

SAN FRANCISCO PUBLIC UTILITIES COMMISSION

ALTERNATIVE WATER SUPPLY PLAN

FEBRUARY 2024



San Francisco
Water Power Sewer
Services of the San Francisco Public Utilities Commission

CONTENTS

Acronyms & Abbreviations	vi
Executive Summary	x
Chapter 1: Introduction	1
1.1 Planning History	2
1.2 Water Supply Planning Challenges	5
1.3 Alternative Water Supply Program and Plan	7
1.3.1 The SFPUC's Regional Focus for the AWS Program	8
1.3.2 Role of Wholesale Customers and BAWSCA in the AWS Program Development and Implementation	8
1.4 Organization of the AWS Plan	9
Chapter 2: Background	11
2.1 SFPUC Service Area and Customers	11
2.2 Regional Water System Overview	15
2.2.1 Operational Organization of the RWS	15
2.2.3 Bay Area Portion of the RWS	19
2.2.4 RWS Infrastructure and WSIP	21
2.3 Water Supply	21
2.3.1 Current Water Availability with WSIP Implemented	22
2.4 SFPUC Obligations and Demands	24
2.4.1 The SFPUC's Legal and Contractual Obligations with the Wholesale Customers	24
2.4.2 Retail Service Area Obligations	27
2.4.3 Current and Historical Demands	27
2.4.4 Projected Future Demands	30
Chapter 3: Future Water Supply Gap	33
3.1 Approach for Identifying the Future Water Supply Gap	33
3.1.1 Contribution of Rationing to Address the Future Water Supply Gap	34
3.2 Drivers Affecting Water Availability	35
3.2.1 The Bay-Delta Plan Amendment	35
3.2.2 Potential Future Regulations	38
3.2.3 Climate Uncertainty	38
3.2.4 SFPUC Planning Assumptions for Projecting Dry-Year Water Availability	39

3.3 Drivers Affecting Obligations and Customer Demands	39
3.3.1 Supply Assurance under the Water Supply Agreement and Retail Allocation	40
3.3.2 Additional Supply if San Jose and Santa Clara are made Permanent Customers	40
3.3.3 Projected Customer Demands	41
3.3.4 Customer Reliance on RWS Supplies	41
3.4 Future Water Supply Gap (2045)	42
Chapter 4: AWS Program Role in Addressing the Future Water Supply Gap	45
4.1 Demand Reduction through Water Conservation Activities	46
4.2 Reducing Demands on the RWS through Local Water Projects	47
4.3 Other Projects to Increase the Availability of Existing Surface Water Supplies	51
4.4 AWS Planning Approach	52
4.4.1 Challenges Unique to Alternative Water Supply Planning	53
4.4.2 AWS Program Goal	57
4.4.3 AWS Planning Principles	57
4.4.4 Purpose of the AWS Plan	60
4.4.5 Strategies for Supporting Informed Decision-Making	60
Chapter 5: AWS Projects	63
5.1 Characterization of AWS Projects	63
5.1.1 Type of Project and Water Supply	63
5.1.2 Supply Availability	66
5.2 Overview of AWS Projects	66
5.2.1 RWS Supply Assumed and Project Capacity	72
5.2.2 AWS Staffing Considerations	72
5.2.3 AWS Cost Considerations	73
5.3 Project Description Tables	76
Chapter 6: AWS Recommendations	111
6.1 Avoid Widening the Water Supply Gap	112
6.1.1 Water Supply Benefits of Existing WSIP Projects	112
6.1.2 Other Actions Affecting Water Availability from the RWS	114
6.1.3 Baseline Demands on the RWS	116

6.2 Fill the Water Supply Gap	119
6.2.1 AWS Projects	119
6.2.2 AWS Program	124
6.3 Reduce the Water Supply Gap	127
6.3.1 New Local Supplies	127
6.4 Summary of Recommendations	129
Glossary	132
Appendix A: Customer Profiles	A-1
Appendix B: Water Availability Modeling	A-29
Appendix C: AWS Program Cost Development Approach	A-35
Appendix D: Response to Comments	A-45

TABLES

Table 2-1: Overview of SFPUC Customers	12
Table 2-2: Dry-Year Water Availability	23
Table 2-3: SFPUC Customer Projected Demands on the RWS in 2045	30
Table 3-1: Projected 2045 Water Availability during Dry Years, with and without the Bay-Delta Plan Amendment	36
Table 4-1: AWS Planning Principles	58
Table 5-1: AWS Project Summary Table	68
Table 6-1: Comparison of Wholesale Customer Purchases from the RWS (FY 2008-09 to present)	118
Table 6-2: Summary of Recommendations	129

FIGURES

Figure 1-1: SFPUC’s History of Water Supply Planning	2
Figure 1-2: Elements of SFPUC Future Water Supply Planning	6
Figure 2-1: SFPUC Wholesale Service Area and Customers	13
Figure 2-2: SFPUC Retail Customer Locations	14
Figure 2-3: The RWS and Main Facilities	16
Figure 2-4: Components Used to Estimate Dry-Year Water Availability	23
Figure 2-5: Visual Representation of Wholesale Customers	26
Figure 2-6: Historical Retail and Wholesale Demands on the RWS (2000-2022)	28
Figure 2-7: Projected Retail and Wholesale Demands on the RWS (2025-2045)	31
Figure 3-1: Approach Used to Calculate the Water Supply Gap	33
Figure 3-2: Drivers which Affect the Future Water Supply Gap	34
Figure 3-3: Estimated Contributions of New Water Supplies and Rationing Needed to Fill the Future Water Supply Gap	35
Figure 3-4: Water Supply Gap for Meeting Obligations and 2045 Demands in Dry-Year Conditions	42
Figure 4-1: Long-Term Water Supply Planning Coordinated Approach of Local and Regional Actions	45
Figure 4-2: Wholesale Customer 2045 Demand Projections by Source	50
Figure 5-1: Map of AWS Project Locations	67

ACRONYMS & ABBREVIATIONS

\$ mil	Dollars in millions
\$/AF	Dollars per acre-foot
1984 Agreement	1984 Settlement Agreement and Master Water Sales Contract
AACE	Association for the Advancement of Cost Engineering
ACWD	Alameda County Water District
ACRP	Alameda Creek Recapture Project
AFY	Acre-foot per year
AWS	Alternative Water Supply
AWTF	Advanced Water Treatment Facility
AWS Plan or Plan	Alternative Water Supply Plan
AWS Projects	Alternative Water Supply Projects
BAWSCA	Bay Area Water Supply and Conservation Agency
Bay-Delta Plan Amendment	2018 Amendment to the Water Quality Control Plan for San Francisco Bay/Sacramento-San Joaquin Delta Estuary
BDPLs	Bay Division Pipelines
Cal Water	California Water Service Company
CCWD	Contra Costa Water District
CDD	City Distribution Division
CEQA	California Environmental Quality Act
CIP	Capital Improvement Plan
Coastside CWD	Coastside County Water District
DPR	Direct potable reuse
DWR	California Department of Water Resources
EBMUD	East Bay Municipal Utility District

FERC	Federal Energy Regulatory Commission
FY	Fiscal year
gpcd	Gallons per capita per day
gpm	Gallons per minute
HHWP	Hetch Hetchy Water and Power
IPR	Indirect potable reuse
ISG	Individual Supply Guarantee
ISL	Interim Supply Limitation
JPA	Joint Powers Authority
LOS	Level of Service
LTVA	Long-term Vulnerability Assessment
LVE	Los Vaqueros Expansion Project
mgd	million gallons per day
NEPA	National Environmental Policy Act
NGO	Non-governmental organizations
NPDES	National Pollutant Discharge Elimination System
O&M	Operations and Maintenance
PEIR	Programmatic Environmental Impact Report
RGSR	Regional Groundwater Storage and Recovery
RWS	Regional Water System
San Francisco	City and County of San Francisco
SBA	South Bay Aqueduct
SFPUC	San Francisco Public Utilities Commission
State	State of California

continued on next page

ACRONYMS & ABBREVIATIONS

SVCW	Silicon Valley Clean Water
SWP	State Water Project
SWRCB	State Water Resources Control Board
The Peninsula	San Francisco Peninsula
USBR	United States Bureau of Reclamation
USD	Union Sanitary District
UWMP	Urban Water Management Plan
Westside Project	Westside Enhanced Water Recycling Project
WQD	Water Quality Division
WSA	Water Supply Agreement
WSIP	Water System Improvement Program
WSTD	Water Supply and Treatment Division
WTP	Water treatment plant
WWTP	Wastewater treatment plant

Blue text within this document indicates key terms that are defined in the glossary. They are not highlighted every time they appear, or necessarily even the first time they appear, rather only when it serves to emphasize a main theme of the section.

Information and assumptions contained in this document are based on the latest available data as of May 2023. Changes related to capital budget planning were updated as of December 2023.

Executive Summary

The San Francisco Public Utilities Commission (SFPUC) is the third largest municipal utility in California, providing drinking water for more than 2.7 million residents and businesses within San Francisco and three other Bay Area counties by way of the San Francisco Regional Water System (RWS). The RWS draws approximately 85% of its water from Hetch Hetchy Reservoir in the Sierra Nevada's Tuolumne River watershed and the remaining 15% of its water supply from local surface waters in the Alameda and Peninsula watersheds.

RWS supplies serve both retail and wholesale customers. These include retail customers located within the City of San Francisco (in-City retail customers), retail customers located outside San Francisco (suburban retail customers), and 27 wholesale customers located in Alameda, Santa Clara, and San Mateo counties. Of the wholesale customers, 26 are represented by the Bay Area Water Supply and Conservation Agency (BAWSCA).



Crystal Springs Reservoir, 2019

While the SFPUC serves as both a wholesale and retail water supplier, the SFPUC is undertaking the development of the Alternative Water Supply Program (AWS Program) with a regional focus as the operator and steward of the RWS responsible for delivering reliable supplies to customers throughout its service area.

The SFPUC is undertaking the Alternative Water Supply Program for two main reasons.

First, the SFPUC faces potential future reductions to its existing water supply that could require the development of new supplemental sources to improve long-term water supply reliability. Climate change and future regulatory uncertainties could exacerbate the need for new diversified and distributed supply sources.

Second, the SFPUC Commission faces a policy decision by December 31, 2028 of whether or not to make the cities of San Jose and Santa Clara permanent customers of the SFPUC; these two cities have held temporary, interruptible status with the SFPUC since the 1970s. By identifying a supply source(s) to address San Jose and Santa Clara's demands, the AWS Program can help provide relevant information to the SFPUC Commission to make this decision.

This AWS Plan is intended to guide decision-making and provide recommendations on project implementation and areas for future analysis.

The AWS Plan includes:

- Identification of the anticipated water supply gap through the 2045 planning horizon
- Description of ongoing efforts to reduce demands and optimize RWS supply availability
- Description of AWS Projects that can augment RWS supply and address the future water supply gap
- Recommendations that will further advance the AWS Program

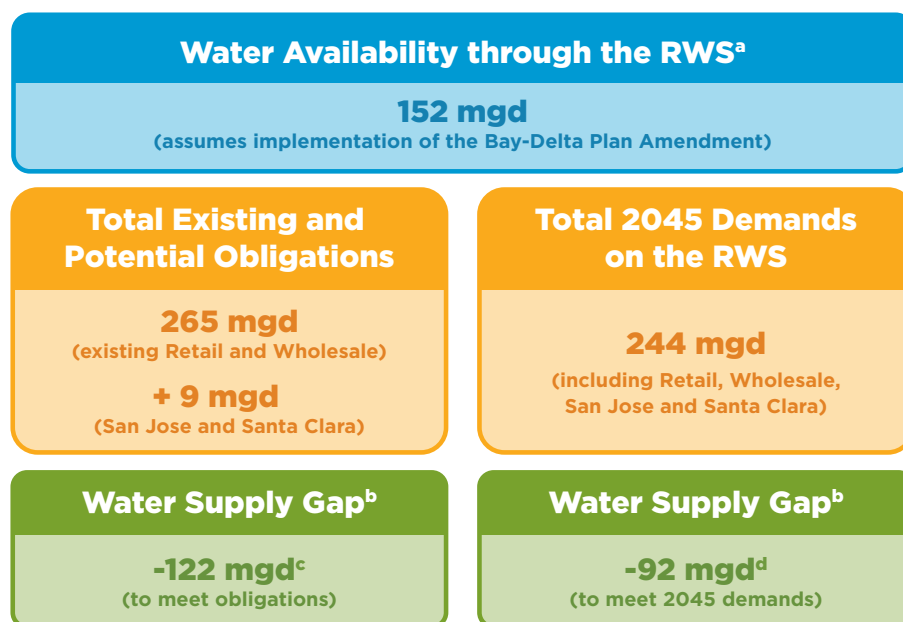
Addressing the Water Supply Gap

The SFPUC's water supply planning reflected in the AWS Program is based on anticipated supplies compared to obligations and projected demands in 2045. By comparing factors both on the supply side, which affect future water availability, and on the demand side, which consider obligations and future demands, the SFPUC can identify and address a potential water supply shortfall or water supply gap. **The AWS Program identifies a future water supply gap in dry years, both to meet existing and potential obligations to its customers, and to meet future customer demands.**



One of the most pronounced drivers affecting water availability is the potential implementation of the 2018 Amendment to the State Water Resources Control Board's San Francisco Bay/Sacramento-San Joaquin Delta Estuary Water Quality Control Plan (Bay-Delta Plan Amendment). Unlike other factors that could affect SFPUC's water supply, such as climate change, the effect of implementing the Water Quality Control Plan update would be immediate. **The Bay-Delta Plan Amendment, if implemented as adopted in 2018, would result in new instream flow requirements that would reduce projected water availability from the RWS in dry years, as expressed as total system yield, from 257 mgd to 152 mgd.** This reduction in water availability would result in a significant water supply gap in dry years. However, the requirements of the Bay-Delta Plan Amendment are still under review as part of a Proposed Voluntary Agreement and may change as a result of ongoing negotiations between the SFPUC and the State. The results of these negotiations will impact water availability, which will in turn impact future water supply gap estimates.

For this AWS Plan, the future water supply gap is characterized as a range of 92 mgd to meet 2045 customer demands to 122 mgd to meet obligations. Based on the SFPUC's rationing policy, rationing could contribute to filling approximately 12% of the water supply gap. The remaining gap would need to be addressed through the development of new regional alternative water supply projects (AWS Projects).



a Represents the total system yield. The total system yield is the sum of the firm yield of the RWS plus rationing (134 mgd firm yield and 18 mgd of demands addressed by implementing the rationing policy [see Chapter 2 for additional detail]).

b The water supply gap estimates: 1) the total difference between water availability and obligations and 2) the difference between water availability and customer demands on the RWS in 2045.

c As rationing is a function of water supply availability, to close the gap with new supplies and rationing, new supplies of 107 mgd would be required. Up to 15 mgd of the water supply gap can then be met by rationing.

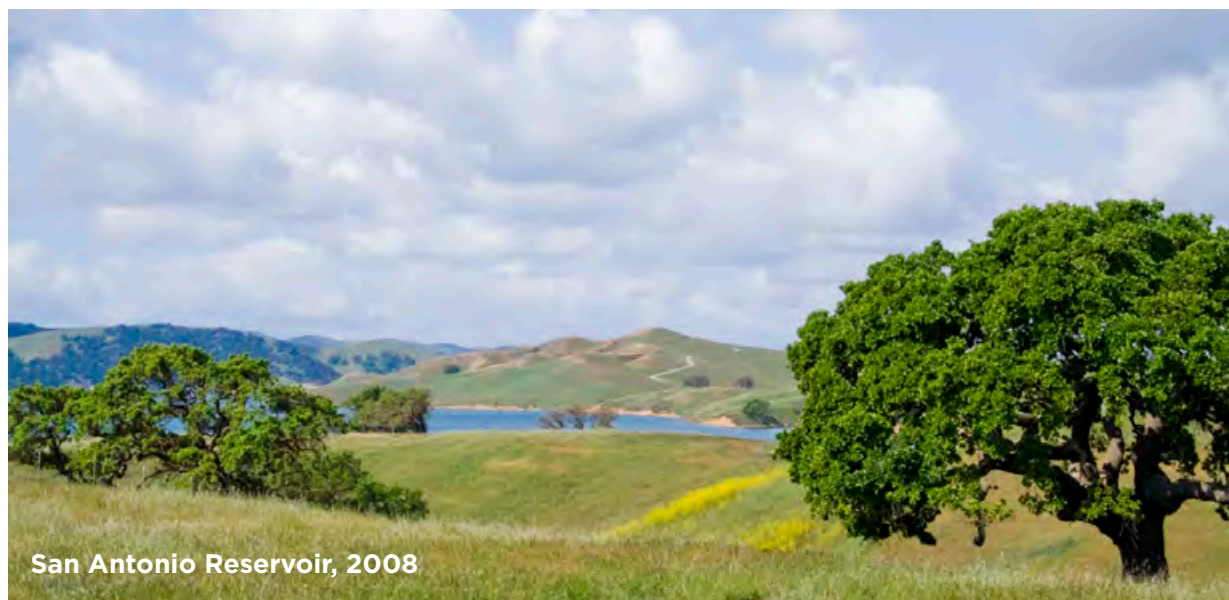
d As rationing is a function of water supply availability, to close the gap with new supplies and rationing, new supplies of 81 mgd would be required. Up to 11 mgd of the water supply gap can then be met by rationing.

Project and Programmatic Recommendations

To avoid overbuilding new water supply projects, the approach reflected in the AWS Program is to *Plan for Obligations and Build for Demands*. This approach recognizes the importance of developing water supplies to meet obligations while prioritizing investments that focus on the most imminent need of meeting customer demands. Furthermore, the AWS Program outlines a dynamic planning process that is adaptive to changing conditions and challenges. As water availability and demand projections continue to be updated, the approach requires that the projected gap and AWS Plan be revisited periodically as changes occur, thereby enabling the AWS Plan to move forward in a stepwise manner. This allows recommendations to be phased in order to balance forward action and progress of project development, while minimizing the risk of overcommitting financial resources.

The goal of the AWS Program is to identify water supply projects that increase the dry-year reliability of RWS supplies and address the long-term water supply gap in alignment with the Level of Service Goals and Objectives.

As summarized in the table below, **this AWS Plan describes the six AWS Projects that are currently being planned and evaluated to address the water supply gap**: one recycled water project that offsets groundwater pumping, three regional purified water projects, and two storage expansion projects with associated conveyance alternatives and supply, as needed. **Based on current planning estimates, these projects can augment supplies of 22 mgd to 48 mgd in future dry years.** Each of the projects are at different stages of planning and design, and their need for funding and commitment for implementation will be staggered. The dry-year supply benefit they can provide for the SFPUC may also continue to change. Measured project-specific recommendations can help advance the AWS Projects so they can continue being planned while limiting financial and operational risks of overbuilding or overcommitting financial resources.

