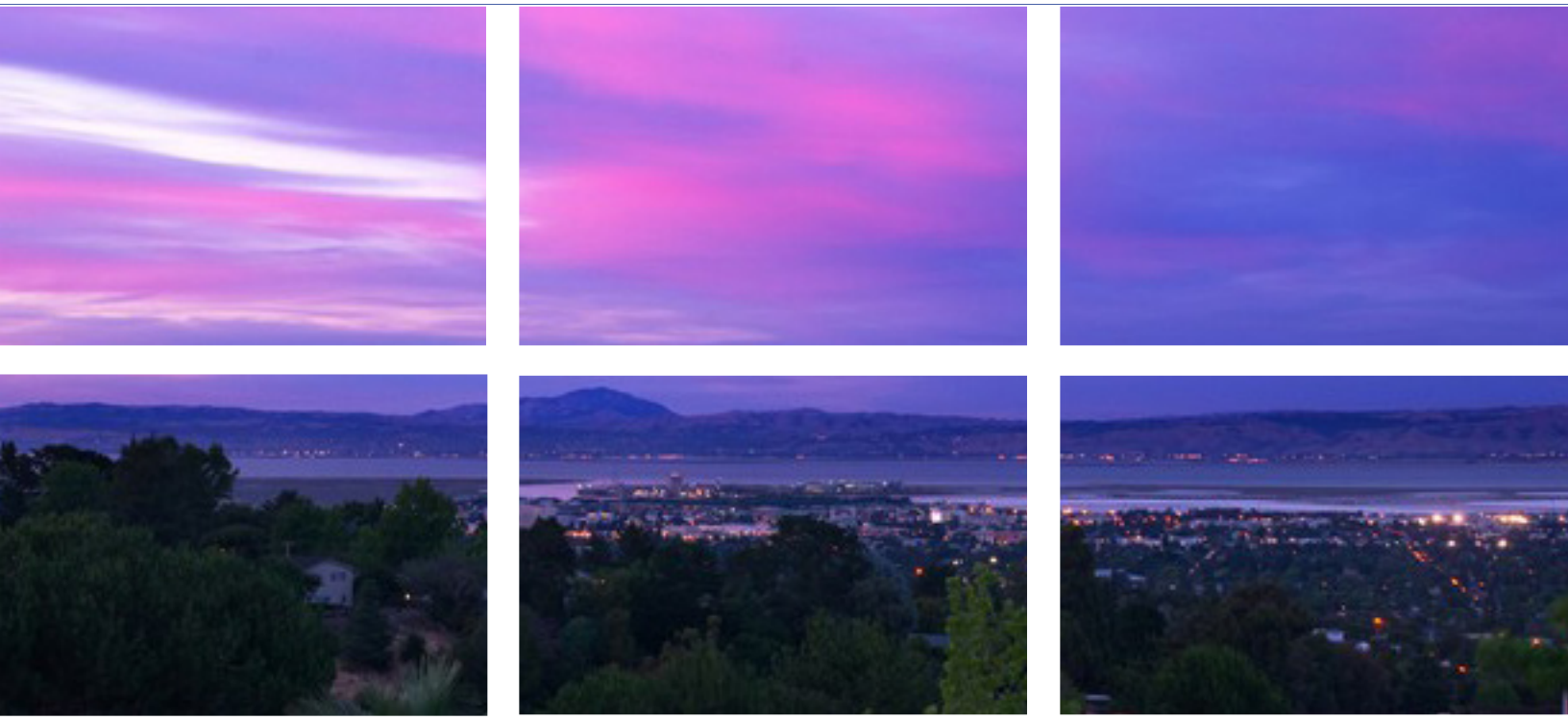
June 2021

2020 Urban Water Management Plan

for City of Redwood City



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ABBREVIATIONS

AB	Assembly Bill
ACWD	Alameda County Water District
ADWF	average dry weather flow
AF	acre-feet
AFY	acre-feet per year
AMI	Advance Metering Infrastructure
AWSP	Alternative Water Supply Planning Program
AWWA	American Water Works Association
BAIRWMP	Bay Area Integrated Regional Water Management Plan
BARR	Bay Area Regional Reliability
BAWSCA	Bay Area Water Supply and Conservation Agency
BDPL	Bay Division Pipeline
BG	billions of gallons
BMP	Best Management Practices
CAP	Climate Action Plan
CASGEM	California Statewide Groundwater Elevation Monitoring
CCR	California Code of Regulations
CCWD	Contra Costa Water District
CDT	Community Development & Transportation
Census	United States Census
CEQA	California Environmental Quality Act
CII	commercial, industrial, and institutional
CIP	capital improvement program
CUWCC	California Urban Water Conservation Council
CWC	California Water Code
DBP	disinfection by-product
DDW	Division of Drinking Water
DMM	demand management measures
DOF	Department of Finance
DRA	Drought Risk Assessment
DRT	Drought Response Tool
DSS Model	Demand Management Decision Support System Model
DWR	Department of Water Resources
EBMUD	East Bay Municipal Utilities District
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EKI	EKI Environment & Water, Inc.
ETo	reference evapotranspiration
FY	fiscal year
GIS	geographic information system
GPCD	gallons per capita per day
gpf	gallons per flush

GPM	gallons per minute
GRP	Groundwater Reliability Partnership
GSP	Groundwater Sustainability Plan
GSRP	Groundwater Storage and Recovery Project
Guidebook	*2020 Urban Water Management Plans Guidebook for Urban Water Suppliers*
GWMP	groundwater management plan
HET	High-Efficiency Toilet
HHLSM	Hetch Hetchy and Local Simulation Model
HMP	Hazard Mitigation Plan
HOA	homeowner association
HTWTP	Harry Tracy Water Treatment Plant
IPCC	International Panel on Climate Change
IRR	irrigation
ISG	Individual Supply Guarantee
JPA	Joint Powers Authority
kWh	kilowatt-hour
LCSD	Lower Crystal Springs Dam
LOS	Level of Service
LVE	Los Vaqueros Reservoir Expansion
Methodologies	*Methodologies for Calculating Baseline and Compliance Urban Per Capita Water, California Department of Water Resources Division of Statewide Integrated Water Management Water Use and Efficiency Branch*
MF	multi-family
MGD	million gallons per day
MID	Modesto Irrigation District
MMWD	Marin Municipal Water District
MOU	Memorandum of Understanding
MWELO	Model Water Efficient Landscape Ordinance
PAPMWC	Palo Alto Park Mutual Water Company
PG&E	Pacific Gas & Energy
PREP	Crystal Springs Purified Water
PVC	polyvinyl chloride
PWS	Public Works Services
PWWF	peak wet weather flow
R-GPCD	residential gallons per capita per day
RUWMP	Regional Urban Water Management Plan
RWQCB	Regional Water Quality Control Board
RWS	Regional Water System
SB	Senate Bill
SCVWD	Santa Clara Valley Water District
SF	single family
SFPUC	San Francisco Public Utilities Commission
SGMA	Sustainable Groundwater Management Act
SMC	San Mateo County

SMP	Surface Mining Permit
Strategy	BAWSCA Long Term Reliable Water Supply Strategy
SVCW	Silicon Valley Clean Water
SVWTP	Sunol Valley Water Treatment Plant
SWAP	Shared Water Access Program
SWRCB	State Water Resources Control Board
Target	water use target
TDS	total dissolved solids
TID	Turlock Irrigation District
Title 22	California Code of Regulations, Title 22
TRVA	Tuolumne River Voluntary Agreement
USD	Union Sanitary District
USEPA	United States Environmental Protection Agency
UWMP	Urban Water Management Plan
WCIP	Water Conservation Implementation Plan
WQD	Water Quality Division
WSA	Water Supply Assessment
WSCP	Water Shortage Contingency Plan
WSAP	Water Shortage Allocation Plan
WSIP	Water System Improvement Program
WSMP	Water System Master Plan
WWTP	Wastewater Treatment Plant

1. INTRODUCTION AND OVERVIEW

This chapter discusses the importance and uses of this Urban Water Management Plan ("UWMP" or "Plan"), the relationship of this Plan to the California Water Code (CWC), the relationship of this Plan to other local and regional planning efforts, and how this Plan is organized and developed in general accordance with the UWMP Guidebook 2020 (Guidebook; DWR, 2020a).

1.1 Background and Purpose

The City of Redwood City (referred to herein as the "City" or "Redwood City") serves water to customers within the incorporated limits of the City as well as portions of San Mateo County. Redwood City delivers water to residential, commercial, industrial, and governmental customers and purchases all of its potable water supplies from the San Francisco Public Utilities Commission (SFPUC). Additionally, the City serves recycled water to its customers via its recycled water program. As of 2020, the City serves 23,974 connections within its service area.

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

- A long-range planning document for water supply and system planning; and
- A source for data on population, housing, water demands, water supplies, and capital improvement projects used in:
    - Regional water resource management plans prepared by wholesale water suppliers and other regional planning authorities (as applicable),
    - General Plans prepared by cities and counties, and
    - Statewide and broad regional water resource plans prepared by the California Department of Water Resources (DWR), the State Water Resources Control Board (State Board), or other state agencies.

Redwood City's last UWMP was completed in 2016, referred to herein as the "2015 UWMP." This Plan is an update to the 2015 UWMP and carries forward information that remains current and relevant to this Plan, and provides additional information as required by amendments to the UWMP Act (CWC §10610 – 10657). Although this Plan is an update to the 2015 UWMP, it was developed to be a self-contained, stand-alone document and does not require readers to reference information contained in previous updates.

1.2 Urban Water Management Planning and the California Water Code

The UWMP Act requires urban water suppliers to prepare an UWMP every five years and to submit this plan to the DWR, the California State Library, and any city or county within which the supplier provides water supplies. All urban water suppliers, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet annually are required to prepare an UWMP (CWC §10617).

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

A subsequent substantial revision to the UWMP Act was made in 2018 through a pair of bills (i.e., Assembly Bill 1668 and Senate Bill 606), referred to as "Making Water Conservation a California Way of Life" or the "2018 Water Conservation Legislation." These changes include, among other things, additional requirements for Water Shortage Contingency Plans (WSCPs), expansion of dry year supply reliability assessments to a five-year drought period, establishment of annual drought risk assessment procedures and reporting, and new conservation targets referred to as "annual water use objectives," which will require retailers to continue to reduce water use beyond the 2020 SB X7-7 targets.

As applicable, Redwood City's 2020 UWMP reflects the following significant revisions to the UWMP Act that have been made since 2015.

- ***Five Consecutive Dry-Year Water Reliability Assessment***. The Legislature modified the dry-year water reliability planning from a "multiyear" time period to a "drought lasting five consecutive water years" designation.
- ***Drought Risk Assessment***. The Drought Risk Assessment (DRA) requires a supplier to assess water supply reliability over a five-year period from 2021 to 2025 that examines water supplies, water uses, and the resulting water supply reliability under a reasonable prediction for five consecutive dry years.
- ***Energy Analysis.*** UWMPs are now required to include water system energy usage information that can be readily obtained.
- ***Seismic Risk***. The Water Code now requires suppliers to specifically address seismic risk to various water system facilities and to have a mitigation plan.
- ***Water Shortage Contingency Plan***. In 2018, the Legislature modified the UWMP laws to require a WSCP with specific elements.
- ***Groundwater Supplies Coordination***. Water Code now requires suppliers' 2020 UWMPs to be consistent with Groundwater Sustainability Plans, in areas where those plans have been completed by the Groundwater Sustainability Agencies.
- ***Lay Description***. The Legislature included a new statutory requirement for suppliers to include a lay description of the fundamental determinations of the UWMP, especially regarding water service reliability, challenges ahead, and strategies for managing reliability risks.

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

1.3 Relationship to Other Planning Efforts

This Plan provides information specific to water management and planning within the Redwood City service area. However, water management does not happen in isolation; there are other planning processes that integrate with the UWMP to accomplish urban planning. Some of these relevant planning documents include relevant city and county General Plans, Water Master Plans, Recycled Water Master Plans, integrated resource plans, Integrated Regional Water Management Plans, and others.

This Plan is informed by and helps to inform these other planning efforts. In particular, this Plan was prepared in close coordination with the City of Redwood City's Public Works Services and Community Development & Transportation departments and has been integrated with the City's planning efforts. As such, the City's 2020 UWMP has been developed to be consistent with the City's 2010 General Plan, a visioning document that guides the growth and development of Redwood City through 2030, and subsequent documents, such as the Downtown Precise Plan. Primary coordination was achieved through City staff's participation in two workshops (held on January 13 and March 1). At these workshops, key information regarding the 2020 UWMP content was presented and City representatives were provided the opportunity to review, comment, and present additional information.

1.4 Plan Organization

The organization of this Plan follows the same sequence as outlined in the Guidebook (DWR, 2020a).

Chapter 1 - Introduction

Chapter 2 - Plan Preparation

Chapter 3 - Service Area and System Description

Chapter 4 - System Water Demands

Chapter 5 - Baseline Water Use and Water Conservation Targets

Chapter 6 - Water System Supplies

Chapter 7 - Water Supply Reliability

Chapter 8 - Water Shortage Contingency Planning

Chapter 9 - Demand Management Measures

Chapter 10 - Plan Adoption and Submittal

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

1.5 Demonstration of Consistency with the Delta Plan for Participants in Covered Actions

Although not required by the UWMP Act, in the Guidebook (DWR, 2020a), DWR recommends that all suppliers that are participating in, or may participate in, receiving water from a proposed project that is considered a "covered action" under the Delta Plan—such as a (1) multiyear water transfer; (2) conveyance facility; or (3) new diversion that involves transferring water through, exporting water from, or using water in the Sacramento-San Joaquin Delta (Delta)—provide information in their UWMP to demonstrate consistency with the Delta Plan policy WR P1, Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance (California Code of Regulations, Title 23, Section 5003). The SFPUC, Redwood City's wholesale agency, has made a legal determination that this requirement does not apply to their water sources.[1]

1.6 Lay Description

☑ ***CWC § 10630.5***

Suppliers shall provide a simple lay description of their projected water use for the foreseeable future.

This Urban Water Management Plan ("UWMP" or "Plan") is prepared for the City of Redwood City (also referred to as the "City" or "Redwood City"), which serves drinking water to a population of approximately 89,037. This UWMP serves as a foundational planning document and includes descriptions of historical and projected water demands, and water supplies and reliability over a 20-year planning horizon. This document also describes the actions the City is taking to promote water conservation, both by the City itself and affiliated agencies (referred to as "demand management measures"), and includes a plan to address potential water supply shortages such as drought or other impacts to supply availability (the "Water Shortage Contingency Plan"). This UWMP is updated every five years in accordance with state requirements under the Urban Water Management Planning Act and amendments (California Water Code [CWC] §10610 – 10656). Past plans developed for the City are available on the California Department of Water Resources (DWR) Water Use Efficiency Data Portal website: https://wuedata.water.ca.gov/. This document includes 10 chapters, which are summarized below.

Redwood City relies on the San Francisco Public Utilities Commission (SFPUC) Regional Water System (RWS) for all of its potable water supply. In accordance with the SFPUC's perpetual obligation to Redwood City's Supply Assurance, Redwood City has an Individual Supply Guarantee (ISG) of 10.93 million gallons per day (MGD), or 12,243 acre-feet per year (AFY).

Redwood City also uses recycled water for non-potable uses. Recycled water currently supplies 8% of Redwood City's total demand and is anticipated to supply 14% of Redwood City's total demand by 2045. The recycled water supply is expected to be 100% reliable in all year types.

[1] Email from BAWSCA, dated February 9, 2021.

Redwood City's supply reliability relies largely on the reliability of the SFPUC RWS. The SFPUC has committed to, among other things, meeting the retail and wholesale customers' average annual water demand during non–drought years and meeting dry-year delivery needs while limiting rationing to a maximum 20% system-wide reduction in water service during extended droughts. However, several potential constraints have been identified on the future supply availability of the SFPUC RWS. One of the key factors is the adoption of the 2018 Bay-Delta Plan Amendment. If the Bay-Delta Plan Amendment is implemented, the SFPUC is anticipated to have sufficient supplies to meet the projected water demands in normal years but would experience significant supply shortages in single dry years and multiple dry years.

Chapter 1- Introduction and Overview

This chapter presents the background and purpose of the UWMP, identifies the Plan organization, and provides this lay description overview of the document.

Chapter 2- Plan Preparation

This chapter discusses key structural aspects related to the preparation of the UWMP, and describes the coordination and outreach conducted as part of the preparation of the Plan, including coordination with local agencies (i.e., Bay Area Water Supply and Conservation Agency [BAWSCA]), water wholesalers (i.e., SFPUC), and the public).

Chapter 3- System Description

This chapter provides a description of the City's water system and the service area, including information related to the climate, population, and demographics. Redwood City is located in San Mateo County. The City has a population of approximately 89,037 and has a temperate climate. The majority of precipitation falls during late autumn, winter, and spring, averaging 20.3 inches of rainfall annually. Much of the City is "built out," allowing for only modest population increases in the future assuming continuation of current zoning and densities.

Chapter 4- Water Use Characterization

This chapter provides a description and quantifies the City's current and projected demands through the year 2045. The City provides drinking water (also referred to as "potable water") and recycled water to customers. This chapter details total water demand and potable demand. Recycled water demand is discussed further in Chapter 6. Water demands refer not only to the water used by customers, but also includes the water used as part of the system maintenance and operation, as well as unavoidable losses inherent in the operation of a water distribution system. Total water demand within the City was 9,770 AFY on average between 2016 and 2020. Taking into account historical water use, expected population increase and other growth, climatic variability, and other assumptions, water demand within the City is projected to increase to 11,923 acre-feet (AF) by 2045, a change of 22% compared to the 2016-2020 average.

Chapter 5- SB X7-7 Baselines, Targes, and 2020 Compliance

In this chapter, the City demonstrates compliance with its per capita water use target for the year 2020. The Water Conservation Act of 2009 (Senate Bill X7-7) was enacted in November 2009 and requires the state of California to achieve a 20% reduction in urban per capita water use by December 31, 2020. In

order to achieve this, each urban retail water supplier was required to establish water use targets for 2015 and 2020 using methodologies established by DWR. The City is in compliance with its 2020 water use target of 124 gallons per capita per day (GPCD), having reduced its potable water use in 2020 to 99 GPCD.

Chapter 6- Water Supply Characterization

This chapter presents an analysis of the City's water supplies, as well as an estimate of water-related energy-consumption. The intent of this chapter is to present a comprehensive overview of the City's water supplies, estimate the volume of available supplies over the UWMP planning horizon, and assess the sufficiency of the City's supplies to meet projected demands under "normal" hydrologic conditions.

The City's potable water supply is purchased water from SFPUC. Water delivered to the City originates in Hetch Hetchy Valley. The City's contractual allocation of water from the SFPUC (known as its ISG) is 10.93 MGD, or approximately 12,243 AFY.

The City has implemented a recycled water project that delivers recycled water produced by Silicon Valley Clean Water facilities located in the Redwood Shores portion of the City. During 2020, the City supplied 856 AFY of recycled water to customers near and east of Highway 101. The City plans to expand its recycled water system to areas west of Highway 101 and to downtown Redwood City. The projected recycled water use in 2045 is 1,716 AFY.

Calculation and reporting of water system energy intensity is a new requirement for the 2020 UWMPs. Energy intensity is defined as the net energy used for water treatment, conveyance, and distribution for all water entering the distribution system, less the amount of energy produced within the water system itself. Taking into account the energy produced by the City's potable water system, the energy intensity for the City is estimated to be 288 kilowatt hours per acre-foot of water (kWh/AF).

Chapter 7- Water Service Reliability and Drought Risk Assessment

This chapter assesses the reliability of Redwood City's water supplies, with a specific focus on potential constraints such as water supply availability, water quality, and climate change. The intent of this chapter is to identify any potential constraints that could affect the reliability of the City's supply (such as drought conditions) to support the City's planning efforts to ensure that it can meet projected demands. Water service reliability is assessed during normal, single dry-year, and multiple dry-year hydrologic conditions. Based on this analysis, the City expects the available supplies to be sufficient to meet projected demands in normal year conditions; however, significant shortfalls are projected in dry year conditions, which if realized would require the City to enact its Water Shortage Contingency Plan (WSCP). Numerous uncertainties exist in the assumptions that drive the projected dry year shortage estimates, and the City anticipates revising its water service reliability assessment within the next five years as some of these uncertainties are resolved. These uncertainties stem from the implementation of the Bay Delta Plan which is facing legal challenges in State and Federal Court, and the potential that a voluntary agreement will be reached that alters the allocation of water as adopted in the Bay Delta Plan.

Chapter 8- Water Shortage Contingency Plan

This chapter describes the WSCP for the City. The WSCP serves as a standalone document to be engaged in the case of a water shortage event, such as a drought or supply interruption, and defines specific policies and actions that will take be implemented at various shortage level scenarios. For example, implementing customer water budgets and surcharges, or restricting landscape irrigation to specific days

and/or times. Consistent with DWR requirements, the WSCP includes six levels to address shortage conditions ranging from up to 10% to greater than 50% shortage.

Chapter 9- Demand Management Measures

This chapter includes descriptions of past and planned conservation programs that the City operates within each demand management measure (DMM) category outlined in the UWMP Act, specifically: (1) water waste prevention ordinances, (2) metering, (3) conservation pricing, (4) public education and outreach, (5) distribution system water loss management, (6) water conservation program coordination and staffing support, and (7) "other" DMMs. The City has developed a suite of conservation programs and policies, which address each DMM category. Additionally, the City participates in water conservation programs offered by BAWSCA.

Chapter 10- Plan Adoption and Submittal

This chapter provides information on a public hearing, the adoption process for the UWMP, the adopted UWMP submittal process, Plan implementation, and the process for amending the adopted UWMP. Redwood City adopted the UWMP during a City Council meeting on June 14, 2021. In addition, this chapter provides information on the adoption of the included WSCP. This UWMP and the WSCP were submitted to DWR within 30 days of adoption and by the July 1, 2021 deadline.

2. PLAN PREPARATION

This chapter discusses the type of Urban Water Management Plan ("UWMP" or "Plan") the City of Redwood (also referred to as the "City" or "Redwood City") has prepared and includes information that will apply throughout the Plan. Coordination and outreach during the development of the Plan is also discussed.

2.1 Compliance with the UWMP Act

☑ ***CWC § 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.

An urban water supplier is defined in CWC §10617 as a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually. In 2020, the City provided water to 23,974 accounts and served 10,708 acre-feet (AF) of water (Table 2-1). The City is therefore subject to the requirements of the UWMP Act.

Table 2-1 Public Water Systems (DWR Table 2-1)

Public Water System Number	Public Water System Name	Number of Municipal Connections 2020	Volume of Water Supplied 2020
CA4110022	City of Redwood City	23,974	10,708
	TOTAL	23,974	10,708
NOTES: Volumes are in units of AF.			

The City's 2020 UWMP is an individual UWMP (Table 2-2). It has been prepared in general accordance with the format suggested in the California Department of Water Resources' (DWR's) UWMP Guidebook (Guidebook; DWR, 2020a). Text from the UWMP Act has been included in text boxes at beginning of relevant chapters of this UWMP. The information presented in the respective UWMP chapters and the associated text, figures, tables and charts are collectively intended to fulfill the requirements of that sub-section of the UWMP Act. To the extent practicable, supporting documentation has also been provided in Appendices A through P. Other sources for the information contained herein are provided in the references section of the document.

Per California Water Code (CWC) §10644(a)(2), selected information for the 2020 UWMP updates must be presented in standardized tables for electronic submittal to DWR. Text and tables in the main body of the UWMP document have been cross-referenced to the companion DWR tables.

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

Select Only One	Type of Plan		Name of RUWMP or Regional Alliance *if applicable*
X	Individual UWMP		
		Water Supplier is also a member of a RUWMP	
		Water Supplier is also a member of a Regional Alliance	
	Regional Urban Water Management Plan (RUWMP)		
NOTES:			

2.2 Coordination and Outreach

As described below and in Chapter 10, this UWMP has been prepared in coordination with the Bay Area Water Supply and Conservation Agency (BAWSCA), the BAWSCA member agencies, the San Francisco Public Utilities Commission (SFPUC), the public, and other appropriate entities.

2.2.1 Role of BAWSCA and the UWMP Common Language

Among its other functions, BAWSCA represents the City and the 25 other water districts, cities, and utilities, collectively referred to as the "Wholesale Customers", in negotiations and other coordination efforts with the SFPUC. Together with the SFPUC, BAWSCA developed common language for inclusion in each Wholesale Customers' 2020 UWMP regarding the following common issues:

- Description of BAWSCA;
- Regional Water Demand and Conservation Projections;
- Long Term Reliable Water Supply Strategy;
- Making Conservation a Way of California Life Strategic Plan
- Tier One Drought Allocations;
- Tier Two Drought Allocations;
- SFPUC Regional Water System
- Individual Supply Guarantees (ISGs);
- 2028 SFPUC Decisions (formerly 2018 SFPUC Decisions);
- Reliability of the Regional Water System;
- Climate Change;

- SFPUC's Efforts to Develop Alternative Water Supplies
- SFPUC's Decision to use Bay-Delta Plan Scenario in UWMP Submittal Tables;
- Bay Delta Plan Implementation Starting Year;
- SFPUC's Decision to Present Both Modeling Results in its UWMP;
- Rate Impacts of Water Shortages; and
- BAWSCA Conservation Programs.

For clarification purposes, and as shown below, the common language provided by BAWSCA and SFPUC is shown in grey font and has been indented for emphasis; it is otherwise presented unchanged from the original text. As a result, there may be some redundancy in the information presented and the number of times that certain terms are abbreviated or defined. A description of BAWSCA's role generally and related to the 2020 UWMP development process is provided below.

> BAWSCA provides regional water reliability planning and conservation programming for the benefit of its 26 member agencies that purchase wholesale water supplies from the San Francisco Public Utilities Commission (SFPUC). Collectively, the BAWSCA member agencies deliver water to over 1.8 million residents and nearly 40,000 commercial, industrial and institutional accounts in Alameda, San Mateo and Santa Clara Counties.
>
> BAWSCA also represents the collective interests of these wholesale water customers on all significant technical, financial, and policy matters related to the operation and improvement of the SFPUC's Regional Water System (RWS).
>
> BAWSCA's role in the development of the 2020 Urban Water Management Plan (UWMP) updates is to work with its member agencies and the SFPUC to seek consistency among UWMP documents.

2.2.2 Wholesale Coordination

☑ ***CWC § 10631 (h)***

An urban water supplier that relies upon a wholesale agency for a source of water shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (f). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (f).

The SFPUC is a wholesale water supplier to all of the BAWSCA member agencies, and is the only wholesale water supplier to Redwood City. As part of the coordination effort for the 2020 UWMP, and in compliance

with CWC §10631(h), Redwood City supplied BAWSCA with its water demand projections through 2045 for transmittal to the SFPUC.[2]

Additionally, as described in more detail in Chapter 7, the City has relied upon the water supply reliability projections provided by the SFPUC for the purposes of analyzing the reliability of its SFPUC supplies during normal and dry years through 2045 (Table 2-3).[3]

Table 2-3 Water Supplier Information Exchange (DWR Table 2-4)

The retail Supplier has informed the following wholesale supplier(s) of projected water use in accordance with Water Code Section 10631.
Wholesale Water Supplier Name
San Francisco Public Utilities Commission
NOTES:

2.2.3 Agency Coordination

☑ ***CWC § 10620 (d) (3)***

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.

☑ ***CWC § 10631 (a)*** *A plan shall be adopted in accordance with this chapter that shall do all of the following:*

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, as developed pursuant to Article 5 (commencing with Section 65300) of Chapter 3 of Division 1 of Title 7 of the Government Code.

As a member of BAWSCA and the BAWSCA Water Management Representative Committee, Redwood City has coordinated closely with BAWSCA and its 25 other member agencies throughout the update of the City's UWMP. Between February 12, 2021 and April 9, 2021, Redwood City attended a series of five webinars on supply reliability hosted by BAWSCA. During the webinars, BAWSCA and the member agencies reviewed the water supply reliability projections provided by the SFPUC, as well as the updated dry year supply allocations described in Section 7.1.3. The City also attends monthly water management meetings with BAWSCA and its member agencies that, among other topics, include discussion of items pertinent to the preparation of the 2020 UWMPs.

[2] Email to BAWSCA, dated January 26, 2021.

[3] Email from BAWSCA dated January 25, 2021, and information provided by the SFPUC, Appendix J.

The City also contacted the wastewater agency that treats wastewater collected from the City's service area and provides recycled water to the City's recycled water program, Silicon Valley Clean Water (SVCW; formerly South Bayside System Authority).

In addition, the City notified local and regional water retailers and public agencies of the City's intent to prepare this 2020 UWMP (and the Water Shortage Contingency Plan; WSCP), and the associated public hearing. A total of 50 recipients from 28 agencies and groups received notices, several of which are listed in Table 2-4, including the City of San Carlos, Town of Woodside, San Mateo County. For a full list of recipients see Appendix B. A sample copy of the notices is provided in Appendix A.

Table 2-4 Notification to Cities and Counties (DWR Table 10-1)

City Name	60 Day Notice	Notice of Public Hearing
City of Redwood City	X	X
City of San Carlos	X	X
Town of Woodside	X	X
County Name	**60 Day Notice**	**Notice of Public Hearing**
San Mateo County	X	X
Other Agency Name	**60 Day Notice**	**Notice of Public Hearing**
(a)	X	X
NOTES: (a) See Appendix B for the full list of notice recipients.		

2.2.4 Public Participation

☑ *CWC § 10642*

Each urban water supplier 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 both the plan and the water shortage contingency plan. Prior to adopting either, the urban water supplier shall make both the plan and the water shortage contingency plan available for public inspection and shall hold a public hearing or hearings thereon. Prior to any of these hearings, 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 a hearing to any city or county within which the supplier provides water supplies. Notices by a local public agency pursuant to this section shall be provided pursuant to Chapter 17.5 (commencing with Section 7290) of Division 7 of Title 1 of the Government Code. A privately owned water supplier shall provide an equivalent notice within its service area. After the hearing or hearings, the plan or water shortage contingency plan shall be adopted as prepared or as modified after the hearing or hearings.

Water suppliers are required by the UWMP Act to encourage active involvement of the community within the service area prior to and during the preparation of its UWMP. The UWMP Act also requires water suppliers to make a draft of the UWMP available for public review and to hold a public hearing regarding the findings of the UWMP prior to its adoption. In addition to sending notices to the various agencies listed in Table 2-4, the City also notified the public of the City's intent to adopt its UWMP. The Public Review Draft of the 2020 UWMP was made available on the City's website[4] and at the City Hall on May 25, 2021.

On May 28, June 4, and June 11, 2021, the City published a notice in the *San Mateo Daily Journal* informing the public that the 2020 UWMP and WSCP would be available for public review at City Hall and on the City's website, consistent with requirements of California Government Code 6066[5]. The notice also informed the public that the 2020 UWMP and WSCP public hearing would be held at City Hall on June 14, 2021.

Public participation in the development of the City's 2020 UWMP is summarized in Appendix C.

[4] https://www.redwoodcity.org/water

[5] Government Code section 6066. Publication of notice pursuant to this section shall be once a week for two successive weeks. Two publications in a newspaper published once a week or oftener, with at least five days intervening between the respective publication dates not counting such publication dates, are sufficient. The period of notice commences upon the first day of publication and terminates at the end of the fourteenth day, including therein the first day.

2.2.5 Relationship of the 2020 UWMP to Other Planning Efforts

In addition to the efforts mentioned above, Redwood City's 2020 UWMP has been prepared in close coordination with the City's Public Works Services (PWS) and Community Development & Transportation (CDT) departments and has been integrated with the City's planning efforts. As such, the City's 2020 UWMP has been developed to be consistent with the City's 2010 General Plan and subsequent documents, such as the Downtown Precise Plan, as well as the timing of individual planned and approved projects. Primary coordination was achieved through City staff's participation in two workshops (held on January 13 and March 1). At these workshops, key information regarding the 2020 UWMP development was presented and City representatives were provided the opportunity to review, comment and present additional information.

2.3 UWMP Structure, Standard Units, and Basis for Reporting

Per CWC §10644(a)(2), selected information for the 2020 UWMP updates must be presented in standardized tables for electronic submittal to DWR. Tables and text in the main body of the UWMP document have been cross-referenced to the companion DWR tables.

Per the Guidebook, the UWMP preparer is requested to complete a checklist of specific UWMP requirements to assist the DWR review of the submitted UWMP. The completed checklist is included in Appendix A.

As shown in Table 2-5, the City is a retail water supplier. Further, information presented in this UWMP is reported on a fiscal year basis. As such, "2020" refers to Fiscal Year 2019-20, and so forth. The unit of measure for reporting water volumes is AF and is maintained consistently throughout the Plan, unless otherwise noted.

Further, consistent with the Guidebook, the terms "water use", "water consumption", and "water demand" are used interchangeably in this UWMP.

Table 2-5 Supplier Identification (DWR Table 2-3)

Type of Supplier	
	Supplier is a wholesaler
X	Supplier is a retailer
Fiscal or Calendar Year	
	UWMP Tables are in calendar years
X	UWMP Tables are in fiscal years
If using fiscal years provide month and date that the fiscal year begins (mm/dd)	
07/01	
Units of measure used in UWMP	
Unit	AF
NOTES:	

3. SYSTEM DESCRIPTION

☑ ***CWC § 10631 (a)*** *A plan shall be adopted in accordance with this chapter that shall do all of the following:*

Describe the service area of the supplier, including current and projected population, climate, and other social, economic, and demographic factors affecting the supplier's water management planning. 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. 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, as developed pursuant to Article 5 (commencing with Section 65300) of Chapter 3 of Division 1 of Title 7 of the Government Code.

The City of Redwood City ("City" or "Redwood City") water service area includes the incorporated limits of the City, portions of San Mateo County outside the corporate limits, including Cañada College and the Emerald Lake Hills area, and parts of the Town of Woodside and the City of San Carlos. The City's water service area covers approximately 17 square miles and is generally bounded by Interstate 280 to the west, Highway 101 and San Francisco Bay to the east, Whipple Avenue to the north, and Marsh Road to the south; the service area also includes the non-contiguous Redwood Shores area. The City's water service area is shown on Figure 3-1.

The City purchases all of its potable water from the San Francisco Public Utilities Commission (SFPUC) Regional Water System (RWS) and is a member of Bay Area Water Supply and Conservation Agency (BAWSCA). Water distribution, water conservation and maintenance of water quality are the City's main water resource functions, as treated water purchased from the SFPUC RWS does not require further water treatment.

Redwood City has also been supplying recycled water to its customers since 2000. Phase I of the City's recycled water project was implemented by 2010 and is currently serving more than 450 points of connection along the area east of Highway 101 in Redwood Shores, the Greater Bayfront Area, and the Seaport Area. Phase II of the City's recycled water project is underway and will serve customers located west of Highway 101, including in the Downtown area. As of 2021, Phase II-A of the recycled water system was completed and extended the City's service along Walnut Street from Highway 101 to Marshall Street. Also, as part of Phase II, the recycled water system was extended along East Bayshore Road from Seaport Avenue to Douglas Avenue, and along Broadway to the Stanford in Redwood City project. A detailed description of the City's recycled water program is provided in Chapter 6. The City's planned recycled water service area and current distribution system is shown on Figure 3-2.

As required by the Urban Water Management Plan (UWMP) Act, specific information about the City's service area population and climate is provided below.

3.1 Land Uses within Service Area

General Plans are required by State law to guide land use and development within cities (California Government Code §65030.1). The "Urban Form and Land Use" section of the City's 2010 General Plan details current and projected land use[6].

The City is largely built-out and most future growth is expected to be associated with multiple unit and mixed use developments that will be infill or redevelopment within the City's Downtown area, along transit corridors, and in the emerging mixed-use waterfront neighborhoods east of Highway 101 between Whipple Avenue and Seaport Boulevard (see Figure 3-3). The density of the new development is expected to be higher than the existing land uses they replace, which drives the population and employment growth projections presented in Section 3.2 below.

In addition to land use projections in the 2010 General Plan, there are several developments with projected water demand that will require General Plan Amendments.[7] The future population, employment, and water demand projections presented in Chapters 3 and 4 reflect buildout of the General Plan, including the additional development projects that will require General Plan Amendments.

3.2 Service Area Population and Demographics

The historical and projected population and employment data from 2000 through 2045 for the City water service area are shown in Table 3-1 and Table 3-2 and the associated charts. Consistent with the California Department of Water Resources (DWR) requirements, the historical and current population served by the City has been estimated herein using United States Census Bureau data and the DWR Population Tool as documented in Section 5.1.

Future population and employment projections reported in this UWMP were provided by the City's Community Development & Transportation Department based on federal, state, and local reports and projections and are consistent with the City's 2010 General Plan for areas within the City's jurisdictional boundary. Population and employment estimates for areas within the City's service area but outside the City's jurisdictional boundary were estimated by the City using the geographic information system (GIS)-based method described in Appendix D. Table 3-1 and Table 3-2 and the associated charts show projected population and employment for the City's water service area through 2045, respectively.

[6] Figure BE-6 in the General Plan provides a land use map for Redwood City. The City's General Plan and its Urban Form and Land Use section can be accessed at https://www.redwoodcity.org/departments/community-development-department/planning-housing/planning-services/general-plan-precise-plans/general-plan.

[7] Current development projects can be accessed at https://www.redwoodcity.org/city-hall/current-projects/development-projects.

3.2.1 Future Population Growth

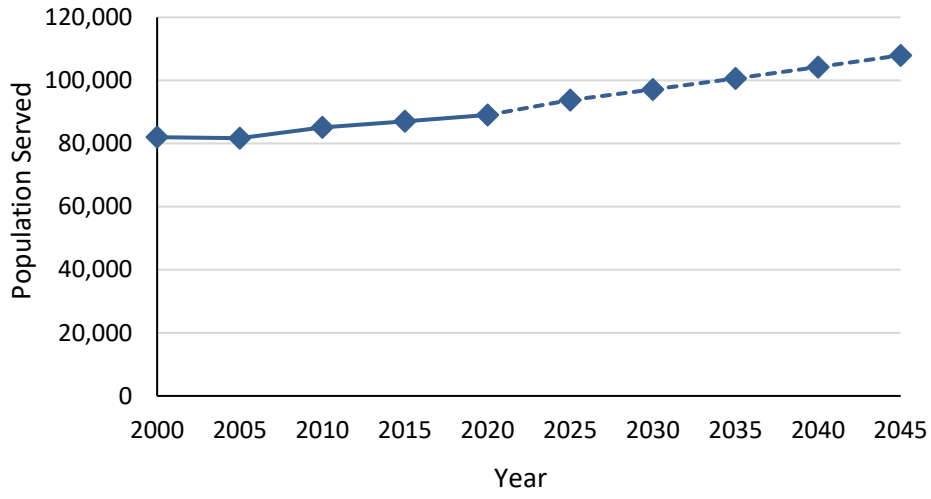
The City is largely built-out with a historic population growth rate of approximately 0.4% per year since 2000 (see chart associated with Table 3-1). The 2020 population is estimated to be 89,037. By 2045, the total population within the City's service area is expected to be 107,947, which represents a 0.9% annual growth rate compared to the 2020 population.

Table 3-1 Population - Current and Projected (DWR Table 3-1)

Population Served	2020	2025	2030	2035	2040	2045
	89,037	93,765	97,128	100,614	104,247	107,947

NOTES:
(a) Population for 2020 was estimated using the DWR Population Tool.
(b) Population projections for 2025 through 2045 were provided by the City's Community Development & Transportation Department.
(c) Historical population from 2010 through 2020 is documented in Table 4-1.

