estimated Water Use Efficiency Since Baseline	--	288	352	1,098	1,159	1,223	1,292	1,364
Service Area Water Demands without Water Use Efficiency Accounted For	3,696	4,056	4,861	5,279	5,601	5,938	6,292	6,615

Notes:
Units: MG

K.2.2 Water Supplies Contributing to Regional Self-Reliance

As part of WR P1, agencies must include in their UWMP the expected outcome for measurable improvement in regional self-reliance as a reduction in water used from the Delta watershed. While WR P1 does not require that agencies demonstrate measurable improvement in regional self-reliance directly, the approach presented in Appendix C of the DWR Guidebook suggests agencies quantify the water supplies in their portfolio that contribute to self-reliance as a means of providing documentation that could help support a future certification of consistency for future water supply projects that are covered actions, such as the Los Vaqueros Reservoir Expansion. For this analysis it was assumed that the supplies contributing to the City’s self-reliance include the water use efficiency supply calculated in Section 1.2.1, the recycled water it produces and distributes, and the City’s groundwater supplies. It was assumed that the City would meet 20 percent of its potable and raw water demands through its groundwater supply as this amount most closely aligns with the amount of groundwater the City typically uses during normal years. The supply totals are summarized in Table 2a.

Table 2a. Water Supplies Contributing to Regional Self-Reliance

Water Supplies	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
Water Use Efficiency	--	288	352	1,098	1,159	1,223	1,292	1,364
Water Recycling	18	18	206	364	412	460	508	508
Stormwater Capture and Use	--	--	--	--	--	--	--	--
Advanced Water Technologies	--	--	--	--	--	--	--	--
Conjunctive Use Projects	736	750	861	763	806	851	898	949
Local and Regional Water Supply and Storage Projects	--	--	--	--	--	--	--	--
Other Programs and Projects the Contribute to Regional Self-Reliance	--	--	--	--	--	--	--	--
Water Supplies Contributing to Regional Self-Reliance	754	1,056	1,419	2,225	2,377	2,534	2,698	2,821

Notes:
Water use efficiency supply values are from Table 1c
Baseline (2010) water recycling values – City's 2010 UWMP, Table 5-1
2015 water recycling values – City's 2010 UWMP, Table 5-1
2020 water recycling values – City's 2015 UWMP, Table 6-5
2025-2045 water recycling values – City's 2020 UWMP, Table 6-6
Units: MG

Table 2b. Service Area Water Demands without Water Use Efficiency

	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
Service Area Water Demands without Water Use Efficiency Accounted For	3,696	4,056	4,861	5,279	5,601	5,938	6,292	6,615

Notes:
Water use demand values are from Table 1d
Units: MG

Using the water supplies from Table 2a, the change in water supplies contributing to regional self-reliance can be calculated relative to the 2010 baseline. These numbers are presented in Table 2c below.

Table 2c. Change in Regional Self Reliance

	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
Water Supplies Contributing to Regional Self-Reliance	754	1,056	1,419	2,225	2,377	2,534	2,698	2,821
Change in Water Supplies Contributing to Regional Self-Reliance	--	302	665	1,471	1,623	1,780	1,944	2,067

Notes:
Units: MG

The calculated values from Table 2c can also be expressed as a percentage of the water demands without water use efficiency savings accounted for. This is done by dividing the water supplies from Table 2a by the water demands included in Table 2b. The change in the percentage of regional water supplies can then be evaluated for each outcome year in the analysis compared to the baseline year to demonstrate increased regional self-reliance as shown in Table 2d.

Table 2d. Percent Change in Regional Self Reliance

	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
Percent of Water Supplies Contributing to Regional Self-Reliance	20.4%	26.0%	29.2%	42.1%	42.4%	42.7%	42.9%	42.6%
Change in Percent of Water Supplies Contributing to Regional Self-Reliance	--	5.6%	8.8%	21.7%	22.0%	22.3%	22.5%	22.2%

Notes:
Units: MG

K.2.3 Reliance on Supplies from the Delta Watershed

As part of WR P1, agencies must also include in their UWMP the expected outcomes for measurable reductions in supplies from the Delta watershed either as a quantity or as a percentage of their water supply portfolios. The City's Delta water supply stems from a permanent entitlement to purchase 14,800 AFY (4,823 MGY) of surplus irrigation water from ECCID. ECCID has pre-1914 water rights, which historically have not been subject to delivery reductions during water shortages, including regulatory restricted and drought years. Historically, the City has not used its full purchase entitlement, instead relying on a mixture of both surface and groundwater supplies to meet potable and raw water demands. For this reason, it was deemed not appropriate to include the full 4,823 MG in the analysis for reliance on supplies from the Delta watershed. Instead, the values included in Table 3a are based on the totals that most closely represent the amount of supply the City would likely rely on to meet normal year demands. For this analysis it was assumed that the City would meet 80 percent of its potable and raw water demands through its Delta purchase entitlement and the other 20 percent using groundwater. This split was based on historical water supply use trends during normal years.