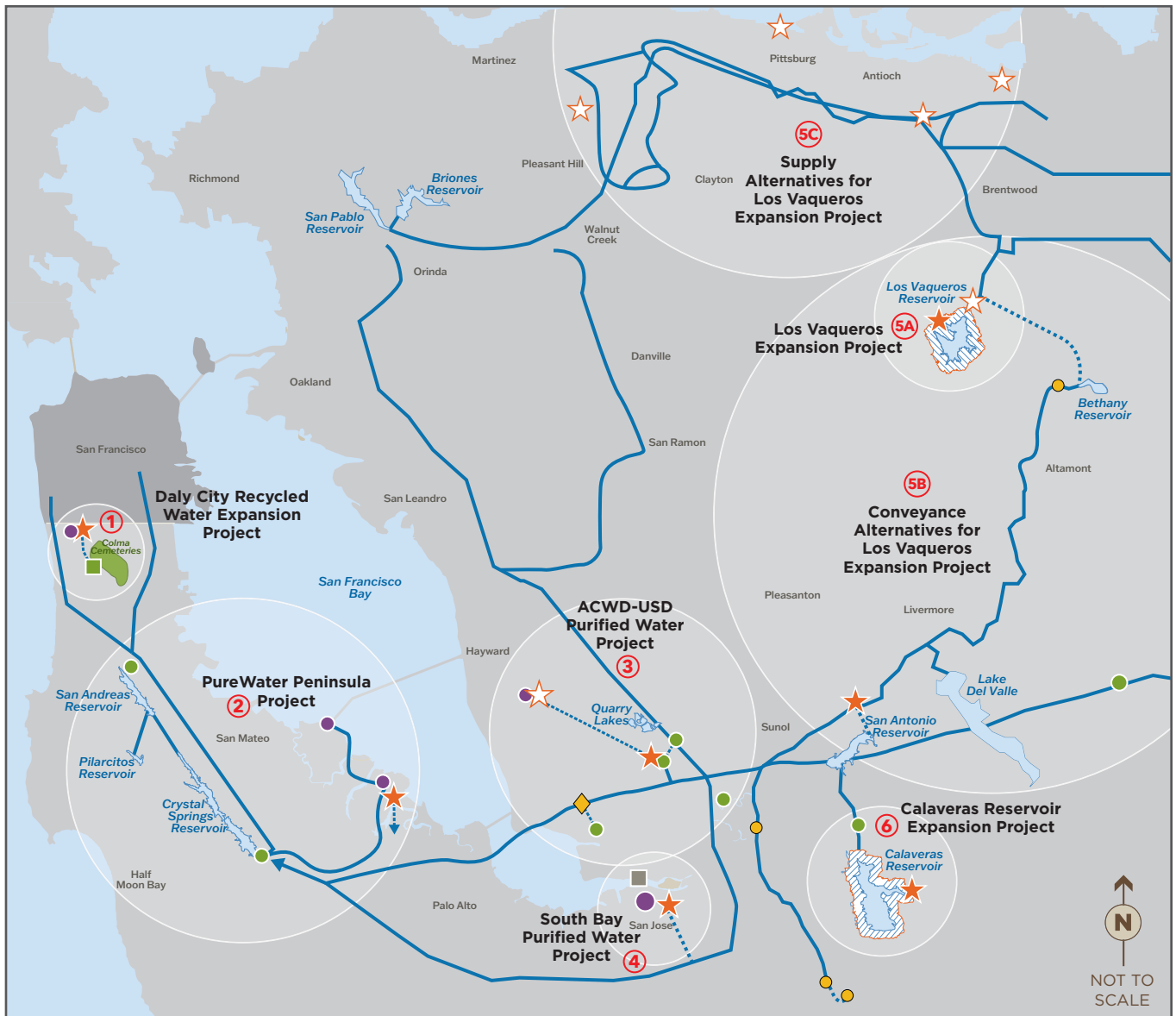


San Antonio Reservoir, 2008

Alternative Water Supply Projects

Project	Project Type	Project Status	Earliest Online Date	Regional Supply Assumed	AWS Plan Recommendations
1. Daly City Recycled Water Expansion	Recycled Water/ Groundwater	Design	2030	0.7 mgd	<ul style="list-style-type: none"> Continue developing agreement terms with partners and potential customers In anticipation of near-term approval of agreements, funding of \$114.7 million is proposed in the FY 2025-2034 CIP to complete final design and construction of the project
2. PureWater Peninsula	Purified Water (Potable Reuse)	Planning	2039	6 mgd	<ul style="list-style-type: none"> Continue planning through environmental review and 10% design Funding of \$5.3 million is proposed in the FY 2025-2034 CIP to complete planning, environmental review, and 10% design
3. ACWD-USD Purified Water	Purified Water (Potable Reuse)	Planning	2039	5.4 mgd	<ul style="list-style-type: none"> Continue planning through environmental review and 10% design Funding of \$8 million is proposed in the FY 2025-2034 CIP to complete planning, environmental review, and 10% design
4. South Bay Purified Water	Purified Water (Potable Reuse)	Planning	2038	3.5 mgd	<ul style="list-style-type: none"> Continue planning through environmental review and 10% design Funding of \$6.7 million is proposed in the FY 2025-2034 CIP to complete planning, environmental review, and 10% design
5A. Los Vaqueros Expansion (LVE)	Storage	Planning	2030	3.9 mgd	<ul style="list-style-type: none"> Develop water supply strategy for LVE Supply Options and agreement terms for conveyance Based on supply strategy, AWS staff will recommend whether to approve participation in the LVE the project in 2024 Funding of \$42.5 million is proposed in the FY 2025-2034 CIP to complete the design and construction of the storage component Funding of \$4.3 million is proposed in the FY 2025-2034 CIP to complete the design and construction of the conveyance component Funding of \$6.7 million is proposed in the FY 2025-2034 CIP to continue planning the supply component
5B. Conveyance Alternatives for LVE	Conveyance	Planning	2030	--	
5C. Supply Alternatives for LVE	Transfers and/or Alternative Supply	Planning	2030 (for transfers) to 2040 (for alternative supplies)	--	
6. Calaveras Reservoir Expansion	Storage (with conveyance)	Planning	2035 to 2039*	2.7 - 28.6 mgd*	<ul style="list-style-type: none"> Continue planning through the Alternatives Analysis No additional funding is proposed in the FY 2025-2034 CIP

* Online date and supply depend on which of the Calaveras Dam raise options is selected, the range shown represents the smallest and largest dam raise options



LEGEND All locations and sizes shown are approximate and represent the general vicinity for potential facilities. Shaded circles serve to indicate project facilities associated with each project; they do not indicate project size or volume of water produced.

	Existing Pipeline		Daly City Recycled Water Expansion Project
	Potential/Proposed Pipeline		PureWater Peninsula Project
	Potential/Proposed Project Facility		ACWD-USD Purified Water Project
	Alternate Potential/Proposed Project Facility		South Bay Purified Water Project
	Water Treatment		Los Vaqueros Expansion Project
	Water Storage		Conveyance Alternatives for Los Vaqueros Expansion Project
	Potential New Outfall		Supply Alternatives for Los Vaqueros Expansion Project
	Wastewater Treatment		Calaveras Reservoir Expansion Project
	Intertie		
	Turnout		

AWS Planning Challenges and Areas of Future Focus

Many of the planning challenges with developing new and alternative water supplies are different from those faced for traditional water supply planning at the SFPUC. From introducing new supply sources to treating purified recycled water under a new regulatory regime for drinking water—and addressing the institutional considerations associated with the partnerships central to many of the projects—the AWS Projects will require new approaches for implementation and operation. With projects largely still in the early stages of planning, costs will also be further developed and affordability for SFPUC customers will be a key issue to address. As such, **the AWS Plan also includes programmatic recommendations in the following key areas: operations planning, purified water planning, and financing and affordability.** Programmatic recommendations are specific to the current phase of program development, and additional programmatic recommendations will likely be identified in the future as planning progresses.



The recommendations included in this AWS Plan are intended to address the water supply gap that the SFPUC faces. Several have financial implications for the SFPUC and cannot be evaluated without the full context of all other capital investment and financial sustainability priorities of the SFPUC. Between May and December 2023, the capital planning process for the SFPUC's FY 2025-2034 CIP was underway and project planning continued to advance. As a result, some recommendations in Chapter 6 shifted from those that were presented in the June 2023 Draft AWS Plan. Furthermore, public comments also resulted in some clarifications and additions to Chapter 6. Recommendations included in the final AWS Plan reflect the most current recommendations as of December 2023. Still, until a final budget is adopted by the SFPUC in February 2024, any funding associated with the recommendations is subject to change.



Lake Eleanor, 2011

Chapter 1: Introduction

The San Francisco Public Utilities Commission (SFPUC), a department of the City and County of San Francisco (San Francisco), is the third largest municipal utility in California, providing drinking water for more than 2.7 million residents and businesses within San Francisco and three other Bay Area counties by way of the San Francisco **Regional Water System (RWS)**. The RWS draws approximately 85% of its water from **Hetch Hetchy Reservoir** in the Sierra Nevada's **Tuolumne River watershed**, which it delivers 167 miles by gravity through an aqueduct system to Bay Area reservoirs to serve SFPUC customers. The RWS draws the remaining 15% of its water supply from local

surface waters in the **Alameda and Peninsula watersheds**. In addition to enabling the SFPUC to manage deliveries during normal water years, the RWS's network of reservoirs allows the SFPUC to store water during wet years for use during dry periods. This storage-based approach is integral to the operation and reliability of the RWS.

RWS supplies serve both SFPUC retail and wholesale customers throughout the Bay Area. The SFPUC provides water to 27 wholesale customers in Alameda, Santa Clara, and San Mateo counties. Together, these customers comprise approximately two-thirds of RWS demand. Retail customers, who are located primarily in San Francisco, but also include a small number of customers outside of San Francisco, make up the remaining one-third of demand on the RWS.

The SFPUC's **Alternative Water Supply Program (AWS Program)** is the focus of this Alternative Water Supply Plan (AWS Plan or Plan) and supports the SFPUC's mission. Specifically, the AWS Program enhances the SFPUC's ability to reliably meet customers' future water supply demands in a manner that is consistent with its **legal and contractual obligations** and **Level of Service (LOS) Goals and Objectives**, as well as environmental and regulatory requirements.

This chapter introduces the AWS Program and Plan in the larger context of the SFPUC's water supply planning history.

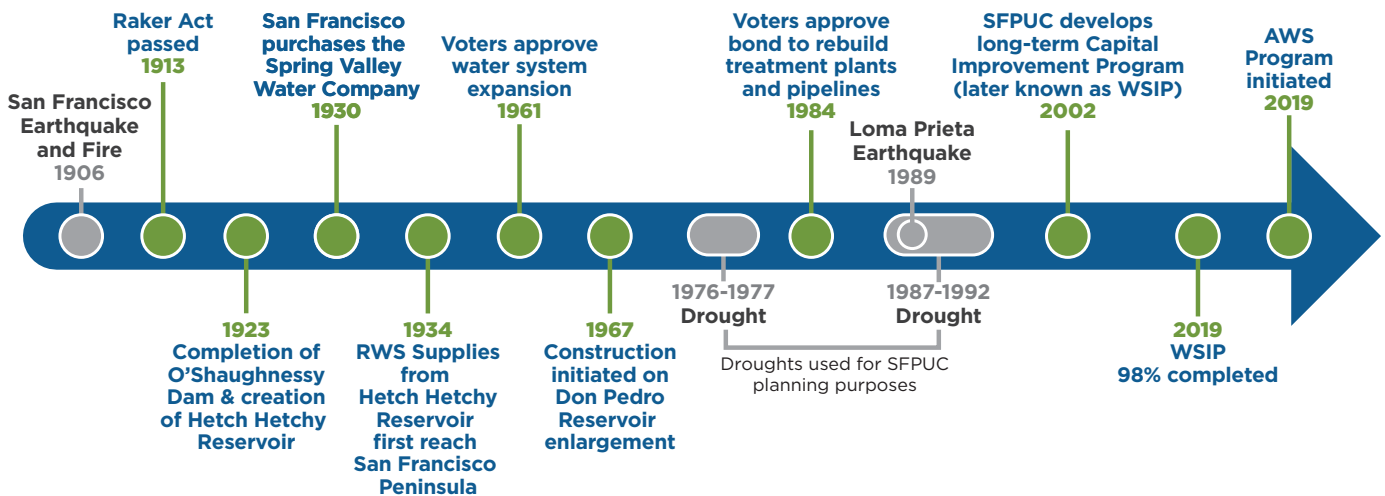
SFPUC MISSION

The SFPUC's mission is to provide our customers with high quality, efficient and reliable water, power, and sewer services in a manner that is inclusive of environmental and community interests, and that sustains the resources entrusted to our care.

1.1 Planning History

San Francisco’s water system developed over time from local streams and groundwater wells within its borders during its earliest days to today’s complex system of dams, reservoirs, tunnels, and pipelines. This system brings water from the Sierra Nevada by gravity across California together with supplies from Bay Area watersheds and groundwater sources. Many extraordinary events and milestones have shaped the RWS, and thanks to its original planners’ exceptional foresight, the SFPUC is able to provide today’s Bay Area with high quality drinking water supplies and fulfill its role as a regional water purveyor as the RWS’s designers intended. The SFPUC has a long history of water supply planning and providing water for the Bay Area through the RWS (Figure 1-1).

Figure 1-1: SFPUC’s History of Water Supply Planning



Pulgas Water Temple, 1934

San Francisco’s need for reliable public water supplies became very apparent after the devastation of the San Francisco Earthquake and Fire of 1906. The creation of the SFPUC by 1932 City Charter followed San Francisco’s purchase of the Spring Valley Water Company for \$39.96 million in 1930. The Spring Valley Water Company’s system included over 40,000 acres of watershed lands on the San Francisco Peninsula and in the Alameda Creek watershed, as well as Pilarcitos, San Andreas, Lower Crystal Springs, and Calaveras dams and reservoirs. Congressional approval of the **Raker Act** in 1913 (38 Stat. 242) allowed San Francisco to construct Hetch Hetchy

Reservoir and related infrastructure on National Park and Forest lands between 1914 and the early 1930s. Construction of the RWS facilities during this period required hydraulic engineering across more than 160 miles of mountain wilderness, San Joaquin Valley farmlands, and the Coast Range. San Francisco developed new technologies and construction techniques, mastered impassable terrain, and overcame financial challenges to complete the monumental RWS. Supplies from Hetch Hetchy Reservoir first reached the **San Francisco Peninsula (the Peninsula)** in 1934, representing the culmination of an investment by the people of San Francisco of more than \$100 million.

Throughout the mid-1900s, the SFPUC and its ratepayers made critical and strategic investments in the RWS so it could continue to provide reliable water service to its Bay Area customers. In 1961, voters approved general obligation bonds for the construction of **San Antonio Reservoir**, Bay Division Pipeline No. 4, and San Francisco's share of the **Don Pedro Reservoir** and other projects to keep pace with the growing water demands of its Bay Area customers. The SFPUC's \$45 million investment in the Don Pedro Reservoir, owned and operated by the Modesto and Turlock Irrigation Districts, enabled San Francisco to utilize 570,000 acre-feet of additional water storage in lieu of building numerous smaller mountain reservoirs. This storage, which is key to the SFPUC's storage-based system, allows the SFPUC to pre-pay the water the SFPUC owes the Districts under the Raker Act. The **water bank** also allows the SFPUC to divert, deliver, and/or store Tuolumne River water during times it would have had to bypass those flows to meet its obligations to the Districts.



In addition to keeping pace with the Bay Area's growing population, the SFPUC and its ratepayers have invested in the RWS's emergency and disaster preparedness. Emergencies and disasters are a reality in California, and the 1970s and 1980s brought both prolonged drought and a major seismic event. In 1976 and 1977, the Bay Area experienced two extremely dry years, which compelled the SFPUC to impose mandatory rationing of water supplies. One decade later, 1987 marked the first year of a prolonged, six-year drought that lasted through 1992, stressed the RWS's ability to deliver reliable water supplies, and again necessitated mandatory customer rationing

of water supplies. In 1984, voters approved a \$104 million bond measure to upgrade water treatment plants and pipelines. In 1992, the SFPUC expanded water treatment capacity on the Peninsula with an additional investment of \$55 million.



On October 17, 1989, the Loma Prieta Earthquake struck. Centered in Santa Cruz County about 60 miles south-southeast of San Francisco on the San Andreas Fault, the magnitude 6.9 earthquake gave San Francisco a major jolt and a field test of the water system's structural integrity and reliability under severe seismic strain. Although water mains in the Marina District failed, and there were pockets of low pressure in certain areas of San Francisco caused by power failure, 97% of customers in San Francisco had no loss of water supply. On the Peninsula, the RWS dams and transmission lines were unaffected.

Following the Loma Prieta Earthquake, the SFPUC began taking steps to further upgrade its water infrastructure, build new facilities with operational flexibility, and create interconnections with neighboring water systems to provide needed water supplies in an emergency. In 2002, Assembly Bill 1823, the Wholesale Regional Water System Security and Reliability Act, required the SFPUC to complete a capital improvement program to improve the reliability of the RWS. In response to the legislation, the SFPUC developed an ambitious long-term capital improvement program that became the **Water System Improvement Program (WSIP)**, along with strategic business and financial plans for its implementation. Through WSIP, the SFPUC has significantly upgraded its regional and local water systems to protect its ability to reliably provide water to its customers. The WSIP regional projects were over 98% complete as of 2019, when the SFPUC established the AWS Program, and is continuing to progress toward 100% completion. WSIP's total cost is estimated to be \$4.8 billion.

As demonstrated through this history, the SFPUC places a high priority on maintaining reliable delivery systems and disaster preparedness while adapting to changing needs through investments in RWS infrastructure. Looking ahead, the SFPUC is focusing its planning efforts to address both existing and emerging challenges, which will be particularly evident during dry years, including potential loss of water supply availability due to proposed environmental flow requirements and regulatory changes; changes in customer demand; the impacts of droughts, wildfires, earthquakes, and other emergencies; and additional uncertainties related to climate change. The SFPUC faces an urgent and pressing need to address these water supply planning challenges, which are discussed in greater detail in the following section and later chapters of this Plan.

In 2019, the SFPUC established the AWS Program to evaluate new and diverse water supply options to improve the RWS's ability to reliably meet demands through 2045. Implementing the AWS Program is a critical next step in the SFPUC's water supply planning. The SFPUC assembled a new AWS planning team to develop the AWS Program, evaluate drivers that impact future water supply



uncertainty, and make recommendations on how the SFPUC can position itself to be prepared to proactively address challenges expected to impact the RWS.

1.2 Water Supply Planning Challenges

Providing high quality and reliable water supplies for Bay Area residents and businesses is critical to the economic vitality, health and safety, and social well-being of the region. For nearly a century, the SFPUC has served a growing Bay Area population primarily with surface water sourced from the upper portions of the Tuolumne River watershed combined with water collected in local Bay Area watersheds. Sustained stewardship of the environment from which RWS supplies are drawn is vital to the work of the SFPUC and a part of its mission. RWS supplies are increasingly vulnerable as the frequency and severity of droughts due to climate change reduces the amount of water available.

Water supply management in California is adapting to drier conditions in a changing climate. **Instream flow requirements**, for example, may increase in order to protect river ecosystems and other environmental resources, which would have a more significant impact on drinking water supplies during dry years when surface water supplies are naturally more limited. Storage-based water systems like the RWS can enhance dry-year reliability by leveraging **carryover storage** from wet and normal years for use during dry years. In the California Water Supply Strategy released by the Governor in August 2022, storage is identified as a key focus area for climate change adaptation.

The implementation of the 2018 Amendment to the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (referred to as the **Bay-Delta Plan Amendment**) by the State Water Resources Control Board (SWRCB) could have a pronounced impact on future RWS dry-year water supply availability. The SFPUC and the Modesto and Turlock Irrigation Districts are involved in ongoing negotiations with the State on a Proposed Voluntary Agreement for the Tuolumne River that would implement the Bay-Delta Plan Amendment for an 8- to 15-year period.

The results of these negotiations, and the ecological response to changes in the river flow regime over the term of the ultimate agreement, will determine the impact of the Bay-Delta Plan Amendment on the SFPUC's future water supply. Based on current RWS supply and demand projections, if the Bay-Delta Plan Amendment is implemented as it was adopted in 2018, the SFPUC could immediately experience a water supply shortfall for meeting customer demands in dry years. As a result, while the AWS Plan uses a **planning horizon** of year 2045, impacts to water supply could occur much sooner, creating an urgency to find new sources of dry-year supply to address the projected gap between supply and demand.

As shown in **Figure 1-2**, future water supply planning will require a planning approach that relies on a variety of strategies that include both institutional considerations and water supply planning and development actions. The uncertainties and challenges that affect the continued availability of RWS

supplies require the SFPUC to broaden its water supply planning approach to include additional **demand management** and supply-side actions. Demand management actions, which aim to reduce customer demands on the RWS, include activities such as increased and expanded customer conservation and implementation of water projects at the local and individual customer level. Supply-side actions aim to address the availability of existing system supplies and augment RWS supplies with new, alternative water supplies at a regional scale.

Addressing the water supply planning challenges and filling the projected gap between future demands and system supplies will not happen quickly or easily. On the demand side, for example, water conservation efforts to achieve reduced demands on the RWS require broad participation by retail and wholesale customers and ongoing implementation to realize sustained benefits. On the supply side, development of new alternative water supply projects requires large infrastructure investments with long-term planning and implementation horizons, some extending decades. Therefore, there is an underlying urgency to plan thoughtful and diverse projects that can increase the reliability of SFPUC supplies in dry years.

THE BAY-DELTA PLAN

The Bay-Delta Plan establishes water quality objectives for which the State Water Resources Control Board may assign a measure of responsibility to upstream water rights holders to protect the beneficial uses of the San Francisco Bay/Sacramento-San Joaquin River Delta Estuary tributary watersheds.

Figure 1-2: Elements of SFPUC Future Water Supply Planning



1.3 Alternative Water Supply Program and Plan

The AWS Program looks beyond the RWS's existing infrastructure, surface water supplies, and local groundwater sources to identify new and diverse **Alternative Water Supply Projects (AWS Projects)** such as projects involving expanded surface water storage, groundwater banking, transfers, purified water, and desalination, as well as technological innovations and other tools that can increase system-wide supply availability.

The goal of the AWS Program is to identify water supply projects that increase the dry-year reliability of RWS supplies and address the long-term water supply gap in alignment with the LOS Goals and Objectives.

The AWS Program includes projects that help enable the SFPUC to meet more of its instream flow requirements and customer obligations, including legal and contractual obligations. The Program also includes a project that can assist the SFPUC's decision-making on potentially bringing on new permanent customers, while preparing for future climate effects.

On June 23, 2020, by Resolution No. 20-0138, the **SFPUC Commission** directed SFPUC staff to “complete development of an Alternative Water Supply Plan to implement a collection of projects to achieve a water supply goal established through the AWS Planning Program [...] no later than July 1, 2023.” In accordance with Resolution No. 20-0138, this AWS Plan is intended to guide the AWS Program decision-making process and provide recommendations on project implementation and areas for future analysis.