Chart 3-1 Current and Projected Population



3.2.2 Future Employment Growth

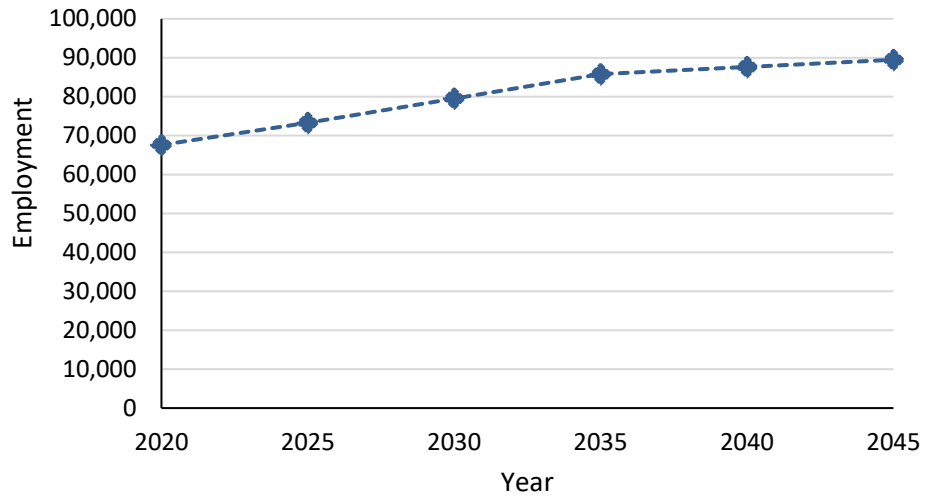
As shown in Table 3-2 and associated chart, an employment growth rate of 27% is expected between 2020 and 2035. After 2035, the number of jobs is not projected to significantly increase.

Table 3-2 Employment - Current and Projected

Service Area Employment	2020	2025	2030	2035	2040	2045
	67,624	73,288	79,519	85,782	87,636	89,490

NOTES:
(a) Employment projections for 2020 through 2045 were provided by the City's Community Development & Transportation Department.

Chart 3-2 Current and Projected Employment



3.2.3 Other Social, Economic, and Demographic Factors

Demographic data for the City are summarized in Table 3-3. The same data are also provided for the state of California as a whole and were obtained from the U.S. Census Bureau QuickFacts website (U.S. Census, 2021). Relative to the rest of California, the City's population is somewhat less racially diverse. Educational attainment and median household income in the City are higher than for the state as a whole, while persons below the poverty level is comparatively lower.

Table 3-3 Demographic and Housing Characteristics

Demographics (a)	Redwood City	California
Age and Sex		
Persons under 5 years	6.3%	6.0%
Persons under 18 years	21.4%	22.5%
Persons 65 years and older	12.7%	14.8%
Female persons	50.2%	50.3%
Race and Hispanic Origin		
White alone	58.6%	71.9%
Black or African American alone	1.7%	6.5%
American Indian and Alaska Native alone	0.7%	1.6%
Asian alone	14.5%	15.5%
Native Hawaiian and Other Pacific Islander alone	1.0%	0.5%
Two or More Races	4.9%	4.0%
Hispanic or Latino	35.4%	39.4%
White alone, not Hispanic or Latino	44.1%	36.5%
Families & Living Arrangements		
Persons per household	2.73	2.95
Living in same house 1 year ago, percent of persons age 1 year+	85.4%	87.1%
Language other than English spoken at home, age 5 years+	46.4%	44.2%
Education		
High school graduate or higher, persons age 25 years+	87.1%	83.3%
Bachelor's degree or higher, persons age 25 years+	50.2%	33.9%
Income & Poverty		
Median Household Income (2019 dollars)	$117,123	$75,235
Per capita income in past 12 months (2019 dollars)	$60,389	$36,955
Persons in poverty	9.0%	11.8%

NOTES:
(a) Demographic data per the U.S. Census Bureau QuickFacts website (U.S. Census, 2021).

3.3 Climate

The Redwood City service area is located within a region characterized by a Mediterranean climate with cool, wet winters and warm, dry summers. As shown in Table 3-4 and the associated chart, rainfall in the area averages 20.3 inches per year and is generally confined to the wet season from late October to early May. The average reference evapotranspiration (ETo) for the region is 44 inches per year. The ETo is a standard measurement related to the water demand by plants in a specific region. Because the average annual ETo is approximately 24 inches more than the average annual precipitation, and because 90% of the annual precipitation occurs between the months of November and April, growing turf or other plantings in this region requires a significant amount of irrigation during the dry season. This irrigation

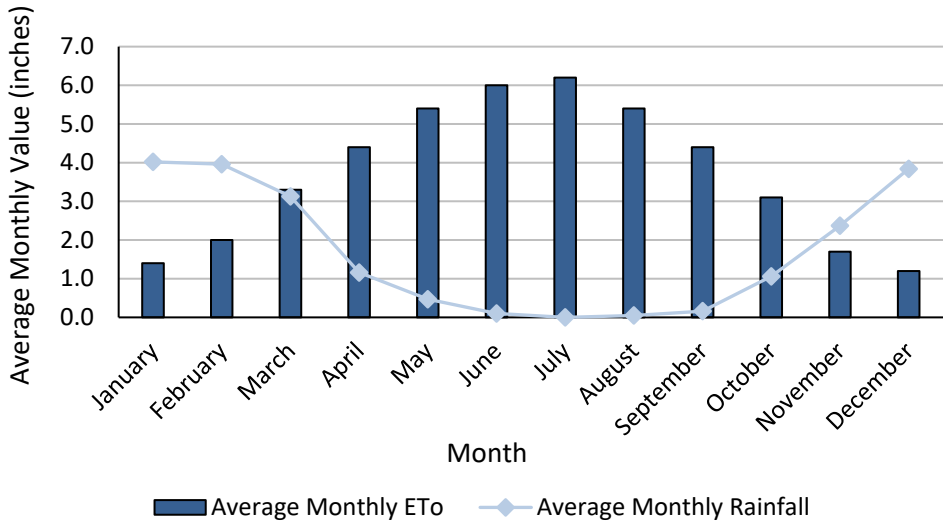
demand contributes to the overall and observed seasonal variation in water demand throughout the City service area (see Appendix L).

Table 3-4 Climate Characteristics

Month	Average Temperature		Standard Average ETo (inches)	Average Rainfall (inches)
	Min (°F)	Max (°F)		
January	40	58	1.4	4.02
February	43	62	2.0	3.96
March	45	65	3.3	3.13
April	46	69	4.4	1.16
May	50	74	5.4	0.47
June	53	79	6.0	0.1
July	55	81	6.2	0
August	56	81	5.4	0.05
September	54	80	4.4	0.16
October	50	74	3.1	1.06
November	44	65	1.7	2.37
December	40	58	1.2	3.84
Annual	**48.0**	**70.5**	**44**	**20.3**

NOTES:
(a) Average temperature and rainfall data were obtained from U.S. Climate Data 2020 (www.usclimatedata.com).
(b) Reference evapotranspiration data for Union City station #171 are from the Department of Water Resources, California Irrigation Management Information System.

Chart 3-4 Average Monthly Climatic Conditions



3.3.4 Climate Change Considerations

Projections of climate change in California indicate a further intensification of wet and dry extremes and shifting temperature. Within the County of San Mateo, the average temperature is expected to increase 3.2°F to 5.4°F by 2090 (San Mateo County, 2016; Cal EMA et al., 2012).

Changing climate can affect both water uses and supplies. For example, extreme and higher temperatures can lead to increases in water use; declining snowpack and earlier runoff patterns could result in changes in stream flows and reservoir operations; projection of frequent, severe, prolonged droughts could lead to not only less surface water available, but also exacerbate ongoing stressors in groundwater basins. Some of these pressures are already apparent in California as of 2021.

Several sections in the California Water Code (CWC) relevant to UWMPs refer to climate change. Pursuant to CWC requirements and the UWMP Guidebook, this Plan incorporates climate change considerations into following relevant chapters:

- Chapter 3 – Service Area and System Description,
- Chapter 4 – System Water Demands,
- Chapter 6 – Water System Supply, and
- Chapter 7 – Water Supply Reliability.

In addition, this Plan incorporates the following documents by reference that include information on climate change hazards and mitigation actions within the Redwood City service area:

- City of Redwood City 2030 Climate Action Plan (CAP; Redwood City, 2020), and
- County of San Mateo Hazard Mitigation Plan (HMP; San Mateo County, 2016).

The City's 2030 CAP discusses actions to be taken by the City to increase resiliency in the event of climate change impacts such as sea level rise, wildfire, extreme heat, and droughts. As part of its actions to mitigate sea level rise, Redwood City has partnered with other local entities and the County of San Mateo Office of Sustainability[8] to launch the Sea Change San Mateo County (SMC) Initiative[9]. The Sea Level Rise Vulnerability Assessment completed in 2018 (San Mateo County, 2018) is the first step of the Sea Change SMC Initiative and provides an overview of the risk within the County from current and future flooding. The assessment identified many built and natural assets in Redwood City that are vulnerable, including stormwater, power, and wastewater infrastructure.

In 2019, as a result of the Sea Change convenings, the cities and County of San Mateo formed a Flood and Sea Level Rise Resiliency District to address sea level rise, flooding, coastal erosion, and large-scale storm water infrastructure improvements through integrated regional planning, investment, and project implementation.

Chapters 4, 6, and 7 of this Plan discuss the potential impacts of climate change on water demand and water sources. As detailed in Chapter 6 and Chapter 9 of this Plan, Redwood City has established robust recycled water and water conservation programs to increase drought resiliency. The City has also enhanced its water storage in the event of a disaster to have enough water stored for one day worth of water needs in addition to "fire flow" within its jurisdiction. Redwood City continues to plan for future water needs and to enhance the resiliency of its water system.

3.4 Water Distribution System

In 2011, a Water System Master Plan (WSMP; West Yost Associates, 2011) for the City's potable water system was developed based on future water demand estimates associated with the 2010 General Plan land use and population projections. The 2011 WSMP forecasts the infrastructure improvements necessary to accommodate water demand by new and redevelopment activities; analyzes and identifies improvements for reliable performance during normal and emergency conditions, such as fires and earthquakes; and prioritizes capital improvements to the system over a 20-year planning horizon. The information provided below is largely based on the City's WSMP.

As shown on Figure 3-4, the City's potable water distribution system has 13 turnouts from the five SFPUC RWS Bay Division pipelines located in Redwood City. There are also eight active interties with California Water Service Company, Mid-Peninsula Water District, and the City of Menlo Park. The potable water distribution system delivers water to 24 pressure zones through approximately 259 miles of pipelines, 12 active storage reservoirs, and 10 booster pump stations.

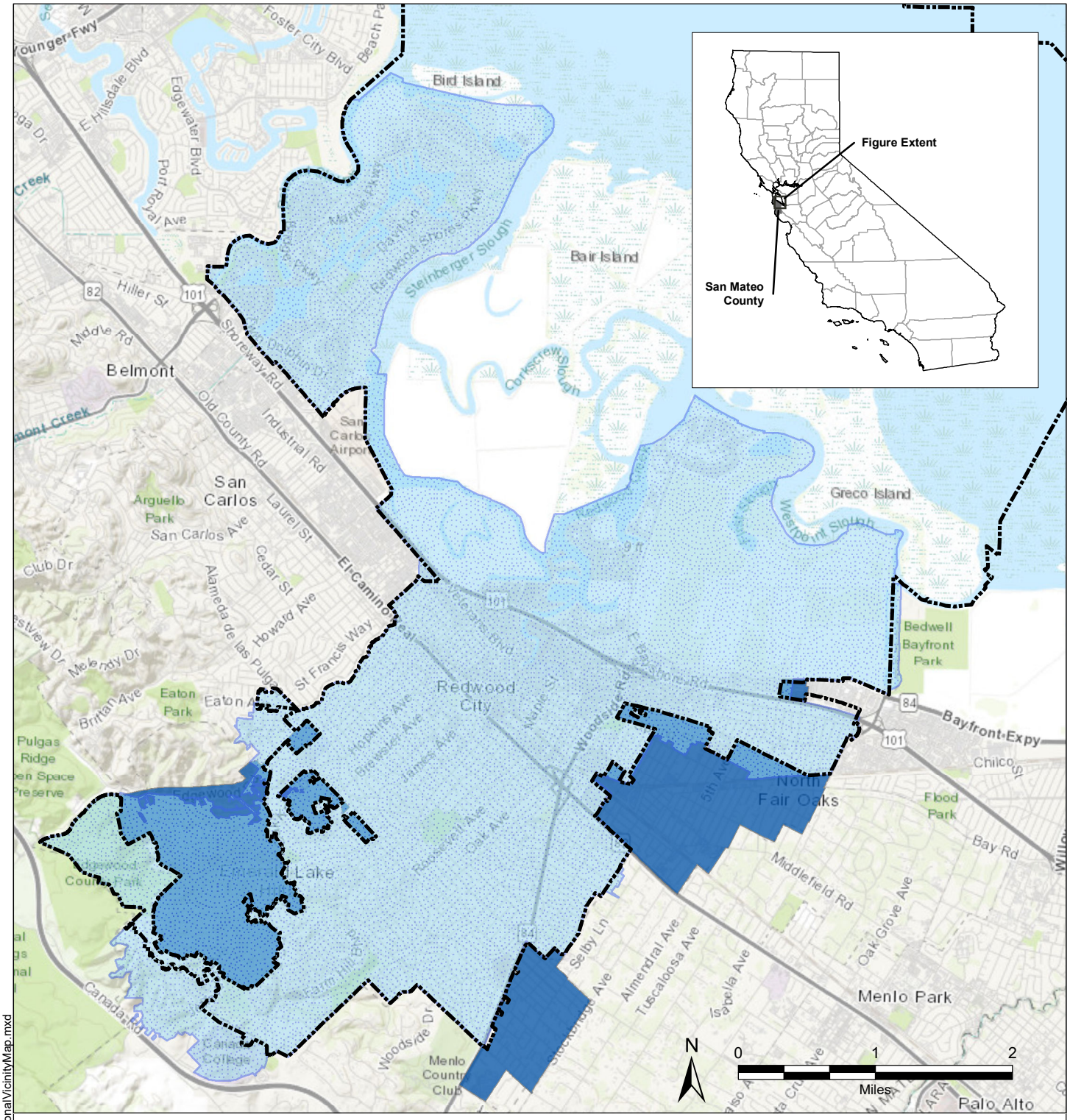
The City's distribution pipeline materials consist mainly of cast iron, polyvinyl chloride (PVC), and asbestos cement. The City has an ongoing Capital Improvement Program for water main replacement in which undersized, aged and deteriorated mains are replaced with PVC pipe.

[8] https://www.smcsustainability.org/climate-ready

[9] https://seachangesmc.org/

The City currently has a total storage capacity of 21.2 million gallons and is in the process of constructing additional system storage. The storage tanks and reservoirs are cleaned and inspected once every three years. Recoating, repairs, and structural work are performed as needed. All storage tanks have cathodic protection to prevent corrosion.

Ten booster pump stations are located throughout the potable water distribution system. Six of the pump stations have permanent standby generators; the City also has four portable generators and a portable pump for emergency use. A seismic improvement project is currently in progress for the City's water tanks and pump stations.



Legend

- Water Service Area
- City Limits
- Sphere of Influence

Notes

1. All locations are approximate.

Sources

1. Topographic base map provided by ArcGIS Online.
2. Potable water service area, city limits, and sphere of influence provided by City staff on December 21, 2020.

Redwood City Service Area Map

City of Redwood City
2020 Urban Water Management Plan
Redwood City, CA
June 2021
EKI C00110.00

Figure 3-1

eki environment & water

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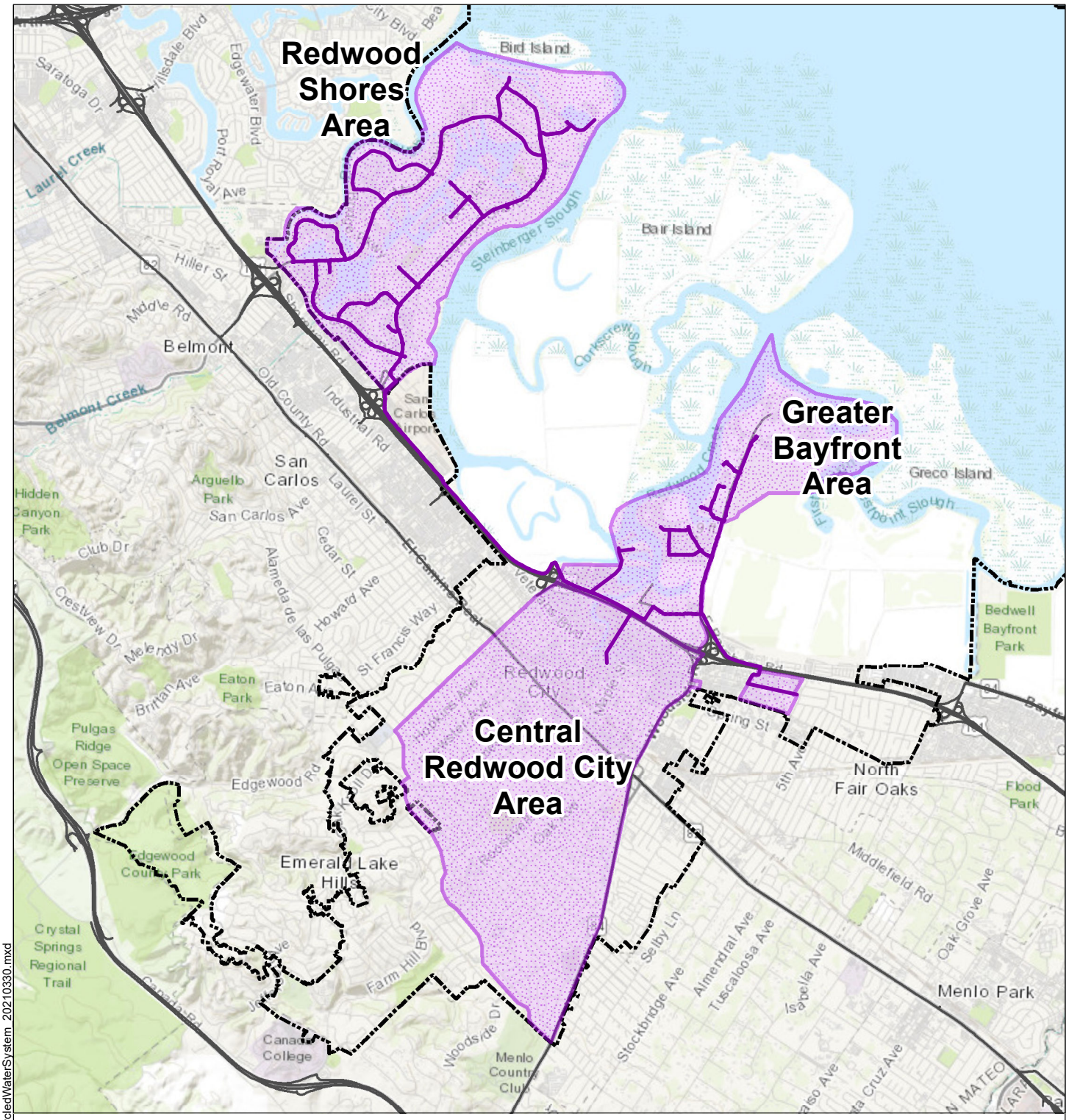

Legend

- Recycled Water Mains
- Recycled Water Service Area
- City Limits

Notes

1. All locations are approximate.
2. Recycled water distribution system and service area locations provided by City staff on December 21, 2020.

Sources

Aerial base map provided by ArcGIS Online.

N

0 1 2

Miles

Redwood City Recycled Water Service Area and Distribution System

City of Redwood City
2020 Urban Water Management Plan
Redwood City, CA
June 2021
EKI C00110.00

Figure 3-2

eki environment & water

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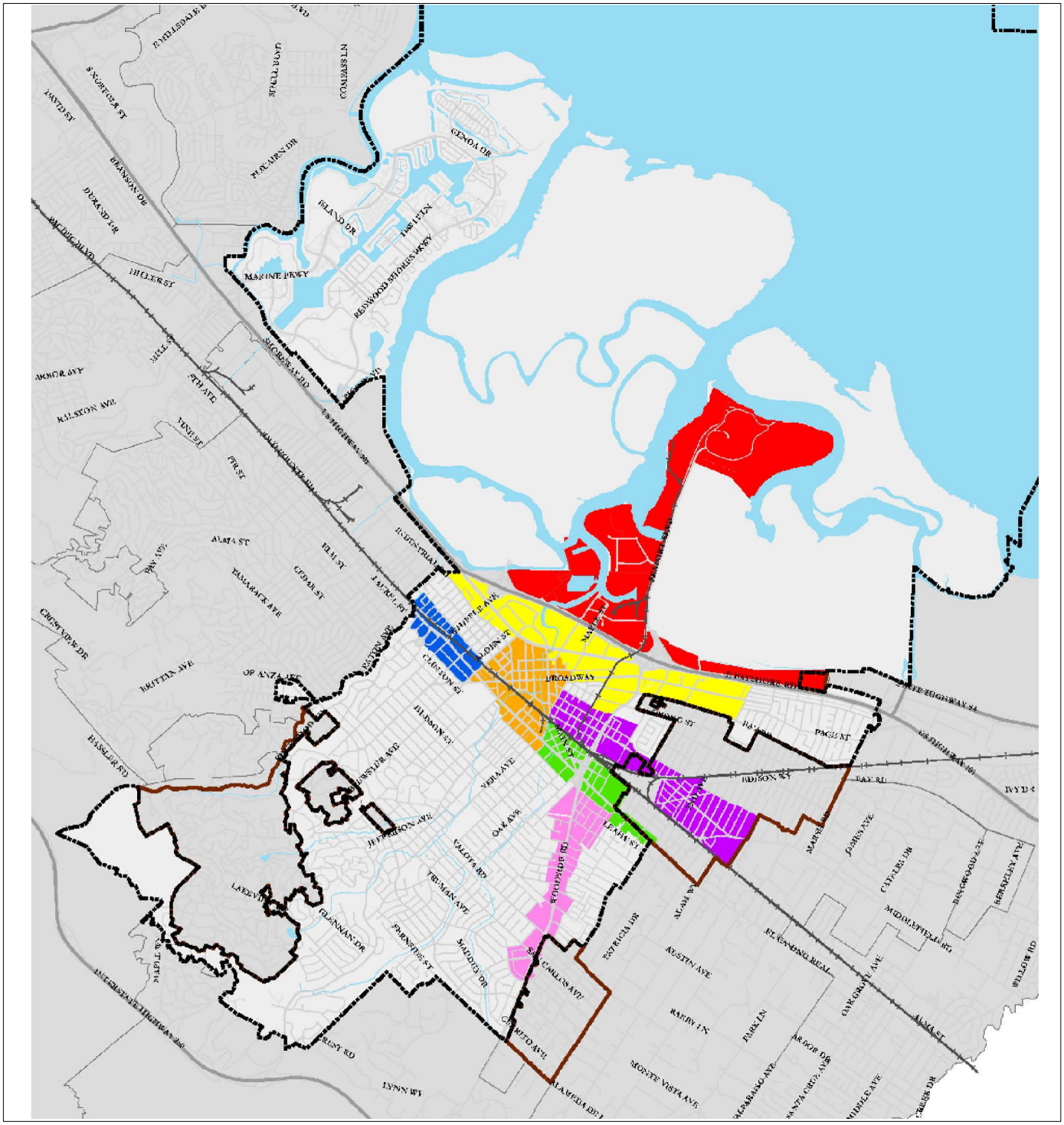

Legend

- City Boundary
- SOI Boundary
- Middlefield
- Downtown
- ECR North
- ECR South
- Woodside
- Bayfront
- Veterans/Broadway

Abbreviations

ECR = El Camino Real
SOI = sphere of influence

Notes

1. All locations are approximate.

Sources

West Yost Associates, 2011. City of Redwood City Water System Master Plan, dated October 2011

General Plan Focus Area

City of Redwood City
2020 Urban Water Management Plan
Redwood City, CA
June 2021
EKI C00110.00

Figure 3-3

eki environment & water

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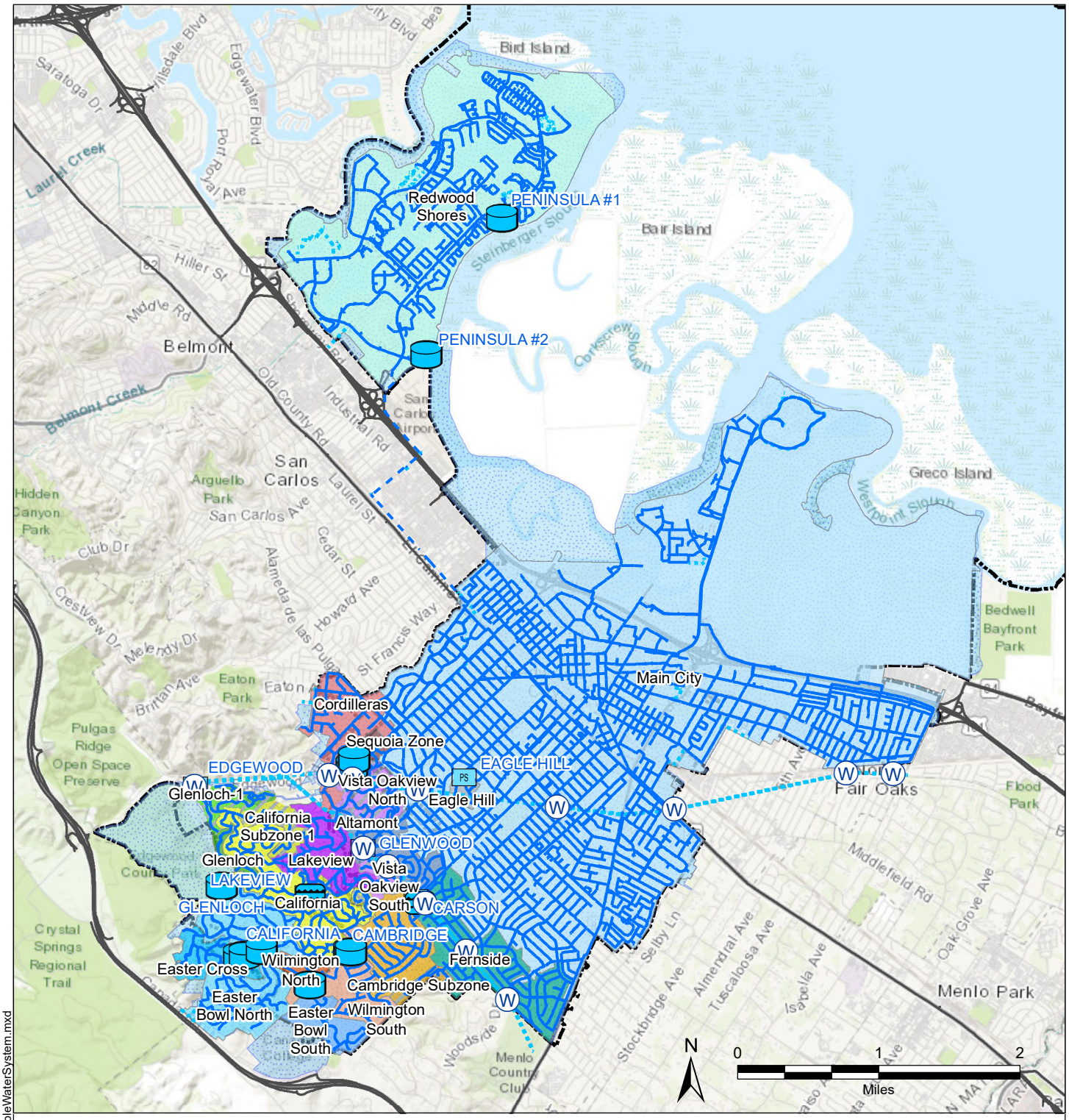


Legend

Water Mains

- Distribution Mains
- Transmission Mains
- SFPUC BDPLs

Water Storage

- Reservoir
- Tanks

- Water Pump Stations
- SFPUC Turnouts
- Water Service Area
- City Limits

Notes

1. All locations are approximate.
2. Potable water distribution system and service area locations provided by City staff on December 21, 2020.

Sources

Aerial base map provided by ArcGIS Online

Potable Water Distribution System

City of Redwood City
2020 Urban Water Management Plan
Redwood City, CA
June 2021
EKI C00110.00

Figure 3-4

eki environment & water

Path: X:\C00110\Maps\...00\2021\06\Fig3-4_Redwood City_PotableWaterSystem.mxd

4. WATER USE CHARACTERIZATION

☑ ***CWC § 10631 (d) (1)*** *A plan shall be adopted in accordance with this chapter that shall do all of the following:*

For an urban retail water supplier, 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, based upon information developed pursuant to subdivision (a), identifying the uses among water use sectors, including, but not necessarily limited to, all of the following:

(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.

(2) *The water use projections shall be in the same five-year increments described in subdivision (a).*

For the purposes of this Urban Water Management Plan ("UWMP" or "Plan"), potable water demand is defined as the volume of potable water that the City of Redwood City ("City" or "Redwood City") purchased from the San Francisco Public Utilities Commission (SFPUC) Regional Water System (RWS). Among other things, water demand is dependent on climate, population, industry, and the types of development present in a community. Sections 4.1 and 4.2 describe the historical and projected water demands for the residential, commercial, industrial, institutional, and landscape irrigation sectors within the City's service area (water use sectors A through F and J, as described per California Water Code (CWC) §10631(d)(1)(A) through (F) and (J)). As described in Section 4.2.6, this discussion does not include demands for water use sectors CWC §10631(d)(1)(G) through (I) as they are not applicable or present within the City's service area.

4.1 Historic and Current Total Water Demand

The City's total water demand is the sum of potable water demand and recycled water demand within its service area. The City's total water demand includes water consumed by metered accounts in the service area (metered water use), unmetered water use, and the water that is lost within the distribution system (losses).

Table 4-1 and the associated charts show trends in water demand and per capita potable water use between 2010 and 2020. Between 2013 and 2016, calls for water use cutbacks locally and the mandatory

state-wide restrictions issued by the State Water Resources Control Board (SWRCB) in response to the recent historic drought led to a significant decline in total water demand (i.e., a 24% reduction between 2013 and 2016). A slow rebound in water demand is observed since 2016 following the drought. The City's total water demand was 10,708 acre-feet per year (AFY) in 2020, a decrease from 11,144 AFY in 2010 despite population growth during this period. A further description of potable and recycled water demand over the last five years is included below.

Table 4-1 Current and Historical Water Demand and Per Capita Water Demand

Year	Total Water Demand (AFY)	Potable Water Demand (AFY)	Recycled Water Demand (AFY)	Service Area Population	Per Capita Potable Water Use (GPCD)
2010	11,144	10,764	380	83,780	115
2011	10,869	10,246	623	84,557	108
2012	10,833	10,148	685	86,647	105
2013	11,609	10,897	712	86,647	112
2014	10,860	10,118	742	86,427	105
2015	9,589	8,876	712	87,023	91
2016	8,841	8,193	647	83,395	88
2017	9,321	8,694	627	84,767	92
2018	10,157	9,421	737	86,280	97
2019	9,825	9,136	689	87,707	93
2020	10,708	9,852	856	89,037	99

NOTES:
(a) Detailed potable water demand data from 2016 through 2020 are documented in Table 4-2.
(b) Service area population in 2010, 2015, and 2020 are estimated using the DWR population tool. Service area population from 2011 through 2014 were based on the 2015 UWMP. Service area population from 2016 through 2019 are estimated from the pro-rated persons-per-connection for 2015 and 2020 using the DWR population tool.
(c) Per capita potable water use is calculated by dividing the total annual potable water demand by the service area population and the number of days in a year.
(d) Total water demand for 2015 includes a master meter and supply error adjustment of 2%. The City's actual potable water purchase volume in 2015 was 8,698 AFY.

Chart 4-1A Historical and Current Potable Water Demand and Population

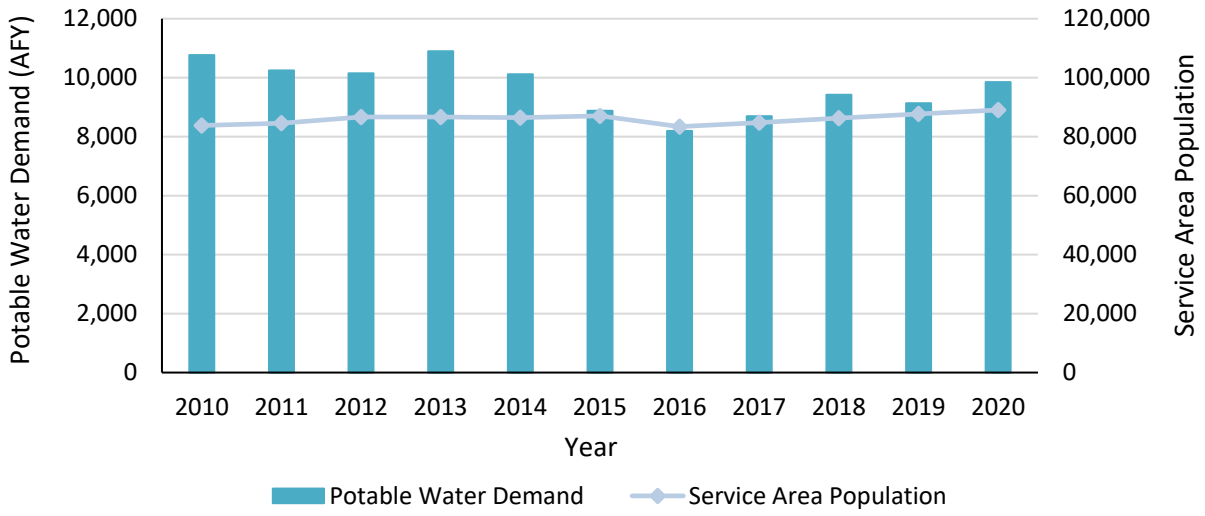
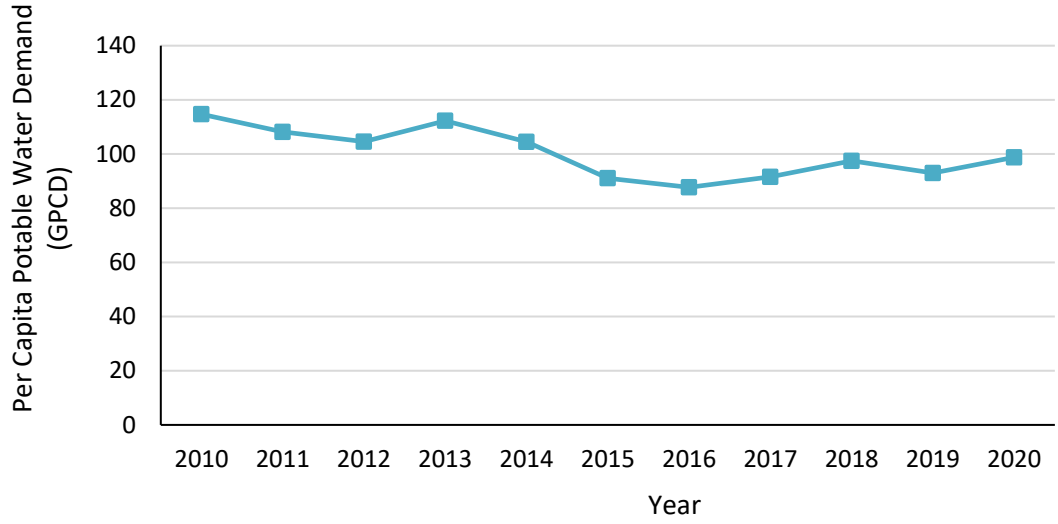


Chart 4-1B Historical and Current Per Capita Potable Water Use



4.1.1 Historical and Current Potable Water Demand

Potable water demand within the City's water service area is measured using water meters that are installed at each customer account. Records of current and historical water use at each account are maintained by Public Works Services (PWS), in coordination with the Finance Department. Potable water demand within the City's service area is tracked and reported for the following sectors:

- Single Family Residential: Attached or detached dwelling units that are individually metered and billed on a bi-monthly basis.

- Multi-Family Residential: Two or more dwelling units served by a common water meter and billed on a bi-monthly basis. Water use is predominately for indoor water uses; irrigation water use for multiple family sites are usually separately metered and listed in the irrigation sector.
- Commercial: Includes commercial customers. Irrigation water use at these sites is usually separately metered and listed in the irrigation sector and is billed on a monthly basis.
- Industrial: Includes industrial customers. Irrigation water use at these sites is usually separately metered and listed in the irrigation sector and is billed on a monthly basis.
- Municipal: Includes meters serving City sites, billed on a monthly basis.
- Other: Includes schools, churches, temporary meters, and miscellaneous customers not listed elsewhere, billed on a monthly basis.
- Irrigation: Water meters used exclusively for outdoor uses associated with multiple family residential customers (i.e., homeowner associations; HOAs) and other irrigation sites, billed on a monthly basis.
- Fire Service: Water meters used for fire suppression or system maintenance, billed on a monthly basis.

As shown in Table 4-2 and the associated charts, the City's potable water use is largely associated with residential accounts. Over the last five years, the single family and multi-family residential sectors together accounted for an average of 63% of the potable water demand in the City's service area; the single family sector has accounted for over 44% of the City's potable water demand over the last five years. The commercial, industrial, and institutional (CII) sectors collectively accounted for approximately 17% of the potable water demand, and the irrigation sector accounted for 7%.

As shown in Table 4-1 and the associated charts, per capita potable water use in the City's service area has shown a decreasing trend over the past 10 years. The highest per capita potable water use was observed in 2010 at 115 gallons per capita per day (GPCD), whereas the lowest per capita water use was observed in 2016 at 88 GPCD due to the City's response to the 2014-2017 drought.

Table 4-2 Demands for Potable and Non-Potable Water – Actual (DWR Table 4-1)

Use Type	Additional Description *(as needed)*	Level of Treatment When Delivered	Volume				
			2016	2017	2018	2019	2020
Single Family		Drinking Water	3,571	3,794	4,221	4,112	4,427
Multi-Family		Drinking Water	1,586	1,714	1,780	1,787	1,824
Commercial		Drinking Water	1,547	1,478	1,519	1,485	1,375
Industrial		Drinking Water	113	106	116	107	86
Institutional/ Governmental		Drinking Water	35	31	34	34	34
Landscape		Drinking Water	499	557	693	696	824
Losses		Drinking Water	708	881	916	767	1,089
Other	See note (b)	Drinking Water	121	129	136	144	173
Other	Fire Services	Drinking Water	13	5	5	5	20
		TOTAL	8,193	8,694	9,421	9,136	9,852

NOTES:
(a) Volumes are in units of AF.
(b) "Other" water use includes water used for schools, churches, temporary meters, and miscellaneous customers not listed elsewhere.
(c) Losses are estimated as the difference between total demand and metered consumption, and thus includes unmetered water consumption and distribution system water losses.
(d) Demands reported are potable water demand. Besides recycled water, the City does not have other non-potable water use. This table and Table 4-2 exclude demands from recycled water. See Table 6-4 for recycled water demands.