Table 3a. Reliance on Water Supplies from the Delta

Water Supplies from the Delta Watershed	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
CVP/SWP Contract Supplies	--	--	--	--	--	--	--	--
Delta/Delta Tributary Diversions	2,942	3,000	3,442	3,054	3,224	3,404	3,594	3,794
Transfers and Exchanges	--	--	--	--	--	--	--	--
Other Water Supplies from the Delta Watershed	--	--	--	--	--	--	--	--
Total Water Supplies from the Delta Watershed	2,942	3,000	3,442	3,054	3,224	3,404	3,594	3,794

Notes:
Units: MG

Table 3b. Service Area Water Demands without Water Use Efficiency

	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
Service Area Water Demands without Water Use Efficiency Accounted For	3,696	4,056	4,861	5,279	5,601	5,938	6,292	6,615

Notes:
Water use demand values are from Table 1d
Units: MG

Using the water supplies from Table 3a, the change in water supplies contributing to Delta reliance can be calculated relative to the 2010 baseline. These numbers are presented in Table 3c below.

Table 3c. Change in Supplies from the Delta Watershed

	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
Total Water Supplies from the Delta Watershed	2,942	3,000	3,442	3,054	3,224	3,404	3,594	3,794
Change in Water Supplies from the Delta Watershed	--	58	500	111	282	462	651	852

Notes:
Units: MG

The calculated values from Table 3c can also be expressed as a percentage of the water demands without water use efficiency savings accounted for. This is done by dividing the water supplies from Table 3a by the water demands included in Table 3b. The change in the percentage of Delta water supplies compared to the baseline year can then be evaluated for each outcome year in the analysis to demonstrate decreased reliance on supplies from the Delta watershed as shown in Table 2d.

Table 3d. Percent Change in Supplies from the Delta Watershed (As a Percent of Demand without Water Use Efficiency)

	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
Percent of Water Supplies from the Delta Watershed	79.6%	74.0%	70.8%	57.8%	57.6%	57.3%	57.1%	57.4%
Change in Percent of Water Supplies from the Delta Watershed	--	-5.7%	-8.8%	-21.8%	-22.0%	-22.3%	-22.5%	-22.2%

Notes:
Units: MG

K.2.4 Summary of Expected Outcomes for Reduced Reliance on the Delta

The following provides a summary of the near-term (2025) and long-term (2045) expected outcomes for the City’s self-reliance and Delta reliance. The results show that the City is measurably improving self-reliance and reducing reliance on the Delta, both as an amount of water used and as a percentage of water used.

Expected Outcomes for Self-Reliance

- **Near-term (2025) –**Self-reliance is expected to increase to 1,471 MG per year from the 2010 baseline (Table 2c); this represents an increase of over 21 percent of 2025 water demands (Table 2d).
- **Long-term (2045) –**Self-reliance is expected to increase to 2,067 MG per year from the 2010 baseline (Table 2c), this represents an increase of over 22 percent of 2045 water demands (Table 2d).

Expected Outcomes for Reduced Reliance on Supplies from the Delta Watershed

- **Near-term (2025) –** While the reliance on supplies from the Delta watershed are projected to increase to 111 MG per year from the 2010 baseline (Table 3c), this actually represents an overall decrease of over 21 percent in water supplies from the Delta that will be contributing towards meeting 2025 water demands (Table 3d).
- **Long-term (2045) –** While the reliance on supplies from the Delta watershed are projected to increase to 852 MG per year from the 2010 baseline, this actually represents an overall decrease of just over 22 percent in water supplies from the Delta that will be contributing towards meeting 2045 water demands (Table 3d).

K.3 UWMP Implementation

In addition to the analysis presented above, WR P1 also requires that all programs and projects included in the UWMP that are locally cost-effective and technically feasible, and which reduce reliance on the Delta, are identified, evaluated, and are being implemented. As part of the UWMP process, the City identified ongoing and future projects that will improve existing and future water supplies for the City. These projects include major transmission mains, new water sources, improvements to existing water wells, reservoirs, and treatment facilities. Section 6.9 of the City's UWMP includes a brief description of each of these projects that include estimates on the water supply that is expected to be available from each project and an implementation timeline for each project or program.

In addition to projects and programs described in the City's UWMP, the City also conducts an ongoing water conservation program and has committed to continue to implement water conservation measures for all customer sectors. Water conservation can be achieved through managing the water supply and water demand. Supply management is used to improve the overall system efficiency and reduce waste within the production and delivery facilities. The City uses DMMs to encourage water conservation by the consumer. Section 9 of the City's UMWP provides narrative descriptions addressing the nature and extent of each DMM implemented.

K.4 Appending the 2015 UWMP

Consistent with WR P1 requirements, the information contained in this appendix is also intended to be appended to the City's 2015 UWMP. As required by the Act, the City is making the UWMP (which includes the Reduced Delta Reliance Reporting) and WSCP available for public inspection and held a public hearing prior to adopting these documents. The City notified cities and counties within the service area more than 60 days before the public hearing (see Appendix B for documentation). The UWMP, WSCP, and Reduced Delta Reliance Reporting for the 2015 UWMP were adopted by the Brentwood City Council on May 25, 2021. A copy of the adoption resolution is provided in Appendix D.

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