This AWS Plan includes:

- Identification of the anticipated water supply gap through the 2045 planning horizon
- Description of ongoing efforts to reduce demands and optimize RWS supply availability
- Description of AWS Projects that can augment RWS supply and address the future water supply gap
- Recommendations that will further advance the AWS Program

The AWS Projects included in this Plan are mostly in the early planning stages. This Plan recommends actions to advance projects so they may address the water supply gap with limited financial and operational risks of overbuilding or overcommitting financial resources. This is reinforced in the AWS planning principle of “plan for obligations, build for demands,” discussed further in Chapter 4 (AWS Program Role

in Addressing the Future Water Supply Gap), which recognizes the importance of developing water supplies to meet obligations while prioritizing investments that focus on the most imminent need of meeting customer demands.

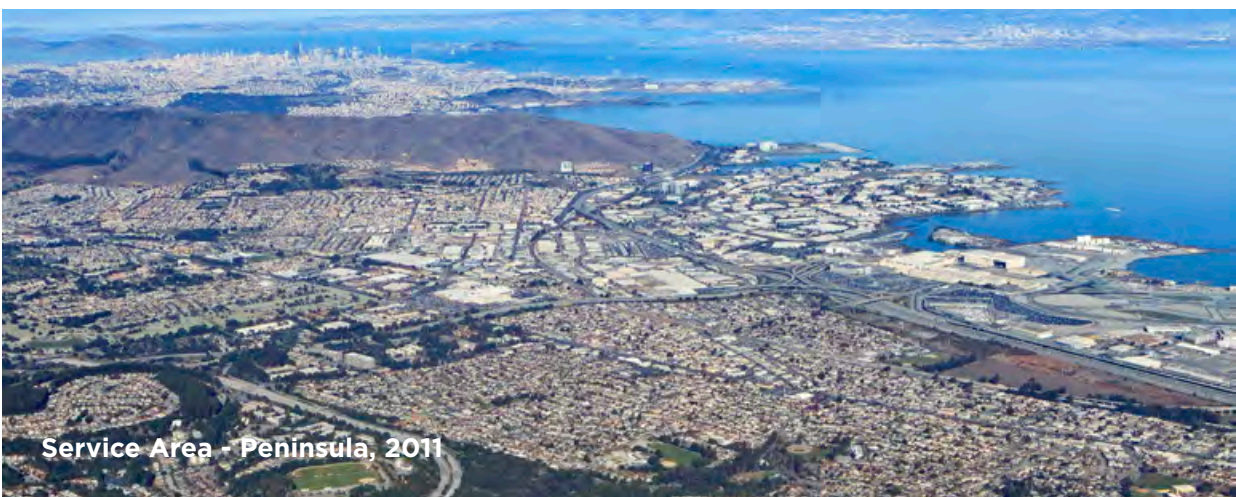
1.3.1 The SFPUC's Regional Focus for the AWS Program

While the SFPUC serves as both a wholesale and retail water supplier, the SFPUC is undertaking the AWS Program with a regional focus as the operator and steward of the RWS responsible for delivering reliable supplies to customers throughout its service area, including San Francisco and locations in other Bay Area counties. Consistent with its mission statement, the SFPUC intends to continue to provide all of its customers with high quality, efficient, and reliable water, in a manner that is inclusive of environmental and community interests, and that sustains the resources entrusted to its care. This requires both securing and maintaining the reliability of the RWS. As such, the AWS Program focuses on supply options that can provide a regional benefit to customers throughout the SFPUC service area.

The SFPUC will balance utilizing available resources with exploring new and different options in its efforts to plan for long-term water supply reliability in the face of numerous challenges and uncertainties. As the AWS Program aims to help fill the projected water supply gap, it will be thoughtful and adaptive, recognizing that some of the drivers that impact the water supply gap may change in the future.

1.3.2 Role of Wholesale Customers and BAWSCA in the AWS Program Development and Implementation

As a regional supplier and owing to its contractual obligation, the SFPUC has a responsibility to keep its wholesale customers informed of the actions and progress of the AWS Program. In considering the planning, funding, and implementation of this AWS Plan and AWS Projects, the SFPUC will continue to engage with its wholesale customers, and with the [Bay Area Water Supply and Conservation Agency \(BAWSCA\)](#), which represents 26 of the SFPUC's 27 wholesale customers (see Section 2.1). The SFPUC will also continue to solicit and consider BAWSCA's input and recommendations in the AWS Program planning efforts.



Service Area - Peninsula, 2011

1.4 Organization of the AWS Plan

The AWS Plan is organized into six chapters.

- **Chapter 1: Introduction** – Describes the role of the AWS Program and this Plan in the SFPUC’s water supply planning efforts
- **Chapter 2: Background** – Includes relevant background information that provides the context related to the SFPUC’s water supply sources, service area, customers, and agreements that frame the SFPUC’s water supply obligations, water use and demands, and factors affecting future water supplies
- **Chapter 3: Future Water Supply Gap** – Quantifies the future water supply gap by comparing the SFPUC’s water supply obligations and projected future demands against water availability
- **Chapter 4: AWS Program Role in Addressing the Future Water Supply Gap** – Outlines the local and regional activities the SFPUC is undertaking throughout its service area that impact long-term water supply planning and details the elements of the AWS Program planning approach
- **Chapter 5: AWS Projects** – Provides details on AWS Projects that would diversify SFPUC water supplies and help address the future water supply gap
- **Chapter 6: AWS Recommendations** – Outlines AWS Project and AWS Program level recommendations



Chapter 2: Background

This chapter provides relevant context for the AWS Program, including background on the SFPUC service area and customers, an overview of the RWS, water supplies, and the SFPUC's obligations and demands. Chapter 2 is intended to provide baseline information on water supply availability. Chapter 3 builds on this baseline and describes how dry-year water supply availability could change with the implementation of the Bay-Delta Plan Amendment.

2.1 SFPUC Service Area and Customers

The SFPUC is the third-largest municipal utility in California, providing drinking water that serves more than 2.7 million residents and businesses in the San Francisco Bay Area.

The SFPUC currently delivers water to 27 wholesale customers in the Bay Area that purchase water for resale to retail customers in their individual service areas. BAWSCA represents the collective interests of 26 of these 27 wholesale customers. The one wholesale customer not represented by BAWSCA is the Cordilleras Mutual Water Company, a small water association serving 18 single-family homes located in Redwood City in San Mateo County. Throughout this Plan, references to the **Wholesale Customers** mean the 26 wholesale customers that are members of BAWSCA. For more detailed information on each of the SFPUC's 26 Wholesale Customers, see **Appendix A**.

The SFPUC also provides direct retail water service to a population of nearly 900,000 customers in San Francisco (referred to as **in-City** retail customers) and a number of retail customers outside San Francisco (referred to as suburban retail customers). The suburban retail customers are generally located right off of RWS transmission pipelines and do not form one contiguous service area. Some of the SFPUC's suburban retail customers include the Town of Sunol, San Francisco International Airport, Lawrence Livermore National Laboratory, Moffett Federal Airfield, Castlewood County Service Area, and Groveland Community Services District¹, among others. This Plan refers to the in-City and suburban retail customers collectively as **Retail Customers**.

¹ Groveland Community Services District can be characterized as either a suburban retail customer or a wholesale customer. This Plan treats Groveland Community Services District as a suburban retail customer, as RWS supplies to Groveland Community Services District are accounted for in the retail supply allocation of 81 mgd.

Table 2-1 provides an overview of the SFPUC’s 27 wholesale customers and the SFPUC’s Retail Customers.

Table 2-1: Overview of SFPUC Customers

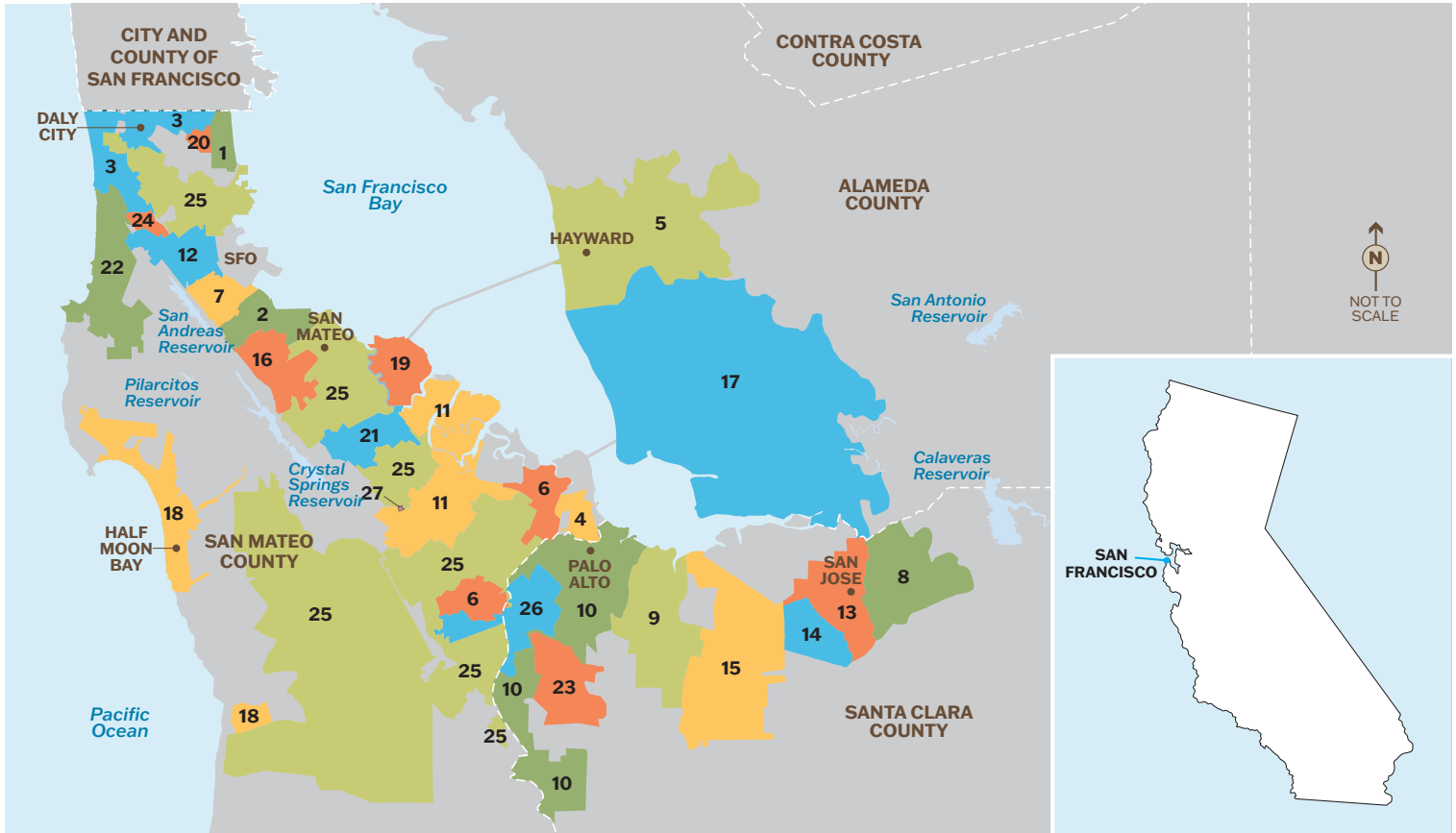
Customers	Location
Wholesale	26 Wholesale Customers in Alameda, Santa Clara, and San Mateo counties (represented by BAWSCA)
	1 wholesale customer in Redwood City (Cordilleras Mutual Water District)
Retail	Customers in the City of San Francisco (in-City retail)
	Customers in Alameda, Santa Clara, San Mateo, and San Joaquin counties (suburban retail)

Historically, the SFPUC has met approximately 96% of the Retail Customers’ collective demands with RWS supplies, supplemented by local groundwater for irrigation and recycled water for wash-down operations at municipal facilities. More recently, it has also provided recycled water for irrigation at two public golf courses owned and operated by San Francisco. The SFPUC has a responsibility to meet the water demands of its Retail Customers through a combination of regional and local supplies. Consistent with other planning efforts, the AWS Program assumes that 81 million gallons per day (mgd) will be available to Retail Customers in non-drought years (**Retail Allocation**). In 2012, the SFPUC began to implement a number of new local water supply projects for its Retail Customers. The SFPUC is currently planning and implementing additional conservation, groundwater, and recycled water projects to help meet future Retail Customer demand.

Figure 2-1 shows the location of the SFPUC wholesale service area and its 27 wholesale customers, and **Figure 2-2** shows the location of the SFPUC Retail Customers.



Figure 2-1: SFPUC Wholesale Service Area and Customers



MUNICIPALITIES

- 1 City of Brisbane
- 2 City of Burlingame
- 3 City of Daly City
- 4 City of East Palo Alto
- 5 City of Hayward
- 6 City of Menlo Park
- 7 City of Millbrae
- 8 City of Milpitas
- 9 City of Mountain View
- 10 City of Palo Alto
- 11 City of Redwood City
- 12 City of San Bruno
- 13 City of San Jose^a
- 14 City of Santa Clara^a
- 15 City of Sunnyvale
- 16 Town of Hillsborough

WATER DISTRICTS

- 17 Alameda County Water District
- 18 Coastside County Water District
- 19 Estero Municipal Improvement District
- 20 Guadalupe Valley Municipal Improvement District
- 21 Mid-Peninsula Water District
- 22 North Coast County Water District
- 23 Purissima Hills Water District
- 24 Westborough Water District

OTHER WATER SUPPLIERS

- 25 California Water Service Company^b
- 26 Stanford University
- 27 Cordilleras Mutual Water Company^c

Source: FY 2021-22 BAWSCA Annual Survey

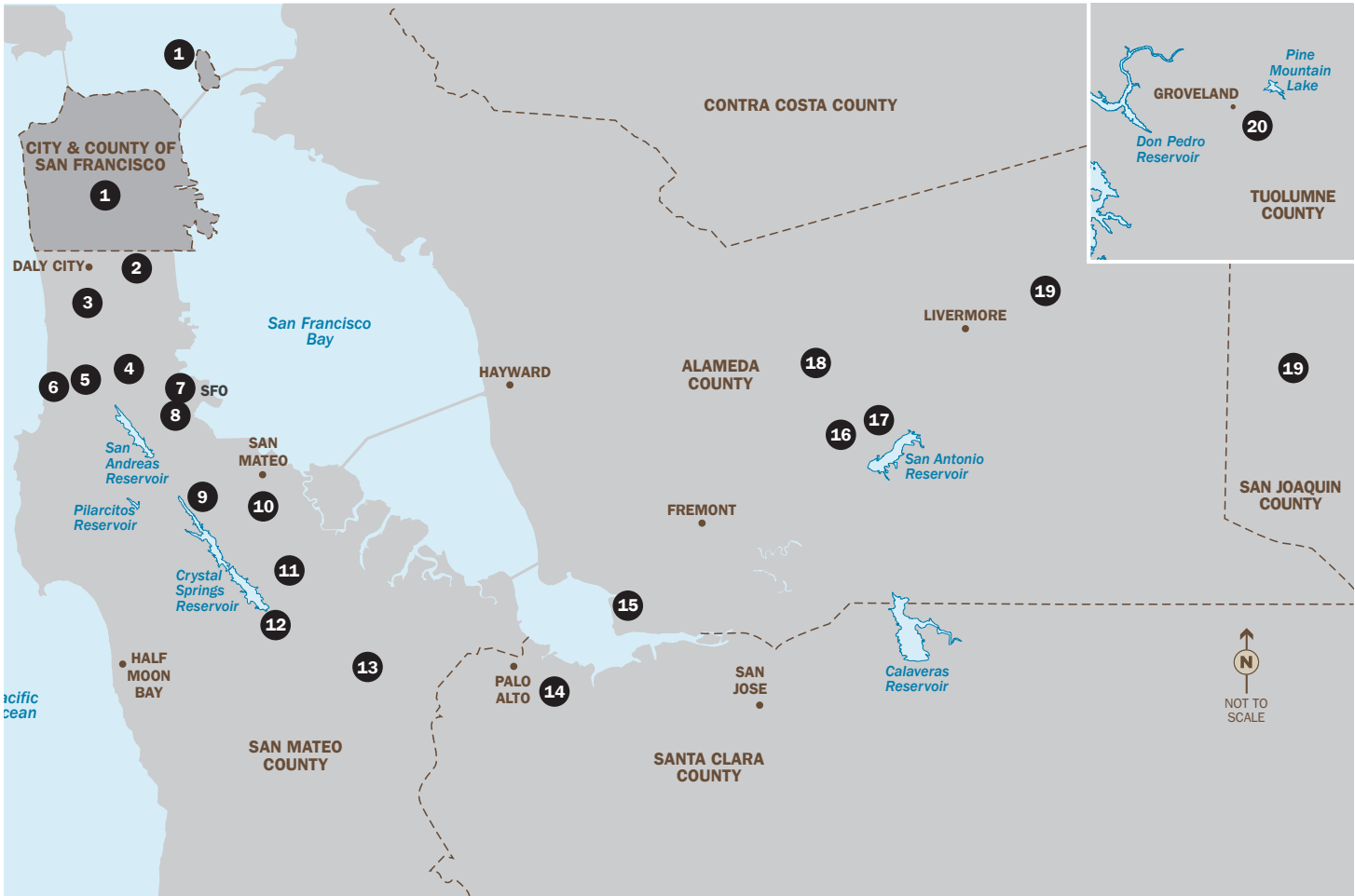
This figure is for illustrative purposes only. Figure may not provide accurate and complete boundaries for the agencies identified

a The SFPUC provides water on an interruptible basis to fixed service areas in the northern portions of the cities of San Jose and Santa Clara.

b California Water Service Company, an investor-owned utility, provides water service to three separate districts: Bear Gulch (Atherton vicinity), San Carlos/San Mateo, and South San Francisco.

c Cordilleras Mutual Water Company is not a member of BAWSCA.

Figure 2-2: SFPUC Retail Customer Locations



IN-CITY RETAIL SERVICE AREA

- 1 City and County of San Francisco

SUBURBAN RETAIL SERVICE AREA

- | | |
|---|---|
| <ul style="list-style-type: none"> 2 Residential and Non-residential Customers in Daly City 3 Cemeteries in Colma 4 Golden Gate National Cemetery 5 San Francisco County Jail #5 6 Sharp Park Golf Course 7 San Francisco International Airport 8 SFPUC Millbrae Headquarters 9 Crystal Springs Golf Course 10 Peninsula Golf and Country Club 11 Residential Customers in Redwood City | <ul style="list-style-type: none"> 12 Filoli Center 13 Menlo Country Club 14 NASA Ames Research Center 15 Cargill Salt 16 Residential and Non-residential Customers in Sunol 17 GE Hitachi Nuclear 18 Castlewood Country Club 19 Lawrence Livermore National Laboratory (two sites) 20 Groveland Community Services District |
|---|---|

This figure is for illustrative purposes only.

The suburban retail customers shown above represent the majority of water use in the suburban retail service area, but are not comprehensive. This Plan treats Groveland Community Services District as a suburban retail customer.

2.2 Regional Water System Overview

The RWS is owned by San Francisco and operated by the SFPUC. The RWS collects water from the Tuolumne River watershed and from local reservoirs in the Alameda and Peninsula watersheds, delivering high-quality drinking water to residents and businesses in the Bay Area. The RWS draws an average of 85% of its water from the Tuolumne River watershed supply collected in Hetch Hetchy Reservoir in Yosemite National Park, which feeds an aqueduct system that delivers water 167 miles by gravity to Bay Area reservoirs to serve the SFPUC's customers. The RWS draws the remaining 15% of its water supply from local surface waters in the Alameda and Peninsula watersheds. The RWS system consists of more than 280 miles of pipelines, 60 miles of tunnels, 11 reservoirs, five pump stations, and two water treatment plants. **Figure 2-3** shows the RWS and some of its main facilities.