Chart 4-2A Annual Water Demand by Sector: 2016-2020

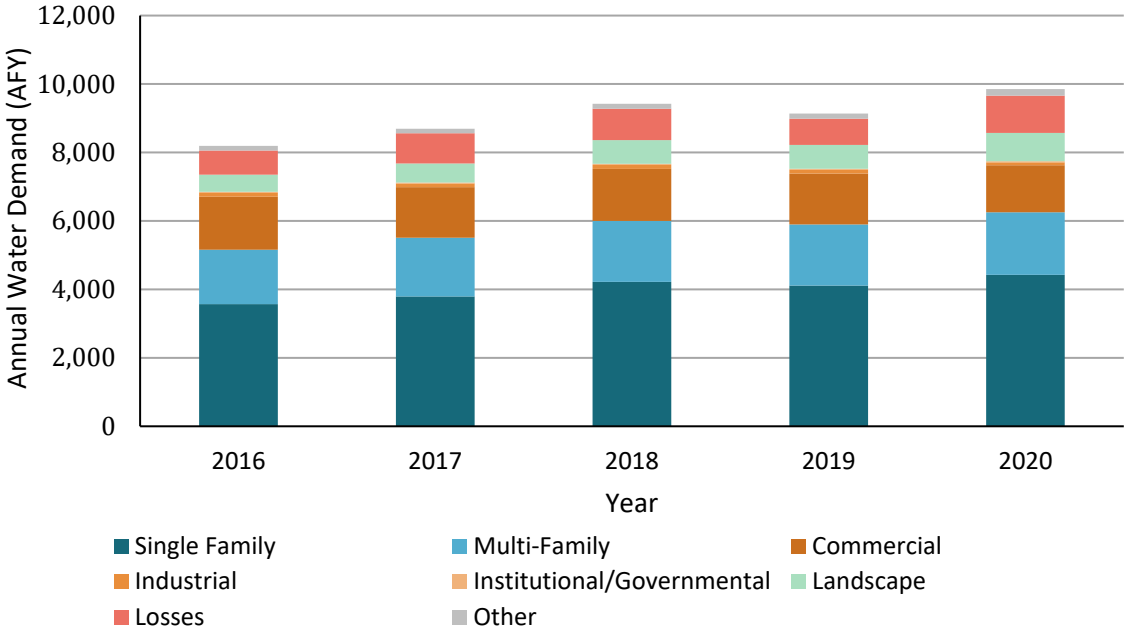
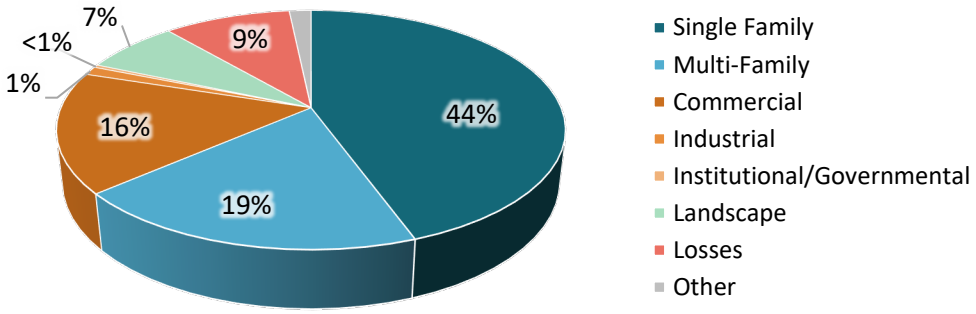


Chart 4-2B Percentage of Total Water Demand by Sector: 2016-2020



4.1.2 Historical and Current Recycled Water Demand

Over the last five years, the City's recycled water demand increased from 647 AFY in 2016 to 856 AFY in 2020 (see Table 4-1). During this period, recycled water demand as a percentage of total water demand increased from 7.3% to 8.0%. Almost all recycled water is currently used for landscape irrigation with some indoor uses for toilet and urinal flushing, and a small portion dedicated to industrial and construction uses. Detailed discussion of the City's recycled water program and recycled water use is provided in Section 6.5.

4.1.3 Distribution System Water Loss

☑ ***CWC § 10631 (3)***

(A) The distribution system water loss shall be quantified for each of the five years preceding the plan update, in accordance with rules adopted pursuant to Section 10608.34.

(B) 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.

(C) In the plan due July 1, 2021, and in each update thereafter, data shall be included to show whether the urban retail water supplier met the distribution loss standards enacted by the board pursuant to Section 10608.34.

Since 2016, urban retail water suppliers have been required under CWC §10608.34 and California Code of Regulations (CCR) §638.1 et seq to quantify distribution system water losses using the American Water Works Association (AWWA) Water Audit Software (referred to as the "AWWA Water Loss Worksheet"). Water losses within Redwood City's potable water distribution system over the last five years were estimated using the AWWA Water Loss Worksheet and summarized in Table 4-3.

The "Losses" are the sum of "apparent" and "real" losses estimated by the AWWA Water Loss Worksheet analysis. Apparent losses include metering inaccuracies, systematic data handling errors, and unauthorized consumption. Real losses represent water loss attributable to the distribution system and include physical water losses from the pressurized system and storage tanks up to the point of customer consumption.

The "Losses" are a portion of the total differential between water supply and metered water use (Table 4-2), and the remaining portion is the "Other-Unbilled Consumption" which includes unbilled water uses such as system flushing and leak repair flushing.

As shown in Table 4-2, of the 9,852 AFY of total potable water demand in 2020, 8,763 AFY was attributable to metered consumption, 85 AFY was estimated to be from unmetered water use, and 1,004 AFY was estimated to be from distribution system water loss. Over the last five years, distribution water loss varied from 8% to 10% of the City's potable water demand.

The City assesses distribution system water loss annually using the AWWA Water Loss Worksheet. The City also monitors its non-revenue water rate continuously and repairs system leaks immediately when found. The metering and maintenance programs for the City's distribution system are further discussed in Section 9.2.2.

Table 4-3 12 Month Water Loss Audit Reporting (DWR Table 4-4)

Reporting Period Start Date	Volume of Water Loss
07/2015	708
07/2016	878
07/2017	787
07/2018	695
07/2019	1,004

NOTES:
(a) Volumes are in units of AF.
(b) Water losses for FY 2016 through FY 2019 are estimated using the AWWA Free Water Audit Software and include both real and apparent losses. Water losses for FY 2015 were calculated as the difference between consumption and production and include real and apparent losses as well as other non-revenue water.

4.2 Projected Water Total Demand

Per CWC §10631(d)(1), Redwood City's potable and recycled water demand projections are discussed in the following sections.

Future water demands within the Redwood City service area are estimated as the sum of the future water demands associated with: (1) population and employment growth within the Redwood City service area, which are consistent with the City's 2010 General Plan; and (2) the planned development projects that are supplemental to the 2010 General Plan and will require a General Plan amendment.

The associated water demand estimates are presented in Table 4-4 in five-year increments from 2025 through 2045. As shown in Table 4-4, it is estimated that the total water demand (i.e., potable and recycled water demand) will increase to approximately 11,923 AFY in 2045 from 10,708 AFY in 2020.

4.2.1 Demands Associated with the 2010 General Plan

In 2020, future water demands for the Redwood City service area were projected by Bay Area Water Supply and Conservation Agency (BAWSCA) on behalf of the City in the *Regional Water Demand and Conservation Projections Report* (BAWSCA, 2020). Future water demands were projected using the Demand Management Decision Support System Model (DSS Model) and were based on the population and employment projections within the City's service area. A detailed description of the DSS Model and the associated demand and conservation projection methodology is provided in the *Regional Water Demand and Conservation Projections Report* (BAWSCA, 2020). A brief description of BAWSCA's 2020 demand projections is provided below.

> In June 2020, BAWSCA completed the Regional Water Demand and Conservation Projections Report (Demand Study).[10] The goal of the Demand Study was to develop transparent, defensible, and uniform demand and conservation savings projections for each wholesale customer using a common methodology to support both regional and individual agency planning efforts and compliance with the new statewide water efficiency targets required by Assembly Bill (AB) 1668 and Senate Bill (SB) 606.
>
> Through the Demand Study process, BAWSCA and the wholesale customers (1) quantified the total average-year water demand for each BAWSCA member agency through 2045, (2) quantified passive and active conservation water savings potential for each individual wholesale customer through 2045, and (3) identified 24 conservation programs with high water savings potential and/or member agency interest. Implementation of these conservation measures, along with passive conservation, is anticipated to yield an additional 37.3 MGD of water savings by 2045. Based on the revised water demand projections, the identified water conservation savings, increased development and use of other local supplies by the wholesale customers, and other actions, the collective purchases of the BAWSCA member agencies from the SFPUC are projected to stay below 184 MGD through 2045.
>
> As part of the Demand Study, each wholesale customer was provided with a demand model that can be used to support ongoing demand and conservation planning efforts, including UWMP preparation.

In 2021, as part of the 2020 UWMP update, the City's DSS Model was revised to account for several changes since the demand projections were estimated by BAWSCA. The 2021 DSS Model update included revised population and employment projections developed by City staff consistent with the City's 2010 General Plan and the City's approved and anticipated projects (i.e., consistent with the population and employment projections included in Table 3-1 and Table 3-2).

As described further in Section 4.2.3, passive and active water conservation savings associated with existing water uses in the City's service area have been subtracted from the water demand projections associated with the City's 2010 General Plan. The 2021 DSS Model update included revised conservation measure assumptions consistent with City's planned demand management measures (DMMs) that are described in Chapter 9.

As shown in Table 4-4 and the associated charts, by 2045, it is estimated that the water demand associated with buildout of the City's 2010 General Plan would be 13,373 AFY without passive or active conservation savings. Passive conservation savings are projected to reduce this water demand by 1,657 AFY (i.e., by 12%) and active conservation is projected to further reduce demands by 453 AFY (i.e., by 3.2%). As such, it is estimated that annual water demands associated with buildout of the City's 2010 General Plan will be approximately 10,611 AFY in 2025 and 11,263 AFY in 2045.

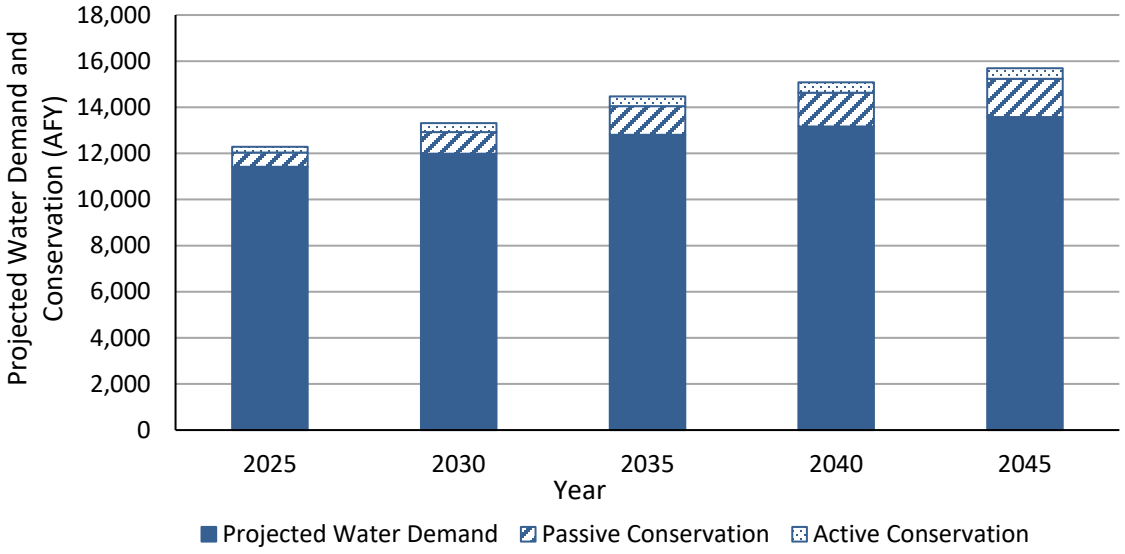
[10] Phase III Final Report: http://bawsca.org/uploads/pdf/BAWSCA_Regional_Water_Demand_and_Conservation%20Projections%20Report_Final.pdf

Table 4-4 Projected Total Water Demand and Projected Passive and Active Water Conservation

Water Conservation Type	Projected Total Water Demand (AFY)				
	2025	2030	2035	2040	2045
2010 General Plan					
Projected Water Demand	11,480	12,073	12,616	12,999	13,373
Projected Water Conservation					
Passive Conservation	613	938	1,241	1,468	1,657
Active Conservation	256	384	423	450	453
Subtotal 2010 General Plan	10,611	10,751	10,952	11,081	11,263
Other Planned Projects					
Projected Water Demand	195	299	614	614	659
Total Projected Demand	10,806	11,049	11,566	11,696	11,923

NOTES:
(a) Projected water demands associated with the 2020 General Plan are estimated using the DSS Model based on population and employment projections shown in Tables 3-1 and 3-2.
(b) Projected water demands associated with other planned projects that will require a General Plan Amendment are calculated using the City's demand factors and provided by City staff.
(c) Total water demand is the sum of potable water demand and recycled water demand and includes metered water consumption and losses. The projected water demands include savings from plumbing codes and conservation efforts that the City plans to undertake. Totals may not sum due to rounding.

Chart 4-4 Projected Water Demand and Conservation



4.2.2 Demands Associated with Other Planned Projects

As identified by the City's Community Development & Transportation Department, several proposed development projects within the City's service area would have increased development intensities relative to the 2010 General Plan land use designations and would require a General Plan amendment. These projects and their projected future water demands are summarized in Table 4-5. As shown on Table 4-5, the net annual water demand associated with these projects totals to 659 AFY by 2045. In addition to the below-mentioned projects that need a General Plan amendment, the City is beginning to undertake their Housing Element Update. This Update will be completed by 2023 and will include accommodation for an additional 4,500 units that were not included in the 2010 Housing Element.

Table 4-5 Anticipated Water Demand for Projects that Require a General Plan Amendment

Project Name	Project Type	Projected Potable and Recycled Water Demand (AFY)		
		Potable Water Demand	Recycled Water Demand	Total Water Demand
320-350 Blomquist	Commercial	28.4	148.3	176.8
505 E. Bayshore	Residential	6.2	12.1	18.3
1205-1295 Veterans	Residential	44.5	21.3	65.8
603 Jefferson/750 Bradford	Mixed-Use	12.0	25.7	37.7
1057 El Camino Real	Mixed-Use	64.1	175.0	239.1
2300 Broadway	Mixed-Use	14.1	28.9	43.0
901 - 999 El Camino Real	Mixed-Use	10.7	23.1	33.8
651 El Camino	Residential	31.2	13.4	44.6
TOTAL		211	448	659

4.2.3 Water Savings from Codes, Standards, Ordinances, or Transportation and Land Use Plans

☑ ***CWC § 10631 (d) (4)***

(A) 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.

(B) 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.

"Passive conservation" refers to water savings resulting from actions and activities that do not depend on direct financial assistance or educational programs implemented by water suppliers. These savings result primarily from: (1) the natural replacement of existing plumbing fixtures with water-efficient models

required under current plumbing code standards,[11] (2) the installation of water-efficient fixtures and equipment in new buildings and retrofits as required under CALGreen Building Code Standards, [12] and (3) inclusion of low-water use landscaping and high-efficiency irrigation systems to minimize outdoor water use in new connections and projects in accordance with the State's Model Water Efficient Landscape Ordinance (MWELO).

"Active conservation" refers to water savings resulting from the City's implementation of water conservation programs, education programs, and the offering of financial incentives (e.g., rebates). The City's current and planned active conservation programs, or DMMs, are discussed in Chapter 9.

Furthermore, the City's implementation of water conservation programs is substantiated by the City's 2010 General Plan. Specifically, Policies NR-2.1 through 2.4 require aggressive implementation of water conservation policies and programs. The implementation of these policies will help minimize the impacts of potential future water shortage through water demand management.

The water demand projections presented herein take into account both passive and active conservation savings, as shown in Table 4-6. As part of the 2021 DSS Model update, passive and active savings within City's service area are subtracted from water demand projections associated with the City's 2010 General Plan. However, because new construction within the City's service area will include water-efficient features per the plumbing code standards, the CALGreen standards, and the MWELO, future water demand estimates associated with planned projects (including those that would require a General Plan amendment) are considered to be "demand hardened", meaning that no further passive or active savings are assumed to be feasible. As can be seen in Table 4-4 and the associated charts, by 2045, it is estimated that passive conservation savings will reduce total projected water demand by 1,657 AFY within the City's service area and active conservation will further reduce demands by 453 AFY (i.e., the total 2045 demand will be reduced from 14,032 AFY to 11,923 AFY).

[11] Including the California Energy Commission Title 20 appliance standards for toilets, urinals, faucets, and showerheads – The appliance standards determine what can be sold in California and therefore will impact both new construction and replacement fixtures in existing homes.

[12] The City requires that all new residential and non-residential construction comply with the mandatory CALGreen Requirements, As described on the City's website: http://www.redwoodcity.org/departments/community-development-department/building-inspection-code-enforcement/building-applications-handouts, accessed on March 22, 2016.

Table 4-6 Inclusion in Water Use Projections (DWR Table 4-5)

Are Future Water Savings Included in Projections?	Yes
If "Yes" to above, state the section or page number, in the cell to the right, where citations of the codes, ordinances, or otherwise are utilized in demand projections are found.	Section 4.2.3
Are Lower Income Residential Demands Included In Projections?	Yes

4.2.4 Projected Total Water Demand

As described above, the total projected potable water demand in the City service area is the sum of water demands associated with population and employment projections consistent with the City's 2010 General Plan and other planned projects that would require a General Plan amendment. After accounting for future passive and active water savings, it is estimated that the total water demand within the City's service area will be approximately 11,923 AFY in 2045 (i.e., 11,263 AFY for the 2010 General Plan plus 659 AFY for the other planned projects).

By 2025, it is estimated that the annual water demand will be approximately 10,806 AFY, which is a 0.92% increase relative to the actual 2020 water demand of 10,708 AFY.

4.2.4.1 Projected Recycled Water Demand

As part of the 2020 UWMP update, the City's estimated its recycled water demand projections based on the planned pipeline alignment of its recycled water program and buildout of planned development projections. The City anticipates that recycled water will be used to supply 1,716 AFY of the total water demand by 2045. Recycled water projections through 2045 are described further in Section 6.5.

4.2.4.2 Projected Potable Water Demand

After accounting for the recycled water use, the remaining demand for potable water (10,207 AFY in 2045; see Table 4-8) is anticipated to be supplied by potable water from the SFPUC RWS. Projected potable water demand for each water use sector within the City's service area is shown in five-year increments through 2045 in Table 4-7 and the associated chart. Water demand is anticipated to keep stable or increase steadily in all sectors through 2045. The sectors with the largest growth in demand by percent are industrial and institutional/governmental with 21% growth from 2025 to 2045.

The City's projected potable and recycled water demand (i.e., "Gross water use") in five-year increments is summarized in Table 4-8.

Table 4-7 Use for Potable and Non-Potable - Projected (DWR Table 4-2)

Use Type	Additional Description *(as needed)*	Projected Water Use				
		2025	2030	2035	2040	2045
Single Family		4,209	4,197	4,218	4,278	4,362
Multi-Family		1,752	1,778	1,803	1,810	1,861
Commercial		1,660	1,744	1,882	1,887	1,895
Industrial		137	148	159	162	165
Institutional/Governmental		39	42	45	46	47
Landscape		764	778	813	836	884
Losses		786	757	773	784	795
Other Potable		168	174	181	187	194
Other	Fire Service	5	5	5	5	5
TOTAL		9,520	9,623	9,880	9,995	10,207

NOTES:
(a) Volumes are in units of AF.
(b) Projected water demands are estimated using the DSS Model provided by the City on December 22, 2020 and are based on population and employment projections shown in Table 3-1 and 3-2.
(c) Demands projections include additional developments that require a General Plan Amendment.
(d) Demands reported are potable water demand. Besides recycled water, the City does not have other non-potable water use. This table and Table 4-2 exclude demands from recycled water. See Table 6-5 for recycled water demands.

Chart 4-7 Current and Projected Potable Water Demand by Sector

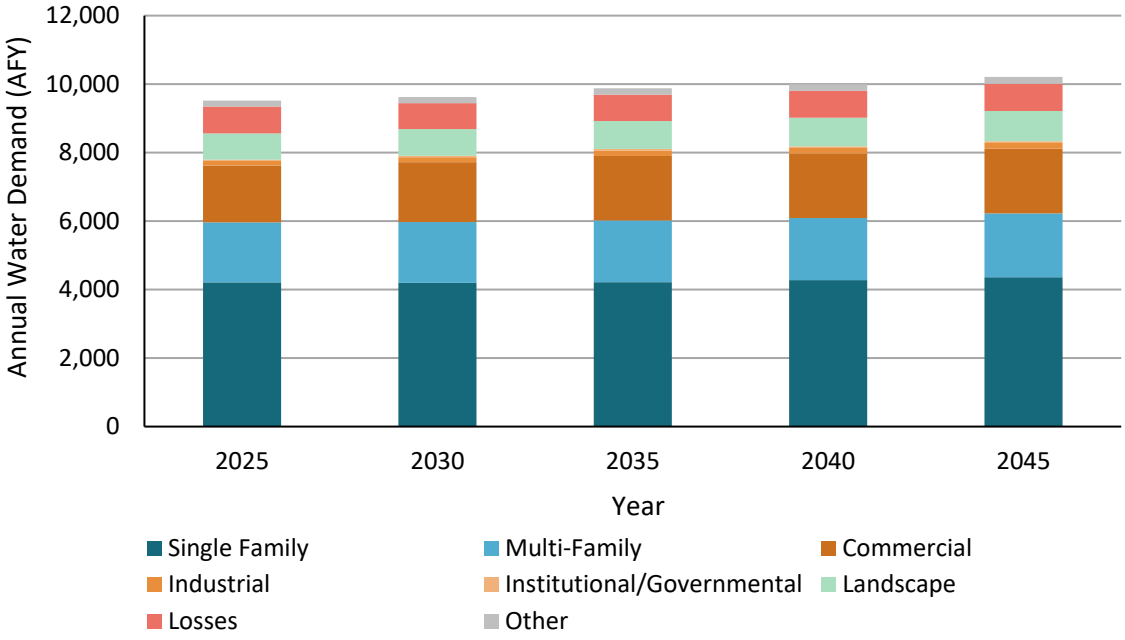
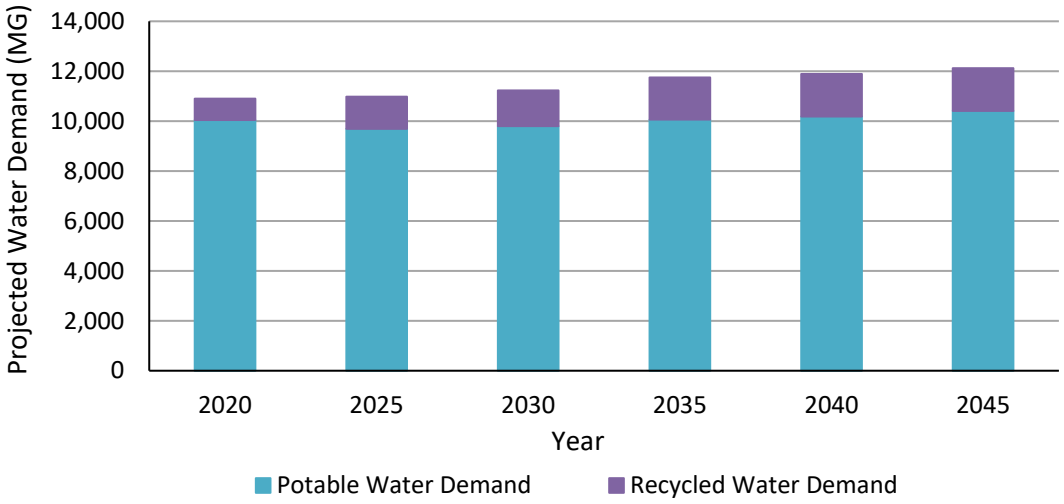


Table 4-8 Total Water Use (Potable and Non-Potable) (DWR Table 4-3)

	2020	2025	2030	2035	2040	2045
Potable Water, Raw, Other Non-potable *From DWR Tables 4-1 and 4-2*	9,852	9,520	9,623	9,880	9,995	10,207
Recycled Water Demand *From DWR Table 6-4*	856	1,286	1,426	1,686	1,701	1,716
Optional Deduction of Recycled Water Put Into Long-Term Storage						
TOTAL WATER USE	10,708	10,806	11,049	11,566	11,696	11,923
NOTES: (a) Volumes are in units of AF.						

Chart 4-8 Current and Projected Total Water Use



4.2.5 Water Use for Lower Income Households

☑ ***CWC § 10631.1***

(a) 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

(b) It is the intent of the Legislature that the identification of projected water use for single-family and multifamily residential housing for lower income households will assist a supplier in complying with the requirements under Section 65589.7 of the Government Code to grant a priority for the provision of service to housing units affordable to lower income households.

The water demands presented in Section 4.2 include projected future water use by lower income households. Per Health and Safety Code 50079.5, a lower income household is defined as a household with lower than 80% of the City's median income. The 2015-2023 Housing Element (City of Redwood City, 2015) indicates that in 2013, 46% of the City's housing units served residents with less than 80% of the median income. Therefore, it is assumed that approximately 46% of the future residential water demand will be associated with lower income households. Water demand associated with these households were included in the total potable water demand projections described above and shown in Table 4-8.

4.2.6 Characteristic Five-Year Water Use

☑ *CWC § 10635(b)(3)*

(b) 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…

(3) A comparison of the total water supply sources available to the water supplier with ***the total projected water use for the drought period.*** (Emphasis added).

A critical component of the new statutory language in Water Code §10635(b) is the requirement to prepare the five-year Drought Risk Assessment (DRA), which is included in Chapter 7. The five-year DRA can also be used to provide the water service reliability assessment for a drought lasting five years.

As a first step, DWR recommends that the expected gross water use for the next five years without drought conditions (also known as *unconstrained demand*) be estimated. These numbers can then be adjusted to estimate the five-years' cumulative drought effects. Redwood City's unconstrained demand is based on the demand projections in Section 4.2.4 assuming linear growth over the next five years, as shown in Table 4-9.

Table 4-9 Characteristic Five-Year Water Use

2021	2022	2023	2024	2025
10,728	10,747	10,767	10,786	10,806
NOTES: (a) Volumes are in units of AF.				

4.3 Water Use Sectors Not Included in the Demand Projections

Historical and projected water demands for the water use sectors described in CWC §10631(d)(1)(G) through (I) and listed below were not included in City's water demand calculations because they are not applicable to the City:

- Sales to other agencies;
- Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof; and
- Agricultural.

4.3.1 Sales to Other Agencies

The City does not sell potable water to other agencies and does not expect to in the future. In the 2012 Recycled Water Feasibility Study Update the City has allocated up to 273 AFY of recycled water for use by other agencies.

4.3.2 Saline Water Intrusion Barriers, Groundwater Recharge, and Conjunctive Use

The City does not use water for saline water intrusion barriers and does not currently participate in active groundwater recharge activities or a conjunctive use program.

4.3.3 Agricultural

The City does not sell water to agricultural customers and does not expect to in the future.

4.4 Climate Change Impacts to Demand

☑ ***CWC § 10635(b)***

(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.

The DRA must include a consideration of climate change impacts on demand. Hotter and drier weather may lead to an increased demand in landscape irrigation. The DSS Model assesses the sensitivity of the City's water demand to weather and then incorporates predicted weather and climate change data into demand projections. Therefore, the demand projections presented in Section 4.2 include considerations of climate change.

A description of the weather and climate change data incorporated into the DSS Model is provided Section 3.6 of the BAWSCA Demand Study (BAWSCA, 2020). Based on data published by the International Panel on Climate Change (IPCC) and the California's Fourth Climate Change Assessment San Francisco Bay Area Summary Report (Ackerly et al., 2018), a predicted annual mean temperature increase of 1.7°F was incorporated into the DSS Model demand forecast for the time period of 2019 to 2045.

4.5 Coordinating Water Use Projections

☑ ***CWC § 10631 (h)***

An urban water supplier that relies upon a wholesale agency for a source of water shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available.

The City provides the SFPUC with water use projections annually as part of reporting to the BAWSCA Annual Surveys and other BAWSCA-led water demand and supply coordination efforts as dictated by the 2009 Water Supply Agreement. As part of the coordination effort for the 2020 UWMP, and in compliance

with CWC §10631(h), the City supplied BAWSCA with its water demand projections through 2045 for transmittal to the SFPUC.[13]

4.6 Urban Water Use Objective

☑ ***CWC § 10609.20***

(a) Each urban retail water supplier shall calculate its urban water use objective no later than January 1, 2024, and by January 1 every year thereafter.

(b) The calculation shall be based on the urban retail water supplier's water use conditions for the previous calendar or fiscal year.

☑ ***CWC § 10609.22***

(a) An urban retail water supplier shall calculate its actual urban water use no later than January 1, 2024, and by January 1 every year thereafter.

(b) The calculation shall be based on the urban retail water supplier's water use for the previous calendar or fiscal year.

☑ ***CWC § 10609.24***

(a) An urban retail water supplier shall submit a report to the department no later than January 1, 2024, and by January 1 every year thereafter. The report shall include all of the following:

(1) The urban water use objective calculated pursuant to Section 10609.20 along with relevant supporting data.

(2) The actual urban water use calculated pursuant to Section 10609.22 along with relevant supporting data.

(3) Documentation of the implementation of the performance measures for CII water use.

(4) A description of the progress made towards meeting the urban water use objective.

(5) The validated water loss audit report conducted pursuant to Section 10608.34.

(b) The department shall post the reports and information on its internet website.

(c) The board may issue an information order or conservation order to, or impose civil liability on, an entity or individual for failure to submit a report required by this section.

Following the 2014-2016 drought, the State of California developed the "Making Water Conservation a California Way of Life" framework to address the long-term water use efficiency requirements called for in executive orders issued by Governor Brown. In May of 2018, AB 1668 and SB 606 went into effect, which built upon the executive orders implementing new urban water use objectives for urban retail water suppliers.

SB 606 and AB 1668 establish guidelines for efficient water use and a framework for the implementation and oversight of the new standards, which must be in place by 2022. The bills call for creation of new

[13] Email from Redwood City to BAWSCA dated January 26, 2021, see Appendix B.

urban efficiency standards for indoor use, outdoor use, and water loss, as well as any appropriate variances for unique local conditions.

The indoor water use standard will be 55 gallons per person per day (gallons per capita per day, or GPCD) until January 2025; the standard will become stronger overtime, decreasing to 50 GPCD in January 2030. Water use standards for the remaining components will be adopted by the State Water Resources Control Board (SWRCB) by regulation no later than June 30, 2022. Using the adopted standards, each urban retail water agency will annually, beginning January 1, 2024, calculate its own objective.

Table 4-10 summarizes estimated potable indoor and outdoor residential demand as part of the City's potable water demand shown above in Table 4-7. Furthermore, Table 4-10 shows the per capita projected indoor residential water demand based on the population projections described in Section 4.2. These estimates show that the City's residential indoor water use is projected to be well below the proposed indoor water use standard.

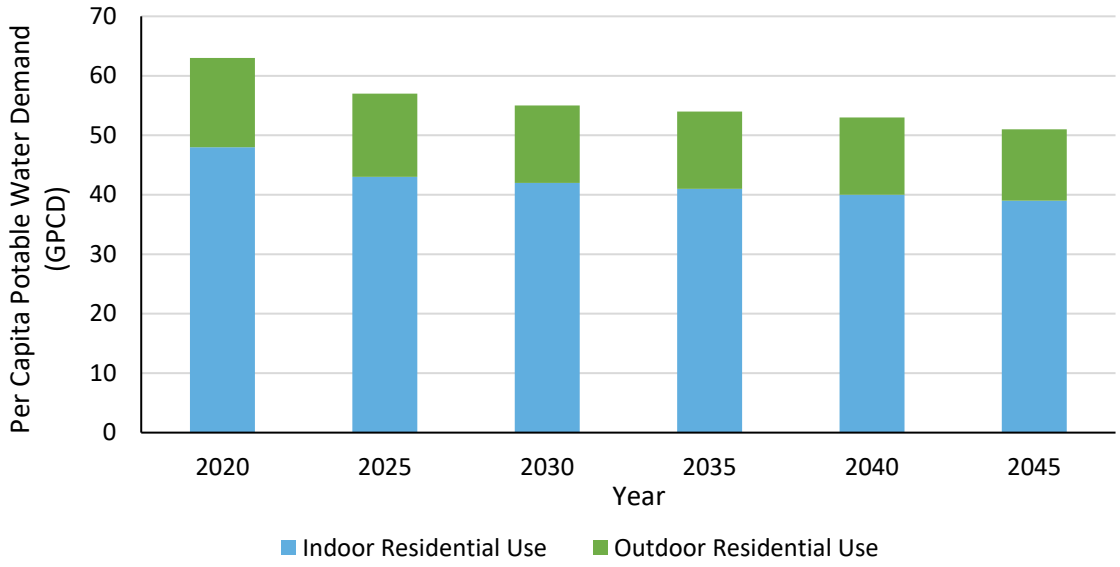
In the past two decades, the City has made significant strides in reducing its per capita potable water demand above and beyond targets delineated by the Water Conservation Act (see Chapter 5). The City plans to continue to implement conservation efforts to meet new legislative requirements as part of the "Making Water Conservation a California Way of Life" framework. Potable water demand reductions will be achieved through expansion of the City's recycled water program and implementation of DMMs as discussed in Chapters 6 and 9, respectively. The City will also implement General Plan policies NR-2.1 through NR-2.4 which require aggressive implementation of water conservation policies and programs. The implementation of these policies will help minimize the impact of potential water supply shortfalls described in Section 7.1.3. The City will continue to monitor per capita water demand to ensure that its compliance targets are being met.

Table 4-10 Current and Projected Residential Per Capita Water Use

Year	Residential Potable Water Demand (AFY)	Service Area Population	Per Capita Residential Potable Water Use (GPCD)	Approximate Per Capita Indoor Residential Potable Water Use (GPCD)	Approximate Per Capita Outdoor Residential Potable Water Use (GPCD)
2020	6,251	89,037	63	48	15
2025	5,961	93,765	57	43	14
2030	5,975	97,128	55	42	13
2035	6,021	100,614	53	41	13
2040	6,089	104,247	52	40	13
2045	6,222	107,947	51	39	12

NOTES:
(a) Service area population is detailed in Table 3-1.
(b) Residential potable water is detailed in Table 4-2 and 4-7 and includes single family and multi-family residential.
(c) Per capita potable water demand is calculated by dividing the annual residential potable water demand by the service area population and the number of days in a year.
(d) Indoor residential water use is approximately 71% of total residential potable water use and is estimated from the DSS Model provided by the City, December 22, 2020. Outdoor residential water use is approximately 29% of total residential potable water use and includes metered residential irrigation accounts. Recycled residential irrigation accounts for an average of 175 AFY and is not included in residential potable water demand.

Chart 4-8 Current and Projected Indoor and Outdoor Residential Per Capita Potable Water Use



5. SB X7-7 BASELINES, TARGETS, AND 2020 COMPLIANCE

☑ ***CWC § 10608.24 (b)***

Each urban retail water supplier shall meet its urban water use target by December 31, 2020.

☑ ***CWC § 10608.28***

(a) An urban retail water supplier may meet its urban water use target within its retail service area, or through mutual agreement, by any of the following:

(1) Through an urban wholesale water supplier.

(2) Through a regional agency authorized to plan and implement water conservation, including, but not limited to, an agency established under the Bay Area Water Supply and Conservation Agency Act (Division 31 (commencing with Section 81300)).

(3) Through a regional water management group as defined in Section 10537.

(4) By an integrated regional water management funding area.

(5) By hydrologic region.

(6) Through other appropriate geographic scales for which computation methods have been developed by the department.

(b) A regional water management group, with the written consent of its member agencies, may undertake any or all planning, reporting, and implementation functions under this chapter for the member agencies that consent to those activities. Any data or reports shall provide information both for the regional water management group and separately for each consenting urban retail water supplier and urban wholesale water supplier.

With the adoption of the Water Conservation Act of 2009, also known as Senate Bill (SB) X7-7, the state is required to reduce urban water use by 20% by the year 2020. Each urban retail water supplier was required to develop a baseline daily per capita water use ("baseline water use") in their 2010 Urban Water Management Plan ("UWMP" or "Plan") and establish per capita water use targets for 2015 and 2020 in order to help the state achieve the 20% reduction.

In support of implementing the requirements of SB X7-7, the California Department of Water Resources (DWR) produced a set of methodologies for developing baseline and compliance water use and targets, which are included in Methodologies for Calculating Baseline and Compliance Urban Per Capita Water, California Department of Water Resources Division of Statewide Integrated Water Management Water Use and Efficiency Branch (Methodologies; DWR, 2016).

Baselines and water use targets for the City of Redwood City ("City" or "Redwood City") were initially calculated in the 2010 UWMP in response to the Water Conservation Act. Per requirements of the DWR, the 2015 UWMP updated the baseline and water use target calculations using 2010 United States Census (Census) data.

This chapter discusses Redwood City compliance with its 2020 water use target. As part of the compliance reporting for SB X7-7, water suppliers are required to complete and submit a set of standardized

verification tables in their 2020 UWMPs. The information in these tables is discussed and summarized in the following subsections, and the complete set of SB X7-7 standardized tables is included in Appendix E.

5.1 Service Area Population

☑ ***CWC § 10608.20 (e)***

An urban retail water supplier shall include in its urban water management plan due in 2010 pursuant to Part 2.6 (commencing with Section 10610) the 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.

☑ ***CWC § 10608.20 (g)***

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).

☑ ***Methodology 2 Service Area Population.***

DWR will examine discrepancy between the actual population estimate and DOF's projections for 2010; if significant discrepancies are discovered, DWR may require some or all suppliers to update their baseline population estimates. (DWR, 2016b)

As reported in the 2015 UWMP, Redwood City updated its service area population for baseline periods spanning from 1999 through 2009 to meet DWR's requirement of using 2010 Census data for its baseline population calculations. The resultant service area population estimates for the baseline periods are included in Appendix E.

DWR's Population Tool was used to estimate Redwood City's service area population in 2020. The DWR Population Tool provides population estimates based on Census data, the number of service connections provided by Redwood City, and the geographic boundary of the Redwood City service area. The population in 2020 for the Redwood City service area was estimated to be 89,037. Calculations from the DWR Population Tool are provided in Appendix F.

5.2 Baseline Water Use

In the 2015 UWMP, Redwood City updated the per capita water use calculations to use the revised population estimates described in Section 5.1 and the historical potable water demand information presented in the 2010 UWMP.

Water suppliers must define a 10- or 15-year base (or baseline) period for water use that is then used to develop their future target per capita water use. Water suppliers must also calculate water use over a 5-year baseline period and use that value to determine a minimum required reduction in water use by 2020. Utilizing a 15-year baseline period is only allowed for water suppliers that met at least 10% of their 2008 measured retail water demand through recycled water; the City does not meet this criterion and thus selected a 10-year baseline.

The 10-year baseline water use was calculated using gross per capita water usage data (calculated as total water entering the City's water distribution system, including uses by commercial, industrial, and other

users, as well as water loses, divided by total population) for the 10-year period between July 1, 1999 and June 30, 2009. The 5-year baseline water use was calculated using per capita water usage data for the 5-year period between July 1, 2004 and June 30, 2009. The updated 5- and 10-year baseline water uses are shown in Table 5-1 and detailed in Appendix E.

5.3 Water Use Targets

☑ ***CWC § 10608.20 (b)***

An urban retail water supplier shall adopt one of the following methods for determining its urban water use target pursuant to subdivision (a):

(1) Eighty percent of the urban retail water supplier's baseline per capita daily water use.

(2) The per capita daily water use that is estimated using the sum of the following performance standards:

(A) For indoor residential water use, 55 gallons per capita daily water use as a provisional standard. Upon completion of the department's 2016 report to the Legislature pursuant to Section 10608.42, this standard may be adjusted by the Legislature by statute.

(B) For landscape irrigated through dedicated or residential meters or connections, water efficiency equivalent to the standards of the Model Water Efficient Landscape Ordinance set forth in Chapter 2.7 (commencing with Section 490) of Division 2 of Title 23 of the California Code of Regulations, as in effect the later of the year of the landscape's installation or 1992. An urban retail water supplier using the approach specified in this subparagraph shall use satellite imagery, site visits, or other best available technology to develop an accurate estimate of landscaped areas.

(C) For commercial, industrial, and institutional uses, a 10-percent reduction in water use from the baseline commercial, industrial, and institutional water use by 2020.

(3) Ninety-five percent of the applicable state hydrologic region target, as set forth in the state's draft 20x2020 Water Conservation Plan (dated April 30, 2009). If the service area of an urban water supplier includes more than one hydrologic region, the supplier shall apportion its service area to each region based on population or area.

(4) A method that shall be identified and developed by the department, through a public process, and reported to the Legislature no later than December 31, 2010. The method developed by the department shall identify per capita targets that cumulatively result in a statewide 20-percent reduction in urban daily per capita water use by December 31, 2020. In developing urban daily per capita water use targets, the department shall do all of the following:

(A) Consider climatic differences within the state.

(B) Consider population density differences within the state.

(C) Provide flexibility to communities and regions in meeting the targets.

(D) Consider different levels of per capita water use according to plant water needs in different regions.

(E) Consider different levels of commercial, industrial, and institutional water use in different regions of the state.

(F) Avoid placing an undue hardship on communities that have implemented conservation measures or taken actions to keep per capita water use low.

☑ ***CWC § 10608.22***

Notwithstanding the method adopted by an urban retail water supplier pursuant to Section 10608.20, an urban retail water supplier's per capita daily water use reduction shall be no less than 5 percent of base daily per capita water use as defined in paragraph (3) of subdivision (b) of Section 10608.12. This section does not apply to an urban retail water supplier with a base daily per capita water use at or below 100 gallons per capita per day.

Water suppliers were required to calculate their 2020 water use targets ("Targets") and compare their actual water use in 2020 with the calculated Targets to assess compliance. The Water Conservation Act requires that water suppliers calculate their Targets using one of the following four methods:

- Method 1: Eighty percent of the water supplier's baseline per capita water use;
- Method 2: Per capita daily water use estimated using the sum of performance standards applied to indoor residential use, landscaped area water use, and commercial, industrial, and institutional uses;
- Method 3: Ninety-five percent of the applicable state hydrologic region target as stated in the State's 20x2020 Water Conservation Plan, dated February 2010; or
- Method 4: Total savings subtracted from baseline water use. Savings include metering savings, residential savings, commercial, industrial, and institutional savings, and landscape and water loss savings.

The 2020 Target was adjusted in 2015 to achieve a minimum reduction in water use regardless of the target method (this is explained in Methodology 3). The California Water Code (CWC) §10608.24 directs that water suppliers must compare their actual water use in 2020 with their calculated Target to assess compliance. In addition, as part of the 2015 UWMP water suppliers had to comply with an "Interim Target" in 2015 which was established as the midpoint between the baseline water use and the 2020 Target. The years 2015 and 2020 are referred to in the Methodologies as compliance years.

Redwood City's 2020 Target was first calculated using Method 3 in its 2010 UWMP and was then recalculated in its 2015 UWMP using updated service area population. The updated 2020 Target was 124 gallons per capita per day (GPCD). Table 5-1 shows the City's 5- and 10-year baseline periods, the associated baseline water use in GPCD, and its 2020 target. Complete Target calculations are included in Appendix E.

Table 5-1 Baselines and Targets Summary (DWR Table 5-1)

Baseline Period	Start Year	End Year	Average Baseline GPCD	Confirmed 2020 Target GPCD
10-15 year	2000	2009	139	124
5 Year	2005	2009	133	
NOTES:				

5.4 2020 Target Compliance

☑ ***CWC § 10608.24 (b)***

Each urban retail water supplier shall meet its urban water use target by December 31, 2020.

☑ ***CWC § 10608.24 (d)***

(1) When determining compliance daily per capita water use, an urban retail water supplier may consider the following factors:

(A) Differences in evapotranspiration and rainfall in the baseline period compared to the compliance reporting period.

(B) Substantial changes to commercial or industrial water use resulting from increased business output and economic development that have occurred during the reporting period.

(C) Substantial changes to institutional water use resulting from fire suppression services or other extraordinary events, or from new or expanded operations, that have occurred during the reporting period.

(2) If the urban retail water supplier elects to adjust its estimate of compliance daily per capita water use due to one or more of the factors described in paragraph (1), it shall provide the basis for, and data supporting, the adjustment in the report required by Section 10608.40.

☑ ***CWC § 10608.40***

Urban water retail suppliers shall report to the department on their progress in meeting their urban water use targets as part of their urban water management plans submitted pursuant to Section 10631. The data shall be reported using a standardized form developed pursuant to Section 10608.52.

As described above, in 2020, gross potable water demand within the City's service area was 9,852 acre-feet per year (AFY) and the service area population was 89,037. Therefore, the calculated per capita water use in 2020 was 99 GPCD, approximately 80% of the City's 2020 Target of 124 GPCD (Table 5-2). Per the Methodologies (DWR, 2016b), there are several allowable adjustments that can be made to a supplier's 2020 per capita water use calculations as part of evaluating target compliance. However, no adjustments were made to Redwood City's 2020 per capita water use calculations. As demonstrated in Table 5-2, Redwood City is in compliance with its 2020 Target.

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

2020 GPCD			2020 Confirmed Target GPCD	Did Supplier Achieve Targeted Reduction for 2020?
Actual 2020 GPCD	2020 TOTAL Adjustments	Adjusted 2020 GPCD *(Adjusted if applicable)*		
99	0	99	124	Yes
NOTES:				

6. WATER SUPPLY CHARACTERIZATION

☑ ***CWC § 10631 (b)*** *A plan shall be adopted in accordance with this chapter that shall do all of the following:*

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

This section describes the City of Redwood City's ("City's" or "Redwood City's") existing and planned sources of water supply. The City's current water supplies consist of potable water purchased from the San Francisco Public Utilities Commission (SFPUC) Regional Water System (RWS) and non-potable water from the City's recycled water program.

To maintain consistency with the Urban Water Management Plans ("UWMPs" or "Plans") prepared by the SFPUC and the other Bay Area Water Supply and Conservation Agency (BAWSCA) member agencies, much of the language describing the SFPUC wholesale water supply in the following sections is common language provided by BAWSCA, in coordination with the SFPUC.

6.1 Purchased or Imported Water

This section describes the sources of wholesale water provided by SFPUC, and the process for allocating water between SFPUC, BAWSCA, and wholesale customers.

6.1.1 Description of SFPUC RWS

Approximately 85% of the water supply to the SFPUC RWS originates in the Hetch Hetchy watershed, located in Yosemite National Park, and flows down the Tuolumne River into the Hetch Hetchy Reservoir. Water from the Hetch Hetchy watershed is managed through the Hetch Hetchy Water and Power Project. The remaining 15% of the water supply to the SFPUC RWS originates locally in the Alameda and Peninsula watersheds and is stored in six different reservoirs in Alameda and San Mateo Counties. Details of the various components of the SFPUC RWS are provided below and are shown on Figure 6-1. Information regarding the Hetch Hetchy, Alameda, and Peninsula water systems is sourced from the SFPUC's 2020 UWMP and is provided verbatim below.

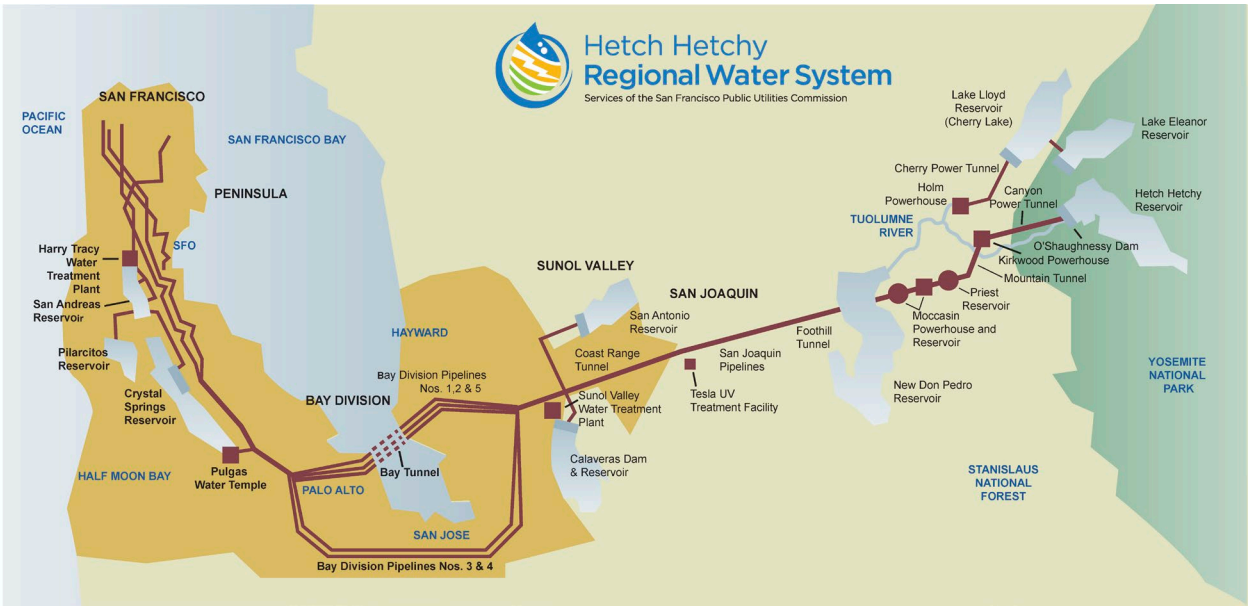


Figure 6-1 Regional Water System

6.1.1.1 Water Distribution

The RWS, shown in [Figure 6-1], consists of more than 280 miles of pipelines, 60 miles of tunnels, 11 reservoirs, five pump stations, and two water treatment plants. It includes the Hetch Hetchy Project and the Bay Area water system facilities. The Hetch Hetchy Project is generally composed of the reservoirs, hydroelectric generation and transmission facilities, and water transmission facilities from the Hetch Hetchy Valley west to the Alameda East Portal of the Coast Range Tunnel in Sunol Valley. Water system components of the Hetch Hetchy Project are also referred to as the Hetch Hetchy System. The local Bay Area water system is comprised of two parts—the Alameda System and the Peninsula System—generally consisting of the facilities west of the Alameda East Portal of the Coast Range Tunnel, including the 63,000-acre Alameda and Peninsula watersheds, storage reservoirs, two water treatment plants, and the distribution system that delivers water to both retail and wholesale customers. The Hetch Hetchy, Alameda, and Peninsula Systems are described in more detail below.

- Hetch Hetchy System: In the Hetch Hetchy System, water is diverted from Hetch Hetchy Reservoir into a series of tunnels and aqueducts from the Sierra Nevada to the San Joaquin Pipelines that cross the San Joaquin Valley to the Coast Range Tunnel, which connects to the Alameda System at the Alameda East Portal. Hetch Hetchy System water is disinfected at the Tesla Treatment Facility.
- Alameda System: The Alameda System includes two reservoirs, San Antonio Reservoir and Calaveras Reservoir, which collect water from the San Antonio Creek, Upper Alameda Creek, and Arroyo Hondo watersheds in Alameda County. San Antonio Reservoir also receives water from the Hetch Hetchy

System. Conveyance facilities in the Alameda System connect the Hetch Hetchy System and Alameda water sources to the Peninsula System. The Bay Division Pipelines (BDPLs) cross the South Bay to the Peninsula System delivering water to customers along the pipeline route. The Sunol Valley Water Treatment Plant (SVWTP) filters and disinfects water supplied from San Antonio Reservoir and Calaveras Reservoir.

- Peninsula System: The Peninsula System includes conveyance facilities connecting the BDPLs to the in-City distribution system and to other customers on the Peninsula. Two reservoirs, Crystal Springs Reservoir and San Andreas Reservoir, collect runoff from the San Mateo Creek watershed. Crystal Springs Reservoir also receives water from the Hetch Hetchy System. A third reservoir, Pilarcitos Reservoir, collects runoff from the Pilarcitos Creek watershed and directly serves one of the Wholesale Customers, the Coastside County Water District (which includes the City of Half Moon Bay), along with delivering water to Crystal Springs and San Andreas Reservoirs. The Harry Tracy Water Treatment Plant (HTWTP) filters and disinfects water supplied from Crystal Springs Reservoir and San Andreas Reservoir before it is delivered to customers on the Peninsula and the in-City distribution system.

6.1.1.2 Water Treatment

The Hetch Hetchy Reservoir is the largest unfiltered water supply on the West Coast, and one of only a few large unfiltered municipal water supplies in the nation. The water originates from well-protected wilderness areas in Yosemite National Park, which flows down the Tuolumne River to Hetch Hetchy Reservoir. This water meets or exceeds all federal and State criteria for watershed protection. Water from Hetch Hetchy Reservoir is protected in pipes and tunnels as it is conveyed to the Bay Area, and requires pH adjustment to control pipeline corrosion and disinfection for bacteria control. Based on the SFPUC's disinfection treatment practice, extensive bacteriological quality monitoring, and high operational standards, the U.S. Environmental Protection Agency (USEPA) and the SWRCB Division of Drinking Water (DDW) determined that the Hetch Hetchy water source meets federal and State drinking water quality requirements without the need for filtration.

A new USEPA regulation took effect in 2012 requiring secondary disinfection for all unfiltered drinking water systems to control the waterborne parasite cryptosporidium. To comply with this regulation, the SFPUC completed construction of a new ultraviolet (UV) treatment facility in 2011. The Tesla Treatment Facility is a key component of the Water System Improvement Program (WSIP) and enhances the high-quality water from the RWS. The facility has a capacity of 315 mgd, making it the third largest UV drinking water disinfection facility in the U.S.

All water derived from sources other than Hetch Hetchy Reservoir is treated at one of two treatment plants: the SVWTP or the HTWTP. The SVWTP primarily treats water from the Alameda System reservoirs and has both a peak capacity and sustainable capacity of 160 mgd. Treatment processes include coagulation, flocculation, sedimentation, filtration, disinfection, fluoridation, corrosion control treatment, and chloramination. Fluoridation, chloramination, and corrosion control treatment can also be provided for the combined Hetch Hetchy System and SVWTP water at the Sunol

Valley Chloramination Facility. The HTWTP treats water from the Peninsula System reservoirs and has a peak capacity of 180 mgd and a sustainable capacity of 140 mgd. Treatment processes include ozonation, coagulation, flocculation, filtration, disinfection, fluoridation, corrosion control treatment, and chloramination. Major upgrades to the SVWTP were completed in 2013 and to the HTWTP in 2015.

6.1.1.3 Water Storage

The majority of the water delivered by the SFPUC is supplied by runoff from the upper Tuolumne River watershed on the western slope of the central Sierra Nevada. Three major reservoirs collect runoff: Hetch Hetchy Reservoir, Lake Lloyd (a.k.a., Cherry Lake), and Lake Eleanor. A "water bank" in Don Pedro Reservoir is also integrated into system operations.[14] Don Pedro Reservoir, which is jointly owned and operated by Modesto Irrigation District and Turlock Irrigation District (the Districts), is located on the Tuolumne River downstream of the Hetch Hetchy System.

As a by-product of water delivery and water supply management, hydroelectric power is generated by the Hetch Hetchy Water and Power System. Water stored in Hetch Hetchy Reservoir is used for hydroelectric generation and also satisfies instream flow requirements when released downstream. Normally, only Hetch Hetchy Reservoir water supplies are exported to the Bay Area, while releases from Lake Eleanor and Lake Lloyd are used to satisfy instream flow requirements, satisfy Raker Act entitlements to the Districts downstream, and produce hydroelectric power. The Hetch Hetchy Water and Power System includes three major hydroelectric powerhouses along the Tuolumne River—Holm, Kirkwood, and Moccasin—that have a collective generating capacity of nearly 400 megawatts.

Downstream of the Hetchy Hetchy System, the SFPUC utilizes local watersheds in the Bay Area. Crystal Springs, San Andreas, and Pilarcitos Reservoirs, located in San Mateo County, capture local runoff in the Peninsula watershed, and Calaveras and San Antonio Reservoirs, located in Alameda Country, capture local runoff in the Alameda watershed. In addition to capturing local runoff, San Andreas, San Antonio, and Crystal Springs Reservoirs also provide storage for water from the Hetch Hetchy System and, along with Calaveras Reservoir, are an important water supply in the event of an interruption to Hetch Hetchy System deliveries.

[14] The Turlock Irrigation District and Modesto Irrigation District have senior water rights to the City for the Tuolumne River water and are provided the first increment of flow in the Upper Tuolumne River watershed according to the apportionment set forth in the Raker Act of 1913 (38 Stat. 242). The water bank at Don Pedro Reservoir provides a credit and debit system, which allows the City to divert water upstream while meeting its obligations to the Turlock Irrigation District and Modesto Irrigation District. Through this mechanism, the SFPUC may pre-deliver the Turlock Irrigation District's and Modesto Irrigation District's entitlements and credit the water bank so that at other times the SFPUC may retain water upstream while the Turlock Irrigation District and Modesto Irrigation District debit the water bank.

Regional Water System Storage Capacity

Reservoir	Storage	
	Acre-Feet (AF)	Billions of Gallons (BG)
Up-Country[a]		
Hetch Hetchy	360,360	117.4
Lake Lloyd[b]	273,300	89.1
Lake Eleanor	27,100	8.8
Subtotal Up-Country	**660,760**	**215.3**
Local		
Calaveras (East Bay)[c]	96,800	31.5
San Antonio (East Bay)	50,500	16.5
Crystal Springs (Peninsula)[d]	69,300	22.6
San Andreas (Peninsula)	19,000	6.2
Pilarcitos (Peninsula)	3,100	1.0
Subtotal Local	**238,700**	**77.8**
Total Regional Water System[e]	**899,460**	**293.1**

a Three other regulating reservoirs are also part of the RWS: Early Intake, Priest, and Moccasin Reservoirs.
b Storage capacity shown includes flashboards, which are structures placed in a spillway to increase the capacity of a reservoir.
c Calaveras Reservoir was constructed with a storage capacity of 96,800 AF. Since December 2001, in response to safety concerns about the seismic stability of the dam and a directive from the Division of Safety of Dams (DSOD), the SFPUC has constructed a new comparably sized replacement dam downstream.
d Crystal Springs Reservoir has a maximum storage capacity of 22.1 BG (at 291.8 feet). When the Lower Crystal Springs Dam Improvement is complete, the reservoir will be operated normally at 287.8 feet (4 feet below capacity) based on permit conditions.
e This includes 63,700 AF in dead storage (i.e., the volume in a reservoir below the lowest controllable level). In addition, the SFPUC may draw against a credit of up to 570,000 AF in storage in a water bank account in Don Pedro Reservoir, for total storage for planning purposes of 1,469,460 AF.

Calaveras Reservoir had been operating in recent years at one-third of its capacity due to restrictions imposed by the DWR Division of Safety of Dams (DSOD). The Calaveras Dam Replacement Project, which took place from 2011 to 2019, involved the construction of a new dam downstream of the existing dam. The SFPUC began impounding water behind the new dam in the winter of 2018/2019 and continued the initial fill of the reservoir during the 2019/2020 winter season.

6.1.2 Individual Supply Guarantees

San Francisco has a perpetual commitment (Supply Assurance) to deliver 184 mgd to the 24 permanent Wholesale Customers collectively. San Jose and Santa Clara are not included in the Supply Assurance commitment and each has temporary and interruptible water supply contracts with San Francisco. The Supply Assurance is allocated among the 24 permanent Wholesale Customers through Individual Supply Guarantees (ISG), which represent each Wholesale Customer's allocation of the 184 mgd Supply Assurance.

The City's Individual Supply Guarantee (ISG) is 10.93 million gallons per day (MGD), or approximately 12,243 acre-feet per year (AFY). Between 2016 and 2020, the City purchased between 67% and 80% of its ISG (see Section 6.9).

6.1.3 2028 SFPUC Decisions (formerly 2018 SFPUC Decisions)

Information regarding the 2028 SFPUC Decisions (formerly 2018 SFPUC Decision) was provided by BAWSCA in coordination with SFPUC and is provided verbatim below.

In the 2009 WSA, the SFPUC committed to make three decisions before 2018 that affect water supply development:

- Whether or not to make the cities of San Jose and Santa Clara permanent customers,
- Whether or not to supply the additional unmet supply needs of the Wholesale Customers beyond 2018, and
- Whether or not to increase the wholesale customer Supply Assurance above 184 mgd.

Events since 2009 made it difficult for the SFPUC to conduct the necessary water supply planning and CEQA analysis required to make these three decisions before 2018. Therefore, in the 2018 Amended and Restated WSA, the decisions were deferred for 10 years to 2028.

Additionally, there have been recent changes to instream flow requirements and customer demand projections that have affected water supply planning beyond 2018. As a result, the SFPUC has established an Alternative Water Supply Planning program to evaluate several regional and local water supply options. Through this program, the SFPUC will conduct feasibility studies and develop an Alternative Water Supply Plan by July 2023 to support the continued development of water supplies to meet future needs.

6.2 Groundwater

☑ ***CWC § 10631***

(b) (4) If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information:

(A) The current version of any groundwater sustainability plan or alternative adopted pursuant to Part 2.74 (commencing with Section 10720), any groundwater management plan adopted by the urban water supplier, including plans adopted pursuant to Part 2.75 (commencing with Section 10750), or any other specific authorization for groundwater management for basins underlying the urban water supplier's service area.

(B) A description of any groundwater basin or basins from which the urban water supplier pumps groundwater. For basins that a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the urban water supplier has the legal right to pump under the order or decree. For a basin that has not been adjudicated, information as to whether the department has identified the basin as a high- or medium-priority basin in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to coordinate with groundwater sustainability agencies or groundwater management agencies listed in subdivision (c) of Section 10723 to maintain or achieve sustainable groundwater conditions in accordance with a groundwater sustainability plan or alternative adopted pursuant to Part 2.74 (commencing with Section 10720).

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

To date, the City has not utilized groundwater as a potable water source (i.e., as described above, the sole source of the City's potable water has been wholesale water supplied by the SFPUC RWS). The City is the early phase of evaluating groundwater as a future emergency and back-up supply.

6.2.1 Groundwater Basin Description

The City overlies the southern end of the San Mateo Plain Subbasin (DWR Basin number 2-009.03) of the Santa Clara Valley Basin. The subbasin is not adjudicated, nor has it been found by DWR to be in a condition of overdraft. As part of the implementation of the Sustainable Groundwater Management Act (SGMA), the subbasin was ranked as a "very low priority" basin under the 2014 California Statewide Groundwater Elevation Monitoring (CASGEM) basin prioritization process and maintained this ranking in DWR's latest basin prioritization effort in 2019. The subbasin is therefore not subject to the requirements of SGMA.

6.2.1.1 Physical Setting

The subbasin is approximately 38,000 acres[15] and is bounded by the Santa Cruz Mountains on the west, San Francisco Bay and the Niles Cone subbasin on the east, the Westside Basin on the north near Burlingame Avenue and Coyote Point, and the San Francisquito Creek and the Santa Clara subbasin to the south.

Figure 6-2 shows the subbasin boundary, the surrounding subbasins of the Santa Clara Valley Basin, and the location of the Redwood City service area within the subbasin.

The subbasin is filled with alluvial fan deposits formed by tributaries to San Francisco Bay that drained across the basin and toward the center of the Bay (RWQCB, 2003; EKI et al., 2018). These alluvial fan deposits are interbedded with thick clay aquitards or confining layers and comprise the main water bearing formations within the subbasin. The major water bearing formation of the subbasin is the Quaternary alluvium, from which all larger yielding wells acquire their water. The Santa Clara Formation underlies the Quaternary alluvium and is the other water bearing formation of the subbasin. In general, the groundwater system is unconfined in the higher elevations, and confined or semiconfined at lower elevations closer to San Francisco Bay.

Groundwater flow in the subbasin is generally from west-southwest to east-northeast, from the edge of the Santa Cruz Mountains to San Francisco Bay. Both the southern and eastern edges of the subbasin are political boundaries that are roughly coincident with County lines, rather than physical hydrogeologic barriers to groundwater flow (Fio and Leighton, 1995; RWQCB 2003; EKI et al., 2018). Depending upon temporally varying streamflow, recharge, and pumping conditions, groundwater flow likely occurs in variable directions across each boundary.

Natural recharge occurs by infiltration of water from streams that enter the valley from the upland areas within the drainage basin, including San Francisquito Creek, San Mateo Creek, and other smaller creeks, and by percolation of precipitation that falls directly on the land surface. Additional recharge occurs as a result of infiltration of applied irrigation water. Subbasin outflows include limited municipal and private well pumping and groundwater outflows across subbasin boundaries.

6.2.1.2 Groundwater Conditions

Groundwater use in the subbasin has been relatively limited for the last several decades, as the primary water supply source for the overlying population has been imported water from the SFPUC RWS. The only municipal water suppliers within the subbasin that utilize groundwater as a regular potable supply source are Palo Alto Park Mutual Water Company (PAPMWC), O'Connor Tract Co-operative Water Company (O'Connor Tract CWC), and the City of East Palo Alto. Groundwater is also used for emergency supply, or

[15] Basin area is based on the SGMA 2019 Basin Prioritization results.

landscape or domestic irrigation purposes. Total groundwater production for water supply within the subbasin is approximately 2,300 acre-feet per year (AFY) as of 2018 (EKI et al., 2018)[16].

Based on limited available groundwater level information, the subbasin is currently in a relatively full and stable condition. However, historical information indicates that during past periods of high groundwater production in the 1850s to 1960s, groundwater levels in the subbasin were significantly lower and some occurrences of seawater intrusion and land subsidence were observed (EKI et al., 2018). A recent renewed interest in groundwater development in the subbasin has increased the need and interest in gaining a better understanding of the subbasin and evaluating the extent to which increased groundwater development can be pursued, while mitigating potential negative impacts. Details on the subbasin groundwater management efforts are described in the section below.

6.2.2 Groundwater Management

As stated above, the subbasin is currently designated by the DWR as a "very low priority" basin and is exempt from complying with SGMA. However, multiple entities overlying the subbasin have expressed interests in maintaining groundwater sustainability and/or established a formal role in the subbasin management.

The San Mateo County conducted a comprehensive groundwater basin assessment in 2018 (EKI et al., 2018). The study provided a more complete understanding of the subbasin hydrogeologic framework and groundwater flow and quality conditions. It also identified potential groundwater management strategies for the subbasin.

Informed by this study, San Mateo County has begun to participate in the CASGEM program. CASGEM is a groundwater elevation monitoring program that was developed by DWR per the requirements of SBx7-6. The objective of CASGEM is to establish a permanent, locally managed program of regular groundwater monitoring to track seasonal and long-term trends in groundwater elevations. The County provided initial notification to DWR of its intent to become the CASGEM Monitoring Entity for the subbasin in 2019. A CASGEM Monitoring Plan including a monitoring network of approximately ten wells throughout the subbasin was developed and submitted for DWR review in 2020. Compliance with CASGEM is an important first step in setting the subbasin up for long-term sustainable management and funding.

The subbasin is currently not managed pursuant to any groundwater management plan (GWMP). However, Santa Clara Valley Water District (SCVWD) and the City of East Palo Alto adopted their own GWMPs in 2012 and 2015, respectively. The SCVWD GWMP covers the small far southern portion of the subbasin within Santa Clara County, and was updated in 2016 (SCVWD, 2016) and submitted to DWR as an Alternative to a Groundwater Sustainability Plan (GSP). The East Palo Alto GWMP addresses groundwater conditions within the jurisdictional boundary of the City of East Palo Alto in the southeastern portion of the subbasin (Todd Engineers, 2015). The East Palo Alto GWMP was prepared in accordance

[16] The groundwater production value stated above excludes East Palo Alto which did not start pumping from its re-activated Gloria Way Well in 2018.

with Assembly Bill (AB) 3030 and the amendments to AB 3030 provided by Senate Bill (SB) 1938 and AB 359.

There has been widespread agreement among the overlying cities, water suppliers and other interested parties that cooperative, sustainable groundwater management of the entire subbasin is needed. Several entities (e.g., Menlo Park, East Palo Alto, Atherton, Palo Alto, and the SCVWD) have passed similar sustainable groundwater management resolutions in support of cooperative, sustainable management of the subbasin. In addition, BAWSCA initiated work with San Mateo County and its member agencies to form the Groundwater Reliability Partnership (GRP) in 2015. The main focus of the GRP was to provide information regarding SGMA and other locally relevant groundwater management efforts to the BAWSCA member agencies and other interested parties. The GRP has not been active since 2018.

6.2.3 Historical Groundwater Use

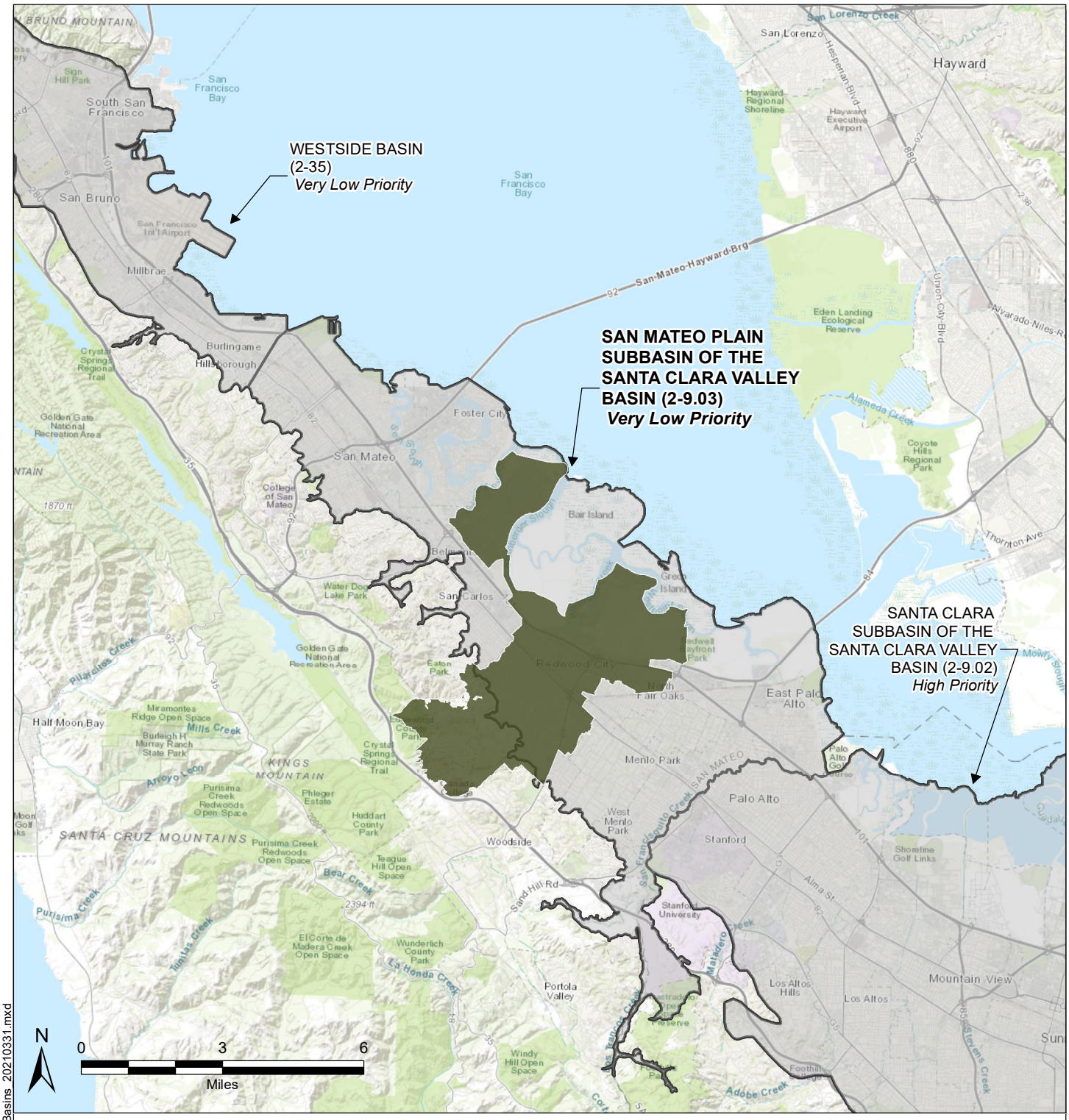
As discussed above, the City has not historically used groundwater as a potable water source (see Table 6-1).

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

X	Supplier does not pump groundwater. The supplier will not complete the table below.					
	All or part of the groundwater described below is desalinated.					
Groundwater Type	Location or Basin Name	2016	2017	2018	2019	2020
	TOTAL					
NOTES:						

6.2.4 Projected Future Groundwater Use

The City is currently evaluating groundwater as a potential future emergency or back-up supply source. A preliminary assessment of groundwater production potential for the City found that sufficient groundwater supply may be available for the City to use as a source of back-up supply for emergency conditions (EKI, 2020; Appendix G). Annual aquifer recharge and discharge were estimated using the San Mateo Plain Groundwater Model to be approximately 3,000 AFY. This indicates that the portion of the subbasin underlying the City is in a state of equilibrium and that a portion of this annual recharge could be captured without inducing detrimental effects on the aquifer system. An analysis of existing wells for other entities showed an estimated well yield average of approximately 200 gallons per minute (GPM), or 300 AFY. Water quality is expected to be sufficient for municipal and irrigation uses, though some level of treatment may be required depending on well location, depth, and intended use.



Legend

- Redwood City Water Service Area
- DWR Bulletin 118 Groundwater Basin

Sources

1. World Topographic base map provided by ArcGIS Online

Abbreviations

CASGEM = California Statewide Groundwater Elevation Monitoring Program
DWR = Department of Water Resources

Notes

1. All locations are approximate.
2. Priority rankings from CASGEM groundwater basin prioritization, May 2020.
3. DWR Bulletin 118 Groundwater Basin Boundaries, Feb 2019.

Groundwater Basins in the Vicinity of The Redwood City Service Area

City of Redwood City
2020 Urban Water Management Plan
Redwood City, CA
June 2021
EKI C00110.00

Figure 6-2

eki environment & water

Path: X:\C00110\Maps_00\2021\06\Fig6-2_RWC_GroundwaterBasins_20210331.mxd

6.3 Surface Water

Water that is self-supplied to agencies from streams, lakes and reservoirs is considered a surface water supply. Although the City's potable water supply is originally derived from surface water, it is categorized as "purchased" water since the water is obtained from the SFPUC RWS. The City does not currently, nor does it plan to in the future, use self-supplied surface water as part of its water supply portfolio.

6.4 Stormwater

The City does not currently, nor does it plan to in the future, use diverted stormwater as part of its water supply portfolio.

6.5 Wastewater and Recycled Water

☑ ***CWC § 10633***

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

Recycling water involves treating wastewater to an acceptable level such that it can be reused for irrigation, cooling, and other non-potable applications. A key benefit of water recycling is its potential to offset the use of potable supplies. The regulatory requirements for recycled water are defined in the California Code of Regulations, Title 22, Article 3 (Title 22) and differ for different uses (e.g., irrigation for food crops, landscape, and recreation). Because recycled water is treated wastewater, its availability is closely linked to the location and treatment capability of the wastewater treatment plant that receives and treats wastewater from a water supplier's service area. The following section describes wastewater collection and treatment for Redwood City's service area, the production of recycled water, as well as existing and future uses of recycled water.

6.5.1 Recycled Water Coordination

As described in Section 2.2.3, this UWMP has been prepared in coordination with Silicon Valley Clean Water (SVCW), which operates the wastewater treatment plant and produces recycled water for use within the City.

6.5.2 Wastewater Collection, Treatment, and Disposal

☑ ***CWC § 10633 (a)***

A description of the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.

☑ ***CWC § 10633 (b)***

A description of the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.

Redwood City owns, operates, and maintains a wastewater collection system comprised of 194 miles of sewer mains and 31 sewer lift stations that serve both residential and commercial customers. Wastewater flow from the City is conveyed from the Redwood City pump station (located at 1585 Maple Street) through the SVCW facilities to SVCW's sub-regional wastewater treatment plant. The plant is located at the eastern end of the Redwood Shores peninsula in Redwood City. Wastewater collected in the Redwood Shores area does not enter the SVCW-operated conveyance system and is conveyed separately to the plant through City-operated facilities. Figure 6-3 shows the City's wastewater collection area and the location of the SVCW facilities.

The SVCW wastewater treatment plant is jointly owned and operated by the Cities of Redwood City, Belmont, and San Carlos and the West Bay Sanitary District as a Joint Powers Authority (JPA). Terms of the JPA entitle each member agency to a portion of ownership of SVCW. Redwood City's capital and reserve allocation factor totals approximately 49%, which is the largest of the four members.

The SVCW treatment plant has a permitted operating capacity of 29 MGD average dry weather flow (ADWF) and a design capacity of 71 MGD peak wet weather flow (PWWF). Pursuant to the JPA, Redwood City has maximum capacity rights of 11.4 ADWF and 30.5 PWWF. Table 6-2 summarizes the ADWF allocation among the four member agencies.

The treatment processes at the SVCW treatment plant involve the following: primary sedimentation, dual secondary treatment with fixed film reactors and activated sludge, filtration, disinfection using sodium hypochlorite, and dechlorination with sodium bisulfide. Discharge of the advanced secondarily-treated effluent to the San Francisco Bay is permitted by the San Francisco Regional Water Quality Control Board (RWQCB). The volume of wastewater collected from the City's service area in 2020 was approximately 7,971 AFY (Table 6-3).

Wastewater volumes that are treated and discharged at the SVCW treatment plant are summarized in Table 6-4. Since 2000, the SVCW has produced tertiary-treated, unrestricted use recycled water under Title 22 for reuse in Redwood City. The recycled water is delivered into City-owned and operated storage tanks (located at the SVCW plant) for use in the City's recycled water system. Also included in Table 6-4 is the current volume of recycled water that is used within the City's service area (i.e., 856 AF in 2020).

Table 6-2 Maximum Capacity Rights for SVCW Member Agencies

	Redwood City	Belmont	San Carlos	West Bay Sanitary District	Total
Average Daily Dry Weather Flow (MGD)	11.4	2.3	3.7	6.6	24.0
Peak Wet Weather Flow (MGD)	30.5	8.8	14.3	14.4	68.0
NOTES: (a) Data obtained from Preliminary Official Statement, Silicon Valley Clean Water 2015 Wastewater Revenue Bonds, draft January 2015.					