2.2.1 Operational Organization of the RWS

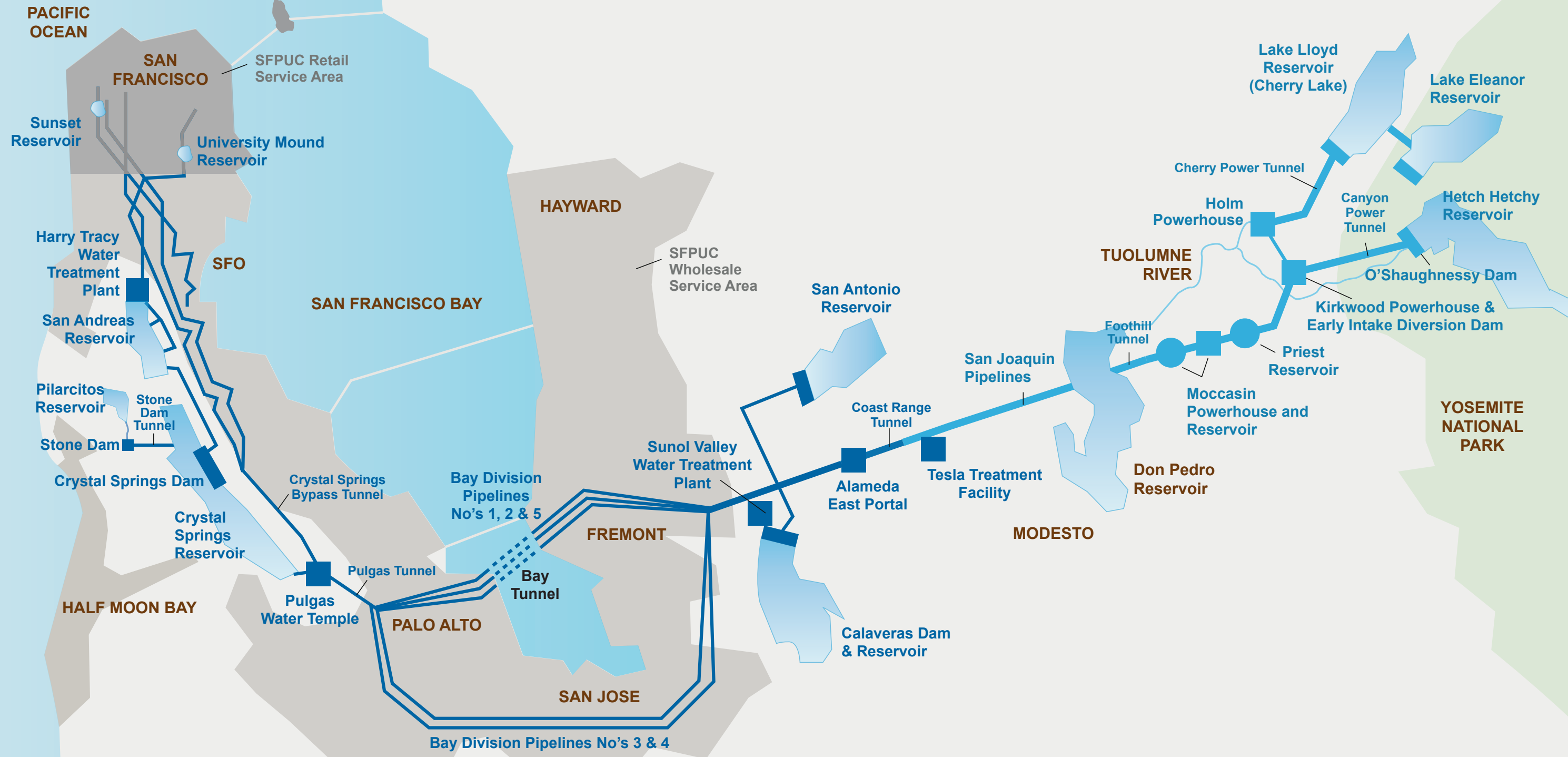
The SFPUC manages the RWS through its Water Enterprise operating divisions:

- **Hetch Hetchy Water and Power (HHWP)**, which manages water supply and treatment for the **Upcountry portion of the RWS**, which is the portion of the RWS east of the Alameda East Portal
- **Water Supply and Treatment Division (WSTD)**, which delivers water to the wholesale and suburban retail customers located primarily in Alameda, Santa Clara, and San Mateo counties
- **Water Quality Division (WQD)**, which provides technical water quality, compliance, and regulatory support for both HHWP and WSTD in operation of the RWS
- **Natural Resources and Lands Management Division (NRLMD)**, which oversees the operation and maintenance (O&M) of Bay Area watershed and right-of-way (ROW) lands and is responsible for environmental regulatory compliance for O&M of the RWS, watershed, and ROW lands in the Upcountry and Bay Area portions of the RWS as well as in San Francisco
- **City Distribution Division (CDD)**, which manages the portion of the RWS that extends beyond San Mateo County into San Francisco as well as the distinct in-City distribution system that solely serves customers located in San Francisco

Figure 2-3: The RWS and Main Facilities

■	RWS Upcountry facilities managed by Hetch Hetchy Water and Power
■	RWS Bay Area facilities managed by Water Supply and Treatment Division
■	San Francisco facilities managed by City Distribution Division

This figure is for illustrative purposes only.



BACKGROUND

BACKGROUND

While the SFPUC is responsible for overseeing duties as both a wholesale and retail water supplier, it is undertaking the AWS Program in its capacity as the system operator of the RWS. The AWS Program is focused on the regional water supply and the SFPUC's role in serving that supply system-wide. Therefore, the in-City distribution system is not discussed in detail as part of the AWS Plan.

2.2.2 Upcountry Portion of the RWS

The Upcountry portion of the RWS, also known as the Hetch Hetchy System, provides on average about 85% of the water that the SFPUC delivers to its customers. This portion of the system, managed by HHWP, begins with Hetch Hetchy Reservoir, which collects water from well-protected wilderness areas in Yosemite National Park in the upper portions of the Tuolumne River watershed. The National Park Service in Yosemite National Park manages Hetch Hetchy Reservoir watershed. The SFPUC also utilizes nearby RWS reservoirs, Lake Lloyd (Cherry Lake) and Lake Eleanor, most often to meet downstream Raker Act flow obligations to the Districts, while Hetch Hetchy Reservoir typically stores water delivered to the SFPUC's customers. To support RWS operations during dry periods, the SFPUC also maintains a water bank account in Don Pedro Reservoir, per the terms of the 1966 [Fourth Agreement](#) between San Francisco and the reservoir's owners and operators, Modesto and Turlock Irrigation Districts. The Fourth Agreement governs the operations of Don Pedro Reservoir as it pertains to the water bank. The Fourth Agreement also contains provisions that may require the SFPUC to contribute to instream flows required by the Federal Energy Regulatory Commission (FERC).

Supply from Hetch Hetchy Reservoir undergoes initial corrosion control at Rock River Lime Plant and is then diverted into a series of tunnels and aqueducts that carry the water from the Sierra Nevada to the San Joaquin Pipelines, which cross the San Joaquin Valley and feed into the Coast Range Tunnel, which then connects to the Bay Area portion of the RWS at the Alameda East Portal.



Don Pedro Reservoir, 2019

WATER RIGHTS

San Francisco holds **pre-1914 appropriative water rights** to store and deliver water from the Tuolumne River and from the Alameda and Peninsula watersheds. The SFPUC operates San Antonio Reservoir under a post-1914 appropriative water right. The 1913 Raker Act granted San Francisco rights-of-way for the construction and operation of RWS facilities on federally owned land.

The Raker Act recognized the senior water rights of the Modesto and Turlock Irrigation Districts to divert water from the Tuolumne River. The Raker Act specified that the SFPUC must release water to the Districts under certain conditions and included conditions for the protection of drinking water quality, road and trail construction for public recreational use, and other purposes.

Don Pedro Reservoir is owned and operated by the Districts. The 1966 Fourth Agreement between San Francisco and the Districts allows the SFPUC to access a 570,000 acre-foot water bank in Don Pedro Reservoir, which helps the SFPUC manage water supply during drought years. During multiple sequential dry years, the SFPUC's water diversions may be limited to previously stored water in RWS reservoirs and the exchange water bank account in Don Pedro Reservoir. Complying with these requirements affects the quantity of water available to the RWS.

2.2.3 Bay Area Portion of the RWS

The Bay Area portion of the RWS, which is managed by the WSTD, includes water collection, treatment, and transmission facilities from the Alameda East Portal through the wholesale service area in Alameda, San Mateo, and Santa Clara counties up to the San Francisco city and county line. Before water from Hetch Hetchy Reservoir reaches these facilities, the SFPUC treats it at the Tesla Treatment Facility, located just west of Alameda East Portal. The Tesla Treatment Facility is an ultraviolet water treatment facility built in 2011 with a capacity of 315 mgd.

The SFPUC's two reservoirs located in Alameda County, San Antonio Reservoir and **Calaveras Reservoir**, collect water from the San Antonio Creek, Upper Alameda Creek, and Arroyo Hondo watersheds. San Antonio Reservoir also receives water from the Hetch Hetchy System for storage. The Sunol Valley Water Treatment Plant, which filters and disinfects water from San Antonio Reservoir and Calaveras Reservoir, has a peak capacity of 160 mgd and is not operated year-round. Treatment processes include coagulation, flocculation, sedimentation, filtration, disinfection, fluoridation, corrosion control treatment, and chloramination.

The RWS conveys water from Alameda County to the Peninsula via the five Bay Division Pipelines: three delivering water across the South Bay through the Bay Tunnel near the Dumbarton Bridge and two circling the South Bay through northern Santa Clara County. The five pipelines, which deliver water to customers along the pipeline routes, converge near **Crystal Springs Reservoir** on the Peninsula and connect to **conveyance facilities** that deliver water to customers located in San Mateo and Santa Clara counties and to the in-City distribution system, which serves customers in San Francisco.

Two of the SFPUC's three reservoirs located on the Peninsula, Crystal Springs Reservoir and San Andreas Reservoir, collect runoff from the San Mateo Creek watershed. Crystal Springs Reservoir also receives and stores water from Hetch Hetchy Reservoir. The 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), and the Crystal Springs and San Andreas Reservoirs.

The Harry Tracy Water Treatment Plant filters and disinfects water supplied from Crystal Springs Reservoir and San Andreas Reservoir before it is delivered to customers on the Peninsula and the customers in San Francisco via the in-City distribution system. The Harry Tracy Water Treatment Plant has a peak capacity of 180 mgd. Treatment processes include ozonation, coagulation, flocculation, filtration, disinfection, fluoridation, corrosion control treatment, and chloramination.



Harry Tracy Water Treatment Plant, 2015

2.2.4 RWS Infrastructure and WSIP

The SFPUC's reliable water service to both Retail and Wholesale Customers can be attributed to its active maintenance and improvement of the RWS since it was first developed. In the early 2000s, the SFPUC designed an ambitious multi-year capital program, known as WSIP, to ensure that it could continue to reliably meet the projected needs of its customers through 2030.

In 2008, the SFPUC Commission adopted a phased variant of WSIP, which included water supply and facility improvement projects for both the regional and local water systems. As part of its approval of WSIP, the SFPUC Commission adopted the **Interim Supply Limitation (ISL)**, which limited total retail and wholesale water sales to an average annual of 265 mgd from the SFPUC's watersheds. It also adopted LOS Goals and Objectives for WSIP, including limiting rationing to a maximum 20% system-wide reduction in water service during extended droughts. Consistent with the SFPUC's contractual obligations to the Wholesale Customers, estimated demands, and long range planning processes, the LOS Goals and Objectives continue to inform the SFPUC's approach to future water supply planning and the AWS Program's efforts.

2.3 Water Supply

For the purposes of the AWS Program and Plan, RWS water supply means water originating from and delivered through the RWS. As discussed in Section 2.2 above, the majority of the RWS water supply (approximately 85%) currently originates in the upper portions of the Tuolumne River watershed in the Sierra Nevada; the remaining 15% of the RWS water supply is drawn from local surface waters in the Alameda and Peninsula watersheds.

The proportion of supply drawn from each of these sources varies from year to year depending on hydrology and operational circumstances. The SFPUC operates its local watershed facilities in the Bay Area to conserve local runoff for delivery and to maintain enough stored water to meet demands in the event of an emergency that affects the supply of water from the Upcountry portion of the system.

In any given year, the SFPUC delivers approximately two-thirds of the RWS supply to Wholesale Customers and the remaining one-third to Retail Customers. In fiscal year (FY) 2021-22, the SFPUC delivered approximately 187 mgd of RWS supplies to its entire water service area, with 128.1 mgd (or 68.4%) delivered to the Wholesale Customers and 59.1 mgd (or 31.6%) delivered to Retail Customers. During this period, water demand was impacted by the Governor's and SFPUC's calls for voluntary water reductions (i.e., rationing) due to ongoing statewide drought conditions and the continued effects of the Covid-19 pandemic.

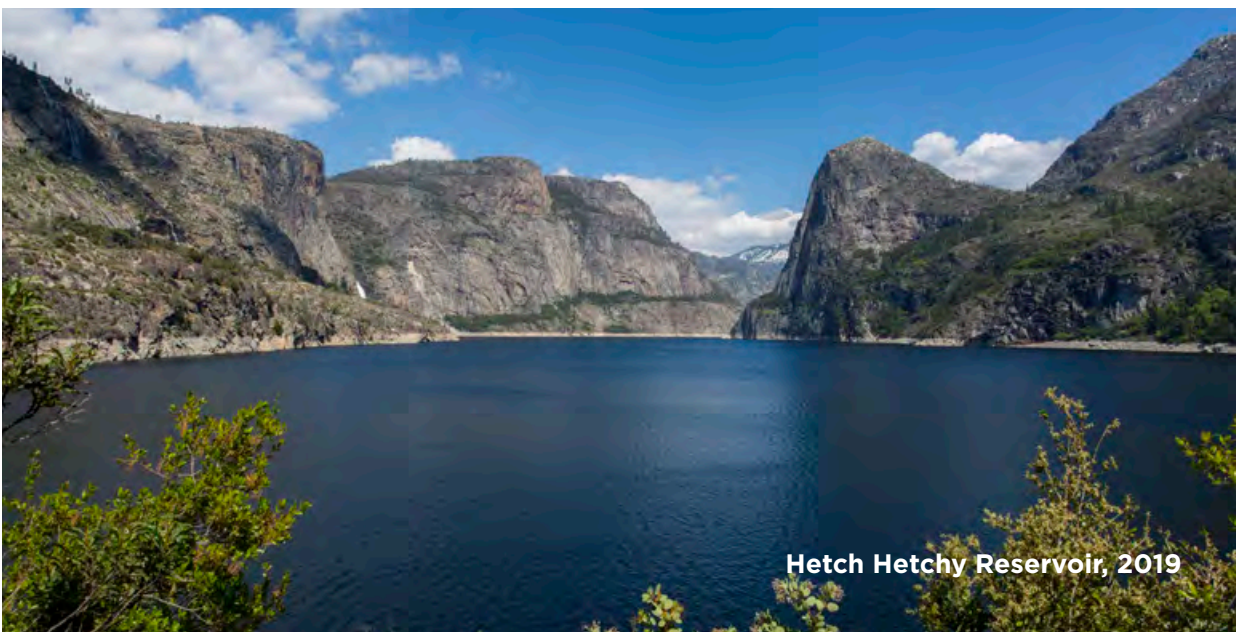
2.3.1 Current Water Availability with WSIP Implemented

Providing reliable water service requires an understanding of the availability of water supply. The amount of water available to the SFPUC from the RWS is constrained by hydrology, physical facilities, and regulatory restrictions, such as instream flow requirements on the Tuolumne River, which may limit the supply that is available in dry periods.

A normal-year RWS supply is defined as the supply that will be used to meet the full demands on the RWS. In normal or wet years, the SFPUC watersheds produce enough supply to meet current and projected future demands, and existing obligations. Under these conditions, the total volume of water that can be delivered through the RWS is limited by physical facilities. Additionally, as noted in Section 2.2.4, in 2008, as part of the action to adopt WSIP, the SFPUC made a policy decision to limit water sales from the SFPUC watersheds delivered through the RWS to an average of 265 mgd annually.

During dry years, the local watersheds produce less water, and a smaller share of the Tuolumne River supply is available to the SFPUC. To maximize the reliability of its water supplies under these circumstances, the SFPUC depends on carryover storage, or water supply in reservoirs that is stored and carried over from one water year to another. Carryover storage is critical during drought cycles because it enables the SFPUC to carry over water supply from wet years to dry years.

The SFPUC uses a water supply planning methodology to estimate the water availability and demands that can be met under dry-year conditions. This methodology takes into account both (1) **firm yield**, or the water supply available for delivery by the RWS in simulated dry-year conditions and (2) deliveries that can be reduced through implementation of a system-wide rationing policy under dry-year conditions. Using this methodology and assuming that WSIP water supply projects are implemented, the SFPUC currently estimates that the **total system yield** (or water availability) is 257 mgd. These elements are illustrated in **Figure 2-4**.



Hetch Hetchy Reservoir, 2019

Figure 2-4: Components Used to Estimate Dry-Year Water Availability



Both firm yield and rationing are estimated with the SFPUC water supply planning methodology, which includes simulation of RWS operation through a **design drought** sequence. The simulated design drought sequence consists of the extreme drought circumstances seen in 1987-1992 (the longest drought on record) followed by another two years of extremely dry conditions as experienced in 1976-1977.

Rationing is limiting the amount of water supply available to customers to reduce deliveries during droughts. In the SFPUC’s water supply planning methodology, rationing is expected during extended droughts. The SFPUC estimates that the water demand addressed through rationing is 30 mgd, based on the **rationing policy** that was adopted under the WSIP Programmatic Environmental Impact Report (PEIR) in 2008. This policy assumes that rationing is approximately 12% as an annual average over the 8½-year design drought sequence. Over the 8½ years of simulated drought, rationing is initially 0% and increases up to a maximum of 20%, with the annual average over the sequence being about 12%. The SFPUC is using this policy as a benchmark for the evaluation of water supply and potential water supply gap presented in this Plan. This enables the SFPUC to compare water availability with WSIP implemented and with the assumed implementation of the Bay-Delta Plan Amendment. Modifications to the SFPUC’s rationing policy would change the estimated total system yield and the future water supply gap presented in this Plan.

Based on the above-described water supply planning methodology, and as summarized in **Table 2-2**, the SFPUC estimates that the firm yield of the RWS is 227 mgd and that the rationing policy can address up to 30 mgd of demand.

Table 2-2: Dry-Year Water Availability

	Annual Supply (mgd)
RWS Water Supply (Firm Yield) ^a	227
Water Demand Addressed Through Rationing ^b	30
Total Supply (Total System Yield)^c	257

- a Firm yield includes implemented WSIP projects and current instream flow releases (not including the Bay-Delta Plan Amendment).
- b Rationing is based on the SFPUC rationing policy adopted under the WSIP PEIR in 2008, which assumes that rationing is approximately 12% as an annual average over the 8½-year design drought sequence.
- c Total system yield is the sum of firm yield plus the water supply benefit from rationing.

More information on the SFPUC’s planning methodology to estimate the available RWS supply and the demands that can be met under drought conditions can be found in [Appendix B](#).

2.4 SFPUC Obligations and Demands

This section describes the SFPUC’s obligations and demands, which set parameters for AWS Program planning.

2.4.1 The SFPUC’s Legal and Contractual Obligations with the Wholesale Customers

The SFPUC’s agreements with the 26 Wholesale Customers represented by BAWSCA include certain legal and contractual obligations that the SFPUC must consider as part of its planning under the AWS Program, as discussed below.

Water Supply Agreement (WSA)

The [Water Supply Agreement \(WSA\)](#) is a 25-year contract between San Francisco and the Wholesale Customers.² The WSA became effective on July 1, 2009, as its predecessor agreement - [the 1984 Settlement Agreement and Master Water Sales Contract \(1984 Agreement\)](#) - expired. The WSA, as amended and restated in January 2021³, with subsequent approval by each of the Wholesale Customers, describes the current contractual relationship between the SFPUC and the Wholesale Customers. Pursuant to the terms of the WSA, each of the Wholesale Customers also has an [Individual Water Sales Contract](#) with San Francisco.

INDIVIDUAL WATER SALES CONTRACTS

Each of the Wholesale Customers also has an Individual Water Sales Contract with the SFPUC that describes the service area of the customer, identifies the location and size of service connections between the RWS and the customer’s distribution systems, and in some instances, contains additional specific provisions unique to the particular customer. The Individual Water Sales Contracts may be amended from time to time by the SFPUC and the applicable Wholesale Customers pursuant to the terms of the WSA.

² As noted above, Cordilleras Mutual Water Company is also a wholesale customer of the SFPUC, but it is not a party to the WSA and is not represented by BAWSCA.

³ All references to the Water Supply Agreement or WSA in this Plan are to the latest version, the 2021 Amended and Restated Water Supply Agreement.

The WSA carries forward many components of the 1984 Agreement, including the **Supply Assurance**, which requires that the SFPUC deliver a maximum of 184 mgd per year to the Wholesale Customers.⁴ The SFPUC's agreement to deliver water up to the amount of the Supply Assurance is perpetual and survives the expiration of the WSA. The amount of water made available to the Wholesale Customers is, however, subject to reduction due to water shortage caused by drought, scheduled RWS maintenance activities, and emergencies.

The WSA carries forward the Supply Assurance, which requires the SFPUC to deliver a maximum of 184 mgd per year to 24 of the 26 Wholesale Customers.

The Supply Assurance is shared among 24 of the 26 Wholesale Customers (all Wholesale Customers, except the cities of San Jose and Santa Clara, which are not **permanent customers** of the SFPUC, as discussed below).

Individual Supply Guarantees (ISGs)

Twenty-three of the 24 Wholesale Customers that share in the Supply Assurance have an **Individual Supply Guarantee (ISG)**, which is their dedicated individual share of the 184 mgd Supply Assurance set forth in Attachment C of the WSA. The ISGs are also perpetual and survive the expiration of the WSA. Because San Jose and Santa Clara are temporary interruptible customers of the SFPUC under the terms of the WSA, they do not have ISGs.

The City of Hayward does not have an ISG due to the terms of its 1962 Individual Water Supply Contract with the SFPUC, which does not contain a fixed allocation of water. Hayward's water supply allocation is, however, included in the Supply Assurance as the difference between 184 mgd and the sum of the other 23 Wholesale Customers' ISGs. As described in the WSA, if the total SFPUC deliveries to Hayward and to the 23 Wholesale Customers with ISGs exceed 184 mgd over three consecutive fiscal years, then the ISGs of those 23 Wholesale Customers shall be reduced pro rata so that their total combined entitlement and the sustained use by Hayward does not exceed 184 mgd.

INDIVIDUAL SUPPLY GUARANTEES

ISGs represent each Wholesale Customer's dedicated individual share of the 184 mgd Supply Assurance.

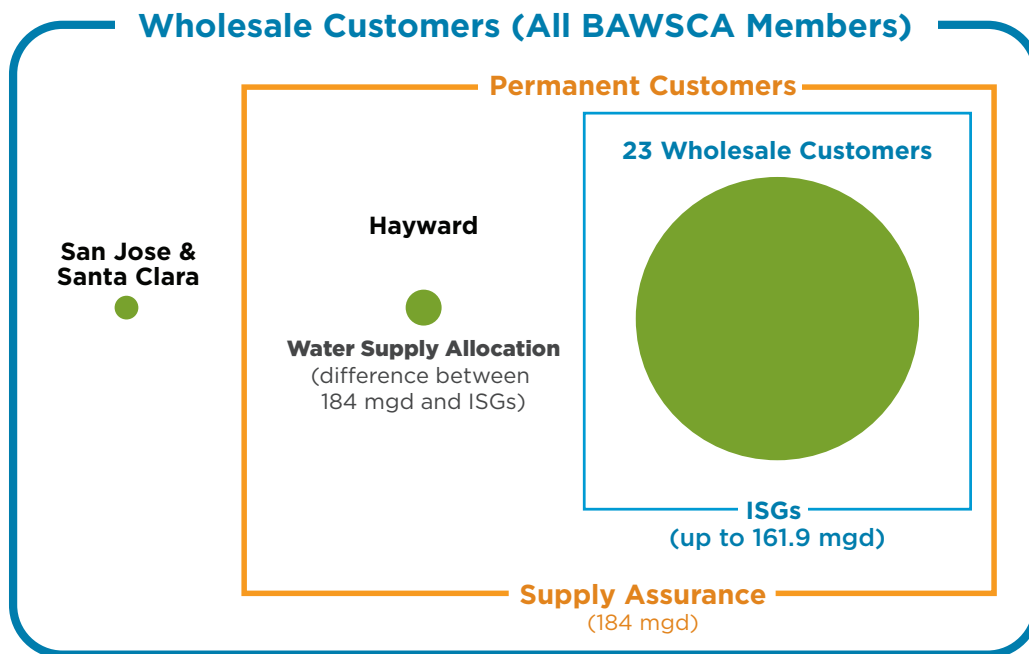
Hayward does not have an ISG due to the terms of its 1962 individual water supply contract.

⁴ The 184 mgd Supply Assurance is the maximum annual average metered supply of water dedicated by San Francisco to public use in the wholesale service area (not including San Jose and Santa Clara).

When combined, the ISGs of the 23 Wholesale Customers total 161.9 mgd. Thus, in the event that Hayward purchases an amount of water exceeding 22.1 mgd (184 mgd Supply Assurance minus 161.9 mgd) for three consecutive fiscal years, the ISGs of each of the 23 Wholesale Customers with ISGs would be reduced in accordance with the WSA to accommodate the demands of Hayward.

Figure 2-5 provides a visual representation of the Wholesale Customers' relationships with respect to the Supply Assurance and ISGs.

Figure 2-5: Visual Representation of Wholesale Customers



Note: Cordilleras Mutual Water Company is not a BAWSCA member and is not subject to the Water Supply Agreement

Interruptible Customers (San Jose and Santa Clara)

Prior to and during the terms of both the 1984 Agreement and the WSA, the SFPUC has provided water to San Jose and Santa Clara on a temporary, interruptible basis. As a result, the two cities are **interruptible customers** and do not have an allocated share of the Supply Assurance. Because San Jose and Santa Clara are not included in the Supply Assurance, they do not have ISGs. While the SFPUC has never interrupted water supply to San Jose and Santa Clara, the WSA allows the SFPUC to issue a conditional notice of termination of supply if sufficient long-term water supplies from the RWS are not available.

The WSA extends the temporary, interruptible status of San Jose and Santa Clara through 2028, by which time the SFPUC must decide whether or not to make the cities permanent customers of the RWS. The two cities have requested permanent status from the SFPUC with a guaranteed supply of 4.5 mgd each (9 mgd total),

which the SFPUC will have to decide on by December 31, 2028. In order to support the decision-making process of making San Jose and Santa Clara permanent or not, SFPUC staff continue to include the potential additional guaranteed supply of 9 mgd for these two customers in its planning estimates. SFPUC staff also continue to encourage San Jose's and Santa Clara's active participation in developing their own local supplies to improve their resilience and ability to contribute back to the RWS in dry years to offset the additional burden on the RWS. One of the AWS Projects described in the Plan, the South Bay Purified Water Project, is designed explicitly to address this issue and could provide a pathway for the SFPUC to consider permanent status for San Jose and Santa Clara.

The SFPUC must decide whether to make the cities of San Jose and Santa Clara permanent customers by December 31, 2028.

2.4.2 Retail Service Area Obligations

The SFPUC has a responsibility to meet the needs of its Retail Customers through a combination of RWS and local supplies. As noted in Section 2.2.4, the SFPUC has limited the deliveries from the RWS watersheds to an average annual of 265 mgd, of which the Retail Customers are allocated 81 mgd and the Wholesale Customers are allocated 184 mgd, as described in the WSA between San Francisco and the Wholesale Customers discussed above. The SFPUC continues to develop demand management and local water supply projects, which are projected to reduce its reliance on the RWS. While the SFPUC is committed to reducing retail demands on the RWS even further, San Francisco could need its full Retail Allocation of 81 mgd in the years beyond 2045.

2.4.3 Current and Historical Demands

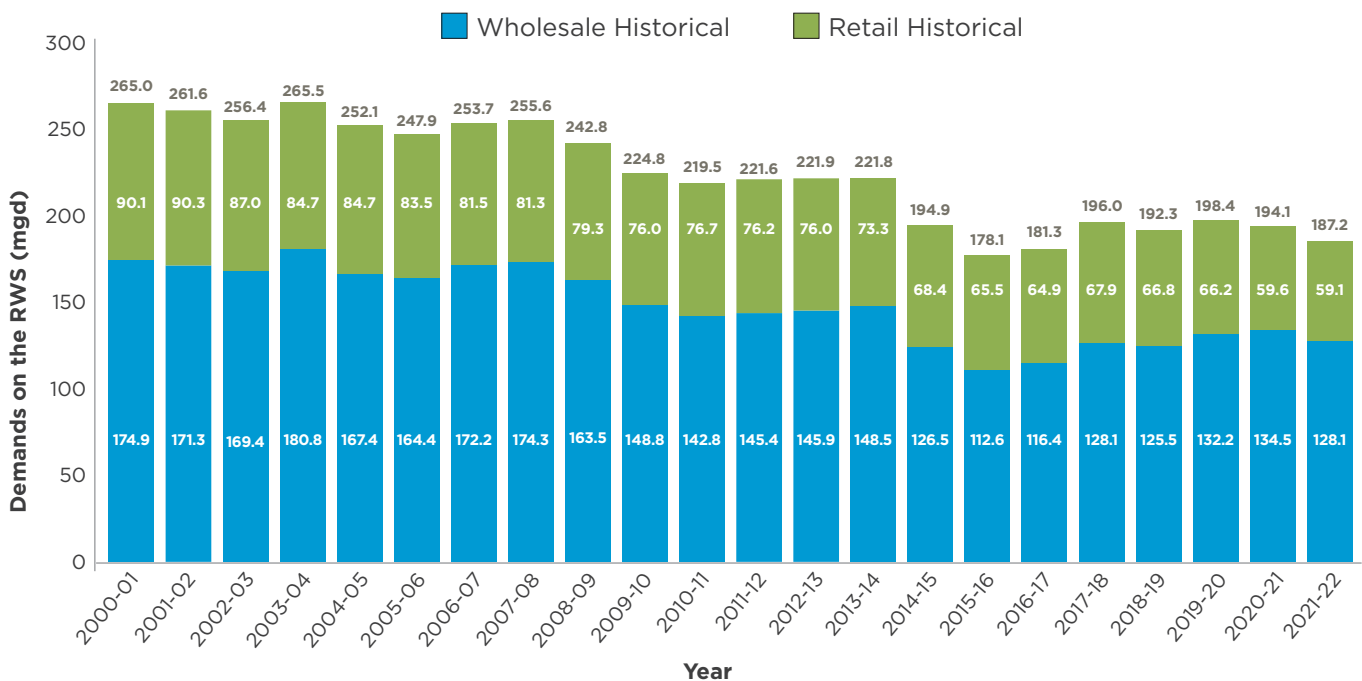
When the WSA became effective in 2009, demand projections indicated that Wholesale Customer demands on the RWS could exceed 184 mgd after 2018. However, due in part to water conservation initiatives, increased use efficiencies, the impact of droughts, and economic conditions, cumulative Wholesale Customer purchase requests continue to be significantly lower than the existing 184 mgd Supply Assurance. Still, the SFPUC's obligation to provide the Supply Assurance is perpetual and, as such, it is important that the AWS Program continues to plan for supplies to meet this obligation. Additionally, the AWS Program accounts for the requirement in the WSA to supply San Jose and Santa Clara with up to 9 mgd through 2028.

The SFPUC continues to track demands from both Retail and Wholesale Customers to better understand current and future water supply needs. For Retail Customers, about 97% of the total demand is currently met with RWS supply while the remaining portion is met with locally produced groundwater and recycled water. Approximately 65% of the total Wholesale Customer demand has been historically met by RWS

supply. Individual Wholesale Customer reliance on the RWS system varies, with some Wholesale Customers relying on RWS supply to meet 100% of their total demand and others relying on RWS supply to meet a portion of their demand, while supplementing with other local and/or imported supplies, such as local groundwater, recycled water, or surface water imported from other sources. Individual Wholesale Customer water use data is compiled each year in the [BAWSCA Annual Survey](#). More details on the breakdown of Wholesale Customer demands and supplies are included in [Appendix A](#).

Figure 2-6 shows historical water deliveries from FY 2000-01 through FY 2021-22. Many factors influence demand, including socioeconomic conditions, weather, and drought. As shown, demands begin to dip after FY 2008-09, coinciding with the economic downturn in the region. FY 2015-16 was a drought year with significantly lower demands corresponding to enhanced conservation and rationing measures. In FY 2021-22, water demand was impacted by mandatory rationing imposed due to ongoing statewide drought conditions and the continued effects of the Covid-19 pandemic. It is also important to note that different factors can influence Wholesale Customers’ total demand for water supplies from any available sources versus their demand on RWS supply specifically. Even when a particular Wholesale Customer’s total demand for water supplies does not increase, its demand on RWS supplies specifically can increase.

Figure 2-6: Historical Retail and Wholesale Demands on the RWS (2000-2022)



Note: Retail numbers include losses and a small portion of suburban retail groundwater. Source for historical retail demands is SFPUC retail sales and delivery data. Sources for historical wholesale demands include BAWSCA purchases data (FY 06-07 to FY 21-22) and SFPUC deliveries data (FY 00-01 to FY 05-06).

According to the most recent BAWSCA Annual Survey for FY 2021-22, the Wholesale Customers reported RWS purchases of 128.1 mgd, 5% lower than the total of 134.5 mgd purchased in FY 2020-21. Of the total amount of water used by these Wholesale Customers in FY 2021-22, 66.2% was RWS supply from the SFPUC and 33.8% was from other sources acquired by the Wholesale Customers including groundwater, local surface water, recycled water, and other supplies from Valley Water, the State Water Project, and Alameda County Water District's brackish water desalination.

In general, Wholesale Customer reliance on RWS supplies has increased in recent years as other supplies have become less reliable in the face of drought and regulatory uncertainties. There are also a number of conservation initiatives taking place in the wholesale service area that serve to reduce overall demand. These efforts include administering several regional water conservation programs and initiatives led by BAWSCA, including both Core Programs (implemented regionally throughout the BAWSCA service area) and Subscription Programs (funded by individual member agencies that elect to participate and implemented within their respective service areas). In addition to the BAWSCA conservation programs, many of the Wholesale Customers administer additional water conservation measures independently or through another entity, such as Valley Water. The FY 2021-22 BAWSCA Annual Survey identified an average residential per capita consumption of 60.27 **gallons per capita per day (gpcd)** across the wholesale service area, with 16 of the Wholesale Customers having a water use of less than 60 gpcd.

Total Retail Customer demand on the RWS has declined over the past decade and has remained consistently low. This is due to continued investment in efficiency improvements, conservation initiatives, and water supply diversification including the incorporation of other local water supply options such as groundwater and recycled water. Total water use within San Francisco continues to be among the lowest in



California and below historical consumption despite population growth over the same time period. Both total consumption and **per capita water use** have been on a general decline since the mid-1970s. Many factors have contributed to this reduction in water use, including significant changes to the mix of industrial and commercial businesses and their associated water demand, and the general characteristics of water use by San Franciscans. In particular, the severe droughts of 1976-77 and 1987-92, changes in plumbing codes, and conservation programs (either voluntarily embraced by residents and businesses or mandated by San Francisco) have affected water demands. During the drought in 2012-2016, per capita water use further declined. In its role as the retail water provider for San Francisco, the SFPUC has implemented aggressive conservation and demand management programs for over three decades, resulting in residential water consumption rate of 42 gpcd in San Francisco, a rate roughly half the statewide average.

2.4.4 Projected Future Demands

Identifying future demand is critical to planning for long-term supply reliability of the RWS. This AWS Plan examines projected demands through the planning horizon of 2045. Consistent with other planning efforts, the AWS Plan relies on the 2021-22 BAWSCA Annual Survey and the 2020 SFPUC **Urban Water Management Plan (UWMP)** to identify projected RWS demands. These sources may not fully reflect the most recent housing element updates of individual customers. BAWSCA agencies provide annual updates to the SFPUC identifying the amount of RWS water that each customer expects to request through the planning horizon. The SFPUC UWMP projects Retail Customer demands out through a 20-year planning horizon and is updated every 5 years. **Based on these sources, total projected future demands on RWS supply in 2045 are estimated to be 244.1 mgd, including 73.5 mgd from Retail Customers and 170.6 mgd from Wholesale Customers (Table 2-3).**

Table 2-3: SFPUC Customer Projected Demands on the RWS in 2045

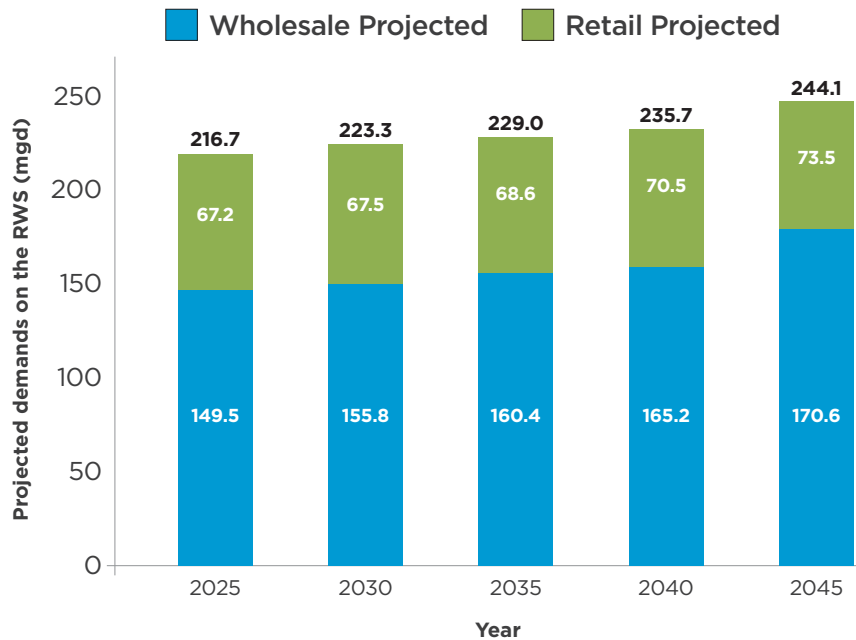
	RWS Projected Demand, 2045 (mgd)
Retail Customers	73.5 ^a
Wholesale Customers	170.6
Total RWS Projected Demand	244.1

Source: SFPUC 2020 Urban Water Management Plan and FY 2021-22 BAWSCA Annual Survey

- a The 2045 RWS projected demand for Retail Customers reflects the implementation of anticipated local supply projects and an updated savings estimate from the expansion of the Non-potable ordinance in 2021

Figure 2-7 shows demand projections through 2045 for both Wholesale and Retail Customers. Demands on the RWS are anticipated to increase through 2045. For Wholesale Customers, in addition to accounting for planned population growth within individual service areas, this may be in part due to prolonged drought and climate uncertainty which makes other non-RWS supplies that contribute to Wholesale Customers' supply portfolios less reliable given the uncertainty around availability and the potential for future State of California (State) and federal regulations. The drivers that influence projected demands on the RWS are discussed further in Chapter 3 (Future Water Supply Gap). Retail Customer demand projections assume local water supplies such as groundwater, recycled water, and onsite potable reuse will offset future RWS demand, as discussed in more detail in Chapter 4 (AWS Program Role in Addressing the Future Water Supply Gap).

Figure 2-7: Projected Retail and Wholesale Demands on the RWS (2025-2045)



Source: SFPUC 2020 Urban Water Management Plan and FY 2021-22 BAWSCA Annual Survey



South Bay Aerial View, 2018



San Antonio Reservoir, 2008

Chapter 3: Future Water Supply Gap

The objective of the AWS Program is to improve reliability in meeting retail and wholesale demands on the RWS in dry years through 2045. This chapter builds on the information presented in Chapter 2 and layers on an analysis of how dry-year water supply availability could change with the implementation of the Bay-Delta Plan Amendment. As discussed in this chapter, a shortfall in future water supply is anticipated in dry years, and this shortfall is expected to be large if the Bay-Delta Plan Amendment is implemented as adopted in 2018. This chapter describes the approach used for estimating the water supply shortfall and describes the drivers that affect the magnitude of the shortfall.

3.1 Approach for Identifying the Future Water Supply Gap

As shown in **Figure 3-1**, the difference between expected **water availability** from the RWS in a dry year and the **obligations** or anticipated customer¹ demands for water from the RWS can result in a water supply shortfall, or **water supply gap**.

Figure 3-1: Approach Used to Calculate the Water Supply Gap



The AWS Program identifies a future water supply gap in dry years, both to meet existing and potential obligations, and to meet customer demands. **The future water supply gap is characterized as a range of 92 mgd to meet 2045 customer demands to 122 mgd to meet obligations, including legal and contractual obligations for Wholesale Customers, the Retail Allocation, and potential future obligations for interruptible customers.**

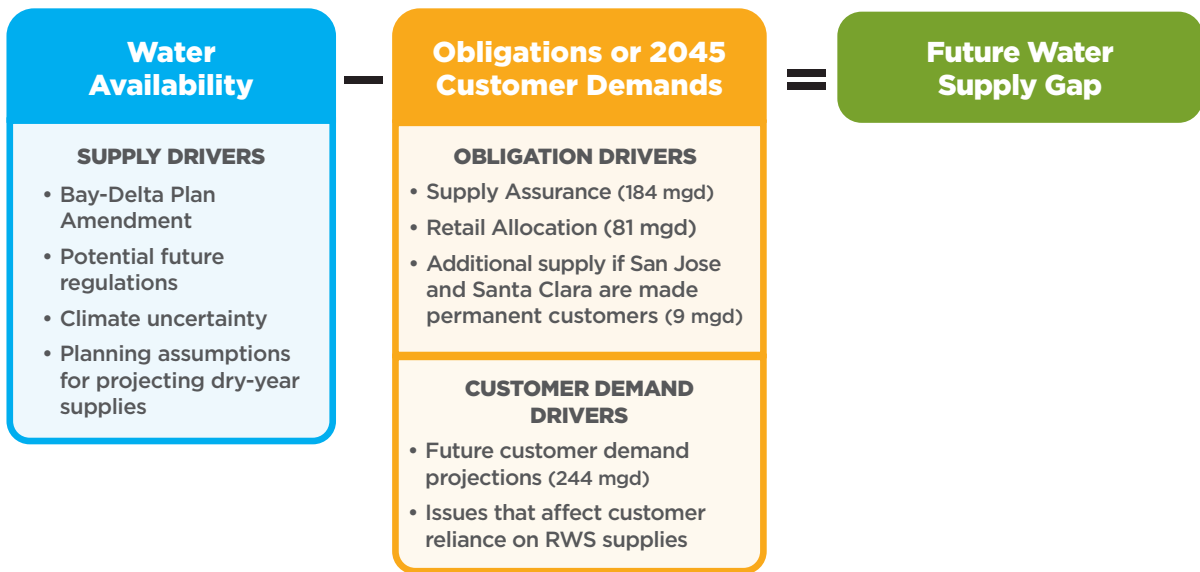
While historical and projected data indicate that customers' actual water demands on, or purchase requests from, the RWS tend to be lower than SFPUC's obligations, the AWS Program still identifies the water supply shortfall to meet obligations. This is because the Supply Assurance for the Wholesale Customers is perpetual and survives the expiration or termination of the WSA, and, as such, it is important that the AWS Program plan for supplies to meet these obligations.