Table 6-3 Wastewater Collected Within Area in 2020 (DWR Table 6-2)

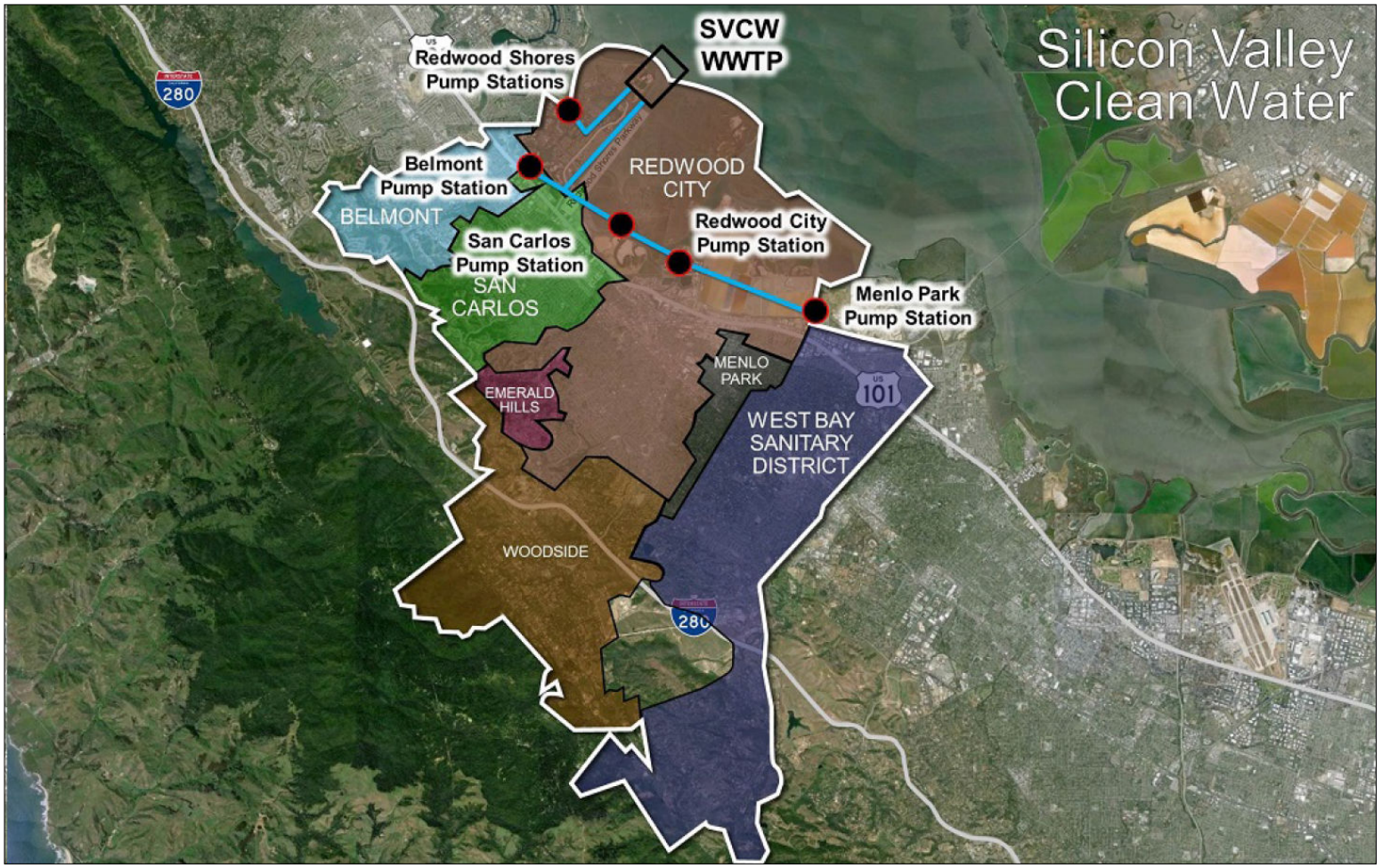
	There is no wastewater collection system. The supplier will not complete the table below.
	Percentage of 2020 service area covered by wastewater collection system *(optional)*
	Percentage of 2020 service area population covered by wastewater collection system *(optional)*

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?	Is WWTP Operation Contracted to a Third Party? *(optional)*
City of Redwood City	Metered	7,971	Silicon Valley Clean Water	Silicon Valley Clean Water Wastewater Treatment Plant	Yes	Yes
Total Wastewater Collected from Service Area in 2020:		7,971				

NOTES:
(a) Volumes are in units of AF.

Table 6-4 Wastewater Treatment and Discharge Within Service Area in 2020 (DWR Table 6-3)

	No wastewater is treated or disposed of within the UWMP service area. The supplier will not complete the table below.										
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	2020 volumes				
							Wastewater Treated	Discharged Treated Wastewater	Recycled Within Service Area	Recycled Outside of Service Area	Instream Flow Permit Requirement
Silicon Valley Clean Water Wastewater Treatment Plant	Lower San Francisco Bay	Deep Channel	CA0038369	Bay or estuary outfall	Yes	Tertiary	14,623	13,767	856	0	0
						Total	14,623	13,767	856	0	0
NOTES: (a) Volumes are in units of AF.											



Abbreviations

SVCW = Silicon Valley Clean Water
WWTP = Wastewater Treatment Plant

Notes

1. All locations are approximate.
2. Not to scale.

Sources

Silicon Valley Clean Water
https://svcw.org/about/, accessed March 31, 2021.

N

SVCW Member Agencies and Facilities

City of Redwood City
2020 Urban Water Management Plan
Redwood City, CA
June 2021
EKI C00110.00
Figure 6-3

eki environment & water

Path: X:\C00110\Maps_00\2021\06\Fig6-3_RWC_SVCWMemberAgencies.mxd

6.5.3 Recycled Water System Description

☑ *CWC § 10633 (c)*

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

In 2000, the City used approximately 1,000 AFY more water than its ISG of 12,243 AFY (Redwood City, 2011). To accommodate future housing, employment, and population growth within the City, the City initiated a water recycling program and an aggressive water conservation program (see Chapter 9) to reduce water demands and to meet both current and future water needs.

The Redwood City recycled water project has a design capacity of up to 3,238 AFY of average annual demand and includes the option to export recycled water to neighboring communities. The City's recycled water project has been implemented in two phases. Phase I of the project included the design and construction of facilities to serve customers east of Highway 101 in Redwood Shores and the Greater Bayfront Area (see Figure 3-2). Phase II of the project is underway and will expand the recycled water service area west of Highway 101 to downtown Redwood City (Central Redwood City area, see Figure 3-2).

As of 2021, Phase II-A of the recycled water system has been completed and extended the City's service along Walnut Street from Highway 101 to Marshall Street. Also, as part of Phase II, the recycled water system was extended along East Bayshore Road from Seaport Avenue to Douglas Avenue crossing under Highway 101, and along Broadway to the Stanford in Redwood City project, a development project located at 425 Broadway. The facilities installed to date were constructed to supply the initial phases of the recycled water project, up to 2,000 AFY, while providing the flexibility to deliver up to 3,238 AFY in the future.

The recycled water program is administered through the City's Public Works Services (PWS) department. The PWS department is responsible for operation and maintenance of the distribution facilities, retrofit process, permitting and monitoring, reporting, and overall program coordination.

The City's recycled water program is governed by the Recycled Water Use Ordinance (Ordinance) that was adopted by the City Council in July 2008. The Ordinance established the Recycled Water Service Area and requirements for recycled water use within the service area. The Recycled Water Service Area was later expanded in 2016 and 2019 via resolution and is illustrated on Figure 3-2.

The purpose of the Ordinance is to ensure that the City remains consistent with the California Water Code (CWC) by achieving the maximum public benefit from the use of the City's recycled water supply. The Ordinance identifies the required and voluntary uses of recycled water, including requirements for dual plumbing (see Appendix H). For sites located outside the Recycled Water Service Area, the Ordinance encourages existing and new customers to consider the feasibility of providing for the use of recycled water for landscape irrigation, internal uses (such as toilet flushing and commercial cooling), and industrial processes. To prepare new developments for future use of recycled water, the City recently developed a Recycled Water Development Standard (a.k.a. "Attachment U"). The document was adopted in November

2019 and included herein as Appendix H. Information regarding the City's recycled water program is also available on the City's website[17].

During preliminary planning and development of the recycled water project, some community members expressed concerns about the safety of recycled water, specifically with respect to exposure to children. As a result, the City Council adopted a policy not to use recycled water in areas where children play; therefore, no schools or parks in the Recycled Water Service Area currently use recycled water for irrigation or non-irrigation uses.

6.5.4 Potential, Current, and Projected Recycled Water Uses

☑ ***CWC § 10633 (c)***

A description of 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 (d)***

A description and quantification of the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, indirect potable reuse, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.

☑ ***CWC § 10633 (e)***

The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years.

Approximately 856 AFY of recycled water was used in Redwood City in 2020 (Table 6-5). A majority of the recycled water use (832 AFY) was for landscape irrigation purposes; the remaining 24 AFY was used for toilet and urinal flushing, as well as for construction. Table 6-5 shows the City's future recycled water demand estimated in 5-year increments. These projections are estimated based on: (1) current 2020 recycled water use, and (2) recycled water demand for future sites that are anticipated to be developed or retrofitted for recycled water.

In 2012 a Water Recycling Feasibility Study Update (Study Update) was completed in support of the Phase II planning (Kennedy/Jenks, 2012). The Study Update includes a recycled water market assessment that estimates recycled water demands for existing customers, sites retrofitted in 2011, sites that could be retrofitted for future recycled water use, and future sites that are anticipated to be developed/redeveloped in accordance with the City's 2010 General Plan. The Study Update proposed conceptual pipeline alignments to serve the majority of future development and redevelopment within the Phase II project area, and included flexibility for serving neighboring communities.

[17] Redwood City Recycled Water Program

http://www.redwoodcity.org/departments/public-works/water/recycled-water, accessed on March 19, 2021.

As part of the 2020 UWMP update, Redwood City's recycled water demand estimates were refined based on the 2012 Study Update market assessment, updated planning information, and the projected demands of projects that have yet to be connected to the recycled water system. As shown in Table 6-5, the recycled water system demand by City customers is estimated to be 1,716 AFY by 2045.

Although the existing recycled water facilities were designed to accommodate 3,238 AFY of projected demand, it may be possible that the existing facilities can produce more recycled water depending on how certain facility elements are operated, modified and/or expanded. Some additional capacity was approved by City Council to build flexibility into the system should the system evolve to serve additional customers in the future.

The SVCW member agencies are each entitled to a share of SVCW's effluent and may eventually wish to exercise their entitlement. The treatment facilities at SVCW are located within Redwood City limits, making access to the effluent somewhat complicated because it would involve trenching through residential neighborhoods and streets. Nevertheless, Redwood City is in a position to serve these agencies with high quality recycled water using the existing recycled water treatment and distribution facilities already installed by the City. Neighboring communities of Belmont, San Carlos, Atherton, Menlo Park, and Woodside rely primarily on potable water from the SFPUC RWS. These communities will likely be facing some of the same water supply issues that Redwood City is currently addressing. The Redwood City recycled water system has the potential to be at the center of a regional or sub-regional system that reduces potable water demands and improves water supply reliability on the San Francisco Peninsula.

Specifically, with completion of Phase II of the recycled water project, the City will have flexibility to serve neighboring communities and customers. Some customers outside City limits were identified in the Study Update based on their potential large water demands, their proximity to the City's Recycled Water Service Area, and the potential for system expansion; the total potential recycled water demand of these non-City customers was estimated to be 273 AFY. Though delivering recycled water to non-City customers offers no potable water reduction for the City, it could reduce City costs, and would provide a regional benefit by reducing regional potable water use and optimizing the recycled water infrastructure already in place.

Table 6-5 Recycled Water Direct Beneficial Uses Within Service Area (DWR Table 6-4)

	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:	Silicon Valley Clean Water
Name of Supplier Operating the Recycled Water Distribution System:	City of Redwood City
Supplemental Water Added in 2020 (volume)	
Source of 2020 Supplemental Water	

Beneficial Use Type	**Potential** Beneficial Uses of Recycled Water (Describe)	Amount of **Potential** Uses of Recycled Water (Quantity)	General Description of 2020 Uses	Level of Treatment	2020	2025	2030	2035	2040	2045
Landscape irrigation (excludes golf courses)			Residential and CII	Tertiary	832	946	969	980	981	982
Commercial use (b)				Tertiary	8	258	316	524	534	534
Industrial use (c)				Tertiary	16	27	29	31	32	32
Other (b)	Residential		Residential	Tertiary	0	55	113	152	154	168
				Total:	856	1,286	1,426	1,686	1,701	1,716
				2020 Internal Reuse						

NOTES:
(a) Volumes are in units of AF.
(b) Projected recycled water demand is from 2012 Recycled Water Feasibility Study Update Market assessment and refined based on recycled water demands for existing, proposed, and anticipated development projects which have yet to be connected to the recycled water system.
(c) Projected recycled water demand for Industrial uses taken from the BAWSCA 2019-20 Regional Water Supply and Demand Conservation Project which utilizes an Econometric Model and the Least Cost Planning Decision Support System (DSS Model).

6.5.5 Comparison of Previously Projected Use and Actual Use

☑ *CWC § 10633 (e)*

A description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision.

The 2015 UWMP projected that 892 AFY of recycled water would be delivered by 2020. In 2020, recycled water use in Redwood City was approximately 856 AFY. Table 6-6 summarizes the recycled water use projected for 2020 in the 2015 UWMP and the actual recycled water use in 2020.

In general, the City's recycled water growth matches its projections with some variants from the 2015 UWMP recycled water projections. Specifically, recycled water use for landscape irrigation was higher than projected, while recycled water uses for commercial, industrial, and residential uses were lower than projected. Between 2015 and 2020, the City's recycled water program had two pipeline extensions constructed in coordination with the Stanford in Redwood City Project and Kaiser Hospital Medical Office Building Project. The Stanford project is using recycled water for irrigation and toilet and urinal flushing; however, the Kaiser project is set to open in early 2021. Due to limited capital improvement program (CIP) funding, the City did not construct any other pipeline extensions between 2015 and 2020. Rather, the City has focused on preparing new commercial and residential developments for future uses of recycled water, including development of the Recycled Water Development Standards discussed above.

Table 6-6 2015 UWMP Recycled Water Use Projection Compared to 2020 Actual (DWR Table 6-5)

	Recycled water was not used in 2015 nor projected for use in 2020. The supplier will not complete the table below.	
Beneficial Use Type	2015 Projection for 2020	2020 Actual Use
Landscape Irrigation	800	832
Commercial Use	19	8
Industrial Use	49	16
Residential Use	25	0
Total	893	856
NOTES: (a) Volumes are in units of AF.		

6.5.6 Promoting Recycled Water Use

☑ ***CWC § 10633 (e-g)***

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

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

(g) 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.

The City's efforts to promote recycled water use in the City's service area are summarized below and in Table 6-7.

6.5.6.1 Customer Incentives

The City will continue its customer outreach program to encourage and assist potable water customers to connect to the recycled water system. Additionally, the City will continue to evaluate financial incentives for customers using recycled water. The primary incentive currently offered by the City is the discounted rate: recycled water service charges and fees cost 25% less than potable water for irrigation use for the first three years of recycled water use on a site, after which the discount decreases 5% every year for three years and then remains at a 10% discount. For non-irrigation use, recycled water service charges and fees cost 40% less than potable water, after which the discount decreases 10% every year for three years and then remains at a 10% discount.

In addition, recycled water offers a drought-proof supply, so recycled water customers are protected from mandatory cutbacks during drought conditions (described in Chapter 8). This is a significant incentive for customers that have invested in highly visible and high-value landscaping. As part of the Phase I project, the City has been paying for site retrofits for irrigation customers that have voluntarily agreed to use recycled water. This, in conjunction with the rate discount, provides a substantial incentive for customers to convert to using recycled water.

6.5.6.2 Recycled Water Use Ordinance and Recycled Water Development Standards

The City will continue to implement the Recycled Water Use Ordinance. By requiring certain customers to use recycled water or consider its use, the City anticipates increasing recycled water use within the service area. The Ordinance also provides a tool for the City to increase and optimize recycled water use when approached by developers about potential new projects.

In November 2019, the City adopted Recycled Water Development Standards that include roles and responsibilities for developers, contractors, and the City, as well as design criteria for developers that

ensures projects are designed, constructed, and operated for the safe use of recycled water[18]. Each project is required to complete a Dual Plumbing Engineering Report that is reviewed by the City and subsequently sent to the State Water Resources Control Board, Division of Drinking Water for approval. The City's Recycled Water Development Standards are attached to this UWMP as Appendix H.

6.5.6.3 New Development

When the City is approached with proposals for new development, water supply is a key issue that must be evaluated before approval of the new developments. Senate Bill 610 requires that Water Supply Assessments (WSAs) be performed for all projects that are subject to California Environmental Quality Act (CEQA) and of a certain size. The WSA thus allows the City to provide input to the developer's proposal for water supply, and allows the City to include recycled water in the planning process. The City's Recycled Water Use Ordinance provides a mechanism for ensuring that developers maximize recycled water use through installation of piping for irrigation and approved indoor uses. Although the City does not provide developers financial incentives to use recycled water, the availability of recycled water improves the chances for new development to be approved since it reduces dependence on the City's limited potable water resources.

Table 6-7 Methods to Expand Future Recycled Water Use (DWR Table 6-6)

	Supplier does not plan to expand recycled water use in the future. Supplier will not complete the table below but will provide narrative explanation.		
	Provide page location of narrative in UWMP		
Name of Action	Description	Planned Implementation Year	Expected Increase in Recycled Water Use
Recycled Water Use Policies	Require certain customers to use recycled water or consider its use, implement outreach programs and financial incentives, and bring recycled water into new development planning process.	Ongoing	860
		Total	860
NOTES: (a) Volumes are in units of AF.			

[18] The Recycled Water Development Standards can be found on the City website at https://www.redwoodcity.org/home/showdocument?id=20392.

6.6 Desalinated Water

☑ ***CWC § 10631 (g)*** *A plan shall be adopted in accordance with this chapter and shall do all of the following:*

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

Opportunities to develop desalinated water supplies from ocean water, brackish surface, and brackish groundwater were investigated by BAWSCA as part of Phase II of its Long-Term Reliable Water Supply Strategy (Strategy, see Section 7.1.3.5). According to BAWSCA, there are high costs and intensive permitting requirements associated with desalination. However, it does potentially provide a substantial yield given the limited options for generating significant new water supplies for the region. The SFPUC is also exploring desalination as part of its Alternative Water Supply Planning Program (see Section 7.1.3.5). The City does not anticipate opportunities for the independent development of desalinated water supplies within the planning horizon of this UWMP and this water supply is not being considered.

6.7 Water Exchanges and Transfers

☑ ***CWC § 10631 (c)*** *A plan shall be adopted in accordance with this chapter and shall do all of the following:*

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

Exploration of surface water transfers as an additional source of supply is among the City's 2010 General Plan policies that support the goal of ensuring adequate and sustainable water supplies. There are potential transfer and exchange opportunities within and outside of the SFPUC RWS. The City does not presently anticipate the need for water right transfers during normal year conditions. However, should that condition change in the future, it is possible that the City could purchase water from another agency or entity either within or outside of the SFPUC RWS.

Within the SFPUC RWS, it is possible to transfer water entitlements and/or banked water among agencies. The Water Shortage Allocation Plan (WSAP) adopted by all BAWSCA agencies and the SFPUC provides the basis for voluntary transfers of water among BAWSCA agencies during periods when mandatory rationing is in effect on the SFPUC RWS (see Section 7.1.1.1). Some BAWSCA agencies have the capacity to rely on groundwater or other sources during dry years and thus may be willing to transfer a portion of their wholesale water entitlement to other BAWSCA agencies in need of supply above their allocations. Securing water from willing sellers outside the SFPUC RWS is a more complex process than transfers within the RWS, which requires both a contract with the seller agency and approval by the SFPUC. BAWSCA has the authority to plan for and acquire supplemental water supplies and continues to evaluate the feasibility of water transfers as part of its implementation of the Strategy (see Section 7.1.3.5).

Pursuant to General Plan policies, the City will continue to explore water transfer opportunities as a potential source of additional supply.

6.8 Potential Water Supply Projects and Programs

☑ ***CWC § 10631*** *A plan shall be adopted in accordance with this chapter and shall do all of the following:*

(b) (3) For any planned sources of water supply, a description of the measures that are being undertaken to acquire and develop those water supplies.

(f) Include a description of all water supply projects and water supply programs that may be undertaken by the urban water supplier to meet the total projected water use, as established pursuant to subdivision (a) of Section 10635. 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 normal and single-dry water years and for a period of drought lasting five consecutive 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.

This section lists the water supply projects that may be undertaken by the City. The future water supply projects are not compatible with the DWR standardized table and therefore only narrative descriptions are provided below (see Table 6-8). The City anticipates continued expansion of its recycled water system and is currently evaluating groundwater as an emergency and back-up supply.

As described in Section 6.5.3, the City's recycled water project is being implemented in two phases. The City has completed construction of Phase I and Phase II-A and is currently implementing the remainder of Phase II. Construction of a new recycled water pipeline servicing the Broadway Plaza Project (1401 Broadway) is set to begin in 2021; and construction of a new extension in coordination of the South Main Mixed-Use Project is planned within the next two to three years. Both of these projects will include irrigation, commercial, and residential recycled water uses. The City is also including an expansion of the recycled water system to the Downtown Area in its 5-year CIP. The first phase of this project will extend the pipeline from Marshall Street to Jefferson Ave, and then north on Jefferson to Bradford Street, and south on Jefferson to approximately 837 Jefferson Ave. Furthermore, the City is working with potable irrigation customers along existing recycled water pipelines to retrofit their irrigation systems for recycled water use.

Development and redevelopment are anticipated to occur in the Greater Bayfront Area (see Figure 3-2) in the next 20 years. Additional recycled water pipelines are expected to be constructed as development occurs. Potential recycled water expansion opportunities in the Phase I area include recycled water use at the following development or redevelopment projects:

- Syufy Theater Site (Bayside Gardens); and
- Vacant site currently owned by Abbott Laboratories (near Seaport Center)

Future recycled water demand associated with these projects are included in the recycled water demand projections discussed in Section 6.5.4.

Table 6-8 Expected Future Water Supply Projects or Programs (DWR Table 6-7)

	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.					
X	Some or all of the supplier's future water supply projects or programs are not compatible with this table and are described in a narrative format.					
Section 6.8	Provide page location of narrative in the UWMP					
Name of Future Projects or Programs	Joint Project with other suppliers?		Description (if needed)	Planned Implementation Year	Planned for Use in Year Type	Expected Increase in Water Supply to Supplier
	Y/N	*If Yes, Supplier Name*				
NOTES:						

6.9 Summary of Existing and Planned Sources of Water

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

☑ ***CWC § 10631 (b) (4) (D)*** *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.*

The City's water supplies consist of potable water purchased from the SFPUC RWS and recycled water from the City's recycled water program. In 2020, the City purchased approximately 9,852 AFY from the SFPUC RWS and produced approximately 856 AFY of recycled water (Table 6-9).

Water supplies from the SFPUC RWS through 2045 are projected to be equivalent to the City's ISG of 12,243 AFY, which is the City's contractual entitlement to SFPUC wholesale water, which survives in perpetuity. The City plans to continue to expand its recycled water system to connect more customers to recycled water and reduce potable water demand, up to a total of 1,716 AFY. The City's total water supply projections are shown in Table 6-10 in five-year increments through 2045. Although it has begun a preliminary evaluation of groundwater, the City does not anticipate developing additional long-term water supplies from other sources in the near future.

Table 6-9 Water Supplies - Actual (DWR Table 6-8)

Water Supply	Additional Detail on Water Supply	Actual Volume					Water Quality	Total Right or Safe Yield *(optional)*
		2016	2017	2018	2019	2020		
Purchased or Imported Water	SFPUC wholesale water	8,193	8,694	9,421	9,136	9,852	Drinking Water	12,243
Recycled Water		647	627	737	689	856	Recycled Water	3,238
Total		8,841	9,321	10,157	9,825	10,708		15,481
NOTES: (a) Volumes are in units of AF.								

Table 6-10 Water Supplies - Projected (DWR Table 6-9)

Water Supply	Additional Detail on Water Supply	Projected Water Supply									
		2025		2030		2035		2040		2045	
		Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)
Purchased or Imported Water	SFPUC wholesale water	12,243	12,243	12,243	12,243	12,243	12,243	12,243	12,243	12,243	12,243
Recycled Water		1,286	3,238	1,426	3,238	1,686	3,238	1,701	3,238	1,716	3,238
Total		13,529	15,481	13,669	15,481	13,929	15,481	13,944	15,481	13,959	15,481
NOTES: (a) Volumes are in units of AF.											

6.10 Special Conditions

☑ *CWC § 10635(b)*

(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.

6.10.1 Climate Change Effects

Information regarding the impacts of climate change to the SFPUC RWS supply was provided by BAWSCA in coordination with SFPUC and is provided verbatim below:

> The issue of climate change has become an important factor in water resources planning in California, and is frequently considered in urban water management planning processes, though the extent and precise effects of climate change remain uncertain. There is convincing evidence that increasing concentrations of greenhouse gasses have caused and will continue to cause a rise in temperatures around the world, which will result in a wide range of changes in climate patterns. Moreover, observational data show that a warming trend occurred during the latter part of the 20th century and virtually all projections indicate this will continue through the 21st century. These changes will have a direct effect on water resources in California, and numerous studies have been conducted to determine the potential impacts to water resources. Based on these studies, climate change could result in the following types of water resource impacts, including impacts on the watersheds in the Bay Area:
>
> - Reductions in the average annual snowpack due to a rise in the snowline and a shallower snowpack in the low and medium elevation zones, such as in the Tuolumne River basin, and a shift in snowmelt runoff to earlier in the year;
> - Changes in the timing, annual average, intensity and variability of precipitation, and an increased amount of precipitation falling as rain rather than snow;
> - Long-term changes in watershed vegetation and increased incidence of wildfires that could affect water quality and quantity;
> - Sea level rise and an increase in saltwater intrusion;
> - Increased water temperatures with accompanying potential adverse effects on some fisheries and water quality;
> - Increases in evaporation and concomitant increased irrigation need; and
> - Changes in urban and agricultural water demand.
>
> Both the SFPUC and BAWSCA participated in the 2020 update of the Bay Area Integrated Regional Water Management Plan (BAIRWMP), which includes an assessment of the potential climate change vulnerabilities of the region's water resources and identifies climate change adaptation strategies. In addition, the SFPUC continues to study the effect of climate change on the RWS. These works are summarized below.

6.10.1.1 *Bay Area Integrated Regional Water Management Plan*

Climate change adaptation continues to be an overarching theme for the 2019 BAIRWMP update. As stated in the BAIRWMP, identification of watershed characteristics that could potentially be vulnerable to future climate change is the first step in assessing vulnerabilities of water resources in the Bay Area Region (Region). Vulnerability is defined as the degree to which a system is exposed to, susceptible to, and able to cope with or adjust to, the adverse effects of climate change. A vulnerability assessment was conducted in accordance with the DWR's Climate Change Handbook for Regional Water Planning and using the most current science available for the Region. The vulnerability assessment, summarized in the table below, provides the main water planning categories applicable to the Region and a general overview of the qualitative assessment of each category with respect to anticipated climate change impacts.

Summary of BAIRWMP Climate Change Vulnerability Assessment

Vulnerability Areas	General Overview of Vulnerabilities
Water Demand	**Urban and Agricultural Water Demand** – Changes to hydrology in the Region as a result of climate change could lead to changes in total water demand and use patterns. Increased irrigation (outdoor landscape or agricultural) is anticipated to occur with temperature rise, increased evaporative losses due to warmer temperature, and a longer growing season. Water treatment and distribution systems are most vulnerable to increases in maximum day demand.
Water Supply	**Imported Water** – Imported water derived from the Sierra Nevada sources and Delta diversions provide 66 percent of the water resources available to the Region. Potential impacts on the availability of these sources resulting from climate change directly affect the amount of imported water supply delivered to the Region. **Regional Surface Water** – Although future projections suggest that small changes in total annual precipitation over the Region will not change much, there may be changes to when precipitation occurs with reductions in the spring and more intense rainfall in the winter. **Regional Groundwater** – Changes in local hydrology could affect natural recharge to the local groundwater aquifers and the quantity of groundwater that could be pumped sustainably over the long-term in some areas. Decreased inflow from more flashy or more intense runoff, increased evaporative losses and warmer and shorter winter seasons can alter natural recharge of groundwater. Salinity intrusion

Vulnerability Areas	General Overview of Vulnerabilities
	into coastal groundwater aquifers due to sea-level rise could interfere with local groundwater uses. Furthermore, additional reductions in imported water supplies would lead to less imported water available for managed recharge of local groundwater basins and potentially more groundwater pumping in lieu of imported water availability.
Water Quality	**Imported Water** – For sources derived from the Delta, sea-level rise could result in increases in chloride and bromide (a disinfection by-product (DBP) precursor that is also a component of sea water), potentially requiring changes in treatment for drinking water. Increased temperature could result in an increase in algal blooms, taste and odor events, and a general increase in DBP formation **Regional Surface Water** – Increased temperature could result in lower dissolved oxygen in streams and prolong thermocline stratification in lakes and reservoirs forming anoxic bottom conditions and algal blooms. Decrease in annual precipitation could result in higher concentrations of contaminants in streams during droughts or in association with flushing rain events. Increased wildfire risk and flashier or more intense storms could increase turbidity loads for water treatment. **Regional Groundwater** – Sea-level rise could result in increases in chlorides and bromide for some coastal groundwater basins in the Region. Water quality changes in imported water used for recharge could also impact groundwater quality.
Sea-Level Rise	Sea-level rise is additive to tidal range, storm surges, stream flows, and wind waves, which together will increase the potential for higher total water levels, overtopping, and erosion. Much of the bay shoreline is comprised of low-lying diked baylands which are already vulnerable to flooding. In addition to rising mean sea level, continued subsidence due to tectonic activity will increase the rate of relative sea-level rise. As sea-level rise increases, both the frequency and consequences of coastal storm events, and the cost of damage to the built and natural environment, will increase. Existing coastal armoring (including levees, breakwaters, and other structures) is likely to be insufficient to protect against projected sea-level rise. Crest elevations of

Vulnerability Areas	General Overview of Vulnerabilities
	structures will have to be raised or structures relocated to reduce hazards from higher total water levels and larger waves.
Flooding	Climate change projections are not sensitive enough to assess localized flooding, but the general expectation is that more intense storms would occur thereby leading to more frequent, longer and deeper flooding. Changes to precipitation regimes may increase flooding. Elevated Bay elevations due to sea-level rise will increase backwater effects exacerbating the effect of fluvial floods and storm drain backwater flooding.
Ecosystem and Habitat	Changes in the seasonal patterns of temperature, precipitation, and fire due to climate change can dramatically alter ecosystems that provide habitats for California's native species. These impacts can result in species loss, increased invasive species ranges, loss of ecosystem functions, and changes in vegetation growing ranges. Reduced rain and changes in the seasonal distribution of rainfall may alter timing of low flows in streams and rivers, which in turn would have consequences for aquatic ecosystems. Changes in rainfall patterns and air temperature may affect water temperatures, potentially affecting coldwater aquatic species. Bay Area ecosystems and habitat provide important ecosystem services, such as: carbon storage, enhanced water supply and quality, flood protection, food and fiber production. Climate change is expected to substantially change several of these services. The region provides substantial aquatic and habitat-related recreational opportunities, including: fishing, wildlife viewing, and wine industry tourism (a significant asset to the region) that may be at risk due to climate change effects.
Hydropower	Currently, several agencies in the Region produce or rely on hydropower produced outside of the Region for a portion of their power needs. As the hydropower is produced in the Sierra, there may be changes in the future in the timing and amount of energy produced due to changes in the timing and amount of runoff as a result of climate change.

Vulnerability Areas	General Overview of Vulnerabilities
	Some hydropower is also produced within the region and could also be affected by changes in the timing and amount of runoff.

Source: 2019 Bay Area Integrated Regional Water Management Plan (BAIRWMP), Table 16-3.

6.10.1.2 SFPUC Climate Change Studies

The SFPUC views assessment of the effects of climate change as an ongoing project requiring regular updating to reflect improvements in climate science, atmospheric/ocean modeling, and human response to the threat of greenhouse gas emissions. Climate change research by the SFPUC began in 2009 and continues to be refined. In its 2012 report "Sensitivity of Upper Tuolumne River Flow to Climate Change Scenarios," the SFPUC assessed the sensitivity of runoff into Hetch Hetchy Reservoir to a range of changes in temperature and precipitation due to climate change. Key conclusions from the report include the following:

- With differing increases in temperature alone, the median annual runoff at Hetch Hetchy would decrease by 0.7-2.1 percent from present-day conditions by 2040 and by 2.6-10.2 percent from present-day by 2100. Adding differing decreases in precipitation on top of temperature increases, the median annual runoff at Hetch Hetchy would decrease by 7.6-8.6 percent from present-day conditions by 2040 and by 24.7-29.4 percent from present-day conditions by 2100.
- In critically dry years, these reductions in annual runoff at Hetch Hetchy would be significantly greater, with runoff decreasing up to 46.5 percent from present day conditions by 2100 utilizing the same climate change scenarios.
- In addition to the total change in runoff, there will be a shift in the annual distribution of runoff. Winter and early spring runoff would increase and late spring and summer runoff would decrease.
- Under all scenarios, snow accumulation would be reduced and snow would melt earlier in the spring, with significant reductions in maximum peak snow water equivalent under most scenarios.

Currently, the SFPUC is conducting a comprehensive assessment of the potential effects of climate change on water supply using a wide range of plausible increases in temperature and changes in precipitation to address the wide uncertainty in climate projections over the planning horizon 2020 to 2070. There are many uncertain factors such as climate change, changing regulations, water quality, growth and economic cycles that may create vulnerabilities for the Regional Water System's ability to meet levels of service. The uncertainties associated with the degree to which these factors will occur and how much risk they present to the water system is difficult to predict,

but nonetheless they need to be considered in SFPUC planning. To address this planning challenge, the project uses a vulnerability-based planning approach to explore a range of future conditions to identify vulnerabilities, assess the risks associated with these vulnerabilities that could lead to developing an adaptation plan that is flexible and robust to a wide range of future outcomes.

6.10.2 Regulatory Conditions and Project Development

Emerging regulatory conditions (e.g., issues surrounding the Water Quality Control Plan for the San Francisco/Sacramento-San Joaquin Delta Estuary [Bay-Delta Plan]) may affect planned future projects and the characterization of future water supply availability and analysis. A detailed description of the potential impacts of Bay-Delta Plan implementation on RWS supply reliability is included in Section 7.1.

The City is currently in the early phases of considering groundwater as a new supply source; however, no new supply sources are currently planned for use in the near future. If the City does move forward with any plans to develop such supply projects, emerging regulatory conditions will be considered, and the associated water supply reliability impacts will be assessed in future UWMP updates.

6.10.3 Other Locally Applicable Criteria

Other locally applicable criteria may affect characterization and availability of an identified water supply (e.g., changes in regional water transfer rules may alter the availability of a water supply that had historically been readily available). Reliability of the RWS supply is further discussed in Section 7.1. The City is currently in the early phases of considering groundwater as a new supply source; however, no new supply sources are currently planned for use in the near future. If the City does move forward with any plans to develop such supply projects, locally applicable criteria will be considered, and the associated water supply reliability impacts will be assessed in future UWMP updates.

6.11 Energy Intensity

☑ ***CWC § 10631.2***

(a) 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:
(1) An estimate of the amount of energy used to extract or divert water supplies.
(2) An estimate of the amount of energy used to convey water supplies to the water treatment plants or distribution systems.
(3) An estimate of the amount of energy used to treat water supplies.
(4) An estimate of the amount of energy used to distribute water supplies through its distribution systems.
(5) An estimate of the amount of energy used for treated water supplies in comparison to the amount used for nontreated water supplies.
(6) An estimate of the amount of energy used to place water into or withdraw from storage.
(7) Any other energy-related information the urban water supplier deems appropriate.
(b) The department shall include in its guidance for the preparation of urban water management plans a methodology for the voluntary calculation or estimation of the energy intensity of urban water systems. The department may consider studies and calculations conducted by the Public Utilities Commission in developing the methodology.
(c) The Legislature finds and declares that energy use is only one factor in water supply planning and shall not be considered independently of other factors.

The City used the "Total Utility Approach" defined by DWR in the UWMP Guidebook 2020 to report water-related energy consumption. Calendar year 2019 is selected as the one-year reporting period, and utility bills for the whole year are used as the source for energy consumption data. It is estimated that a total of approximately 2,832,059 kilowatt hours (kWh) of energy was consumed for operation of water facilities in the City's water system in 2019. As the total volume of water entering the system was 9,852 AF, the energy intensity was calculated to be 288 kWh/AF (Table 6-11).

Table 6-11 Recommended Energy Reporting - Total Utility Approach (DWR Table O-1B)

Urban Water Supplier: *City of Redwood City*

Water Delivery Product

Retail Potable Deliveries

Enter Start Date for Reporting Period	7/1/2019	Urban Water Supplier Operational Control		
End Date	6/29/2020			
Is upstream embedded in the values reported?		Sum of All Water Management Processes	Non-Consequential Hydropower	
Water Volume Units Used	AF	Total Utility	Hydropower	Net Utility
Volume of Water Entering Process (volume unit)		*9,852*	*0*	*9,852*
Energy Consumed (kWh)		*2,832,059*	*0*	*2,832,059*
Energy Intensity (kWh/volume)		*288*	*0.0*	*288*

Quantity of Self-Generated Renewable Energy

0 kWh

Data Quality

metered

Data Quality Narrative:

Energy consumed is metered by PG&E bills for Calendar Year 2019 and is the energy used to operate the City's potable water system, including SFPUC turnouts, pump stations, monitoring stations, and tanks. Energy for the recycled water system is not included. The volume of water is based off FY 19-20.

Narrative:

7. WATER SERVICE RELIABILITY AND DROUGHT RISK ASSESSMENT

☑ ***CWC § 10620 (f)***

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 § 10630.5***

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.

This chapter assesses the reliability of the City of Redwood City's ("City's" or "Redwood City's") water supplies, with a specific focus on potential constraints, including purchased water supply availability, water quality, and climate change. The intent of this chapter is to identify any potential constraints that could affect the reliability of the City's supply during normal, single dry-year, and multiple dry-year hydrologic conditions.

As described in Chapter 6, all of Redwood City's potable water supply is purchased from the San Francisco Public Utilities Commission (SFPUC) Regional Water System (RWS) and a portion of the irrigation use is served by recycled water. The reliability of the SFPUC RWS is anticipated to vary greatly in different year types. The City has relied on SFPUC's RWS supply reliability estimates and the drought allocation structure provided by SFPUC and the Bay Area Water Supply and Conservation Agency (BAWSCA) to estimate available RWS supplies in all year types through 2045. In addition to the long-term water service reliability assessment, this chapter also presents a Drought Risk Assessment (DRA) to evaluate Redwood City's supply risks under a severe drought period lasting for the next five consecutive years (i.e., through 2025).

7.1 Water Service Reliability Assessment

The following sections describe Redwood City's water service reliability assessment, which presents Redwood City's expected water service reliability for a normal year, single dry year, and five consecutive dry years projections in five-year increments between 2025 and 2045.

7.1.1 Service Reliability – Constraints on Water Sources

Several potential constraints have been identified on future supply availability, water quality, and climate change. These constraints are summarized in the following sections.

7.1.1.1 Regional Water System Supply Constraints

☑ ***CWC § 10631 (h)*** *A plan shall be adopted in accordance with this chapter and shall do all of the following:*

An urban water supplier that relies upon a wholesale agency for a source of water shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (f). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (f).

Detailed information is provided below regarding factors that impact the SFPUC RWS supply reliability. The source for this information is the common language provided by the SFPUC and BAWSCA (see Appendix I).

Level of Service Goals

The SFPUC historically has met demand in its service area in all year types from its watersheds, which consist of:

- Tuolumne River watershed
- Alameda Creek watershed
- San Mateo County watersheds

In general, 85 percent of the supply comes from the Tuolumne River through Hetch Hetchy Reservoir and the remaining 15 percent comes from the local watersheds through the San Antonio, Calaveras, Crystal Springs, Pilarcitos and San Andreas Reservoirs. The adopted Water Supply Improvement Program (WSIP) retains this mix of water supply for all year types.

In 2008, the SFPUC adopted Level of Service (LOS) Goals and Objectives in conjunction with the adoption of WSIP. The SFPUC updated the LOS Goals and Objectives in February 2020. The SFPUC's LOS Goals and Objectives related to water supply are:

Program Goal	System Performance Objective
Water Supply *– meet customer water needs in non-drought and drought periods*	• Meet all state and federal regulations to support the proper operation of the water system and related power facilities. • Meet average annual water demand of 265 mgd from the SFPUC watersheds for retail and Wholesale Customers during non–drought years for system demands consistent with the 2009 Water Supply Agreement. • Meet dry-year delivery needs while limiting rationing to a maximum 20 percent system-wide reduction in water service during extended droughts. • Diversify water supply options during non-drought and drought periods. • Improve use of new water sources and drought management, including groundwater, recycled water, conservation, and transfers.

Bay-Delta Plan Amendment Impacts

Based on information provided by SFPUC and BAWSCA (Appendix I and Appendix J) the adoption of the 2018 Bay-Delta Plan Amendment is anticipated to impact the reliability of the RWS supplies in the future.

> In December 2018, the State Water Resources Control Board (SWRCB) adopted amendments to the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay-Delta Plan Amendment) to establish water quality objectives to maintain the health of the Bay-Delta ecosystem. The SWRCB is required by law to regularly review this plan. The adopted Bay-Delta Plan Amendment was developed with the stated goal of increasing salmon populations in three San Joaquin River tributaries (the Stanislaus, Merced, and Tuolumne Rivers) and the Bay-Delta. The Bay-Delta Plan Amendment requires the release of 30-50% of the "unimpaired flow"[19] on the three tributaries from February through June in every year type. In SFPUC modeling of the new flow standard, it is assumed that the required release is 40% of unimpaired flow.

[19] "Unimpaired flow represents the natural water production of a river basin, unaltered by upstream diversions, storage, or by export or import of water to or from other watersheds." (Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Dec. 12, 2018) p.17, fn. 14, available at https://www.waterboards.ca.gov/plans_policies/docs/2018wqcp.pdf.)

If the Bay-Delta Plan Amendment is implemented, the SFPUC will be able to meet the projected water demands presented in this Urban Water Management Plan (UWMP) in normal years but would experience supply shortages in single dry years or multiple dry years. Implementation of the Bay-Delta Plan Amendment will require rationing in all single dry years and multiple dry years. The SFPUC has initiated an Alternative Water Supply Planning Program (AWSP) to ensure that San Francisco can meet its Retail and Wholesale Customer water needs, address projected dry years shortages, and limit rationing to a maximum 20 percent system-wide in accordance with adopted SFPUC policies. This program is in early planning stages and is intended to meet future water supply challenges and vulnerabilities such as environmental flow needs and other regulatory changes; earthquakes, disasters, and emergencies; increases in population and employment; and climate change. As the region faces future challenges – both known and unknown – the SFPUC is considering this suite of diverse non-traditional supplies and leveraging regional partnerships to meet Retail and Wholesale Customer needs through 2045.

The SWRCB has stated that it intends to implement the Bay-Delta Plan Amendment on the Tuolumne River by the year 2022, assuming all required approvals are obtained by that time. But implementation of the Plan Amendment is uncertain for multiple reasons.

First, since adoption of the Bay-Delta Plan Amendment, over a dozen lawsuits have been filed in both state and federal courts, challenging the SWRCB's adoption of the Bay-Delta Plan Amendment, including a legal challenge filed by the federal government, at the request of the U.S. Department of Interior, Bureau of Reclamation. This litigation is in the early stages and there have been no dispositive court rulings as of this date.

Second, the Bay-Delta Plan Amendment is not self-implementing and does not automatically allocate responsibility for meeting its new flow requirements to the SFPUC or any other water rights holders. Rather, the Bay-Delta Plan Amendment merely provides a regulatory framework for flow allocation, which must be accomplished by other regulatory and/or adjudicatory proceedings, such as a comprehensive water rights adjudication or, in the case of the Tuolumne River, may be implemented through the water quality certification process set forth in section 401 of the Clean Water Act as part of the Federal Energy Regulatory Commission's licensing proceedings for the Don Pedro and La Grange hydroelectric projects. It is currently unclear when the license amendment process is expected to be completed. This process and the other regulatory and/or adjudicatory proceedings would likely face legal challenges and have lengthy timelines, and quite possibly could result in a different assignment of flow responsibility (and therefore a different water supply impact on the SFPUC).

Third, in recognition of the obstacles to implementation of the Bay-Delta Plan Amendment, the SWRCB Resolution No. 2018-0059 adopting the Bay-Delta Plan Amendment directed staff to help complete a "Delta watershed-wide agreement, including potential flow measures for the Tuolumne River" by March 1, 2019, and to incorporate such agreements as an "alternative" for a future amendment to the Bay-Delta Plan to be presented to the SWRCB "as early as possible after December 1, 2019." In accordance with the SWRCB's instruction, on March 1, 2019, SFPUC, in

partnership with other key stakeholders, submitted a proposed project description for the Tuolumne River that could be the basis for a voluntary substitute agreement with the SWRCB ("March 1st Proposed Voluntary Agreement"). On March 26, 2019, the Commission adopted Resolution No. 19-0057 to support the SFPUC's participation in the Voluntary Agreement negotiation process. To date, those negotiations are ongoing under the California Natural Resources Agency and the leadership of the Newsom administration.[20]

Drought Allocation Methodology

Given the constraints described above, the SFPUC has provided all of the Wholesale Customers with estimates of the RWS reliability in all year types though 2045, as shown in Appendix J. The Tier One Plan describes the method for allocating RWS water between Retail and Wholesale Customers during system-wide shortages of 20% or less. The Tier Two Plan allocates the collective Wholesale Customer share from the Tier One Plan among each of SFPUC's 26 Wholesale Customers.

For the purposes of 2020 UWMP development only, SFPUC and BAWSCA have provided revised methodologies to allocate RWS supplies during projected future single dry and multiple dry years in instances where the projects supply shortfalls are greater than 20%. SFPUC and BAWSCA assumed that Tier One allocations for system-wide shortfalls of 16% to 20% would apply for all shortfalls greater than 20%. BAWSCA also provided a revised methodology to allocate RWS supplies to Wholesale Agencies. The inclusion of these revised methodologies, which serve as the preliminary basis for UWMP supply reliability analyses, does not in any way imply an agreement by BAWSCA member agencies as to the exact allocation methodologies.

The Tier One and Tier Two Plans and the drought allocation methodologies used in the 2020 UWMP for shortfalls of greater than 20% are further described below.

Tier One Drought Allocations

In July 2009, San Francisco and its Wholesale Customers in Alameda County, Santa Clara County, and San Mateo County (Wholesale Customers) adopted the Water Supply Agreement (WSA), which includes a Water Shortage Allocation Plan (WSAP) that describes the method for allocating water from the RWS between Retail and Wholesale Customers during system-wide shortages of 20 percent or less. The WSAP, also known as the Tier One Plan, was amended in the 2018 Amended and Restated WSA.

The SFPUC allocates water under the Tier One Plan when it determines that the projected available water supply is up to 20 percent less than projected system-wide water purchases. The following table shows the SFPUC (i.e, Retail Customers) share and the Wholesale Customers' share of the annual water supply available during shortages depending on the level of system-wide reduction in water use that is

[20] California Natural Resources Agency, "Voluntary Agreements to Improve Habitat and Flow in the Delta and its Watersheds," available at https://files.resources.ca.gov/voluntary-agreements/.

required. The Wholesale Customers' share will be apportioned among the individual Wholesale Customers based on a separate methodology adopted by the Wholesale Customers, known as the Tier Two Plan, discussed further below.

Level of System-Wide Reduction in Water Use Required	Share of Available Water	
	SFPUC Share	Wholesale Customers Share
5% or less	35.5%	64.5%
6% through 10%	36.0%	64.0%
11% through 15%	37.0%	63.0%
16% through 20%	37.5%	62.5%

The Tier One Plan allows for voluntary transfers of shortage allocations between the SFPUC and any Wholesale Customer as well as between Wholesale Customers themselves. In addition, water "banked" by a Wholesale Customer, through reductions in usage greater than required, may also be transferred.

As amended in 2018, the Tier One Plan requires Retail Customers to conserve a minimum of 5 percent during droughts. If Retail Customer demands are lower than the Retail Customer allocation (resulting in a "positive allocation" to Retail[21]) then the excess percentage would be re-allocated to the Wholesale Customers' share. The additional water conserved by Retail Customers up to the minimum 5 percent level is deemed to remain in storage for allocation in future successive dry years.

The Tier One Plan will expire at the end of the term of the WSA in 2034, unless mutually extended by San Francisco and the Wholesale Customers.

The Tier One Plan applies only when the SFPUC determines that a system-wide water shortage exists and issues a declaration of a water shortage emergency under California Water Code Section 350. Separate from a declaration of a water shortage emergency, the SFPUC may opt to request voluntary cutbacks from its Retail and Wholesale Customers to achieve necessary water use reductions during drought periods.

As discussed above, the Tier One Plan only applies to system-wide shortages of 20% or less, and there is currently no methodology for sharing available water between SFPUC and Wholesale Customers for system-wide shortages of greater than 20%. SFPUC and BAWSCA assumed that Tier One allocations for System-Wide shortfalls of 16% to 20% would apply for all shortfalls greater than 20% for purposes of the UWMP supply reliability analyses. The analysis included herein does not in any way imply an agreement

[21] See Water Supply Agreement, Water Shortage Allocation Plan (Attachment H), Section 2.1.

by BAWSCA member agencies with the assumed application of the Tier One allocations by SFPUC and BAWSCA for shortages of greater than 20%.

Tier Two Drought Allocations

The Wholesale Customers have negotiated and adopted the Tier Two Plan, referenced above, which allocates the collective Wholesale Customer share from the Tier One Plan among each of the 26 Wholesale Customers. These Tier Two allocations are based on a formula that takes into account multiple factors for each Wholesale Customer including:

- Individual Supply Guarantee;
- Seasonal use of all available water supplies; and
- Residential per capita use.

The water made available to the Wholesale Customers collectively will be allocated among them in proportion to each Wholesale Customer's Allocation Basis, expressed in millions of gallons per day (MGD), which in turn is the weighted average of two components. The first component is the Wholesale Customer's Individual Supply Guarantee, as stated in the WSA, and is fixed. The second component, the Base/Seasonal Component, is variable and is calculated using the monthly water use for three consecutive years prior to the onset of the drought for each of the Wholesale Customers for all available water supplies. The second component is accorded twice the weight of the first, fixed component in calculating the Allocation Basis. Minor adjustments to the Allocation Basis are then made to ensure a minimum cutback level, a maximum cutback level, and a sufficient supply for certain Wholesale Customers.

The Allocation Basis is used in a fraction, as numerator, over the sum of all Wholesale Customers' Allocation Bases to determine each wholesale customer's Allocation Factor. The final shortage allocation for each Wholesale Customer is determined by multiplying the amount of water available to the Wholesale Customers' collectively under the Tier One Plan, by the Wholesale Customer's Allocation Factor.

The Tier Two Plan requires that the Allocation Factors be calculated by BAWSCA each year in preparation for a potential water shortage emergency. As the Wholesale Customers change their water use characteristics (e.g., increases or decreases in SFPUC purchases and use of other water sources, changes in monthly water use patterns, or changes in residential per capita water use), the Allocation Factor for each Wholesale Customer will also change. However, for long-term planning purposes, each Wholesale Customer shall use as its Allocation Factor, the value identified in the Tier Two Plan when adopted.

Per WSA Section 3.11, the Tier One and Tier Two Plans will be used to allocate water from the Regional Water System between Retail and Wholesale Customers during system-wide shortages of 20% or less. For Regional Water System shortages in excess of 20%, San Francisco shall (a) follow the Tier 1 Shortage Plan allocations up to the 20% reduction, (b) meet and discuss how to implement incremental reductions above 20% with the Wholesale Customers, and (c) make a final determination of allocations above the 20% reduction. After the SFPUC has made the final allocation decision, the Wholesale Customers shall be free to challenge the allocation on any applicable legal or equitable basis. For purposes of the 2020 UWMPs, for San Francisco Regional Water

> System (RWS) shortages in excess of 20%, the allocations among the Wholesale Customers is assumed to be equivalent among them and to equal the drought cutback to Wholesale Customer by the SFPUC.
>
> The Tier Two Plan, which initially expired in 2018, has been extended by the BAWSCA Board of Directors every year since for one additional calendar year. In November 2020, the BAWSCA Board voted to extend the Tier Two Plan through the end of 2021.

Revised Drought Allocation Plan

As detailed by BAWSCA in multiple memos and workshops (Appendix J), the Tier Two Plan was not designed for RWS shortages greater than 20%.[22] In a memorandum dated March 1, 2021, BAWSCA provided a refined methodology to allocate RWS supplies during projected future single dry and multiple dry years in the instance where the supply shortfalls are greater than 20%. The revised methodology developed by BAWSCA allocates the wholesale RWS supplies as follows:

1. When the average Wholesale Customers' RWS shortages are 10 percent or less, an equal percent reduction will be applied across all agencies. This is consistent with the existing Tier Two requirement of a minimum 10 percent cutback in any Tier Two application scenario.
2. When average Wholesale Customers' shortages are between 10 and 20 percent, the Tier Two Plan will be applied.
3. When the average Wholesale Customers' RWS shortages are greater than 20 percent, an equal percent reduction will be applied across all agencies.

The associated allocations based on the updated BAWSCA methodology are included as Appendix J. While this allocation methodology has been used herein, Redwood City notes per BAWSCA's memoranda dated February 18, 2021 (Appendix J):

> "BAWSCA recognizes that this is not an ideal situation or method for allocation of available drought supplies. In the event of actual RWS shortages greater than 20 percent, the Member Agencies would have the opportunity to negotiate and agree upon a more nuanced and equitable approach. Such an approach would likely consider basic health and safety needs, the water needs to support critical institutions such as hospitals, and minimizing economic impacts on individual communities and the region."

As such, this allocation method is only intended to serve as the preliminary basis for the 2020 UWMP supply reliability analysis. The analysis provided herein does not in any way imply an agreement by BAWSCA member agencies as to the exact allocation methodology. BAWSCA member agencies are in discussions about jointly developing an allocation method that would consider additional equity factors

[22] Note that the Tier One Drought Allocations were also not designed for shortages greater than 20%. SFPUC and BAWSCA have assumed for UWMP planning purposes that the Wholesale Share will remain 62.5% for all shortfalls greater than 16%.

in the event that SFPUC is not able to deliver its contractual supply volumes, and its cutbacks to the RWS supply exceed 20%.

7.1.1.2 Recycled Water Supply Constraints

Recycled water currently supplies 8% of Redwood City's total demand and is anticipated to supply 14% of Redwood City's total demand by 2045 (see Chapters 4 and 6). Recycled water is assumed to be a reliable and stable water supply source and is estimated to be available during all hydrologic years at a volume that meets Redwood City's projected recycled water demands.

7.1.1.3 Water Quality

☑ ***CWC § 10634***

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.

Impaired water quality also has the potential to affect water supply reliability. As discussed in Chapter 6, the majority of the water supply to the SFPUC RWS is from the Hetch Hetchy Reservoir in the Sierra Nevada Mountains. The Hetch Hetchy Reservoir is considered a very high-quality water source due to low total dissolved solid (TDS) concentrations and other factors. Additional water supplies from the Alameda and Peninsula sources come from areas with restricted access to protect the source water quality.

The SFPUC's Water Quality Division (WQD) regularly collects and tests water samples from reservoirs and designated sampling points throughout the RWS to ensure that the SFPUC's water meets or exceeds federal and state drinking water standards. In 2019, the WQD conducted more than 53,650 drinking water tests in the sources and transmission systems. This is in addition to the extensive treatment process control monitoring performed by the SFPUC's certified operators and online instruments. The SFPUC also has online instruments providing continuous water quality monitoring at numerous locations.

Additionally, Redwood City routinely monitors the water that is served to customers to ensure that water delivered to customers meets these drinking water standards. The results of this testing are reported to the SWRCB DDW following each test and are summarized annually in Water Quality Reports (also known as "Consumer Confidence Reports"), which are provided to customers by mail and made available on the City's website: https://www.redwoodcity.org/departments/public-works/water/water-quality.

The results of Redwood City's and SFPUC's water quality assessments show that SFPUC RWS watersheds have very low levels of contaminants, and that those contaminants that are found at low levels are associated with wildlife and, to a limited extent, human recreation. For the purposes of this UWMP, it is anticipated that this high-quality potable water source will continue to be available to Redwood City through the planning horizon ending in the year 2045. Water quality is not expected to impact the reliability of Redwood City's supplies.

7.1.1.4 Climate Change

☑ ***CWC § 10631 (b) (1)***

…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.

Section 6.10.1 provides a summary of the assessments of the applicable climate change on supplies that SFPUC has previously performed and those planned for the near term. The anticipated effects of climate change have been directly factored into Redwood City's assessment of its supply reliability. Redwood City is actively working with SFPUC and BAWSCA to further quantify and consider future climate change impacts as part of its ongoing supply and operations planning.

7.1.2 Service Reliability - Year Type Characterization

☑ ***CWC § 10631 (b)***

Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a), providing supporting and related information, including all of the following:

☑ ***CWC § 10631 (b)(1)***

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 § 10635 (a)***

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 long-term total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and a drought lasting five consecutive 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.

Per the UWMP Guidebook 2020, the water service reliability assessment includes three unique year types:

- A normal hydrologic year represents the water supplies available under normal conditions, this could be an averaged range of years or a single representative year,
- A single dry year represents the lowest available water supply, and
- A five-consecutive year drought represents the driest five-year period in the historical record.

The available SFPUC RWS supplies by year type is provided by BAWSCA and SFPUC in Appendix I and Appendix J and are presented in Table 7-1 and Table 7-3. Data and methods used to develop these dry

year supply availabilities are consistent with the UWMP Guidebook 2020 methodology and are described in the sections below.

Table 7-1 Basis of SFPUC RWS Water Year Data (Reliability Assessment) (DWR Table 7-1)

Year Type	Base Year	Available Supplies if Year Type Repeats		
		X	Quantification of available supplies is not compatible with this table and is provided elsewhere in the UWMP. Location: Table 7-3	
			Quantification of available supplies is provided in this table as either volume only, percent only, or both.	
		Volume Available		% of Average Supply
Average Year				100%
Single-Dry Year				
Consecutive Dry Years 1st Year				
Consecutive Dry Years 2nd Year				
Consecutive Dry Years 3rd Year				
Consecutive Dry Years 4th Year				
Consecutive Dry Years 5th Year				
NOTES:				

In addition, a portion of Redwood City's water use is served by recycled water. As discussed in Section 7.1.1.2, Redwood City anticipates that 100% of its recycled water supply will be available during all year types (Table 7-2).

Table 7-2 Basis of Recycled Water Year Data (Reliability Assessment) (DWR Table 7-1)

Year Type	Base Year	Available Supplies if Year Type Repeats		
			Quantification of available supplies is not compatible with this table and is provided elsewhere in the UWMP. Location _____	
		X	Quantification of available supplies is provided in this table as either volume only, percent only, or both.	
		Volume Available		% of Average Supply
Average Year				100%
Single-Dry Year				100%
Consecutive Dry Years 1st Year				100%
Consecutive Dry Years 2nd Year				100%
Consecutive Dry Years 3rd Year				100%
Consecutive Dry Years 4th Year				100%
Consecutive Dry Years 5th Year				100%
NOTES:				

7.1.2.1 SFPUC Supply Modeled RWS Dry Year Supply Availability

As described in SFPUC's 2020 UWMP, SFPUC used the Hetch Hetchy and Local Simulation Model (HHLSM) to estimate SFPUC RWS supply availability for water service reliability assessment and the DRA (Section 7.2). HHLSM simulates supplies over a historical record of hydrology from 1920 through 2017 with a representation of current and planned SFPUC RWS infrastructure and operations.

Water supply shortfalls presented by SFPUC in Appendix J were estimated using SFPUC's design drought methodology. The SFPUC uses a hypothetical 8.5-year design drought that is more severe than what the RWS has historically experienced as the basis for planning and modeling of future scenarios. The design drought consists of the 1987-92 drought, followed by an additional 2.5 years of dry conditions from the hydrologic record that include the 1976-77 drought. The five-consecutive-year dry sequence used for the UWMP represents years 2 through 6 of the design drought. However, the modeling approach assumes water supply rationing each year that is designed to provide sufficient carry-over water in SFPUC reservoirs to continue delivering water, although at reduced levels, during each year of the five-consecutive year drought and the remaining years of the design drought (SFPUC, 2021).

SFPUC provided results for two modeled scenarios, which show significantly different supply reliability projections for the RWS:

1. With full implementation of the Bay-Delta Plan Amendment in 2023
2. Without implementation of the Bay-Delta Plan Amendment

The SFPUC decided to present the water reliability analysis with full implementation of the Bay-Delta Plan Amendment in the SFPUC 2020 UWMP Submittal Tables and provided the following rationale for that decision:

> The adoption of the Bay-Delta Plan Amendment may significantly impact the supply available from the RWS. SFPUC recognizes that the Bay-Delta Plan Amendment has been adopted and that, given that it is now state law, we must plan for a future in which it is fully implemented. SFPUC also acknowledges that the plan is not self-implementing and therefore does not automatically go into effect. SFPUC is currently pursuing a voluntary agreement as well as a lawsuit which would limit implementation of the Plan. With both of these processes occurring on an unknown timeline, SFPUC does not know at this time when the Bay-Delta Plan Amendment is likely to go into effect. As a result, it makes sense to conduct future supply modeling for a scenario that doesn't include implementation of the Bay-Delta Plan Amendment, as that represents a potential supply reliability scenario.
>
> Because of the uncertainty surrounding implementation of the Bay-Delta Plan Amendment, the SFPUC conducted water service reliability assessment that includes: (1) a scenario in which the Bay-Delta Plan Amendment is fully implemented in 2023, and (2) a scenario that considers the SFPUC system's current situation without the Bay-Delta Plan Amendment. The two scenarios provide a bookend for the possible future scenarios regarding RWS supplies. The standardized tables associated with the SFPUC's UWMP contain the future scenario that assumes implementation of the Bay-Delta Plan Amendment starting in 2023.
>
> Although the SWRCB has stated it intends to implement the Bay-Delta Plan Amendment on the Tuolumne River by the year 2022, given the current level of uncertainty, it is assumed for the purposes of the SFPUC's draft UWMP that the Bay-Delta Plan Amendment will be fully implemented starting in 2023.

As shown in Appendix J, SFPUC also provided results for each of the modeling scenarios described above assuming demands on the RWS equal to both: (1) the total of projected retail demands and projected Wholesale Customer purchases and (2) a constant water demand of 265 million gallons per day (MGD) from the SFPUC watersheds for retail and Wholesale Customers, consistent with SFPUC's contractual obligation. According to the SFPUC, the modeling based on a demand of 265 MGD was used to "facilitate planning that supports meeting this Level of Service goal and their contractual obligations." Supply modeling results presented in the text of the SFPUC's 2020 UWMP reflect an input of projected retail and Wholesale demands on the RWS.

Consistent with SFPUC's approach and guidance from SFPUC and BAWSCA, Redwood City's UWMP presents results for the water service reliability assessment and the DRA (Section 7.2) based on the modeling scenario that assumes full implementation of the Bay Delta Plan Amendment in 2023 and uses projected demands on the RWS. SFPUC modeling results for this scenario showing the total RWS supply

available to Wholesale Customers during the characteristic year types can be found in Tables 3a-3g of the SFPUC letter dated March 30, 2021. These results show total Wholesale RWS supply shortfalls ranging from 36% to 54% of projected purchases during dry years after 2023.

For comparison purposes, results for the scenario without the Bay-Delta Plan Amendment can be found in Tables 4a-4g of the same SFPUC letter. These results indicated that the SFPUC would be able to meet 100% of Wholesale projected purchases during all year types except during the fourth and fifth consecutive dry years for base year 2045 when 15% Wholesale supply shortages are projected.

7.1.2.2 Redwood City's Year-Type Characterization

As discussed in Section 7.1.2.2, in accordance with the SFPUC's perpetual obligation to Redwood City's Supply Assurance, Redwood City has an Individual Supply Guarantee (ISG) of 10.93 MGD, or 12,243 AF per year. SFPUC is obligated to provide Redwood City with up to 100% of Redwood City's ISG during normal years.

Using the SFPUC modeling results presented in the SFPUC letter dated March 30, 2021, BAWSCA provided single and five-consecutive dry-year allocations for each agency based on the methodology described in Section 7.1.1.1. As discussed in therein, for the purposes for the 2020 UWMP supply reliability analysis only, Wholesale Agency drought allocations assume an equal percent reduction across all agencies when the average Wholesale Customers' RWS shortages are greater than 20%. These percent reductions for the scenario that assumes the implementation of the Bay-Delta Plan Amendment in 2023 are included in Table E of the BAWSCA updated drought allocation memorandum dated April 1, 2021 (Appendix J). BAWSCA then applied these percent reductions to each agency's projected demands to calculate the drought allocation volumes for base year 2025 through 2045, which are included in Table G2 to K2 of the same memorandum. Results for Redwood City are reproduced in Table 7-3 below and are used to calculate the total supplies presented in Table 7-5 and Table 7-6.

Table 7-3 RWS Wholesale Supply Availability During Normal and Dry Years for Based Years 2025 through 2045 (Responds to DWR Table 7-1)

Year Type		2025	2030	2035	2040	2045
Normal Year		12,243	12,243	12,243	12,243	12,243
Single Dry Year		6,049	6,060	6,150	6,217	5,433
Multiple Dry Years	First year	6,049	6,060	6,150	6,217	5,433
	Second year	5,186	5,197	5,265	5,332	5,433
	Third year	5,186	5,197	5,265	5,332	5,433
	Fourth year	5,186	5,197	5,265	4,705	4,615
	Fifth year	5,186	5,197	4,828	4,705	4,615

NOTES:
(a) Volumes are in units of AF.
(b) Normal-year water supply is presented as Redwood City's ISG (10.93 MGD or approximately 12,243 AF).
(c) Dry-year water supplies are Redwood City's drought allocations provided by BAWSCA based on the revised BAWSCA Drought Methodology that assumes equal percent cutbacks across all Wholesale Agencies.
(c) Results reflect scenario with Bay-Delta Plan Amendment implemented in 2023.

7.1.3 Service Reliability - Supply and Demand Assessment

☑ ***CWC § 10635 (a)***

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 long-term total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and a drought lasting five consecutive 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.

The following sections compare Redwood City's projected water demands with projected water supply availability during normal years, single dry years, and multiple dry year periods.

7.1.3.1 Water Service Reliability - Normal Year

Table 7-4 shows the projected supply and demand totals for a normal year. The supply and demand totals are consistent with those in Table 6-10 and Table 4-8, respectively. Redwood City is expected to have adequate water supplies during normal years to meet its projected demands through 2045.

Table 7-4 Normal Year Supply and Demand Comparison (DWR Table 7-2)

	2025	2030	2035	2040	2045
Supply totals *From DWR Table 6-9*	13,529	13,669	13,929	13,944	13,959
Demand totals *From DWR Table 4-3*	10,806	11,049	11,566	11,696	11,923
Difference	2,723	2,620	2,363	2,248	2,036
NOTES: (a) Volumes are in units of AF. (b) Supply and demand include both potable water and recycled water.					

7.1.3.2 Water Service Reliability – Single Dry Year

The reliability of the SFPUC RWS supply is anticipated to vary greatly in different year types. As described above and detailed in Appendix J, Redwood City has relied on SFPUC's RWS supply reliability estimates and the drought allocation structure provided by SFPUC and BAWSCA to estimate available RWS supplies in dry year types through 2045. Recycled water supply is expected to be 100% reliable in all year types.

Table 7-5 shows the projected supply and demand totals for the single dry year.

Table 7-5 Single Dry Year Supply and Demand Comparison (DWR Table 7-3)

	2025	2030	2035	2040	2045
Supply totals	7,335	7,486	7,836	7,917	7,149
Demand totals	10,806	11,049	11,566	11,696	11,923
Difference	(3,471)	(3,563)	(3,730)	(3,779)	(4,774)
NOTES: (a) Volumes are in units of AF. (b) Supply and demand include both potable water and recycled water.					

7.1.3.3 Water Service Reliability – Five Consecutive Dry Years

Based on the supply reliability estimates and allocation structure provided by SFPUC and BAWSCA and the assumed 100% reliability for recycled water supply, Table 7-6 shows the projected supply and demand totals for multiple dry year periods extending five years.

Table 7-6 Multiple Dry Years Supply and Demand Comparison (DWR Table 7-4)

		2025	2030	2035	2040	2045
First year	Supply totals	7,335	7,486	7,836	7,917	7,149
	Demand totals	10,806	11,049	11,566	11,696	11,923
	Difference	(3,471)	(3,563)	(3,730)	(3,779)	(4,774)
Second year	Supply totals	6,472	6,624	6,951	7,033	7,149
	Demand totals	10,806	11,049	11,566	11,696	11,923
	Difference	(4,334)	(4,426)	(4,615)	(4,664)	(4,774)
Third year	Supply totals	6,472	6,624	6,951	7,033	7,149
	Demand totals	10,806	11,049	11,566	11,696	11,923
	Difference	(4,334)	(4,426)	(4,615)	(4,664)	(4,774)
Fourth year	Supply totals	6,472	6,624	6,951	6,405	6,331
	Demand totals	10,806	11,049	11,566	11,696	11,923
	Difference	(4,334)	(4,426)	(4,615)	(5,291)	(5,592)
Fifth year	Supply totals	6,472	6,624	6,514	6,405	6,331
	Demand totals	10,806	11,049	11,566	11,696	11,923
	Difference	(4,334)	(4,426)	(5,052)	(5,291)	(5,592)

NOTES:
(a) Volumes are in units of AF.
(b) Supply and demand include both potable water and recycled water.

7.1.3.4 Uncertainties in Dry Year Water Supply Projections

As shown in the above tables, significant water supply shortfalls are currently projected in future single and multiple dry years, directly because of the Bay-Delta Plan Amendment implementation. However, numerous uncertainties remain in the implementation of the Bay-Delta Plan Amendment. The water supply projections presented above likely represent a worst-case scenario in which the Bay-Delta Plan Amendment is implemented without the SFPUC and the State Water Resources Control Board (SWRCB) reaching a Voluntary Agreement and do not account for implementation of SFPUC's Alternative Water Supply Program (AWSP), described in more detail below. Under this supply scenario, SFPUC appears not to be able to meet its contractual obligations (i.e., Level of Service goals) and Redwood City's forecasted demands during droughts.

As discussed in Section 7.1.2.1, SFPUC also provided water supply reliability projections without the Bay-Delta Plan Amendment (see Appendix J), which likely represents a highly optimistic water supply reliability outcome. These projections indicated that without the Bay-Delta Plan Amendment SFPUC would be able to supply 100% of projected RWS demands in all year types through 2045, except for the 4th and 5th consecutive dry year in 2045, during which 90% of projected RWS demands (85% of the Wholesale demands) would be met. The large disparity in projected water supply reliability between these two scenarios demonstrate the current level uncertainty.

In addition to these two UWMP scenarios, in a March 26, 2021 Special Commission Meeting, SFPUC staff presented HHLSM modeling results for 10 different scenarios, including scenarios with the

implementation of the Tuolumne River Voluntary Agreement (TRVA), with the implementation of the Bay-Delta Plan Amendment and the AWSP, and with the use of a modified rationing policy and a modified design drought (Appendix J). Results for the scenarios with the TRVA and with the AWSP (particularly with a modified rationing policy and design drought) showed significantly improved RWS supply availability compared to the Bay-Delta Plan Amendment scenario shown herein.

The current sources of uncertainty in the dry year water supply projections are summarized below:

- *Implementation of the Bay-Delta Plan Amendment is under negotiation.* The SFPUC is continuing negotiations with the SWRCB on implementation of the Bay-Delta Plan Amendment for water supply cutbacks, particularly during droughts. The SFPUC, in partnership with other key stakeholders, has proposed a voluntary substitute agreement to the Bay-Delta Plan Amendment, the TRVA, that provides a collaborative approach to protect the environment and plan for a reliable and high-quality future potable water supply. This is a dynamic situation and the projected drought cutback allocations may need to be revised before the next (i.e., 2025) UWMP depending on the outcome of ongoing negotiations.
- *Benefits of the AWSP are not accounted for in current supply projections.* As discussed in Section 7.1.3.5and Appendix J, SFPUC is exploring options to increase its supplies through the AWSP. Implementation of feasible projects developed under the AWSP is not yet reflected in the supply reliability scenarios presented herein and is anticipated to reduce the projected RWS supply shortfalls (Appendix K).
- *SFPUC is considering modifications to its design drought methodology and rationing policy.* Shortening the 8.5-year design drought or modifying the rationing policy to increase rationing in the early years of a drought are anticipated to reduce projected RWS supply shortfalls (Appendix K).
- *Methodology for Tier One and Tier Two Wholesale drought allocations have not been established for wholesale shortages greater than 20%.* As discussed in Section 7.1.1.1, the current Tier One and Tier Two Plans are not designed for RWS supply shortages of greater than 20%. For UWMP planning purposes per BAWSCA guidance, the Tier One Wholesale share for a 16% to 20% supply reduction (62.5%) has been applied for reductions greater than 20% and an equal percent reduction has been applied across all Wholesale agencies. BAWSCA member agencies have not formally agreed to adopt this shortage allocation methodology and are in discussions about jointly developing an alternative allocation method that would consider additional equity factors if SFPUC is unable to deliver its contractual supply volume and cutbacks to the RWS supply exceed 20%.
- *RWS demands are subject to change.* The RWS supply availability is dependent upon the system demands. As discussed in Section 7.1.2, the supply scenarios are based on the total projected Wholesale Customer purchases provided by BAWSCA to SFPUC in January 2021. Many BAWSCA agencies have refined their projected demands during the UWMP process after these estimates were provided to SFPUC. Furthermore, the RWS demand projections are subject to change in the future based upon future housing needs, increased conservation, and development of additional local supplies.

- *Frequency and duration of cutbacks are also uncertain.* While the projected shortfalls presented in the UWMP appear severe, the actual frequency and duration of such shortfalls are uncertain. Based on the HHLSM simulations provided by BAWSCA for the with Bay-Delta Plan Amendment scenario (Appendix J), rationing is anticipated to be required 20% of years for base year 2025 through 2035, 23% of all years for base year 2040, and 25% of years for base year 2045. In addition to the supply volumes, the above listed uncertainties would also impact the projected frequency and duration of shortfalls.

As such, in addition to evaluating local options to increase supply reliability, Redwood City has placed high priority on working with BAWSCA and SFPUC in the upcoming years to better refine the estimates of RWS supply reliability and may amend this UWMP when new information becomes available.

The above uncertainties notwithstanding, BAWSCA's current drought allocation cutbacks will require Redwood City to apply its Water Shortage Contingency Plan (WSCP) Stage 5, for water use restrictions up to 50% (see Appendix L) and will affect Redwood City's short- and long-term water management decisions. As described further below (Section 7.1.3.5), Redwood City is working independently and with the other BAWSCA agencies to identify regional mitigation measures to improve reliability for regional and local water supplies and meet its customers' water needs. If conditions for large drought cutbacks to the RWS persist, Redwood City will need to implement additional demand management practices to invoke strict restrictions on potable water use and accelerate efforts to develop alternative supplies of water.

Redwood City recommends that users of its 2020 UWMP contact Redwood City staff for potential updates about its water supply reliability before using the 2020 UWMP drought cutback projections for their planning projects and referencing the drought.

7.1.3.5 Strategies and Actions to Address Dry Year Supply Shortfalls

Although there remains significant uncertainty in future supply availability, as discussed above, Redwood City, SFPUC, and BAWSCA have developed strategies and actions to address the projected dry year supply shortfalls. These efforts are discussed in the following sections.

SFPUC and Other Regional Strategies and Actions

Dry Year Water Supply Projects

The WSIP authorized the SFPUC to undertake a number of water supply projects to meet dry-year demands with no greater than 20% system-wide rationing in any one year. Implementation of these projects is also expected to mitigate impacts of the implementation of the Bay-Delta Plan Amendment. Those projects include the following:

- *Calaveras Dam Replacement Project*. Calaveras Dam is located near a seismically active fault zone and was determined to be seismically vulnerable. To address this vulnerability, the SFPUC constructed a new dam of equal height downstream of the existing dam. Construction on the project occurred between 2011 and July 2019. The SFPUC began impounding water behind the new dam in accordance with California Division of Safety of Dams (DSOD) guidance in the winter of 2018/2019.

- *Alameda Creek Recapture Project*. As a part of the regulatory requirements for future operations of Calaveras Reservoir, the SFPUC must implement bypass and instream flow schedules for Alameda Creek. The Alameda Creek Recapture Project will recapture a portion of the water system yield lost due to the instream flow releases at Calaveras Reservoir or bypassed around the Alameda Creek Diversion Dam and return this yield to the RWS through facilities in the Sunol Valley. Water that naturally infiltrates from Alameda Creek will be recaptured into an existing quarry pond known as SMP (Surface Mining Permit)-24 Pond F2. The project will be designed to allow the recaptured water to be pumped to the Sunol Valley Water Treatment Plant or to San Antonio Reservoir. Construction of this project will occur from spring 2021 to fall 2022.
- *Lower Crystal Springs Dam Improvements*. The Lower Crystal Springs Dam (LCSD) Improvements were substantially completed in November 2011. The joint San Mateo County/SFPUC Bridge Replacement Project to replace the bridge across the dam was completed in January 2019. A WSIP follow up project to modify the LCSD Stilling Basin for fish habitat and upgrade the fish water release and other valves started in April 2019. While the main improvements to the dam have been completed, environmental permitting issues for reservoir operation remain significant. While the reservoir elevation was lowered due to DSOD restrictions, the habitat for the Fountain Thistle, an endangered plant, followed the lowered reservoir elevation. Raising the reservoir elevation now requires that new plant populations be restored incrementally before the reservoir elevation is raised. The result is that it may be several years before pre-project water storage volumes can be restored.
- *Regional Groundwater Storage and Recovery Project*. The Groundwater Storage and Recovery Project (GSRP) is a strategic partnership between SFPUC and three San Mateo County agencies – Cal Water, the City of Daly City, and the City of San Bruno – to conjunctively operate the south Westside Groundwater Basin. The project sustainably manages groundwater and surface water resources in a way that provides supplies during times of drought. During years of normal or heavy rainfall, the project would provide additional surface water to the partner agencies in San Mateo County in lieu of groundwater pumping. Over time, reduced pumping creates water storage through natural recharge of up to 20 billion gallons of new water supply available during dry years.