The anticipated water supply gap is determined based on a number of **drivers** on both the supply side, which affect future water availability, and on the demand side,

¹ Customers include both Retail and Wholesale customers, including the cities of San Jose and Santa Clara.

which consider obligations and future demands. These drivers, summarized in **Figure 3-2**, can be uncertain and some are likely to change over time. Some of the drivers are quantitative, and their impact on the future water supply gap can be estimated numerically. Other drivers are qualitative due to future uncertainty but are important to include in the AWS planning considerations and may be refined or quantified in the future. Details of each of the drivers are summarized in Sections 3.2 and 3.3.

Figure 3-2: Drivers which Affect the Future Water Supply Gap

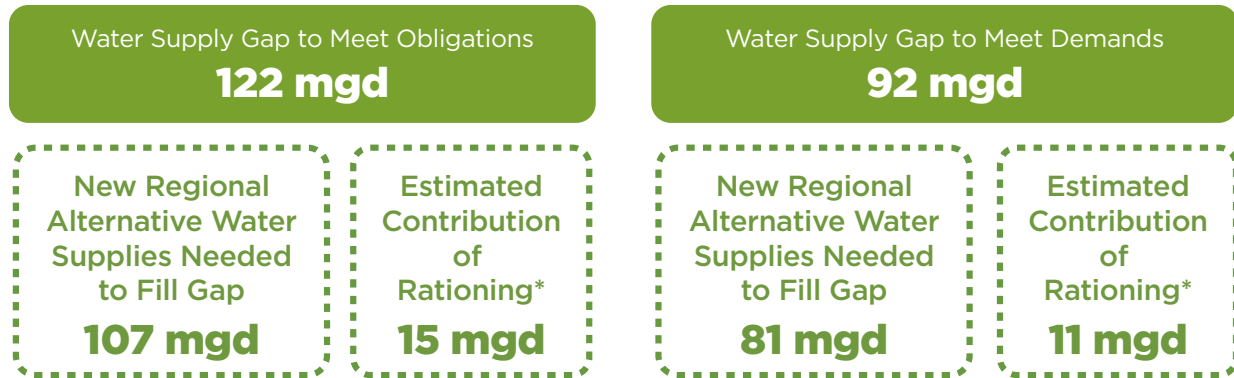


3.1.1 Contribution of Rationing to Address the Future Water Supply Gap

As described in Section 2.3 (Water Supply), the future water supply gap is based on the total system yield, or what is also referred to as water availability. The total system yield includes both firm yield (water supply available during dry periods) and the portion of demand that can be addressed with rationing. Because rationing is a water resources management tool that can address demands, it is included in the estimate of water availability along with firm yield.

The estimate of how much of the water demand could be addressed through rationing is based on a rationing policy that was adopted under the WSIP PEIR in 2008. The rationing policy assumes that over the 8½-year design drought, rationing is initially 0% and increases up to a maximum of 20%, with the annual average over the sequence being about 12%. This policy is being used as a benchmark for the evaluation of water availability with the implementation of the Bay-Delta Plan Amendment so that it can be compared to the prior planning estimates of water availability that were developed for WSIP. **Based on SFPUC’s rationing policy, rationing could contribute to filling approximately 12% of the water supply gap.** The remaining gap would need to be addressed through the development of new regional alternative water supplies, as shown in **Figure 3-3**.

Figure 3-3: Estimated Contributions of New Water Supplies and Rationing Needed to Fill the Future Water Supply Gap



* Note that the volume of demands that rationing can address is dependent on water supply. If estimated new water supplies to fill the future water supply gap is less than what is needed, the estimated contribution of rationing would also be proportionately less.

3.2 Drivers Affecting Water Availability

As described in Chapter 2 (Background), the current water supply delivered through the RWS consists of surface waters originating primarily from the Tuolumne River watershed in the Sierra Nevada (comprising approximately 85% of RWS supply) and water drawn from local surface waters in the Alameda and Peninsula watersheds (approximately 15%).

There are a number of drivers that have the potential to limit water supply from these sources in the future, including instream flow requirements, climate uncertainty, and future regulatory changes. However, **the Bay-Delta Plan Amendment is the driver that could have the most pronounced impact on water availability** through the 2045 planning horizon.

Water Availability

SUPPLY DRIVERS

- Bay-Delta Plan Amendment
- Potential future regulations
- Climate uncertainty
- Planning assumptions for projecting dry-year supplies

3.2.1 The Bay-Delta Plan Amendment

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 (referred to as the Bay-Delta Plan Amendment) to establish water quality objectives to protect certain beneficial uses within the Bay-Delta ecosystem. The Bay-Delta Plan Amendment was developed with the goal of increasing salmonid populations in three San Joaquin River tributaries (the Stanislaus, Merced, and Tuolumne Rivers) and the Bay-Delta. The Bay-Delta Plan Amendment would require the release of 40% of the unimpaired flow on the three tributaries from February through June in every year type, with the ability to adjust unimpaired flow releases down to 30% or up to 50%, depending on conditions.

The Bay-Delta Plan Amendment, if implemented as adopted in 2018, would result in new instream flow requirements that would reduce the SFPUC’s available water supply by an estimated 93 mgd per year. As summarized in **Table 3-1** and discussed in Section 2.3 (RWS Water Supply), the estimated water availability (total system yield) is 257 mgd, without implementation of the Bay-Delta Plan Amendment. This calculation assumes a dry-year baseline water supply of 227 mgd with WSIP implemented and a corresponding equivalent amount of water demands addressed by imposing the SFPUC’s rationing policy (30 mgd) over the 8½-year design drought period. **The new instream flow requirements that would result from implementation of the Bay-Delta Plan Amendment, as adopted, would reduce the projected water availability in dry years expressed as total system yield from 257 mgd to 152 mgd.** This reduction in water availability would result in a significant water supply gap in dry years.

Table 3-1: Projected 2045 Water Availability during Dry Years, with and without the Bay-Delta Plan Amendment

	Scenario <u>without</u> Bay-Delta Plan Amendment	Scenario <u>with</u> Bay-Delta Plan Amendment
Baseline Water Supply with WSIP Implemented	227	227
New Instream Flow Release Requirements from the Bay-Delta Plan Amendment	N/A	-93
Water Supply ^a (Firm Yield)	227	134
Demands Addressed through Implementation of Rationing Policy ^b	30	18
Water Availability (Total System Yield)^c	257	152

- a Firm yield without Bay-Delta Plan Amendment implementation includes implemented WSIP Projects and current instream flow releases; with implementation of the Bay-Delta Plan Amendment the firm yield accounts for additional instream flow releases of 93 mgd.
- b The water supply benefit realized through rationing represents the average annual volume of water delivery reductions in an extended drought. The volume of delivery reduction is proportional to the available water supply, or firm yield. Because the instream flow requirements called for in the Bay-Delta Plan Amendment would reduce the firm yield, the supply benefit realized through rationing would also be reduced.
- c Total system yield is the sum of system firm yield plus the water demand addressed through rationing during extended drought.

The City and County of San Francisco, and other water users on the Tuolumne River, have filed pending legal and administrative challenges to SWRCB actions associated with the Bay-Delta Plan Amendment implementation. The SWRCB Resolution No. 2018-0059 adopting the Bay-Delta Plan Amendment directed staff to “provide appropriate technical and regulatory information to the California Natural Resources Agency” in completing a “Delta watershed-wide agreement, including potential flow and non-flow measures for the Tuolumne River” by March 1, 2019, and “to incorporate the Delta watershed-wide agreement, including potential amendments to implement agreements related to the Tuolumne River, as an alternative for a future, comprehensive Bay-Delta Plan update...” to be presented to the SWRCB.

On March 1, 2019, the California Natural Resources Agency and the California Fish and Wildlife Service, submitted a proposed project description for voluntary agreements in the Sacramento - San Joaquin Bay-Delta including the Tuolumne River to the SWRCB (**Proposed Voluntary Agreement**). The voluntary agreement parties, including the SFPUC, have continued to work together to provide detailed information to the SWRCB so that they may evaluate and consider the Proposed Voluntary Agreement. The SWRCB has indicated it will consider the Proposed Voluntary Agreement for adoption in 2024. The SWRCB issued a Notice of Preparation of a California Environmental Quality Act (CEQA)-equivalent document for the Tuolumne Proposed Voluntary Agreement in April 2023. The impact of the Proposed Voluntary Agreement on projected water availability (as calculated in **Table 3-1**) will remain uncertain until the SWRCB completes its evaluation which will ultimately determine the impact of the Bay-Delta Plan Amendment on the SFPUC’s future water supply gap.

While the exact quantity associated with instream flow release requirements under the Bay-Delta Plan Amendment is subject to change with the Proposed Voluntary Agreement in the future, the Bay-Delta Plan Amendment is anticipated to cause a shortfall in RWS supply during dry years. Regular updates to this AWS Plan will be critical to reflect the latest information on Bay-Delta Plan Amendment requirements.



Tuolumne River, 2010

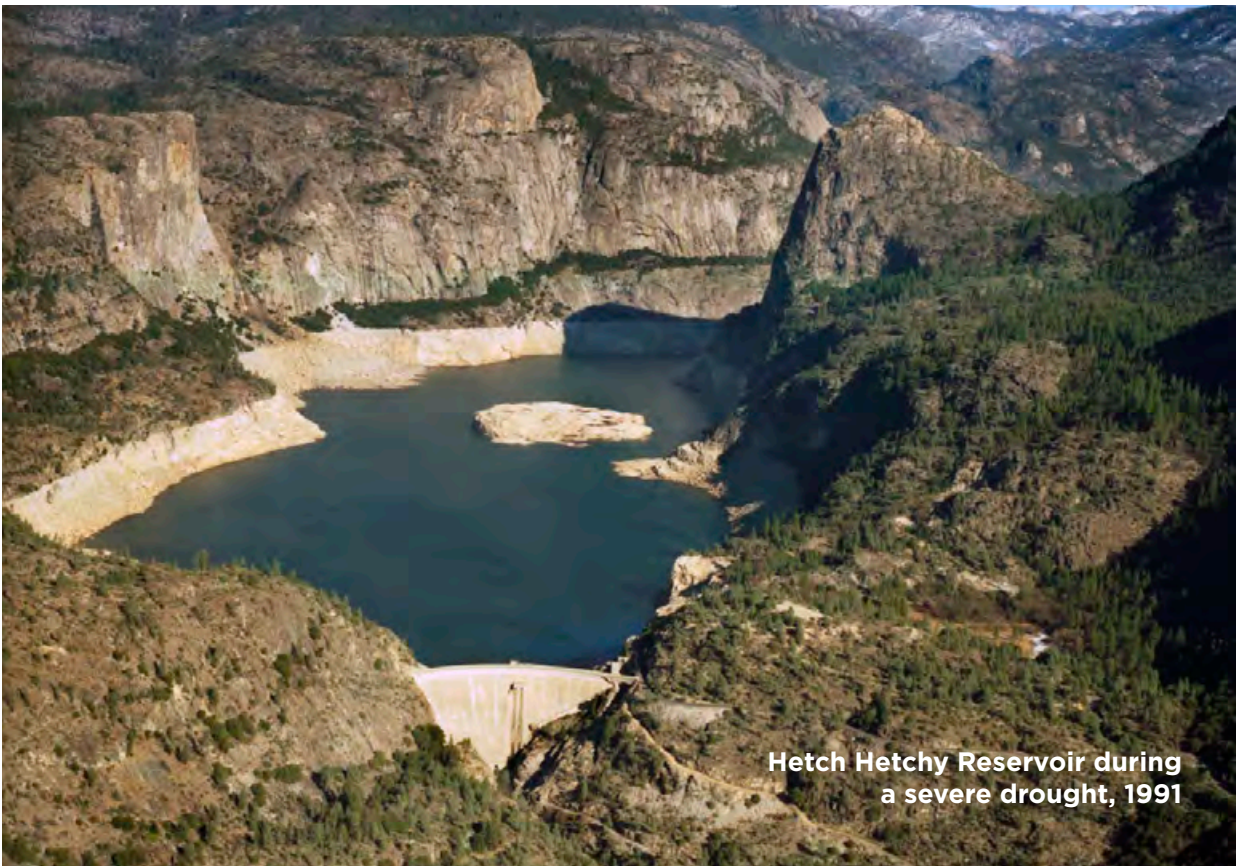
3.2.2 Potential Future Regulations

In addition to the Bay-Delta Plan Amendment, other potential future regulations or water right curtailments represent another driver that may impact water availability in the future. The SFPUC's operation of the RWS is subject to State and federal agency permits designed to protect drinking water quality and the environment. Some permit requirements have been in place for decades and influence the way water supply is managed. New instream flow requirements may result in required changes to releases or bypass flows from SFPUC facilities, which would impact water availability.

Regulatory uncertainties and their resultant impact on water availability make it difficult to definitively plan for the future. AWS planning efforts therefore do not currently assign a numerical shortfall with other potential future regulations, but rather capture them qualitatively by recognizing the risk they pose to the SFPUC's ability to meet customers' water demand. Such regulatory requirements may be quantified in the planning efforts associated with future AWS Plan updates, as necessary.

3.2.3 Climate Uncertainty

Changes in precipitation and extended droughts associated with climate change, as well as future regulations responding to a hotter, drier climate, are additional factors that can affect water supply within the SFPUC's planning horizon. Ongoing climate change assessment efforts need to be updated regularly to reflect improvements in climate science, atmospheric/ocean modeling, and reduction of greenhouse gas emissions. Climate change assessments by the SFPUC will be refined as additional information is released.



Hetch Hetchy Reservoir during a severe drought, 1991

In 2021, the SFPUC partnered with the Water Research Foundation to develop a Long-term Vulnerability Assessment (LTVA) of the RWS to better understand the potential vulnerability of the RWS to uncertain future conditions. The LTVA modeled a range of potential future climate scenarios to help assess to what extent climate change will be a threat to the RWS in comparison to, or in combination with, other external drivers of change. One finding of the assessment was that climate change exacerbates impacts from other drivers of change such as increased instream flow requirements and increased demands on the system.

Impacts related to climate change are not currently quantified in the AWS planning efforts; however, the AWS approach for long-term water supply planning includes diversifying water supplies to account for future potential impacts on the current water supply. Future updates to the AWS Plan may include numerical quantifications associated with climate change, as appropriate and available.

3.2.4 SFPUC Planning Assumptions for Projecting Dry-Year Water Availability

The SFPUC relies on planning assumptions and modeling to project future water availability in dry-year conditions. The SFPUC design drought and rationing policy, which are discussed in Section 2.3 (Water Supply) and detailed in **Appendix B**, are assumptions that affect the estimates of water availability during dry-year conditions. Changes to the assumptions around the design drought or rationing would change total system yield estimates. For the purposes of this AWS Plan, these planning assumptions are being held constant as part of the SFPUC planning methodology for projecting future water supplies. This allows a direct comparison to the planning that was done for the WSIP program.

3.3 Drivers Affecting Obligations and Customer Demands

As described above, the future water supply gap is characterized as the difference between water availability and existing and potential future obligations and customer demands. The gap is influenced by drivers that affect water availability (discussed in Section 3.2) and drivers that affect obligations and demands. This section discusses the drivers that affect obligations and customer demands.

Obligations or 2045 Customer Demands

OBLIGATION DRIVERS

- Supply Assurance (184 mgd)
- Retail Allocation (81 mgd)
- Additional supply if San Jose and Santa Clara are made permanent customers (9 mgd)

CUSTOMER DEMAND DRIVERS

- Future customer demand projections (244 mgd)
- Issues that affect customer reliance on RWS supplies

3.3.1 Supply Assurance under the Water Supply Agreement and Retail Allocation

As described in Section 2.4, the SFPUC has a legal and contractual obligation to deliver water up to the amount of the Supply Assurance (184 mgd) to the Wholesale Customers under the terms of the WSA. The Supply Assurance, which is perpetual and survives the expiration of the WSA, is shared among 24 of the 26 Wholesale Customers because it does not include the cities of San Jose and Santa Clara, who are provided water on a temporary and interruptible basis. In addition, the SFPUC provides an allocation of up to 81 mgd to Retail Customers, which combined with the Supply Assurance, amounts to a total of 265 mgd. The Supply Assurance and the Retail Allocation are obligation drivers that affects the magnitude of the future water supply gap.



3.3.2 Additional Supply if San Jose and Santa Clara are made Permanent Customers

Two Wholesale Customers, San Jose and Santa Clara, are currently temporary, interruptible customers. While they share the costs and benefits of RWS deliveries as other Wholesale Customers do, they do not have a share of the Supply Assurance, or Individual Supply Guarantees (individual customers' allocations of the Supply Assurance). The two cities have requested permanent status from the SFPUC with a guaranteed supply of at least 4.5 mgd each (9 mgd total). The SFPUC must decide whether to make San Jose and Santa Clara permanent customers by December 31, 2028. The SFPUC, San Jose, and Santa Clara are engaged in regular discussions on this topic. One result of this collaboration is the inclusion of a project in this AWS Plan, the South Bay Purified Water Project. This project is discussed in Chapter 5 (AWS Projects).

If the SFPUC makes San Jose and Santa Clara permanent customers, it would result in a future, additional supply guarantee of 9 mgd. Although the SFPUC has not yet made a decision on the cities' future status, this AWS Plan considers what it would take to make San Jose and Santa Clara permanent. Therefore, the guaranteed supply increase required to make San Jose and Santa Clara permanent customers is a driver that affects the SFPUC's potential future obligations.

3.3.3 Projected Customer Demands

Customer demand projections are a driver that affects the SFPUC's water supply gap. Wholesale and Retail Customer projections of demands on the RWS are provided largely through urban water management planning efforts. Periodically, those projections may be updated through local and regional demand studies, BAWSCA Annual Surveys, or other policy or regulatory updates that may affect future purchase projections. Regular updates to the AWS Plan will allow inclusion of the latest customer demand projections and any resulting changes to the water supply gap.

Individual wholesale and retail customer demands are influenced by factors such as conservation measures and local water supply projects. Projected demands can be reduced through actions such as local conservation and water loss reduction measures (such as leak detection), while the degree to which customers rely on the RWS to meet total demands can be offset by local water supply projects such as groundwater or recycled water projects. Given the expected magnitude of the impact of the implementation of the Bay-Delta Plan Amendment on water availability (as described in Section 3.2.1), it is apparent that water conservation and demand management measures alone will not fill the future water supply gap.

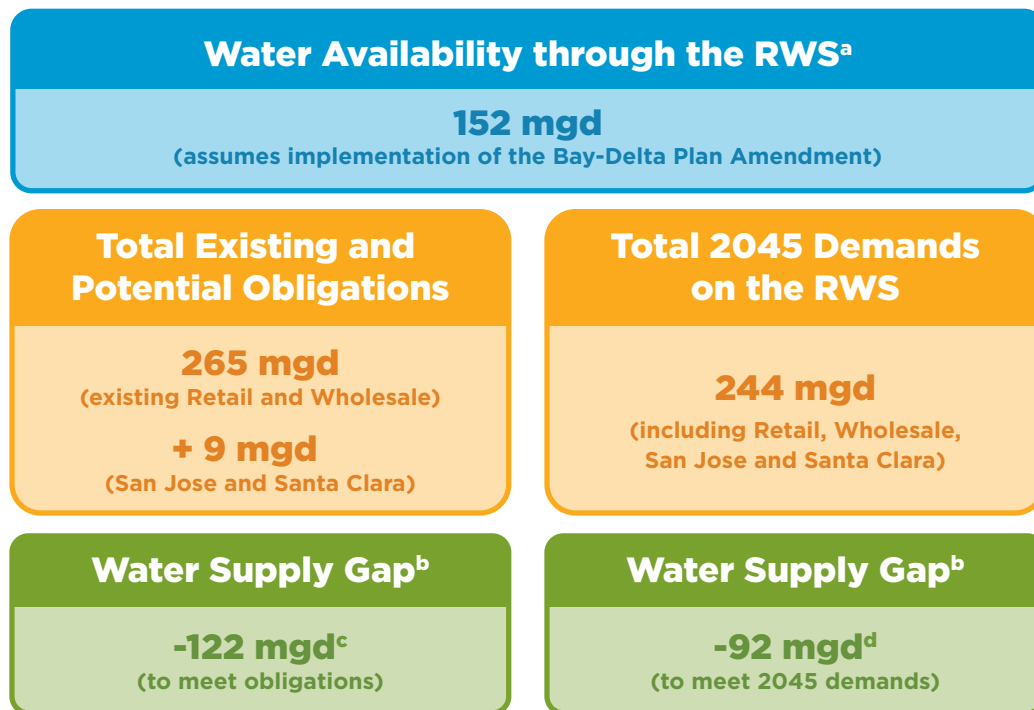
3.3.4 Customer Reliance on RWS Supplies

Recently, some SFPUC Wholesale Customers that have other non-RWS sources of supply have increased their reliance on RWS supplies. This may be in part due to prolonged drought, climate uncertainty, and the relative reliability of other non-RWS supplies, which may shift dependence on one supply source over another. Therefore, while a customer's demands may not increase, their demands on the RWS (reliance on the RWS) may. Climate uncertainty can also influence temperature and rainfall patterns that can locally impact the need for water. Purchase projections in the FY 2020-21 BAWSCA Annual Survey revealed, for example, Alameda County Water District's greater reliance on the RWS over its other supplies, even though the District's overall demands did not increase. Shifts in customer reliance on supply sources is a driver that affects future customer demands on RWS supplies.