  The project's Final Environmental Impact Report was certified in August 2014, and the project also received Commission approval that month. Phase 1 of this project consists of construction of thirteen well sites and is over 99 percent complete. Phase 2 of this project consists of completing construction of the well station at the South San Francisco Main site and some carryover work that has not been completed from Phase 1. Phase 2 design work began in December 2019.
- *2 MGD Dry-year Water Transfer*. In 2012, the dry-year transfer was proposed between the Modesto Irrigation District and the SFPUC. Negotiations were terminated because an agreement could not be reached. Subsequently, the SFPUC had discussions with the Oakdale Irrigation District for a one-year transfer agreement with the SFPUC for 2 MGD (2,240 acre-feet). No progress

towards agreement on a transfer was made in 2019, but the irrigation districts recognize SFPUC's continued interest and SFPUC will continue to pursue transfers.

In order to achieve its target of meeting at least 80 percent of its customer demand during droughts with a system demand of 265 MGD, and to mitigate the impacts of the Bay-Delta Plan, the SFPUC must successfully implement the dry-year water supply projects included in the WSIP.

Furthermore, the permitting obligations for the Calaveras Dam Replacement Project and the Lower Crystal Springs Dam Improvements include a combined commitment of 12.8 MGD for instream flows on average. When this is reduced for an assumed Alameda Creek Recapture Project recovery of 9.3 MGD, the net loss of water supply is 3.5 MGD.

Alternative Water Supply Program

As discussed below, BAWSCA has taken steps to ensure that SFPUC develops alternative water supplies:

With the adoption of the Bay-Delta Plan Phase 1 (Bay-Delta Plan) by the State Water Resources Control Board in December of 2018, coupled with the uncertainties associated with litigation and the development of Voluntary Agreements that, if successful, would provide an alternative to the 40% unimpaired flow requirement that is required by the Bay-Delta Plan, BAWSCA redoubled its efforts to ensure that the SFPUC took necessary action to develop alternative water supplies such that they would be in place to fill any potential gap in supply by implementation of the Bay-Delta Plan and that the SFPUC would be able to meet its legal and contractual obligations to its Wholesale Customers.

In 2019, BAWSCA held numerous meetings with the SFPUC encouraging them to develop a division within their organization whose chief mission was to spearhead alternative water supply development. On June 25, 2019, BAWSCA provided a written and oral statement to the Commissioners urging the SFPUC to focus on developing new sources of supply in a manner similar to how it addressed the implementation of the Water System Improvement Program (WSIP). BAWSCA urged that a new water supply program was called for, with clear objectives, persistent focus, a dedicated team, adequate funding, and a plan for successful execution. The SFPUC Commission supported BAWSCA's recommendation and directed staff to undertake such an approach.

In early 2020, the SFPUC began implementation of the Alternative Water Supply Planning Program (AWSP), a program designed to investigate and plan for new water supplies to address future long-term water supply reliability challenges and vulnerabilities on the RWS.

Included in the AWSP is a suite of diverse, non-traditional supply projects that, to a great degree, leverage regional partnerships and are designed to meet the water supply needs of the SFPUC Retail and Wholesale Customers through 2045. As of the most recent Alternative Water Supply Planning Quarterly Update, SFPUC has budgeted $264 million over the next ten years to fund water supply projects. BAWSCA is heavily engaged with the SFPUC on its AWSP efforts.

SFPUC's AWSP is described in more detail below:

> The SFPUC is increasing and accelerating its efforts to acquire additional water supplies and explore other projects that would increase overall water supply resilience through the AWSP. The drivers for the program include: (1) the adoption of the Bay-Delta Plan Amendment and the resulting potential limitations to RWS supply during dry years, (2) the net supply shortfall following the implementation of WSIP, (3) San Francisco's perpetual obligation to supply 184 MGD to the Wholesale Customers, (4) adopted LOS Goals to limit rationing to no more than 20 percent system-wide during droughts, and (5) the potential need to identify water supplies that would be required to offer permanent status to interruptible customers. Developing additional supplies through this program would reduce water supply shortfalls and reduce rationing associated with such shortfalls. The planning priorities guiding the framework of the AWSP are as follows:
>
> 1. Offset instream flow needs and meet regulatory requirements
> 2. Meet existing obligations to existing permanent customers
> 3. Make interruptible customers permanent
> 4. Meet increased demands of existing and interruptible customers
>
> In conjunction with these planning priorities, the SFPUC considers how the program fits within the LOS Goals and Objectives related to water supply and sustainability when considering new water supply opportunities. The key LOS Goals and Objectives relevant to this effort can be summarized as:
>
> - Meet dry-year delivery needs while limiting rationing to a maximum of 20 percent system-wide reduction in water service during extended droughts;
> - Diversify water supply options during non-drought and drought periods;
> - Improve use of new water sources and drought management, including groundwater, recycled water, conservation, and transfers;
> - Meet, at a minimum, all current and anticipated legal requirements for protection of fish and wildlife habitat;
> - Maintain operational flexibility (although this LOS Goal was not intended explicitly for the addition of new supplies, it is applicate here).
>
> Together, the planning priorities and LOS Goals and Objectives provide a lens through which the SFPUC considers water supply options and opportunities to meet all foreseeable water supply needs.
>
> In addition to the Daly City Recycled Water Expansion project[23], which was a potential project identified in the SFPUC's 2015 UWMP and had committed funding at that time, the SFPUC has taken action to fund the study of potential additional water supply

[23] While this potential project was identified in the 2015 UWMP, it has since been approved by Daly City following environmental review and has a higher likelihood of being implemented.

projects. Capital projects under consideration to develop additional water supplies include surface water storage expansion, recycled water expansion, water transfers, desalination, and potable reuse. A more detailed list and descriptions of these efforts are provided below.

The capital projects that are under consideration would be costly and are still in the early feasibility or conceptual planning stages. Because these water supply projects would take 10 to 30 years to implement, and because required environmental permitting negotiations may reduce the amount of water that can be developed, the yield from these projects are not currently incorporated into SFPUC's supply projections. State and federal grants and other financing opportunities would be pursued for eligible projects, to the extent feasible, to offset costs borne by ratepayers.

- *Daly City Recycled Water Expansion (Regional, Normal- and Dry-Year Supply)*. This project can produce up to 3 MGD of tertiary recycled water during the irrigation season (~7 months). On an average annual basis, this is equivalent to 1.25 MGD or 1,400 AFY. The project is envisioned to provide recycled water to 13 cemeteries and other smaller irrigation customers, offsetting existing groundwater pumping from the South Westside Groundwater Basin; this will free up groundwater, enhancing the reliability of the Basin. The project is a regional partnership between the SFPUC and Daly City. The irrigation customers are located largely within California Water Service's (Cal Water's) service area. RWS customers will benefit from the increased reliability of the South Westside Basin for additional drinking water supply during droughts. In this way, this project supports the GSR Project, which is under construction.
- *ACWD-USD Purified Water Partnership (Regional, Normal- and Dry-Year Supply)*. This project could provide a new purified water supply utilizing Union Sanitary District's (USD) treated wastewater. Purified water produced by advanced water treatment at USD could be transmitted to the Quarry Lakes Groundwater Recharge Area to supplement recharge into the Niles Cone Groundwater Basin or put to other uses in Alameda County Water District's (ACWD) service area. With the additional water supply to ACWD, an in-lieu exchange with the SFPUC would result in more water left in the RWS. Additional water supply could also be directly transmitted to the SFPUC through a new intertie between ACWD and the SFPUC.
- *Crystal Springs Purified Water (Regional, Normal- and Dry-Year Supply)*. The Crystal Springs Purified Water (PREP) Project is a purified water project that could provide 6-12 MGD of water supply through reservoir water augmentation at Crystal Springs Reservoir, which is a facility of the RWS. Treated wastewater from Silicon Valley Clean Water (SVCW) and/or the City of San Mateo would go through an advanced water treatment plant to produce purified water that meets state and federal drinking water quality standards. The purified water would then be transmitted 10 to 20 miles (depending on the alignment) to Crystal Springs Reservoir, blended with regional surface water supplies and treated again at Harry Tracy Water Treatment Plant. Project partners include the SFPUC, Bay Area Water Supply and Conservation Agency (BAWSCA), SVCW, CalWater, Redwood City, Foster City, and the City of San Mateo. Partner agencies are contributing financial and staff resources towards the work effort.

- *Los Vaqueros Reservoir Expansion (Regional, Dry Year Supply)*. The Los Vaqueros Reservoir Expansion (LVE) Project is a storage project that will enlarge the existing reservoir located in northeastern Contra Costa County from 160,000 acre-feet to 275,000 acre-feet. While the existing reservoir is owned and operated by the Contra Costa Water District (CCWD), the expansion will have regional benefits and will be managed by a Joint Powers Authority (JPA) that will be set up prior to construction. Meanwhile, CCWD is leading the planning, design and environmental review efforts. CCWD's Board certified the EIS/EIR and approved the LVE Project on May 13, 2020. The additional storage capacity from the LVE Project would provide a dry year water supply benefit to the SFPUC. BAWSCA is working in concert with the SFPUC to support their work effort on the LVE project.
    - Conveyance Alternatives: The SFPUC is considering two main pathways to move water from storage in a prospective LVE Project to the SFPUC's service area, either directly to RWS facilities or indirectly via an exchange with partner agencies. The SFPUC is evaluating potential alignments for conveyance.
    - Bay Area Regional Reliability Shared Water Access Program (BARR SWAP): As part of the BARR Partnership, a consortium of 8 Bay Area water utilities (including ACWD, BAWSCA, CCWD, EBMUD, Marin Municipal Water District (MMWD), SFPUC, Valley Water, and Zone 7 Water Agency) are exploring opportunities to move water across the region as efficiently as possible, particularly during times of drought and emergencies. The BARR agencies are proposing two separate pilot projects in 2020-2021 through the Shared Water Access Program (SWAP) to test conveyance pathways and identify potential hurdles to better prepare for sharing water during a future drought or emergency. A strategy report identifying opportunities and considerations will accompany these pilot transfers and will be completed in 2021.
- *Bay Area Brackish Water Desalination (Regional, Normal- and Dry-Year Supply)*. The Bay Area Brackish Water Desalination (Regional Desalination) Project is a partnership between CCWD, the SFPUC, Valley Water, and Zone 7 Water Agency. The East Bay Municipal Utilities District (EBMUD) and ACWD may also participate in the project. The project could provide a new drinking water supply to the region by treating brackish water from CCWD's existing Mallard Slough intake in Contra Costa County. While this project has independent utility as a water supply project, for the current planning effort the SFPUC is considering it as a source of supply for storage in LVE. While the allocations remain to be determined among partners, the SFPUC is considering a water supply benefit of between 5 and 15 MGD during drought conditions when combined with storage at LVE.
- *Calaveras Reservoir Expansion (Regional, Dry Year Supply)*. Calaveras Reservoir would be expanded to create 289,000 acre-feet (AF) additional capacity to store excess Regional Water System supplies or other source water in wet and normal years. In addition to reservoir enlargement, the project

would involve infrastructure to pump water to the reservoir, such as pump stations and transmission facilities.

- *Groundwater Banking*. Groundwater banking in the Modesto Irrigation District (MID) and Turlock Irrigation District (TID) service areas could be used to provide some additional water supply to meet instream releases in dry years reducing water supply impacts to the SFPUC service area. For example, additional surface water could be provided to irrigators in wet years, which would offset the use of groundwater, thereby allowing the groundwater to remain in the basin rather than be consumptively used. The groundwater that remains in the basin can then be used in a subsequent dry year for irrigation, freeing up surface water that would have otherwise been delivered to irrigators to meet instream flow requirements.

  A feasibility study of this option is included in the proposed Tuolumne River Voluntary Agreement. Progress on this potential water supply option will depend on the negotiations of the Voluntary Agreement.

- *Inter-Basin Collaborations*. Inter-Basin Collaborations could provide net water supply benefits in dry years by sharing responsibility for in-stream flows in the San Joaquin River and Delta more broadly among several tributary reservoir systems. One mechanism by which this could be accomplished would be to establish a partnership between interests on the Tuolumne River and those on the Stanislaus River, which would allow responsibility for streamflow to be assigned variably based on the annual hydrology.

  As is the case with Groundwater Banking, feasibility of this option is included in the proposed Tuolumne River Voluntary Agreement.

If all the projects identified through the current planning process can be implemented, there would still be a supply shortfall to meet projected needs. Furthermore, each of the supply options being considered has its own inherent challenges and uncertainties that may affect the SFPUC's ability to implement it.

Given the limited availability of water supply alternatives - unless the supply risks are significantly reduced or our needs change significantly - the SFPUC will continue to plan, develop and implement all project opportunities that can help bridge the anticipated water supply gaps during droughts. In 2019, the SFPUC completed a survey among water and wastewater agencies within the service area to identify additional opportunities for purified water. Such opportunities remain limited, but the SFPUC continues to pursue all possibilities.

BAWSCA's Long Term Reliability Water Supply Strategy

BAWSCA's Long-Term Reliable Water Supply Strategy (Strategy), completed in February 2015, quantified the water supply reliability needs of the BAWSCA member agencies through 2040, identified the water supply management projects and/or programs (projects) that could be developed to meet those needs, and prepared an implementation plan for the Strategy's recommendations.

When the 2015 Demand Study concluded it was determined that while there is no longer a regional normal year supply shortfall, there was a regional drought year

supply shortfall of up to 43 MGD. In addition, key findings from the Strategy's project evaluation analysis included:

- Water transfers represent a high priority element of the Strategy.
- Desalination potentially provides substantial yield, but its high effective costs and intensive permitting requirements make it a less attractive drought year supply alternative.
- Other potential regional projects provide tangible, though limited, benefit in reducing dry-year shortfalls given the small average yields in drought years.

Since 2015, BAWSCA has completed a comprehensive update of demand projections and engaged in significant efforts to improve regional reliability and reduce the dry-year water supply shortfall.

- *Water Transfers*. BAWSCA successfully facilitated two transfers of portions of Individual Supply Guarantee (ISG) between BAWSCA agencies in 2017 and 2018. Such transfers benefit all BAWSCA agencies by maximizing use of existing supplies. BAWSCA is currently working on an amendment to the Water Supply Agreement between the SFPUC and BAWSCA agencies to establish a mechanism by which member agencies that have an ISG may participate in expedited transfers of a portion of ISG and a portion of a Minimum Annual Purchase Requirement. In 2019, BAWSCA participated in a pilot water transfer that, while ultimately unsuccessful, surfaced important lessons learned and produced interagency agreements that will serve as a foundation for future transfers. BAWSCA is currently engaged in the Bay Area Regional Reliability Partnership (BARR)[24], a partnership among eight Bay Area water utilities (including the SFPUC, Alameda County Water District, BAWSCA, Contra Costa Water District, Santa Clara Valley Water District) to identify opportunities to move water across the region as efficiently as possible, particularly during times of drought and emergencies.
- *Regional Projects*. Since 2015, BAWSCA has coordinated with local and State agencies on regional projects with potential dry-year water supply benefits for BAWSCA's agencies. These efforts include storage projects, indirect/direct water reuse projects, and studies to evaluate the capacity and potential for various conveyance systems to bring new supplies to the region.

BAWSCA continues to implement the Strategy recommendations in coordination with BAWSCA member agencies. Strategy implementation will be adaptively managed to account for changing conditions and to ensure that the goals of the Strategy are met in an efficient and cost-effective manner. On an annual basis, BAWSCA will reevaluate Strategy recommendations and results in conjunction with development of the BAWSCA's FY 2021-22 Work Plan. In this way, actions can be modified to accommodate changing conditions and new developments.

[24] https://www.bayareareliability.com/

Redwood City Strategies and Actions

In addition to the management tools and options discussed below, Redwood City has been involved directly and through BAWSCA to advocate for an alternative to the Bay-Delta Plan Amendment, including submitting letters and testimony (see Appendix M) that identify, among other things, the significant impact to local water supply reliability.

Further, as part of this UWMP process, Redwood City submitted letters to both BAWSCA and SFPUC (see Appendix M) enumerating concerns regarding the fact that the SFPUC RWS supply allocations do not meet the Level of Service Goals included in the WSA (see Section 7.1.1.1) and, therefore, SFPUC is not meeting its contractual obligations to the Wholesale Customers.

Redwood City's letter to BAWSCA further states that while it is applying BAWSCA's revised Tier Two allocation methodology for RWS shortages greater than 20% for preliminary planning purposes, Redwood City is not agreeing to, or adopting, the revised Tier Two methodology. Among other issues, Redwood City notes that the revised Tier Two methodology does not take minimum health and safety standards into account.

As described in Section 7.1.4, Redwood City is committed to improving its supply reliability, including development of recycled water and groundwater supply sources and continued commitment to its water conservation program.

7.1.4 Management Tools and Options

☑ ***CWC § 10620 (f)***

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.

At a regional level, Redwood City maintains active involvement in the work that SFPUC and BAWSCA are doing with respect to optimizing the use of regional water supplies and pursuing additional supplies. These efforts are detailed above in Section 7.1.3.5.

In addition to supporting SFPUC and BAWSCA, Redwood City has plans to expand its recycled water system to new sites that are anticipated to be developed or retrofitted with recycled water. Further discussion of anticipated expansion of the recycled water system can be found in Section 6.5.4. If additional recycled water is made available, the potable water demands will be less than the current projections and therefore the resultant supply shortage will likely to be smaller.

Redwood City has also been implementing, and plans to continue to implement, the demand management measures described in Chapter 9. Further, in response to the anticipated future dry-year shortfalls, Redwood City has developed a robust WSCP that systematically identifies ways in which Redwood City can reduce water demands. The WSCP is included in Appendix L.

Redwood City is evaluating groundwater resources as a potential emergency or back-up supplemental supply source. A preliminary assessment of groundwater production potential for the City found that sufficient groundwater supply may be available for the City to use as a source of back-up supply for

emergency conditions (EKI, 2020; Appendix G). Further discussion of this assessment can be found in Section 6.2.4.

7.2 Drought Risk Assessment

☑ ***CWC § 10635(b)***

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:

(1) 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 five consecutive water years, starting from the year following when the assessment is conducted.

(2) A determination of the reliability of each source of supply under a variety of water shortage conditions. This may include a determination that a particular source of water supply is fully reliable under most, if not all, conditions.

(3) A comparison of the total water supply sources available to the water supplier with the total projected water use for the drought period.

(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.

In addition to the long-term water service reliability assessment presented above, the DRA evaluates Redwood City's supply risks under a severe drought period lasting for the next five consecutive years after the assessment is completed, i.e., from 2021 through 2025. The DRA is intended to inform the demand management measures and water supply projects and programs to be included in the UWMP (see Chapters 6 and 9). Suppliers may conduct an interim update or updates to this DRA within the five-year cycle of its UWMP update, i.e., before the 2025 UWMP.

7.2.1 Data, Methods, and Basis for Water Shortage Condition

As a first step to the DRA, Redwood City has estimated unconstrained water demand for the next five years (2021-2025). Unconstrained water demand is the expected water use in the absence of drought water use restrictions. The characteristic five-year water demand is described in Section 4.2.6 and is from the Decision Support System (DSS) Water Demand and Conservation Model.

The available potable water supplies assumed in the DRA are based upon the same methodology and assumptions used for the long-term water service reliability assessment (Section 7.1) and relies on information provided by SFPUC and BAWSCA (Appendix I and Appendix J). The available RWS water supplies are estimated based on the following assumptions: (1) the RWS demands are held constant at 132.1 MGD (i.e., 2020 demand levels), (2) implementation of the Bay-Delta Plan Amendment occurs in 2023, and (3) the 2020 infrastructure conditions are maintained (see Table 1 of the January 22, 2021

SFPUC letter in Appendix J. Details of how Redwood City's available supplies are then estimated as part of the DRA are provided below.

7.2.2 DRA Individual Water Source Reliability

As described in Chapter 6, Redwood City relies on imported surface water supply purchased from the SFPUC RWS for potable uses and utilizes recycled water for non-potable uses.

Redwood City's available potable water supplies during the five-consecutive-year drought are based upon information provided by SFPUC and BAWSCA included in Appendix J, as indicated in Section 7.2.1. Specifically, based on the modeling results presented in the March 30, 2021 SFPUC letter, BAWSCA provided percent reductions in RWS supply for 2021 to 2025 in Table E of the April 1, 2021 BAWSCA updated drought allocation memorandum, which are reproduced for Redwood City in Table 7-7 below.

Prior to the assumed implementation of the Bay-Delta Plan Amendment in 2023, sufficient RWS supplies will be available to meet the Wholesale Customers' purchase requests during the first two consecutive dry years (i.e., 2021 and 2022). Shortages are projected to begin in 2023 with the implementation of the Bay-Delta Plan Amendment. In the event of a shortage, the current Tier 2 Drought Allocation Plan (Section 7.1.1.1) specifies that each agencies' Allocation Factor would be calculated once at the onset of a shortage based on the previous year's use and remain the same until the shortage condition is over. Therefore, for the purpose of drought allocations for the DRA, the available RWS supply is assumed to remain static in 2023-2025 and is calculated based on Redwood City's projected potable demands in 2022 and the volumetric drought allocations provided by BAWSCA, as shown in Table 7-7.[25]

[25] BAWSCA also provided drought allocation volumes for each agency, as mentioned in Section 7.1.2. However, Redwood City's 2021-2025 demands that were used for the calculations were outdated. Therefore, the DRA performed here used percent cutbacks provided by BAWSCA and re-calculated the supply volumes based on corrected 2021-2025 demands.

Table 7-7 Redwood City Supply Availability During Multiple Dry Years for Base Year 2020

	2021	2022	2023	2024	2025
Redwood City Drought Allocation	9,768	10,160	5,377	5,377	5,377

NOTES:
(a) Volumes are in units of AF.
(b) Source: Table F2 from the BAWSCA drought allocation tables dated April 1, 2021.
(c) Five consecutive year drought assumed to start in 2021.
(d) Scenario reflects implementation of the Bay-Delta Plan Amendment in 2023.
(e) Sufficient RWS supplies will be available to meet the Wholesale Customers' purchase requests during the first two consecutive dry years, prior to implementation of the Bay-Delta Plan Amendment. Volumes for 2021 and 2022 reflect Redwood City's near-term projected purchases previously provided to BAWSCA.
(f) Per system-wide shortages are projected starting in 2023, Wholesale RWS demand is assumed to be static for the remainder of the drought sequence per the Water Supply Agreement.

Redwood City considers recycled water to be a reliable and stable water supply source and its recycled water supply is estimated to be available during all hydrologic years at a volume that meets its projected recycled water demands (see Chapters 4 and 6).

As shown in Table 7-7, prior to the assumed implementation of the Bay-Delta Plan Amendment in 2023, sufficient RWS supplies will be available to meet the Wholesale Customers' purchase requests during the first two consecutive years (i.e., 2021 and 2022).

Shortages are projected to begin in 2023 with the implementation of the Bay-Delta Plan Amendment. In the event of a shortage, the current Tier 2 Drought Allocation Plan (Section 7.1.1.1) specifies that each agencies' Allocation Factor would be calculated once at the onset of a shortage based on the previous year's use and remain the same until the shortage condition is over. Therefore, for the purpose of drought allocations for the DRA, the available RWS supply is assumed to remain static in 2023-2025 as shown in Table 7-7.

7.2.3 Drought Risk Assessment Total Water Supply and Use Comparison

Table 7-8 provides a comparison of the water supply sources available to Redwood City with the total projected water use for an assumed drought period from 2021 through 2025. Redwood City is expected to experience significant shortfalls in years 2023-2025 of the DRA with unconstrained demands because of the assumed implementation of the Bay-Delta Plan Amendment in 2023.

Redwood City has developed a WSCP (Appendix L) to address water shortage conditions resulting from any cause (e.g., droughts, impacted distribution system infrastructure, regulatory-imposed shortage restrictions, etc.). The WSCP identifies a variety of actions that Redwood City will implement to reduce demands and further ensure supply reliability at various levels of water shortage. Redwood City intends to implement its WSCP to reduce water use and address the projected supply shortfalls.

Given the current uncertainty discussed in Section 7.1.3.4, Redwood City could update its DRA prior to the 2025 UWMP update if significant new information becomes available. CWC §10635(b) permits urban water suppliers to conduct an interim update or updates to their DRA within the five-year cycle of its UWMP update. Redwood City anticipates that by the 2025 UWMP update, SFPUC will provide more specific information about the AWSP, with estimated water supply contributions from such projects. Additionally, Redwood City expects that SFPUC will provide more specific information and a refined estimate of the Bay-Delta Plan Amendment impacts to the SFPUC supply. Redwood City will also have more information regarding the available uses of recycled water by the 2025 UWMP update. Further, it is anticipated that the Wholesale Customers will negotiate a revised Tier 2 allocation formula that could affect each agency's share of available supplies in drought years relative to what has been presented herein.

Redwood City recommends that users of its 2020 UWMP contact Redwood City staff for potential updates to the DRA presented in the 2020 UWMP for their planning projects.

Table 7-8 Five-Year Drought Risk Assessment Tables to Address Water Code 10635(b) (DWR Table 7-5)

2021	Total
Total Water Use	10,728
Total Supplies	10,728
Surplus/Shortfall w/o WSCP Action	
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	--
WSCP - use reduction savings benefit	--
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	0%

2022	Total
Total Water Use	10,747
Total Supplies	10,747
Surplus/Shortfall w/o WSCP Action	0
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	--
WSCP - use reduction savings benefit	--
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	0%

Table 7-8 Five-Year Drought Risk Assessment Tables to Address Water Code 10635(b) (DWR Table 7-5)

2023	Total
Total Water Use	10,767
Total Supplies	6,491
Surplus/Shortfall w/o WSCP Action	(4,276)
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	4,276
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	40%

2024	Total
Total Water Use	10,786
Total Supplies	6,577
Surplus/Shortfall w/o WSCP Action	(4,210)
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	4,210
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	39%

2025	Total
Total Water Use	10,806
Total Supplies	6,663
Surplus/Shortfall w/o WSCP Action	(4,143)
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	4,143
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	38%
NOTES: (a) Volumes are in units of AF. (b) Supply and demand include both potable water and recycled water. (c) It is assumed that the demand-reduction actions included in the WSCP (Appendix L) will be implemented to offset any shortfalls during the drought period.	

8. WATER SHORTAGE CONTINGENCY PLAN

The City of Redwood City's ("City's" or "Redwood City's") Water Shortage Contingency Plan (WSCP) is included as Appendix L. The WSCP serves as a standalone document to be engaged in the case of a water shortage event, such as a drought or supply interruption, and defines specific policies and actions that will be implemented at various shortage level scenarios. The primary objective of the WSCP is to ensure that the City has in place the necessary resources and management responses needed to protect health and human safety, minimize economic disruption, and preserve environmental and community assets during water supply shortages and interruptions. Consistent with California Water Code (CWC) §10632, the WSCP includes six levels to address shortage conditions ranging from up to 10% to greater than 50% shortage, identifies a suite of demand mitigation measures for the City to implement at each level, and identifies procedures for the City to annually assess whether or not a water shortage is likely to occur in the coming year, among other things.

A summary of the key elements of the WSCP, including water shortage levels and demand reduction actions is shown in Table 8-1, Table 8-2, and Table 8-3. Additional details are provided in Appendix L.

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

Shortage Level	Percent Shortage Range	Shortage Response Actions
1	Up to 10%	• Declaration by the City Council upon the determination that the SFPUC or another governing authority (e.g., the SWRCB) has required a voluntary or mandatory reduction in water use of up to 10% due to water supply shortages or an emergency. • Include implementation of voluntary restrictions on end uses and a Water Allocation Program (see Table 8-2) as well as agency actions (see Table 8-3).
2	Up to 20%	• Declaration by the City Council upon the determination that the SFPUC or another governing authority (e.g., the SWRCB) has required a voluntary or mandatory reduction in water use from 10% to 20% due to water supply shortages or an emergency. • Include implementation of voluntary restrictions on end uses and a Water Allocation Program (see Table 8-2) as well as agency actions (see Table 8-3).

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

Shortage Level	Percent Shortage Range	Shortage Response Actions
3	Up to 30%	• Declaration by the City Council upon the determination that the SFPUC or another governing authority (e.g., the SWRCB) has required a voluntary or mandatory reduction in water use from 20% to 30% due to water supply shortages or an emergency. • Include implementation of voluntary restrictions on end uses and a Water Allocation Program (see Table 8-2) as well as agency actions (see Table 8-3).
4	Up to 40%	• Declaration by the City Council upon the determination that the SFPUC or another governing authority (e.g., the SWRCB) has required a voluntary or mandatory reduction in water use from 30% to 40% due to water supply shortages or an emergency. • Include implementation of voluntary restrictions on end uses and a Water Allocation Program (see Table 8-2) as well as agency actions (see Table 8-3).
5	Up to 50%	• Declaration by the City Council upon the determination that the SFPUC or another governing authority (e.g., the SWRCB) has required a voluntary or mandatory reduction in water use from 40% to 50% due to water supply shortages or an emergency. • Include implementation of voluntary restrictions on end uses and a Water Allocation Program (see Table 8-2) as well as agency actions (see Table 8-3).
6	>50%	• Declaration by the City Council upon the determination that the SFPUC or another governing authority (e.g., the SWRCB) has required a voluntary or mandatory reduction in water use greater than 50% due to water supply shortages or an emergency. • Include implementation of voluntary restrictions on end uses and a Water Allocation Program (see Table 8-2) as well as agency actions (see Table 8-3).
NOTES:		

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? (a)	Additional Explanation or Reference	Penalty, Charge, or Other Enforcement?
1	Other	5%	1. Water use shall not exceed Stage 1 water budgets for each customer. 2. Prohibit use of potable water through broken or defective plumbing and irrigation systems. 3. Irrigating outdoor ornamental landscapes or turf with potable water is limited tono more than three (3) days per week. 4. Irrigation with potable water outside of newly constructed homes and buildings not delivered by drip or microspray is prohibited.	Yes
2	Other	15%	1. Continue with actions and measures from Stage 1 except where supersededby more stringent requirements. 2. Irrigating outdoor ornamental landscapes or turf with potable water is limited tono more than two (2) days per week. 3. Water use shall not exceed Stage 2 water budgets for each customer.	Yes
3	Other	25%	1. Continue with actions and measures from Stage 2 except where supersededby more stringent requirements. 2. Irrigating outdoor ornamental landscapes or turf with potable water is limited tono more than one (1) day per week. 3. Vehicle washing is prohibited except at facilities using recycled or recirculating water. 4. Water use shall not exceed Stage 3 water budgets for each customer.	Yes
4	Other	35%	1. Continue with actions and measures from Stage 3 except where superseded by more stringent requirements. 2. Water use shall not exceed Stage 4 water budgets for each customer.	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? (a)	Additional Explanation or Reference	Penalty, Charge, or Other Enforcement?
5	Other	45%	1. Continue with actions and measures from Stage 4 except where superseded by more stringent requirements. 2. Potable water shall not be used for irrigation of turf grass or all outdoor uses. 3. Water use shall not exceed Stage 5 water budgets for each customer.	Yes
6	Other	55%	1. Continue with actions and measures from Stage 5 except where superseded by more stringent requirements. 2. Water use shall not exceed Stage 6 water budgets for each customer.	Yes
NOTES: (a) The percentages listed in this table are the cumulative savings for each shortage level with implementation of corresponding supply augmentation and other agency actions in Table 8-3. Detailed saving estimates based on end use, response action, and implementation rates can be found in Attachment 2 of the WSCP.				

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? (a)	Additional Explanation or Reference
1	Other	5%	1. Maintain water waste reporting portals, which may include a hotline, email address, and/or smart phone application. 2. Conduct public education. 3. Implement voluntary Water Allocation Program Stage 1. 4. Implement a conservation outreach program. 5. Conduct coordination with BAWSCA and SFPUC.
2	Other	15%	1. Continue with actions and measure from Stage 1 except where superseded by more stringent requirements. 2. Increase public education. 3. Accelerate water conservation program implementation. 4. Cut back flushing of water distribution mains for water quality purposes. 5. Implement mandatory Water Allocation Program Stage 2 with moderate water rate incentives and/or penalties for exceeding allocation/budget. 6. Schedule staff for enforcement and customer service. 7. Increase public outreach, including information regarding fines or penalties for non-compliance.
3	Other	25%	1. Continue with actions and measures from Stage 2 except where superseded by more stringent requirements. 2. Implement mandatory Water Allocation Program Stage 3 with significant water rate incentives and/or penalties for exceeding allocation/budget. 3. Increase enforcement and water waste patrols. 4. Suspend routine flushing of water mains except when necessary to address immediate health or safety concerns. 5. Moratorium on new water connections.

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? (a)	Additional Explanation or Reference
4	Other	35%	1. Continue with actions and measures from Stage 3 except where superseded by more stringent requirements. 2. Implement mandatory Water Allocation Program Stage 4 with significant water rate incentives and/or penalties for exceeding allocation/budget. 3. Continue increasing public outreach. 4. Continue increasing enforcement and water waste patrols.
5	Other	45%	1. Continue with actions and measures from Stage 4 except where superseded by more stringent requirements. 2. Implement mandatory Water Allocation Program Stage 5 with severe water rate incentives and/or penalties for exceeding allocation/budget. 3. Reduce distribution system pressures.
6	Other	55%	1. Continue with actions and measures from Stage 5 except where superseded by more stringent requirements. 2. Implement mandatory Water Allocation Program Stage 6 with severe water rate incentives and/or penalties for exceeding allocation/budget.
NOTES: (a) The percentages listed in this table are the cumulative savings for each shortage level with implementation of corresponding demand reduction actions in Table 8-2. Detailed saving estimates based on end use, response action, and implementation rates can be found in Attachment 2 of the WSCP.			

9. DEMAND MANAGEMENT MEASURES

☑ ***CWC § 10631 (e)***

Provide a description of the supplier's water demand management measures. This description shall include all of the following:

(1) (A) 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.

(B) For the supplement required of urban retail water suppliers by paragraph (2) of subdivision (f) of Section 10621, a narrative that describes the water demand management measures that the supplier plans to implement to achieve its urban water use objective by January 1, 2027, pursuant to Chapter 9 (commencing with Section 10609) of Part 2.55.

(C) 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.

The City of Redwood City ("City" or "Redwood City") has a strong record of water conservation and is an early adopter of programs including the Water Allocation Program, budget-based water rates, water budget reports, Advance Metering Infrastructure (AMI), and customer web portal. Through coordination with other agencies and organizations, the City is also a regional leader in landscape and education programs. This section provides an overview of the City's current and planned demand management measures (DMMs), which include specific types and groupings of water conservation measures typically implemented by water suppliers. The City administers several of its DMMs through past participation in California Urban Water Conservation Council (CUWCC) Best Management Practices (BMPs) (succeeded by the California Water Efficiency Partnership [CalWEP]) and currently with the Bay Area Water Supply & Conservation Agency's (BAWSCA's) Regional Water Conservation Program. The following sections describe the past CUWCC BMPs, BAWSCA's Regional Water Conservation Program, and the nature and extent of the specific DMMs implemented by the City.

9.1 Regional Water Conservation

The City has a strong record of water conservation through regional coordination with CUWCC and BAWSCA as well as local non-profit organizations and stakeholders. An overview of CUWCC BMPs and BAWSCA's Regional Water Conservation Program is provided in this section.

9.1.4 CalWEP and CUWCC Best Management Practices

CUWCC was a membership organization dedicated to maximizing urban water conservation throughout California by supporting and integrating innovative technologies and practices. Membership of CUWCC comprised of organizations signatory to the CUWCC Memorandum of Understanding (MOU).

Redwood City was among the early signatories of the 1992 MOU. Signatories of the MOU pledge to develop and implement urban water conservation practices, also known as BMPs, to reduce the demand of urban water supplies. These agencies also agree to report on their BMP activities bi-annually to CUWCC. The list of CUWCC BMPs for retail agencies is provided below:

BMP 1. Operations Practices
- BMP 1.1 Operations Practices
- BMP 1.2 Agency Water Loss Control
- BMP 1.3 Metering with Commodity
- BMP 1.4 Conservation Pricing

BMP 2. School Education and Public Outreach
- BMP 2.1 Public Information Programs
- BMP 2.2 School Education

BMP 3. Residential

BMP 4. Commercial, Industrial, Institutional

BMP 5. Landscape

The City has been implementing CUWCC BMPs since 1994 and was in compliance with the CUWCC MOU since the early 2000s until it was sunset in 2018. City conservation staff held the Secretary position on the CUWCC Residential Committee and contributed to the Residential BMP Implementation Guidebook.

With increased pressure from a changing climate – more severe droughts and water uncertainty – and new mandatory regulations from the state of California, including new framework to "Make Water Conservation a California Way of Life," the CUWCC membership voted to allow the organization to sunset, replacing it with a new one: the California Water Efficiency Partnership, or CalWEP.

In March of 2018, CalWEP launched as an innovative leader, voice and expert on water efficiency in California. CalWEP carries forward the expertise and collaboration that was a CUWCC hallmark but with a new name and new, nimble framework. CalWEP is committed to providing cutting-edge expertise on California water issues, challenges, and opportunities within a broad collaborative framework.

Redwood City has continued its membership with CalWEP and utilizes the resources it provides in support of staff training, public education, to enhance water conservation programs, and assist the City with compliance with new and upcoming State regulations.

9.1.5 BAWSCA Regional Water Conservation Program

Redwood City also participates in BAWSCA's Regional Water Conservation Program, as a part of its overall water conservation program. The BAWSCA Regional Water Conservation Program is a two-tier program, consisting of "Core Programs" and "Subscription Programs," and is open to all member agencies. The BAWSCA Regional Water Conservation Program is implemented consistent with the intent of its Water Conservation Implementation Plan (WCIP), which was developed with input from the member agencies and serves as a coordinated, regional plan for implementing water conservation throughout the BAWSCA service area. Although the program was designed and available at a regional level, most of the implementation of the individual programs within the Redwood City service area is done by City staff.

The Core Programs provided as a part of the Regional Water Conservation Program are funded through the annual BAWSCA budget and include conservation measures that benefit from regional implementation and provide overall regional benefit. Measures provided across the BAWSCA service area as part of the Core Program include regional messaging, public outreach, landscape water efficiency education classes and tools, native garden tours and symposiums, support for adoption of local indoor and outdoor water efficiency ordinances, and access to BAWSCA's water conservation database.

The Subscription Programs are conservation measures that individual agencies must elect to participate in, and whose benefits are primarily realized within individual water agency service areas. As such, the Subscription Programs are funded by individual member agencies, based on their participation level. The City has actively participated in all available Subscription Programs, which include:

- *High-Efficiency Toilet (HET) Rebates**
- *High-Efficiency Residential Washing Machine Rebates **
- Rain Barrel Rebates
- *Free Sprinkler Nozzles Giveaway**
- Smart Irrigation Controller Rebate
- Water-Wise School Education Kits and Curriculum
- EarthCapades Assemblies School Education Program
- Large Landscape Program
- Lawn Be Gone! Turf Replacement Rebates

**Program has ended and is no longer available.*

The City's implementation of and participation in the Core and Subscription Programs are described in detail below, as they relate to City's implementation of DMMs.

9.2 Agency Water Conservation

☑ ***CWC § 10631 (e)***

Provide a description of the supplier's water demand management measures. This description shall include all of the following:

(1) (A) 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 City implements all of the seven DMMs per California Water Code (CWC) Section 10631, as described below.

9.2.1 DMM 1 – Water Waste Prevention Ordinances

The City established a Water Conservation Program that includes numerous water use restrictions and prohibitions, including prohibitions against use of defective irrigation equipment, flooding of gutters, streets or drainage systems, and use of water hoses without a shut-off valve. The Water Conservation Program was adopted by Resolution No. 15530 in October of 2016 and is planned to be updated, as needed, as part of this Plan in 2021.

9.2.2 DMM 2 – Metering

☑ ***CWC § 526 (a)***

Notwithstanding any other provision of law, an urban water supplier that, on or after January 1, 2004, receives water from the federal Central Valley Project under a water service contract or subcontract … shall do both of the following:

(1) On or before January 1, 2013, install water meters on all service connections to residential and nonagricultural commercial buildings constructed prior to January 1, 1992, located within its service area.

(2) On and after March 1, 2013, or according to the terms of the Central Valley Project water contract in operation, charge customers for water based on the actual volume of deliveries, as measured by a water meter.

☑ ***CWC § 527 (a)***

(a) An urban water supplier that is not subject to Section 526 shall do both of the following:

(1) Install water meters on all municipal and industrial service connections located within its service area on or before January 1, 2025.

Redwood City has installed water meters on each water service connection. The City requires separate irrigation meters for customers with large landscaped areas to distinguish outdoor water use from indoor water use and for the facilitation of recycled water conversions. The City's commercial, industrial and institutional (CII) customers are required to have fire sprinkler systems, and since 1999, the City has required residential fire sprinklers in all new single and multi-family construction. The City requires separate meters for multi-family fire sprinkler systems.

The City has been replacing its metering infrastructure with AMI since 2008. With the AMI technology, meter readings are fed from meters to strategically placed collectors throughout the City, which transmit meter reads to City computers. The information is then transformed into customer reports that detail water usage, time of use, and leak detection. The system increases meter reading accuracy and efficiency and provides hour-by-hour meter reads, significantly improving customer service levels. As of 2020, approximately 75% of the City customers are served by AMI.

Implementation of AMI will allow the City to automate meter reading and provide real-time water use data to City staff and customers that can be used to aggressively target leaks and atypically high water use during normal years and periods of water shortage. Implementation of AMI will also increase the City's communication with customers and allow customers to view water use in near real-time through the City's innovative web-based water management tool, MyWater. Non-AMI residential meters are read on a bi-monthly basis; and non-AMI non-residential meters are read on a monthly basis.

The information made available through AMI goes hand-in-hand with the City's Water Allocation Program and Large Landscape Program (see this program in DMM-7, Section 9.2.7). Using the MyWater website, single family and irrigation customers with AMI can compare their actual use to their budgeted use and make timely adjustments in their use patterns to decrease consumption.

9.2.3 DMM 3 – Conservation Pricing

The City's current potable water rate structure for residential and CII customers includes a monthly or bi-monthly service charge and a tiered water consumption charge based on water usage.[26] The water consumption charge is tiered such that customers are billed at a lower rate for efficient water use and increasingly higher rates for higher water use.

The City's large landscape areas and fire sprinkler systems are separately metered. The potable water rate structure for irrigation customers is a budget-based rate based on the Large Landscape Program (see Section 9.2.7). With budget-based rates, the price per unit for irrigation customers increases for each water unit used over the water budget amount in three tiers. The first tier includes 100% of the water budget, the second tier included all use equal to 101% to 200% of the water budget, and the third tier includes all use over 200% of the water budget. The City's fire meters are charged a monthly service charge. The conservation pricing structure is always in place and is not dependent on water shortage.

Recycled water customers are charged at rates similar to the lowest tier rates for each potable water use. However, for the first five years of recycled water use on a site, recycled water service charges and fees cost 25% less than potable water for irrigation use and 40% less than potable water for non-irrigation use.

[26] Current City of Redwood City rate structure located online at https://www.redwoodcity.org/departments/public-works/water/rates/current-rates.

In addition, as discussed in Appendix L, customers exceeding their water budgets will face higher water rates during mandatory implementation of the Water Allocation Program in higher stages of the Water Shortage Contingency Plan (WSCP).

9.2.4 DMM 4 – Public Education and Outreach

The City implements a number of public education and outreach initiatives with support from the BAWSCA Regional Water Conservation Program. The City's public outreach utilizes a variety of media including direct mail, advertising, classes, events, website, and social media. Specific initiatives include:

- ***MyWater water management tool***: Redwood City provides a web-based water management tool, MyWater. By visiting the MyWater website, all City customers can view water use, sign up for leak alerts, and update residential water use factors (if customer participates in the residential Water Allocation Program). Through the MyWater system, the City generates water bills that compare a customer's water use to their water budget or other similar customers. With implementation of AMI, the MyWater tool allows City customers to view water use information on up to an hourly basis.
- ***School education program***: EarthCapades Assemblies: The City facilitates the school assemblies performed by EarthCapades at schools within its service area. The EarthCapades performances combine age-appropriate state science standards with circus skills, juggling, music, storytelling, comedy, and audience participation to teach environmental awareness, water science, and conservation. The EarthCapades assemblies are designed to include local water source and watershed education and specific information pertaining to the City's service area. The City and BAWSCA provide specific information to EarthCapades regarding the SFPUC Regional Water System (RWS) and other topics (e.g., recycled water). EarthCapades integrates this information into the specific scripts used for assemblies conducted within the City's service area. The City facilitated and paid for 79 EarthCapades assemblies between 2016 and 2020.
- ***Water-Wise School Education Kits and Curriculum***: The Water-Wise school education program is provided by Resource Action Programs (a contractor to BAWSCA) to 5th grade students within the City's service area. Resource Action Programs works directly with teachers and schools to provide them with turn-key, in-classroom water conservation curriculum and indoor and outdoor water conservation kits (i.e., the Water-Wise Kits). The Water-Wise curriculum has been designed to be easily implemented by teachers, and easily understood and taken back into the home by the students. The Water-Wise Kits include water saving devices that can be installed at the student's homes (e.g., low-flow showerheads and faucet aerators) and a water audit that the students can perform with their parents.

  The students are provided with the motivation, information, and tools they need to perform an in-home water audit. The information and material provided to the teachers and students also includes methods that can be used to quantify the water savings as a result of installing the equipment contained in the kit and performing the recommended, water-conserving actions. After the student performs the audit and installs the water and energy saving devices, affidavits signed by the parents are returned to the school, collected by the teacher, and forwarded to Resource Action Programs for documentation of measure implementation and the estimated

water savings. Resource Action Programs then prepares a final report for distribution to the City. The City has participated in the Water-Wise School Education Program every year between 2016 and 2020 and distributed at total of 2,623 kits.

- ***Tuolumne River Trust Classroom Presentations***: The Tuolumne River Trust classroom education program is provided by Tuolumne River Trust (a contractor to BAWSCA) to students within the City's service area. The classroom presentations include a visual tour of the Tuolumne River, highlighting the wildlife it supports, history of the Hetch-Hetchy water system, and an overview of some of the current threats to the river, as well as a discussion about ways water is being used, and how the students conserve water in order to protect the River. The City began implementing this program in 2014 and has provided 17 classroom presentations between 2016 and 2020.
- ***Water Conservation Poster Contest***: The City also sponsors an annual Water Conservation Poster Contest for students and awards prizes for the best entries in various categories. In the year prior to each contest, the City provides a curriculum to teachers of participating students based on the upcoming contest theme. City conservation staff will follow-up with classroom visits to review subject material and present contest prizes. A calendar with the winning posters and water saving tips is distributed to the poster contest participants as well as the community. The calendar along with the City's school education programs provide a way to reach residents that the City does not directly have contact information for through the billing system. The City hosted a poster contest in each year between 2016 and 2019, and but did not host one in 2020 due to the Covid-19 pandemic.
- ***Water efficient landscape education classes***: The City hosts a series of landscaping classes and seminars including the Water-Efficient Landscape Education Classes developed by BAWSCA and the Irrigation System Management Seminar. Examples of Water-Efficient Landscape Education Classes topics include "Lawn Replacement 101," "Drought Tolerant Plants," and "From Graywater to Green Garden," among others. The classes and seminars are free to the public and are designed to introduce homeowners, HOA board members, property managers, and landscape professionals to the concepts of sustainable landscape design. Between 2016 and 2020, the City offered a total of 25 landscape education classes.
- ***Water-Wise Gardening in the Bay Area landscape educational tool***: The City promotes the popular landscape educational tool - Water-Wise Gardening in the Bay Area. Initially created as a CD-ROM in 2007, the educational tool is currently available online via BAWSCA's website so that it can be readily accessed by the public. The Water-Wise Gardening in the Bay Area tool contains information on how to create and maintain a beautiful, low-water-use garden and includes photographs of water-efficient gardens and provides links to the plants that compose the featured gardens. The featured gardens are primarily composed of sites in the Bay Area, specifically within the BAWSCA service area. The City promotes and provides a link to the tool on its water conservation program website and offers free CD-ROMs of the tool to its customers. This was done between 2016 and 2020.
- ***Hosting information booths at fairs and public events***: City staff sets up information booths at large public events in the City to distribute information regarding the City's water conservation programs including rebate programs, landscape analysis programs, fixture giveaways, and the

recycled water fill station program. The City participated at 38 public events between 2016 and 2020.

- ***Drought assistance***: Beginning in 2014, the City provided drought assistance to its customers, including but not limited to leak noticing, high water bill noticing, Large Landscape Program customer service, and conservation program assistance. The City stopped tracking drought contacts in 2016.
- ***Informative website, online tools, or social media***: The City maintains pages on its website that are dedicated to its water conservation program[27]. The website provides information regarding its rebate programs, water-saving fixture giveaways, conservation tips and links, and downloadable education curriculum for educators. The website also contains information regarding the City's recycled water program, conservation efforts, and drought updates. The City also messages customers on its Twitter and Facebook accounts and the Redwood City smartphone application myRWC.
- ***Media campaigns and other outreach***: The City encourages water conservation and markets its rebate programs and water-saving fixture giveaways through local television ads, ads at City facilities, newsletters, local newspapers, and bill inserts.

The full extent of public outreach that the City has conducted between 2016 and 2020 is discussed in Section 9.3.

9.2.5 DMM 5 – Programs to Assess and Manage Distribution System Real Loss

As discussed in Section 4.1.3, non-revenue water was estimated to be range from 8% to 10% of total potable water demand between 2016 and 2020. The City has always monitored its distribution system water losses and repairs system leaks immediately when found. The City owns an electronic leak detector unit and City personnel have participated in leak detection trainings sponsored by the American Water Works Association; the City also surveys water mains and service lines on an ongoing basis. Customers can report leaks to the City via various portals including phone, email, website, and smartphone application. The City will respond to leak reports within a few hours.

The City's AMI system currently serves approximately 75% of the City's customers. Through implementation of AMI, the City will provide customers with phone notifications or automated email notifications when a customer has a continuous water leak, allowing the customer to locate and repair the leak as soon as possible. Without implementation of AMI, customers might wait 60 days due to the City's bi-monthly billing cycle before seeing a spike on their utility bill from undetected leaks.

[27] Redwood City Water Conservation Website
https://www.redwoodcity.org/departments/public-works/water/conservation.

9.2.6 DMM 6 – Water Conservation Program Coordination and Staffing Support

The water conservation team consists of various City staff members led by the Public Works Director and Assistant Public Works Director. Team members work collaboratively on implementing the methods outlined in the public outreach plan, evaluating the City's water conservation efforts, and making recommendations for improvements.

The City's PWS dedicates monies into a conservation budget each fiscal year to cover regular program and outreach costs. The City's total water conservation program budget for 2020 was $1.4 million, including the cost for the City's conservation programs and giveaways.

9.2.7 DMM 7 – Other DMMs

Other DMMs provided by the City, in addition to those discussed above, include the following:

- ***Water Allocation Program***: Since 2001, the City has used its Water Allocation Program to produce informational water budgets for single-family customers. The water budget reflects what each household should use if common water efficient technologies and practices are employed. Factors used to calculate the budget include the number of occupants, landscape type and area, daily weather forecasts, and whether or not the property has a swimming pool. In 2001 and again in 2008, the City sent out surveys to all single-family homes to collect the information needed to calculate water budgets. For those not replying to the survey, the program uses default assumptions. The water budget data is continually being updated via contact with customers and by customer participation in other water conservation programs (e.g., residential water surveys). Customers receive water use reports comparing actual water use compared to water budgets on their utility bill.

  Currently, the water budgets for single-family customers are informational only and are not incentivized by water rates. The City could, however, extend the Water Allocation Program to other sectors and allocate water during a future shortage (see WSCP in Chapter 8).

- ***Large Landscape Program***: The City locally administers the BAWSCA Large Landscape Program for all irrigation accounts, as described below. The City has participated in this program since 2003 and through this program, influences large urban landscape sites to irrigate more efficiently by improving metrics and communications. The program is jointly implemented with Waterfluence, BAWSCA's contractor.

  The City requires separate meters for large landscape areas in the City's service area and assigns water budgets to all irrigation accounts based on site area, site-specific characteristics, and real-time weather. Site area for each irrigation customer is measured using a GIS-based method. The City had installed AMI for all of the City's irrigation accounts and established a budget-based water rate to incentivize customer compliance with the water budget. Implementation of AMI irrigation meters allows irrigation customers to view hourly water use information electronically through the web-based MyWater tool. In addition, a bi-weekly "My Water Use" report, and dynamic "over budget alerts" are emailed to customers to help them address inefficiencies within their irrigation systems before they exceed their water budgets.

To facilitate communication, site water use information is distributed to bill payers, site managers, board members, landscapers, and /or any other designated decision maker interested in irrigation efficiency at an irrigation site. The reports include normative statements comparing a site's performance to peer sites, as well as social statements designed to influence those not financially motivated. For sites requesting assistance, the program also includes on-site landscape field surveys by an irrigation expert to document cost-effective recommendations for improvements. The City performed one landscape survey between 2016 and 2020.

- ***Water surveys and water audits***: The City offers free residential water use surveys and CII water audits to customers. The residential survey program includes checking fixtures for leaks and distributing free high-efficiency showerheads and faucet aerators as needed. The residential survey also provides advice on outdoor irrigation efficiency by measuring landscape areas, testing sprinkler systems for irrigation efficiency, teaching customers how to set the irrigation controller, developing a monthly irrigation schedule (based on soil type, evapotranspiration, and irrigation system characteristics), recommending sprinkler system repairs or improvements, and providing brochures on water efficient landscaping, design, and plants. The CII water audit is offered to top water users and evaluates ways for businesses to save water and cost. The City offered 14 residential surveys and no CII surveys between 2016 and 2020.
- ***Water-Saving Fixtures Giveaway***: Redwood City had mailed and distributed kits containing free water-saving fixtures to its residential customers since 2000. The City also gives these kits to its customers during home surveys and at various community events and fairs. Customers can request these free water saving fixtures through phone or email or pick them up from City Hall or Public Works. The free water saving fixtures include two bathroom sink aerators and a kitchen sink aerator. The City gave out 2,698 fixture kits between 2016 and 2020.
- ***HET Rebates***: Redwood City implemented an HET Rebate Program for its residential and commercial customers through BAWSCA's Subscription Program. As part of this program, the City offers customers the following rebates for customers replacing a high-volume toilet (i.e., 3.5 gallons per flush (gpf), or more):
    - Up to a $125 Rebate for replacing an existing toilet with a qualifying MaP® Premium model toilet (1.06 gallons or less per flush); or
    - Up to a $75 Rebate per standard HET (i.e., between 1.06 gallons and 1.28 gallons per flush).

  Up to three rebates are allowed per residential units and up to ten rebates are allowed per commercial customer account. The City provided a total of 288 rebates between 2016 and 2018, but this program was no longer offered to customers beginning in 2019.
- ***High-Efficiency Residential Washing Machine Rebates***: Redwood City locally administered a High-Efficiency Residential Washing Machine Rebate program for its residential customers which, through joint participation with Pacific Gas & Electric (PG&E), included a rebate of up to $150 to

customers that purchased a qualifying washing machine.[28] The High-Efficiency Residential Washing Machine Rebate program was one of the Subscription Programs available to BAWSCA member agencies. Between 2016 and 2017, the City provided 279 washing machine rebates to its customers. The program was no longer offered to customers starting in 2018.

- ***Rain Barrel Rebates***: Redwood City locally administers the BAWSCA Rain Barrel Rebate program for its residential customers which includes a rebate of up to $100 per rain barrel for the purchase and installation of qualifying rain barrels. The program is administered in partnership with the San Mateo Countywide Water Pollution Prevention Program. The City began participating in the program in 2015 and provided 95 rain barrel rebates from 2016 to 2020.
- ***Free Sprinkler Nozzles Giveaway***: Since 2013, Redwood City has offered free sprinkler nozzle giveaways to its customers through partnership with FreeSprinklerNozzles.com and BAWSCA. Each customer is eligible for up to 25 free high efficiency nozzles at a retail value of $4 to $10 each. The City encourages its customers to register for the free sprinkler nozzles online and redeem at a local store. From 2016 and 2020, the City offered 1,689 free sprinkler nozzles to its customers.
- ***Lawn Be Gone! Turf Replacement Rebates***: Redwood City locally administers the BAWSCA Lawn Be Gone! turf replacement rebate program for its residential and CII customers. The City offers its customers $1 per square foot of turf removed. In order to qualify for participation in the Lawn Be Gone! Program, the new landscape must include at least 50% live plant coverage, with the difference completed in permeable hardscape, and all plants must be low water use plants from the BAWSCA-approved plant list. This program offers City's customers a financial incentive to reduce their outdoor water use and create permanent and lasting water savings. Also, because eligible landscapes are limited to front yards and areas visible to the public, this program has an educational and public-outreach element (i.e., demonstrating to the wider public that low water use landscaping can be an attractive alternative to lawns and encouraging conversations about responsible water use among neighbors). The City began participating in the program in 2013 and from 2016 to 2020 rebates have been given to 85 customers for 80,043 square feet of landscape.

The full extent of the other DMMs that the City has implemented between 2016 and 2020 is discussed in Section 9.3.

9.3 Implementation Over the Past Five Years

Table 9-1 and the associated chart summarizes the DMMs implemented by the City and the extent of implementation (e.g., number of kits, number of rebates) for each of the programs listed under DMM-4 and DMM-7 each year between 2016 and 2020. Through implementation of the DMMs, the City has been able to significantly reduce water demands in its service area and help its customers to achieve water and cost savings.

[28] PG&E currently contributes $50 of the total $150 rebate. Total rebate value has varied from year to year.

Table 9-1 Summary of DMMs and Implementation over the Past Five Years (2016-2020)

DMM Category	Program or Activity	Target Sector	Nature of Implementation	Extent of Implementation
1	Water Waste Prevention Ordinances	SF, MF, CII And IRR	Prohibition of water uses to prevent water waste included the City's Municipal Code Section 38.62 are in place at all times, irrespective of water supply condition.	The Water Waste Ordinance was adopted in 1992 and was updated as part of the 2020 Urban Water Management Plan.
2	Metering	SF, MF, CII And IRR	All water service connections are metered. The City's large landscape areas and fire sprinkler systems are separately metered. The City is currently replacing its metering infrastructure with AMI.	All accounts are metered. Approximately 75% of the City is served by AMI as of 2020. Non-AMI meters are read on a bi-monthly or monthly basis.
3	Conservation Pricing	SF, MF, CII And IRR	The current water rate structure includes a tiered water consumption charge based on water usage or water budgets: http://www.redwoodcity.org/utilityrates, accessed 4 January 2021.	Tiered rate structure was in place during 2015-2020.
4	MyWater Water Management Tool	SF, MF, CII And IRR	A web-based water management tool available to all City customer to view water use reports, compare water use to budgets, and sign up for leak alerts. Customers with AMI can view water use information on up to an hourly basis.	The MyWater website was in place during 2015-2020.
4	School Education Program: EarthCapades Assemblies	SF, MF	School assemblies that teach water science and conservation to students, including local water source and watershed education and specific information pertaining to the City's service area. The City participates through the BAWSCA Regional Water Conservation Program.	2016: 15 assemblies 2017: 15 assemblies 2018: 13 assemblies 2019: 17 assemblies 2020: 19 assemblies
4	Water-Wise School Education Kits and Curriculum	SF, MF	Fifth grade teachers are provided with a water conservation curriculum. Kits are distributed to 5th grade students that enable them to install water saving devices and perform a water audit in their home. The City participates through the BAWSCA Regional Water Conservation Program.	2016: 563 kits 2017: 601 kits 2018: 575 kits 2019: 481 kits 2020: 403 kits
4	Tuolumne River Trust Classroom Presentations	SF, MF	Classroom presentations including a visual tour of the Tuolumne River, history of the Hetch-Hetchy water system, and discussions about water conservation. The City participates through the BAWSCA Regional Water Conservation Program.	2016: 11 presentations 2017: 6 presentations 2018: 0 presentations 2019: 0 presentations 2020: 0 presentations

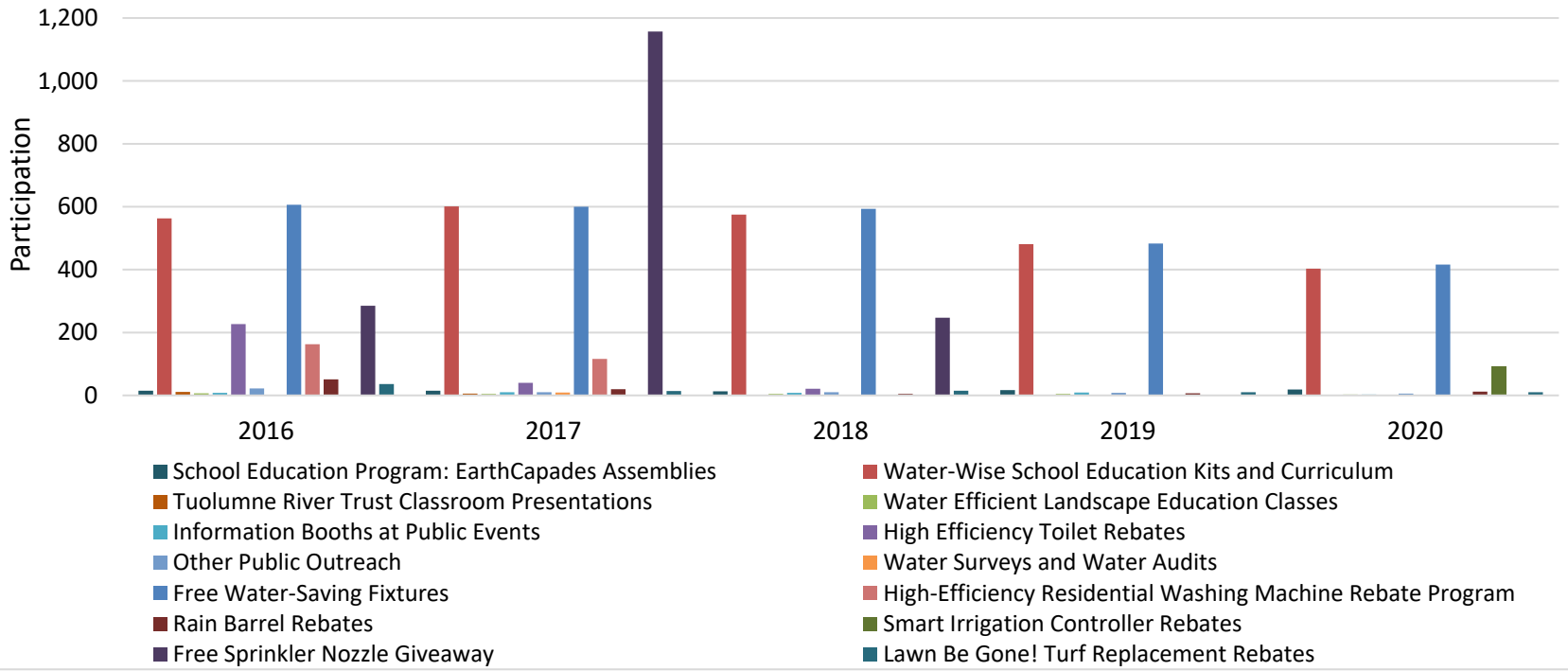
DMM Category	Program or Activity	Target Sector	Nature of Implementation	Extent of Implementation
4	Water Conservation Poster Contest	SF, MF	An annual poster contest for students and awards prizes for the best entries in various categories.	A poster contest was hosted in each year between 2016-2019 (was not held in 2020 due to Covid-19).
4	Water Efficient Landscape Education Classes	SF, MF	Free classes developed by BAWSCA and advertised and hosted by Redwood City provide information regarding water efficient landscaping and the City's water conservation programs. The classes focus on creating beautiful, water-efficient gardens as an alternative to lawns. The City participates through the BAWSCA Regional Water Conservation Program.	2016: 7 classes 2017: 5 classes 2018: 5 classes 2019: 5 classes 2020: 3 classes
4	*Water Wise Gardening in the Bay Area* Landscape Education Tool	SF, MF	The City promotes the landscape education tool available online via BAWSCA's website. The tool contains information on how to create and maintain a beautiful, low-water-use garden.	The City promotes and provides a link to the tool on its water conservation program website and offers free CD-ROMs of the tool to its customers. This program was in place between 2016-2020.
4	Information Booths at Public Events	SF, MF, CII And IRR	At public events, the City distributes information and materials to participants regarding its water conservation programs.	2016: 8 events 2017: 10 events 2018: 8 events 2019: 9 events 2020: 3 events
4	Drought Assistance	SF, MF, CII And IRR	The City provided drought assistance to its customers, including but not limited to leak noticing, high water bill noticing, Large Landscape Program customer service, and conservation program assistance.	The City stopped tracking drought contacts in 2016.
4	Other Public Outreach	SF, MF, CII And IRR	The City maintains water conservation program pages on its website and promotes water conservation through its social media accounts and ENews: http://www.redwoodcity.org/departments/public-works/water/conservation. The City markets its rebate programs and water-saving fixture giveaways primarily through bill inserts, as well as cartvertizing during the drought in 2015 and 2016.	2016: 22 incidents 2017: 10 incidents 2018: 10 incidents 2019: 8 incidents 2020: 6 incidents

DMM Category	Program or Activity	Target Sector	Nature of Implementation	Extent of Implementation
5	Programs to Assess and Manage Distribution System Real Loss	Non-revenue	The City has a leak detection and repair program and surveys the water system on an ongoing basis. Customers can also report water main or service line leaks to the City; the City will respond in a few hours. The City provides automated leak alerts to customers with AMI.	The leak detection and repair program was in place 2016-2020.
6	Conservation Program Coordination and Staff	SF, MF, CII And IRR	The City employs coordination staff and funds the water conservation program.	The water conservation program is coordinated and administered by the water conservation team.
7	Water Allocation Program	SF	Program produces informational water budgets for single family customers. The water budget reflects what each household should use if common water efficient technologies and practices are employed. Customers receive water use reports comparing actual water use compared to his/her water budget.	The Water Allocation Program was in place 2016-2020.
7	Large Landscape Program	IRR	The City provides and tracks water budgets for all irrigation accounts. Performance with respect to the water budgets are tied to a budget-based water rate. The City offers free water audits to target sites that request assistance.	The Large Landscape Program water budgets were in place for all irrigation accounts 2016-2020. 2016: 0 audits 2017: 0 audits 2018: 0 audits 2019: 0 audits 2020: 1 audit
7	Water Surveys and Water Audits	SF, MF, CII	Free residential water use surveys including checking fixtures for leaks, distributing free water saving fixtures, and providing advice on outdoor irrigation efficiency. Free CII water audits offered to top water users to evaluate ways for businesses to save water and cost.	2016: 1 residential survey; 0 CII audits 2017: 9 residential surveys, 0 CII audits 2018: 1 residential survey, 0 CII audits 2019: 2 residential surveys, 0 CII audits 2020: 1 residential survey, 0 CII audits
7	Free Water-Saving Fixtures	SF, MF	Water-saving fixture kits are available to residential customers at City Hall or by mail upon request, and include two bathroom sink aerators and a kitchen sink aerator.	2016: 606 kits 2017: 600 kits 2018: 593 kits 2019: 483 kits 2020: 416 kits

DMM Category	Program or Activity	Target Sector	Nature of Implementation	Extent of Implementation
7	High Efficiency Toilet Rebate	SF, MF, CII	Up to $125 rebate for qualifying toilets less than 1.06 gpf; up to $75 rebate per HET (between 1.06 and 1.28 gpf). Up to three rebates are allowed per residential units and up to ten rebates are allowed per commercial customer account. The City participates through the BAWSCA Regional Water Conservation Program.	The High Efficiency Toilet Rebate Program was in place 2016-2018. 2016: 227 rebates 2017: 40 rebates 2018: 21 rebates 2019: 0 rebates 2020: 0 rebates
7	High-Efficiency Residential Washing Machine Rebate Program	SF, MF	Through a partnership with PG&E, up to a $150 rebate is offered to residential customers, for qualifying high-efficiency washing machines. The City participates through the BAWSCA Regional Water Conservation Program.	The High Efficiency Residential Washing Machine Rebate Program was in place 2016-2017. 2016: 163 rebates 2017: 116 rebates 2018: 0 rebates 2019: 0 rebates 2020: 0 rebates
7	Rain Barrel Rebates	SF	Up to $100 rebate per rain barrel through partnership with the San Mateo Countywide Water Pollution Prevention Program. The City participates through the BAWSCA Regional Water Conservation Program.	2016: 51 rebates 2017: 20 rebates 2018: 5 rebates 2019: 7 rebates 2020: 12 rebates
7	Smart Irrigation Controller Rebate	SF and IRR	Discount on a Rachio 3 Smart Sprinkler Controller for retail customers. The program is sponsored by BAWSCA.	The Smart Irrigation Controller Rebate program began in February 2020. 2020: 93 rebates
7	Free Sprinkler Nozzle Giveaway	SF, MF, CII And IRR	Free water efficient sprinkler nozzles are available to residential customers through partnership with FreeSprinklerNozzles.com. Each customer is eligible for up to 25 free high efficiency nozzles at a retail value of $4 to $10 each.	The Free Sprinkler Nozzle Giveaway Program was in place 2016-2018. 2016: 285 sprinkler nozzles 2017: 1157 sprinkler nozzles 2018: 247 sprinkler nozzles

DMM Category	Program or Activity	Target Sector	Nature of Implementation	Extent of Implementation
7	Lawn Be Gone! Turf Replacement Rebates	SF, MF, CII	Customers are offered $1 per square foot of turf removed and replaced with water-efficient landscaping. The new landscape must include at least 50% live plant coverage, permeable hardscape, and all plants must be low water use plants from the BAWSCA-approved plant list. The City participates through the BAWSCA Regional Water Conservation Program.	2016: 36 sites, 35,251 square feet removed 2017: 14 sites, 12,084 square feet removed 2018: 15 sites, 12,813 square feet removed 2019: 10 sites, 12,097 square feet removed 2020: 10 sites, 7,798 square feet removed

Chart 9-1 DMM Participation (2016-2020)



9.4 Planned Implementation to Achieve Water Use Targets

☑ ***CWC § 10631 (e)***

Provide a description of the supplier's water demand management measures. This description shall include all of the following:

(1) (A) … 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.

Redwood City implemented the DMMs discussed above to achieve its Senate Bill (SB) X7-7 water use targets. As shown in Chapter 5, the City's water use in 2020 was 99 gallons per capital per day (GPCD), which is lower than its SB X7-7 water use target of 124 GPCD.

9.5 Urban Water Use Objectives (Future Requirement)

CWC §10609 requires that urban retail water suppliers develop new water use objectives that are based on specific standards for certain water use sectors. These water use objectives will not be developed until 2023. Suppliers are encouraged in this UWMP cycle to consider how they will align their conservation management actions in order to meet these future obligations.

Redwood City intends to continue and expand implementation of the DMMs discussed above and will continue to participate in BAWSCA's Regional Water Conservation Programs and maintain membership with CalWEP.

BAWSCA led its member agencies in a multi-year effort to develop and implement a strategy to meet these new legislative requirements. BAWSCA's Making Conservation a Way of Life Strategic Plan (Strategic Plan) provided a detailed roadmap for member agencies to improve water efficiency. BAWSCA implementing the following elements of the Strategic Plan:

- Conducted an assessment of the agencies' current practices and water industry best practices for three components of the efficiency legislation that, based on a preliminary review, present the greatest level of uncertainty and potential risk to the BAWSCA agencies. The three components were:
    1. Development of outdoor water use budgets in a manner that incorporates landscape area, local climate, and new satellite imagery data.
    2. Commercial, Industrial, and Institutional water use performance measures.
    3. Water loss requirements.
- Organized an Advanced Metering Infrastructure symposium to enable information exchange, including case studies, implementation strategies, and data analysis techniques.

- Initiated a regional CII audit pilot program, which BAWSCA aims to complete in 2021.[29]
- Implemented a regional program for water loss control to help BAWSCA agencies comply with regulatory requirements and implement cost-effective water loss interventions.
- Engaged with the SFPUC to audit meter testing and calibration practices for SFPUC's meters at BAWSCA agency turnouts.

Finally, BAWSCA's Demand Study developed water demand and conservation projections through 2045 for each BAWSCA agency. These projects are designed to provide valuable insights on long-term water demand patterns and conservation savings potential to support regional efforts, such as implementation of BAWSCA's Long-Term Reliable Water Supply Strategy.

In the future, specific program offerings may change as the market evolves. The City's 2020 DSS Model, as described in Section 4.2, estimates projected water demands and quantifies passive and active conservation water savings potential. As discussed in Section 4.6, the DSS Model projections demonstrate that per capita indoor residential potable water use within the City's service area is expected to be below the indoor use standards presented in the legislation.

[29] Efforts on the CII audit pilot program stalled in March 2020 due to the COVID 19 pandemic and related shelter-in-place orders.

10. PLAN ADOPTION AND SUBMITTAL

Preparation of the Urban Water Management Plan (UWMP) and the Water Shortage Contingency Plan (WSCP) began in January 2021 for completion in July 2021, with notifications and interactions between stakeholders as discussed further below.

10.1 Notification of UWMP Preparation

☑ ***CWC § 10621 (b)***

Every urban water supplier required to prepare a plan pursuant to this part shall, at least 60 days before the public hearing on the plan required by Section 10642, notify any city or county within which the supplier provides water supplies that the 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.

On January 21, 2021, the City of Redwood City ("City" or "Redwood City") sent a letter to 50 recipients from 28 entities, including the San Francisco Public Utilities Commission (SFPUC), Bay Area Water Supply and Conservation Agency (BAWSCA), each BAWSCA member agency, San Mateo County, and other local agencies informing them that the City was in the process of updating its UWMP and WSCP and soliciting their input in the update process. A list of the entities contacted is provided in Table 2-4 and Appendix B. The letter was sent more than 60 days before the public hearing as required by California Water Code (CWC) §10621(b). A sample outreach letter is included in Appendix B.

10.2 Notification of Public Hearing

☑ ***CWC § 10642***

Each urban water supplier 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 both the plan and the water shortage contingency plan. Prior to adopting either, the urban water supplier shall make both the plan and the water shortage contingency plan available for public inspection and shall hold a public hearing or hearings thereon. Prior to any of these hearings, 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 a hearing to any city or county within which the supplier provides water supplies. Notices by a local public agency pursuant to this section shall be provided pursuant to Chapter 17.5 (commencing with Section 7290) of Division 7 of Title 1 of the Government Code. A privately owned water supplier shall provide an equivalent notice within its service area. After the hearing or hearings, the plan or water shortage contingency plan shall be adopted as prepared or as modified after the hearing or hearings.

10.2.1 Notice to Cities and Counties

On May 18, 2021, the City sent a letter to each of the above-mentioned entities informing them the locations the Public Review Draft 2020 UWMP and the updated WSCP would be available for review and welcoming their input and comments on the document. The Public Review Draft 2020 UWMP and the WSCP were available for public review at the City Hall and on the City's website. The letter also informed the agencies that the UWMP and WSCP public hearing would be occurring at City Hall on June 14, 2021. A sample copy of the notification letters is included in Appendix B.

10.2.2 Notice to the Public

The City issued public notifications soliciting public input during the preparation of 2020 UWMP and the WSCP. On May 28, June 4, and June 11, 2021, the City published a notice in the *San Mateo Daily Journal* informing informing the public that the 2020 UWMP and the WSCP would be available for public review at City Hall and on the City's website, consistent with requirements of California Government Code 6066. The notice also informed the public that the 2020 UWMP and WSCP public hearing would be held at City Hall on June 14, 2021. Copies of the newspaper announcements are included in Appendix C.

10.3 Public Hearing and Adoption

☑ ***CWC § 10608.26***

(a) In complying with this part, an urban retail water supplier shall conduct at least one public hearing to accomplish all of the following:

(1) Allow community input regarding the urban retail water supplier's implementation plan for complying with this part.

(2) Consider the economic impacts of the urban retail water supplier's implementation plan for complying with this part.

(3) Adopt a method, pursuant to subdivision (b) of Section 10608.20, for determining its urban water use target.

As described above, the City informed the public and the appropriate agencies of: (1) its intent to prepare a UWMP and the associated WSCP, (2) where the UWMP and WSCP were available for public review, and (3) when the public hearing regarding the UWMP and WSCP would be held.

Pursuant to CWC §10608.26(a), as part of the public hearing, the City provided the audience with information on compliance with the Senate Bill (SB) X7-7, including its baseline daily per capita water use, water use targets, implementation plan, and 2020 compliance.

This UWMP was adopted by Resolution No. 15961 by the City Council during the June 14, 2021 City Council meeting. The WSCP included as Appendix L was adopted by Resolution No. 15962 during the same meeting. Copies of the resolutions are included in Appendix N and Appendix O, respectively.

10.4 Plan Submittal

☑ ***CWC § 10621***

(f) (1) Each urban water supplier shall update and submit its 2020 plan to the department by July 1, 2021.

☑ ***CWC § 10635 (c)***

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.

☑ ***CWC § 10644***

(a) (1) An urban water supplier shall submit to the department, the California State Library, and any city or county within which the supplier provides water supplies a copy of its plan no later than 30 days after adoption. Copies of amendments or changes to the plans shall be submitted to the department, the California State Library, and any city or county within which the supplier provides water supplies within 30 days after adoption.

(2) The plan, or amendments to the plan, submitted to the department pursuant to paragraph (1) shall be submitted electronically and shall include any standardized forms, tables, or displays specified by the department.

(b) If an urban water supplier revises its water shortage contingency plan, the supplier shall submit to the department a copy of its water shortage contingency plan prepared pursuant to subdivision (a) of Section 10632 no later than 30 days after adoption, in accordance with protocols for submission and using electronic reporting tools developed by the department.

A copy of the adopted 2020 UWMP and associated WSCP will be provided to the Department of Water Resources (DWR), the California State Library, San Mateo County, and SFPUC within 30 days of the adoption. An electronic copy of the adopted 2020 UWMP will be submitted to the DWR using the DWR online submittal tool.

10.5 Public Availability

☑ ***CWC § 10645***

(a) Not later than 30 days after filing a copy of its plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.

(b) Not later than 30 days after filing a copy of its water shortage contingency plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.

A copy of the adopted 2020 UWMP and associated WSCP will be available for public review in the City Hall during normal business hours and on the City's website within 30 days of filing the plan with DWR.

10.6 Amending an Adopted Urban Water Management Plan or Water Shortage Contingency Plan

☑ ***CWC § 10644 (b)***

If an urban water supplier revises its water shortage contingency plan, the supplier shall submit to the department a copy of its water shortage contingency plan prepared pursuant to subdivision (a) of Section 10632 no later than 30 days after adoption, in accordance with protocols for submission and using electronic reporting tools developed by the department.

If the UWMP or WSCP are amended, each of the steps for notification, public hearing, adoption, and submittal will also be followed for the amended document.

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