3.4 Future Water Supply Gap (2045)

As described above, the SFPUC’s future water supply gap is determined by comparing its existing and potential future obligations and 2045 customer demands against the future water availability. Implementation of the Bay-Delta Plan Amendment, as adopted, would reduce the projected water availability to 152 mgd. **Figure 3-4** below shows a significant water supply gap in dry years when considering two scenarios: one based on existing and potential future obligations and a second based on projected customer demands on the RWS.

Figure 3-4: Water Supply Gap for Meeting Obligations and 2045 Demands in Dry-Year Conditions



- a Represents the total system yield. The total system yield is the sum of the firm yield of the RWS plus rationing (134 mgd firm yield and 18 mgd of demands addressed by implementing the rationing policy [see Chapter 2 for additional detail]).
- b The water supply gap estimates: 1) the total difference between water availability and obligations and 2) the difference between water availability and customer demands on the RWS in 2045.
- c As rationing is a function of water supply availability, to close the gap with new supplies and rationing, new supplies of 107 mgd would be required. Up to 15 mgd of the water supply gap can then be met by rationing.
- d As rationing is a function of water supply availability, to close the gap with new supplies and rationing, new supplies of 81 mgd would be required. Up to 11 mgd of the water supply gap can then be met by rationing.

For AWS planning, the following key conclusions can be drawn from the supply-demand comparison:

- As shown in **Figure 3-4**, in dry years, the SFPUC has identified a future water supply gap of 122 mgd to meet existing legal and contractual obligations (184 mgd), Retail Allocation to serve future retail service area obligations (81 mgd), and potential future obligations (9 mgd). Based on the projected demands of the same customer base on the RWS in 2045, the water supply gap would be 92 mgd.
- This future dry-year water supply gap is primarily driven by the potential implementation of the Bay-Delta Plan Amendment. However, the requirements of the Bay-Delta Plan Amendment are still under review as part of the Proposed Voluntary Agreement discussions and may change as a result of ongoing negotiations between the SFPUC and the State. The results of these negotiations will impact water availability which will in turn impact future water supply gap estimates.
- Based on SFPUC's rationing policy and consistent assumptions about rationing in future droughts, about 12% of the gap would be addressed through rationing. An additional 107 mgd of new supplies would need to be developed to meet obligations and 81 mgd of new supplies would need to be developed to meet projected 2045 demands.
- The SFPUC must implement new projects and actions that increase supply (firm yield) by augmenting RWS supplies in dry years. If less than 81 mgd of new supplies are developed, the benefit to water availability from rationing will be proportionately less.
- The drivers that affect both water availability and demands on the RWS must be reviewed regularly so that the projected water supply gap can be refined and updated as needed.
- Since 2000, SFPUC watersheds have experienced more frequent and severe dry years than in the preceding 100 years, punctuated by some wet years. Although the water supply gap is a dry-year concern, with drought frequency and severity becoming more commonplace, the utility of dry-year supply projects is likely to increase over time.
- To make San Jose and Santa Clara permanent customers, the SFPUC would need to identify the source(s) of supply that would be used to provide the additional 9 mgd of supply guarantee allocated equally between those two customers. The South Bay Purified Water Project could provide benefits to San Jose and Santa Clara in all years as well as the SFPUC in dry years.

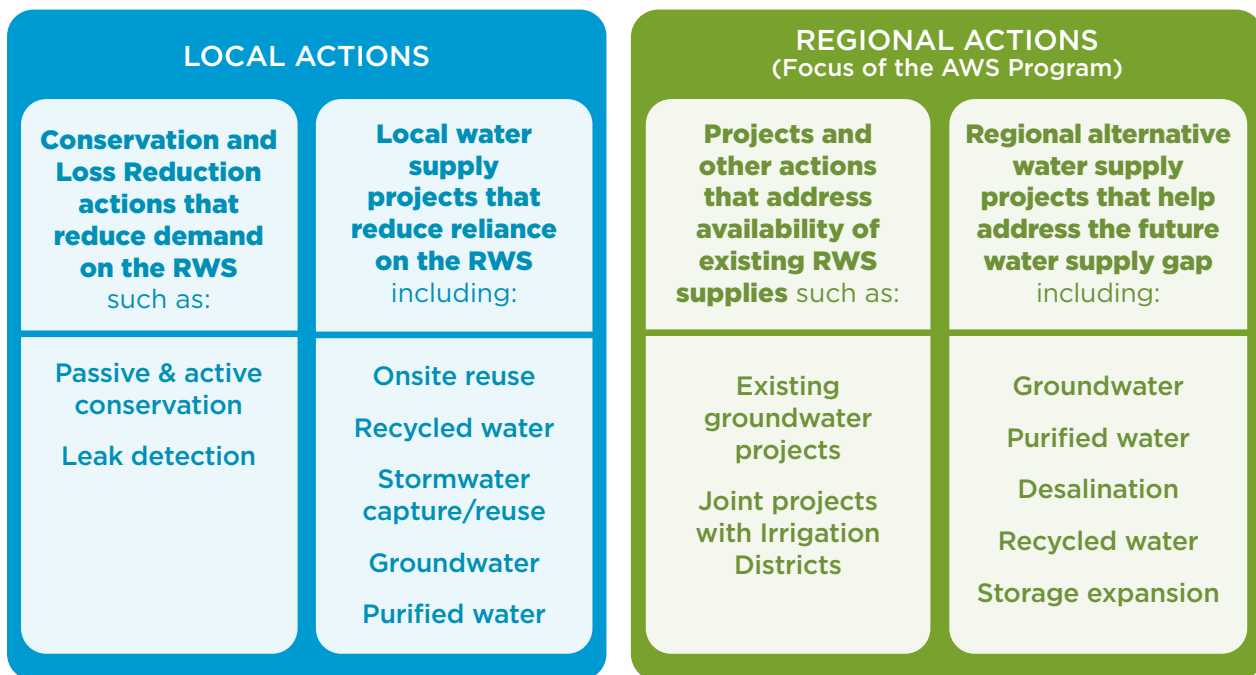


Chapter 4: AWS Program Role in Addressing the Future Water Supply Gap

Long-term water supply planning requires a comprehensive approach. For the SFPUC service area, this means not only looking at new water supplies as discussed in this AWS Plan, but also expanding demand management efforts through conservation, identifying local water supply projects that can utilize local water resources to reduce demands on the RWS, and implementing other actions to strengthen the availability of existing surface water supplies.

As shown in **Figure 4-1**, some of these actions are implemented locally through BAWSCA and/or by the SFPUC as a retail water provider to San Francisco; other actions address regional water supplies and are the responsibility of the SFPUC as the operator and steward of the RWS and in coordination with BAWSCA in accordance with the WSA.

Figure 4-1: Long-Term Water Supply Planning Coordinated Approach of Local and Regional Actions



4.1 Demand Reduction through Water Conservation Activities

The SFPUC as a retail service provider has long been committed to, and is a leader in, water conservation. Individual Wholesale Customers serve a parallel function of managing local water demands in their respective service areas. BAWSCA represents the interests of the Wholesale Customers and coordinates water conservation assistance regionally. Information on each customer's demand reduction efforts and per capita use are included in [Appendix A](#).

SFPUC Retail Water Conservation Activities: The SFPUC has been implementing a retail conservation program in San Francisco for over 30 years. Despite steady population and job growth in the retail service area, the SFPUC's per capita water use rate has declined and remained low, due in large part to SFPUC's retail conservation efforts. Since 2005, San Francisco's residential per capita water use declined by 30% despite a 15% increase in population. With an average residential per capita water use of 42 gpcd, residential water use in San Francisco remains among the lowest in the State. The SFPUC continues to maximize opportunities to do more on demand management. From participating in cutting-edge research and dialogue on [extreme decentralization](#) and 50-liter challenges to inviting independent review of existing programs to identify additional actions for feasible demand reduction action, the SFPUC remains committed to water conservation. By 2025, residential per capita water use is estimated to decrease to 38.4 gpcd, well within industry ranges for what is considered highly efficient.

Wholesale Service Area Conservation Activities: In the wholesale service area, BAWSCA and individual Wholesale Customers offer a wide variety of water conservation programs. These efforts include several regional water conservation programs and initiatives led by BAWSCA, including both Core Programs (implemented regionally throughout the BAWSCA service area) and Subscription Programs (funded by individual Wholesale Customers that elect to participate and implement within their respective service areas). As detailed in BAWSCA's FY 2021-22 Annual Water Conservation Report, all 26 Wholesale Customers benefit from the twelve Core Programs implemented by BAWSCA, including landscape education classes, conservation workshops, and public educational materials. In FY 2021-22, 23 out of 26 Wholesale Customers participated in one or more of the fourteen Subscription Programs offered by BAWSCA, including rebates, water loss management and large landscape audits. BAWSCA continues to refine



Sunol Yard water efficient landscaping

and add to its suite of water conservation programs in an effort to reduce overall demand. The FY 2021-22 BAWSCA Annual Survey found an average residential per capita consumption of 60.27 gpcd across the wholesale service area, with 16 of the Wholesale Customers having a water use of less than 60 gpcd, all of which reflects the region's commitment to water conservation. In addition to the BAWSCA conservation programs, many of the member agencies administer additional water conservation measures independently or through another entity, such as Valley Water.

4.2 Reducing Demands on the RWS through Local Water Projects

It is important to distinguish **local water supply projects** from the **regional water supply projects**, or the AWS Projects, that are the focus of this Plan. AWS Projects are intended to augment regional supplies and have widespread water supply benefit to the SFPUC service area. In contrast, local water supply projects have the potential to reduce demands on the RWS by implementing projects that utilize non-RWS supplies within a retail service area. Examples would include a retail water agency using local groundwater resources, promoting residential- or commercial-scale graywater and stormwater capture and reuse programs, or promoting water recycling programs implemented by a local water agency to meet **non-potable demands** within its retail service area. The SFPUC implements many of these types of programs as the retail service provider for San Francisco, and BAWSCA member agencies, retail water agencies in their own right, are implementing many of these types of programs throughout the wholesale service area, consistent with their agreement to do so under the WSA.

SFPUC Retail Local Water Projects

The SFPUC has been working for years to identify and bring on new local water supply resources in the retail service area through a number of programs including:



Westside Enhanced Recycled Water Project which can provide up to 2 mgd of recycled water to meet non-potable demands in Golden Gate Park and other irrigated landscapes on the west side of San Francisco.

San Francisco Groundwater Supply Project that utilizes groundwater from the Westside Groundwater Basin in San Francisco as a drinking water supply. Groundwater is treated and blended with the City's RWS supplies before it is delivered to in-City retail customers. Currently, less than 1 mgd is being blended into the City's drinking water supply. Over time, pumping can be gradually increased in order to blend up to 4 mgd of treated groundwater with regional water supplies.

Onsite Water Reuse Program which is an innovative program that mandates the collection, treatment, and use of graywater, blackwater, rainwater, stormwater, and foundation drainage in new buildings over 100,000 square-feet to meet non-potable demands such as toilet flushing and irrigation. By 2040, the total potable water offset by the Onsite Water Reuse Program will be approximately 1.5 mgd.

Stormwater Capture and Reuse Program that provides rebates for the purchase of cisterns and rain barrels for residents and business to capture rainwater for irrigation use, thus saving drinking water and reducing the amount of stormwater that enters the City's combined sewer system. This program also supports capital projects that increase the beneficial reuse of stormwater such as the Vista Grande Drainage Basin Improvement Project.

Innovations Program which promotes exploration of new ways to conserve water, recover resources, and diversify the City's water supply. Efforts being explored or implemented under the program include atmospheric water generation, the use of new technologies to detect leaks and reduce losses in the City's water distribution system, and Brewery Process Water Reuse grant opportunities for breweries to collect, treat, and reuse process water generated onsite. In 2021, Anchor Brewing Company, San Francisco's oldest brewery, completed construction of a brewery process water recycling system that has the capacity to recycle up to 20 million gallons per year.

PureWaterSF is another significant local water project in San Francisco that could reduce retail water demands. The SFPUC is exploring the potential to provide a new, local drinking water supply in San Francisco through the use of purified water. As described in the adjacent project highlight, PureWaterSF could provide up to 5.2 mgd of **purified water** in San Francisco with approximately 1.2 mgd serving non-potable uses and 4 mgd being blended with RWS supplies for distribution throughout San Francisco to serve **potable demands**.



**Anchor Brewery
Water Reuse Project, 2021**

PureWaterSF: San Francisco's Opportunity to Further Reduce Demand on the RWS

PureWaterSF is a project concept that envisions providing a new, sustainable drinking water supply in San Francisco by treating recycled water originating from the Oceanside and Southeast Treatment Plants, which treat combined flows of wastewater and stormwater. Research on this concept began in 2016 with grant funding from the U.S. Bureau of Reclamation and the Water Research Foundation. The SFPUC installed a temporary advanced treatment system at the end of an existing water recycling system at its own headquarters in San Francisco. The treatment included ultrafiltration, reverse osmosis, and disinfection with ultraviolet light and advanced oxidation. The research analyzed thousands of data points through third-party laboratories with specialized equipment to conclude that advanced water treatment produces consistently high-quality water that meets or exceeds regulatory standards, even at the building scale. The research marked the beginning of the SFPUC's investigation of purified water as a supply solution in San Francisco and throughout the service area.

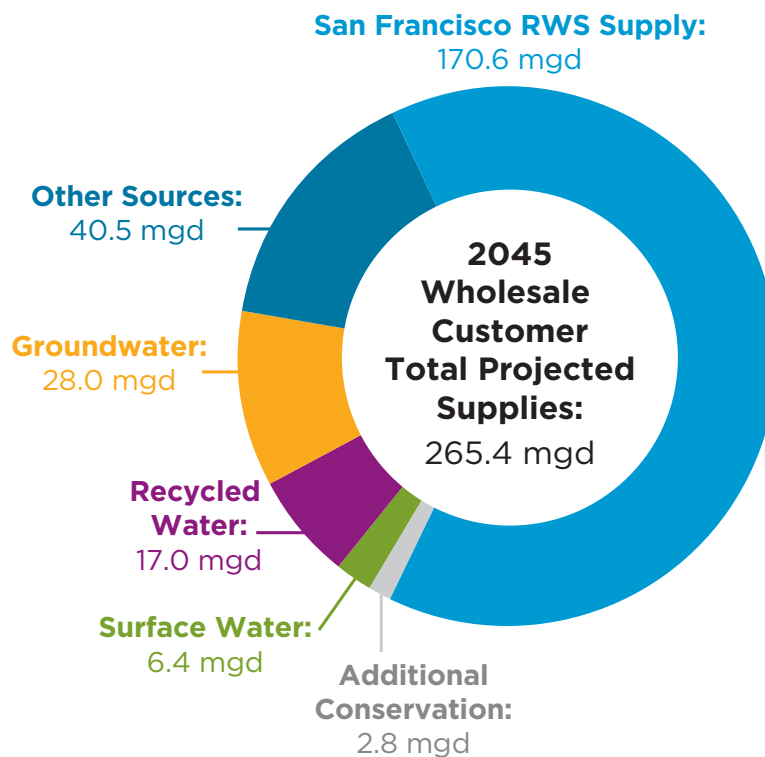
In 2021-2022, after the successful completion of the research, the SFPUC conducted a feasibility study that evaluated four potential scenarios for purified water in San Francisco, including costs and infrastructure needs to meet stringent emerging regulatory requirements. As a result of this feasibility study and a related concurrent study that evaluated the potential for non-potable water supply on the east side of San Francisco, the SFPUC plans to continue developing a project concept that would consist of two parallel plants that distribute water throughout the city, one 2 mgd purified water plant on the east side and one 2 mgd purified water plant on the west side. An additional 1.2 mgd may be added to the plant on the east side to address non-potable demands. Technical studies, siting, environmental review, financial analysis, and demonstration and engagement with the public and regulators will all be needed as the project concept is developed. If implemented, this project could result in reducing San Francisco's demand from the RWS by 5.2 mgd by 2045. Meanwhile, a redesign of the existing reuse system at the SFPUC headquarters building is currently underway and the SFPUC plans to make purified water a permanent demonstrable feature at its building in the near future.



Wholesale Service Area Local Water Projects

In the wholesale service area, individual customers are implementing a variety of local water supply projects of various sizes. Plans for those projects are considered by each Wholesale Customer and are included in their respective UWMPs.¹ Demand studies, along with the BAWSCA Annual Survey, factor those local projects into consideration when calculating the projected purchases from the RWS. As shown in the FY 2021-22 BAWSCA Annual Survey, by the year 2045, Wholesale Customers will have invested locally such that 35.7% of their water demand will be met by sources other than RWS, as shown in **Figure 4-2**.

Figure 4-2: Wholesale Customer 2045 Demand Projections by Source



To further the discussion of collaboration on potential planned projects, BAWSCA held a One Water Reliability Series (Roundtable Series) which brought together different water professionals spanning across the BAWSCA service area including its member agencies, non-governmental organizations (NGOs), counties, wastewater agencies, and other leaders and experts in water related fields. The three primary goals of the Roundtable Series were to: (1) understand how existing and planned projects in the region fit within the One Water concept, (2) identify the potential for collaborative opportunities, and (3) offer ideas for how entities could potentially support, help finance, permit, approve, and expand projects or programs that have the potential to offer multiple benefits.

¹ Wholesale Customer UWMPs can be found at www.bawasca.org/members/urban_water_management

As part of the Roundtable Series, BAWSCA obtained Project Information Forms from all Wholesale Customers regarding what types of water supply projects are being planned, in-progress, or are at a conceptual level within each agency. As of February 2023, a total of 51 potential projects have been identified that include a broad range of supply projects including recycled water, groundwater extraction, and stormwater, among others. Approximately 43% of identified potential projects are in-progress, 37% are in the planning stage, and another 20% are in the conceptual stage.

As the regional water provider, the SFPUC has a need to meet its customers' demands and its legal and contractual obligations to its customers. However, the implementation of local water supply projects can provide multiple benefits through the efficient use of local resources, including building resilience while helping to reduce demands on the RWS. To this end, the SFPUC will continue to look for opportunities to expand local projects in its own retail service area and collaborate with the Wholesale Customers to encourage ongoing implementation of local water projects throughout the wholesale service area.

4.3 Other Projects to Increase the Availability of Existing Surface Water Supplies

The surface water supplies delivered through the RWS will continue to be the backbone of the SFPUC's water supply. Therefore, the SFPUC is identifying other regional actions outside of the AWS Program that can be taken to maintain and increase the availability of supplies delivered through the RWS, especially under dry-year conditions. Examples are the Regional Groundwater Storage and Recovery (RGSR) project and the Alameda Creek Recapture Project, both of which have been initiated as part of WSIP, as well as potential future projects with irrigation districts in the San Joaquin Valley.

Regional Groundwater Storage and Recovery Project. The RGSR project involves the management of surface water and groundwater supplies in the Westside Groundwater Basin that extends through San Mateo and San Francisco counties to increase reliability for the RWS in dry years. Through a regional partnership with California Water Service Company (serving South San Francisco and Colma) and the cities of Daly City and San Bruno, the RGSR will balance groundwater and RWS supply through in-lieu deliveries and resulting **groundwater recharge** during wet years to increase dry-year water supplies. During normal and wet years, when surface water is plentiful, additional water from the RWS is delivered to the partner agencies, which reduces their need to pump groundwater and thus allows the groundwater basin to naturally recharge. Over time, this reduction in groundwater pumping will result in a water savings account of up to 61,000 acre-feet of water, a volume equivalent to that of the SFPUC's Crystal Springs Reservoir. This water stored in the groundwater basin can then be sustainably pumped to augment RWS supplies during a drought or other

emergency. The project is currently being implemented and will include the installation of 7 to 9 wells, which can produce approximately 3.6 mgd of supply annually under dry conditions. To achieve the full 6.2 mgd annual supply originally planned for under WSIP, additional wells, associated treatment systems, and potentially storage would have to be commissioned. Prioritizing completion of this project would ensure that the RWS would be able to deliver the expected supply in future dry years and not increase the shortage further.

Alameda Creek Recapture Project. The Alameda Creek Recapture Project includes new facilities in and around an existing quarry pit in Sunol Valley to recover the loss of water supply associated with instream flow release and bypass requirements related to the Calaveras Dam Replacement Project. During the initial stage of construction, the SFPUC concluded that re-evaluation of the design is necessary before proceeding with construction of the project. It is anticipated that completion of the project can provide the 5 mgd of water supply assumed in the baseline modeling for the AWS Program.

Joint Projects with Irrigation Districts. There are currently a number of projects being investigated that would strengthen the availability of existing surface water supplies from the Tuolumne River watershed under dry-year conditions. Groundwater banking in the Modesto and Turlock Irrigation Districts could be used to provide additional water supply to meet instream flow requirements while reducing the water supply impacts to the SFPUC service area in dry years. Inter-basin collaborations, which could include establishing partnerships between interests on the Tuolumne River and those on the Stanislaus River, have the potential to address streamflow requirements in the basins based on annual hydrology and could create opportunities to beneficially use excess flow to between the two basins. These types of projects help identify collaborative approaches to provide instream flows during dry periods while helping to preserve the availability of RWS supplies. These projects are part of a broader cooperative effort with the Irrigation Districts in parallel with the Voluntary Agreement process. Developments and any resultant effects on the supply gap will be included in future AWS Plan updates.

4.4 AWS Planning Approach

The AWS Program looks beyond existing surface water supplies of the RWS to new and diverse or alternative water supply projects such as groundwater banking, surface water storage expansion with existing or new supply sources, water transfers, purified water, as well as technological innovations and other tools to increase the reliability of regional water supplies.

Implementing, integrating, and delivering alternative water supplies requires detailed planning that considers unique and interrelated issues. Additionally, new water supply projects take years to plan and implement and require significant capital outlay. **To minimize the financial and operational risks of overcommitting capital while**

ensuring that there are sufficient water supplies being developed to help fill the projected water supply gap, the SFPUC has established an approach to help guide the AWS planning process. As described in the following sections, the process considers the planning challenges unique to alternative water supply planning, establishes a program goal to guide long term decision making, and establishes planning principles that guide identification of AWS Projects and AWS Program recommendations. Furthermore, the SFPUC recognizes that the AWS Program must be a dynamic process that will require continued review and update.

4.4.1 Challenges Unique to Alternative Water Supply Planning

Many of the planning challenges associated with developing new and alternative water supplies are different than those associated with traditional water supply planning at the SFPUC. While every project presents a unique set of circumstances and challenges, common issues that must be addressed for alternative water supply projects include operational considerations of integrating new supplies into existing infrastructure, water quality considerations, distribution of new supplies, institutional considerations around multi-party partnership projects, affordability, and addressing community acceptance of new water supplies.

Operational Considerations of Integrating New Supplies

The current water supply conveyed by the RWS generally flows from east to west by gravity, from the Sierra Nevada to San Francisco. The RWS relies on storage and conveyance infrastructure to distribute supplies throughout the SFPUC's service area. Tie-in locations for new supplies would need to be based on the proximity and feasibility of connecting the new supply to existing RWS facilities. **How and where new supplies are brought into the RWS can affect capacity, timing of deliveries and storage, flow rates, and operating pressures.** For example, connecting two systems with different pressures can require new infrastructure, such as pump stations. When new supplies use available capacity of major transmission pipelines, the tradeoff may be that it becomes more difficult to move existing surface water supplies within the system. The type of new water supply being brought into the system may also impact the timing of when supplies are available. For example, purified water projects that provide water every year, including in wet or normal years when surface water supplies are sufficient, may affect decisions about how storage is operated, and which

AWS Program Focus

Regional alternative water supply projects that help address the future water supply gap including:

- Groundwater
- Purified water
- Desalination
- Recycled water
- Storage expansion

Developing alternative water supplies presents new planning challenges that are different from those associated with traditional water supply planning.

supplies are prioritized. All of these considerations can impact system operations and necessitate changes in operational approaches.

Water Quality Considerations

Alternative water supply projects include the delivery of water supplies from new sources such as purified water, groundwater, and desalinated water, and also may include surface water supplies from new sources such as the Delta. The result is that water from a number of alternative supply sources may be commingled with the existing surface water supply in the RWS. Like RWS supplies, alternative supply sources will be required to meet or exceed federal and State drinking water standards and will be subject to testing and monitoring on an ongoing basis. However, **planning for the combined effect of multiple supply sources requires that water quality impacts be considered.** For example, purified water projects require careful evaluation and understanding of emerging regulatory requirements and tradeoffs of storing purified water in surface water reservoirs (**indirect potable reuse**) or of introducing purified water directly into transmission or distribution facilities (**direct potable reuse**). Utilizing surface water from new sources such as the Delta could increase the risk of introducing invasive species into Bay Area surface water reservoirs or potentially cause changes to existing treatment operations. These different types of issues will require careful evaluation of existing facility operations and potential changes to existing water quality monitoring approaches.



Crystal Springs Reservoir, 2019

Distribution of Alternative Water Supplies

Currently, the RWS supplies are relatively homogenous. That is, the RWS supplies are primarily surface water supplies distributed to customers throughout the service area. With the introduction of AWS Projects, specific tie-in locations of new supplies within the existing RWS system will determine the point at which new supplies would be introduced downstream (to the west) into the RWS and the resulting distribution to customers within the service area. This may result in different “supply portfolios” for different customers depending on their location within the SFPUC service area. While it is not possible to evenly distribute each supply source throughout the service area, the SFPUC, as part of its implementation of the AWS Program, will strive to achieve equitable distribution of supplies throughout the retail and wholesale service areas. **In planning, this means that there will need to be a conscious effort to ensure that both the increased reliability benefits that come with a more diverse water supply, and the physical distribution of new supplies, are as wide-ranging as practical across the service area.**

Institutional Issues Involving Multi-Party Partnership Projects

Implementing alternative water supply projects often involves complex partnerships with other public or private agencies. For example, purified water projects require a wastewater purveyor as a partner, and shared **storage projects** require agreements between reservoir operators and partners. Different agencies have different interests and priorities, which will shape how project agreements are developed. Project partnership agreements will require negotiations on cost and water supply allocations that could affect the SFPUC’s share of water supply benefits. **While regional partnerships will be increasingly necessary to more efficiently distribute limited regional water supplies, they will require that the SFPUC approach the costs and value of these water supply investments differently from those of past water supply investments.** Historically, the SFPUC has invested largely in infrastructure that it has owned and operated. Capital investments and planning have emphasized the cost of building or enhancing assets rather than the ongoing expenditure needed to continue to operate and maintain them. In partnership projects, long-term contracts may emphasize responsibilities and costs of **operation & maintenance (O&M costs)** for assets that the SFPUC may not own. How the SFPUC values the water supply and reliability benefits associated with AWS Projects will drive how the SFPUC and its partners make investment decisions and how contracts and cost-share arrangements among parties are structured. Willingness, ability to pay, and available financing options for reliability during dry years may be different from traditional asset-based investments.

Affordability

Building large new capital infrastructure is expensive. In addition to **capital costs**, alternative water supplies also require development of operational capacity to manage and integrate new supplies. Project phasing is a strategy that is being included in Projects to both spread costs out over time, and to enable the SFPUC to continue to revisit planning projections and the anticipated water supply gap as they evolve before committing to additional project investments. AWS Projects may also be eligible for State and federal grant funds such as Title XVI grant funding from the U.S. Bureau of Reclamation. As planning continues at the project level, affordability remains a key programmatic challenge that has to be balanced with the need for additional supplies to improve dry year supply reliability. **Identifying creative financing solutions and approaches is an important next step in the development of the AWS Program in order to minimize the financial impact of AWS Project implementation to SFPUC customers, including it's the most vulnerable communities.**

Community Acceptance

Having diverse water supply sources improves water supply reliability. Therefore, the more water supply sources in a given part of the service area, the greater the water supply resilience in that area. However, it is not uncommon for customers to perceive that there are differences in water quality among different sources, which may impact what is considered equitable distribution of supplies. Community acceptance of varied water supplies will be important for the successful implementation of the AWS Program. For example, surface water supplies from the RWS have long been viewed as a high-quality source by SFPUC customers. While the SFPUC will maintain its high-quality standards across all supply sources, customers may not perceive alternate sources such as groundwater, transfer water, or purified water with the same regard despite those sources' meeting or exceeding the same regulatory standards and testing and monitoring requirements. **Community engagement through outreach and information sharing can help improve the deliverability of projects and distribution of supplies and will be a critical element of the AWS Program.**



4.4.2 AWS Program Goal

The AWS Program is evaluating new projects that will address the projected future water supply gap for the SFPUC service area. The AWS Program goal was developed to align with the SFPUC's LOS Goals and Objectives. Based on the water supply gap identified in Chapter 3 (Future Water Supply Gap), there is specifically a need to address the reliability of the RWS supplies in dry years. These elements of the AWS Program are captured in the AWS Program goal. The goal defines what the AWS Program intends to achieve over the planning period.

The goal of the AWS Program is to identify water supply projects that increase the dry-year reliability of RWS supplies and address the long-term water supply gap in alignment with the LOS Goals and Objectives.

4.4.3 AWS Planning Principles

The AWS planning principles are intended to guide the identification of the AWS Projects and recommendations that advance the Program toward addressing its long-term goal, while accounting for known drivers and challenges. The planning principles, shown in **Table 4-1**, are written in a manner that is intended to be broad, durable, and applicable over the duration of the AWS planning period.

Successful implementation of the AWS Program requires a balance between securing future reliability and maintaining affordability, both of which are critical SFPUC goals. The AWS Program must focus on implementing water supply projects that will address long-term customer demands and obligations without overbuilding or overcommitting capital funding. By considering the different planning principles, AWS recommendations can be phased and prioritized to address the AWS Program goal in a balanced approach that accounts for the varying drivers and challenges. Often a project will consider many different planning principles, other times it will focus more singularly on one principle. But ultimately, by considering the principles throughout the planning process, the AWS Program recommendations will lead the SFPUC toward its long-term goal in a balanced manner without dictating a particular approach.

AWS planning principles minimize the risk of overcommitting capital while ensuring that there are sufficient water supplies being developed to address the future water supply gap.

Table 4-1: AWS Planning Principles

Planning Principle	Basis
<p>Continue to assess opportunities to reduce water consumption</p>	<p>The SFPUC has a successful history of implementing aggressive conservation and demand management programs as the retail water service provider to San Francisco. These efforts have resulted in a per capita residential water consumption that is roughly half the statewide average. As the system operator of the RWS, the SFPUC recognizes the importance of conservation throughout the service area as an approach to reduce demand on the RWS. Conservation is a vital step that must be taken in conjunction with identifying alternative water supplies to ensure that the AWS Program provides long-term water resiliency while providing prudent and well-founded recommendations.</p>
<p>Plan for obligations and build for demands</p>	<p>Based on historical data and current projections, customers’ actual water demands on the RWS tend to be lower than SFPUC’s obligations. Still, the SFPUC’s agreement to deliver water up to the amount of the Supply Assurance and the Wholesale Customers’ ISGs is perpetual. In addition, the SFPUC has an obligation to provide the Retail Allocation of up to 81 mgd to Retail Customers if needed. Therefore, the AWS Program and Plan address water supplies needed to meet these obligations while prioritizing investments for meeting customer demands.</p>
<p>Diversify supplies</p>	<p>Diversifying water supply options through the use of groundwater, recycled water, desalinated water, and purified water is a long-standing objective of the SFPUC and is reflected in the LOS Goals and Objectives and other SFPUC policies such as OneWaterSF. This planning principle reinforces that diversification of supplies is central to the AWS Program and of particular importance given the long-term risks to surface water availability from factors such as potential future regulations and climate uncertainty.</p>

Planning Principle	Basis
<p>Maximize use of existing surface water supplies through optimizing system efficiency and operations</p>	<p>This planning principle recognizes that existing surface water supplies delivered through the RWS will continue to be an essential portion of the SFPUC’s water supply for the foreseeable future. Continuing efforts to optimize system operations is a strategy to maintain supply and increase system resiliency.</p>
<p>Phase projects in a way that they can be scaled</p>	<p>This allows for informed decision-making that considers near-term water demands in relation to long-term goals, while minimizing the financial and operational risks of overbuilding or overcommitting financial resources.</p>
<p>Encourage partnerships that increase the reliability of water supplies throughout the service area</p>	<p>Planning for and implementing alternative water supplies requires consideration of different approaches from those used for traditional water supply planning at the SFPUC. This planning principle recognizes that these approaches often rely on multi-party partnerships that are needed for developing and integrating new supplies into the SFPUC water supply portfolio.</p>
<p>Ensure that AWS Program recommendations are consistent with the LOS Goals and Objectives and other existing SFPUC policies and standards</p>	<p>This planning principle recognizes that existing policies and standards set the basis for identifying the water supply gap and developing recommendations. As policies and standards change, the AWS Program would be updated to reflect how any changes impact assumptions around the water supply gap.</p>
<p>Update the AWS Plan so that it is responsive to changing conditions</p>	<p>This planning principle recognizes that the AWS Program requires a dynamic planning process that must be adaptive to changing conditions and challenges. The recommendations included in the AWS Plan must be reviewed periodically so that they continue to address the water supply gap as it is understood based on the most current conditions and changing drivers, and updated water demands on the RWS.</p>

4.4.4 Purpose of the AWS Plan

The purpose of the AWS Plan is to:

- Identify the future water supply shortfall to meet obligations and demands through the 2045 planning period as they are currently understood
- Identify AWS Projects that can augment RWS supply
- Support the SFPUC Commission’s decision-making by providing recommendations that will move the AWS Program forward, as well as other policy decisions

4.4.5 Strategies for Supporting Informed Decision-Making

For each of the proposed AWS Projects included in the AWS Plan, planning is in the early stages. **Large, complex water supply projects require a long lead time to fully develop and implement.** There is a need to progress systematically from planning to environmental review, and then to detailed design, permitting, and construction. During this time, it will be important to continually review and understand the status of different projects in relation to the current drivers, and the most up-to-date long-term water supply shortfall estimates. Doing so allows appropriate assessment of the next steps in developing the projects and helps the SFPUC make informed decisions about how to proceed with each project as more information is available.

Several of the AWS planning principles help decision making around AWS recommendations in a stepwise manner. Specifically, these principles include:

Update the AWS Plan so that it can be responsive to changing conditions. This includes setting a schedule for regular updates to the SFPUC Commission on overall program and project progress, as well as making specific updates to both water availability and customer demands that inform the water supply gap described in the Plan and making updates to project and programmatic recommendations. Ensuring these key elements of the Plan are updated on a regular basis will be a critical element to supporting decision-making and identifying key decision points on how to proceed with each project as they move from planning toward implementation.

For example, as discussed in Chapter 3 (Future Water Supply Gap), the driver with the most significant impact on water availability is the implementation of the Bay-Delta Plan Amendment. As currently proposed, the Bay-Delta Plan Amendment would reduce water availability by 93 mgd. However, the requirements of the Bay-Delta Plan Amendment are still under review as part of the Proposed Voluntary Agreement

discussions and may change as a result of ongoing negotiations between the SFPUC and the State. The results of these negotiations will impact water availability which will in turn impact future water supply gap estimates. Regular updates to the AWS Plan will be critical to ensure that the Plan recommendations are responsive to these, and other, changing conditions.

Phase projects in a way they can be scaled. This allows project recommendations to be phased to balance forward action and progress of project development, while minimizing the risk of overcommitting financial resources. Large new water supply projects will take years to fully plan and design before construction can begin. A phased approach allows for the planning and engineering activities associated with projects to progress in phases so that projects progress in a stepwise manner and in conjunction with the continual review and update of the drivers of the water supply gap.



Pilarcitos Reservoir, 2019



Calaveras Dam Replacement, 2012

Chapter 5: AWS Projects

This chapter describes the projects that have been identified under the AWS Program. Given the wide range and diverse nature of the projects, this chapter provides an overview of each AWS Project as it is currently understood to support decision making for the next steps of AWS Program development. A detailed discussion of programmatic and project recommendations is presented in Chapter 6 (AWS Recommendations).

As described in Chapter 4 (AWS Program Role in Addressing the Future Water Supply Gap), AWS Projects go beyond the supplies currently delivered through the RWS. The AWS Projects included in this chapter are intended to augment regional supply with new, alternative water supplies and have widespread benefit throughout the SFPUC service area. While it is understood that supply augmentation is just one part of long-term water supply planning along with conservation and implementation of local projects, this chapter does not include conservation actions or local water supply project options that would be pursued by the SFPUC in its role as the retail service provider for San Francisco, nor those local actions and projects that would be implemented by BAWSCA and the Wholesale Customers.

5.1 Characterization of AWS Projects

The SFPUC is pursuing a broad range of projects under the AWS Program. The projects are characterized by their type (supply, storage, conveyance), their supply availability (dry-year, all-year).

5.1.1 Type of Project and Water Supply

The projects included in the AWS Program are characterized as supply projects, storage projects, or conveyance projects. Supply projects are further characterized by the type of supply produced (surface water, purified water, groundwater, or recycled water).

Supply Projects

In the AWS Program, **supply projects** provide a new source of supply to the SFPUC service area. Currently the SFPUC service area is served with surface water supplies generated in the Tuolumne River watershed and from Bay Area watersheds. Adding new and different supply sources can not only help fill the water supply gap that is anticipated under future dry-year conditions, it can also diversify risks associated with relying on just a small number of water sources. The different water sources utilized by the AWS Projects include:

Surface Water - Surface water supply projects under the AWS Program utilize a surface water supply that is outside of the SFPUC's existing supplies (Tuolumne watershed and Bay Area watersheds). Surface water supplies may also include brackish water. Surface water supply projects would rely on a combination of transfers, storage, and conveyance to make the supply available within the SFPUC service area.

Purified Water - Purified water projects generate potable water through the advanced treatment of wastewater. Purified water can be made available to the SFPUC service area through indirect potable reuse (IPR) or direct potable reuse (DPR). IPR projects are those where purified water is blended in surface water reservoirs (referred to as **reservoir augmentation**) or injected into groundwater basins (**groundwater recharge**) before it is added to distribution facilities. Regulations for these processes have been in place in California as of 2018 and 2014, respectively. DPR projects are those where purified water is added directly to the distribution system. This may be done through **raw water augmentation**, which is the planned placement of purified water into a system of pipelines that deliver raw water to a drinking water treatment plant, or **treated water augmentation**, which is the planned placement of purified water into the water distribution system. Regulations for these types of projects are under development and are anticipated in December 2023, and likely to become effective by mid-2024. While it is very common for the terms IPR and DPR to be used in the water industry, the State regulations are based on the more specific treatment and delivery pathways of reservoir augmentation, groundwater recharge, raw water augmentation, and treated water augmentation.



San Francisco groundwater well, 2021

Groundwater - Groundwater can be utilized in a variety of ways. It can be used directly as a drinking water supply, and it can also be managed for storage and recovery in dry years. This **storage and recovery** approach is accomplished by offsetting groundwater use in normal or wet years with available surface water supplies or, in the case of non-potable use of groundwater, with alternatives supplies such as recycled water. The groundwater that is offset accumulates, or is stored, in the basin and then recovered for use as a potable supply in future dry years when surface water supplies are limited.

Recycled water - Recycled water is wastewater that is carefully treated to be safe for a variety of non-potable uses. The projects included in the AWS Program are aimed at increasing potable water supplies. Recycled water has a role in increasing potable water supplies when it can be used to offset potable water use, as described above in groundwater storage and recovery projects.

Storage Projects

With the growing uncertainties associated with precipitation and drought, storage forms a critical element of AWS planning. Due to extreme changes from severe weather patterns and their effect on the timing of water availability, it is important to have sufficient storage for making the water available for use in dry years. Planning for storage also needs to account for 1) water supply to fill and utilize the storage facility and 2) conveyance to ensure delivery of the water to customers. Thus, identifying and developing connectivity between the different water infrastructure elements from the source to the customer helps ensure reliable service delivery. Different types of storage options may include:

Surface water storage – Surface water storage includes expanding or building new reservoirs.



Groundwater storage – Water supplies can also be stored below ground by sustainably managing groundwater aquifers as storage for future dry-year reliability. Storage can be realized by offsetting use of groundwater and thus preserving it by utilizing alternative water supplies (through storage and recovery projects, as described above) and also by percolation or injection of water supply into the aquifer for future recovery.

Conveyance Projects

Conveyance facilities connect existing or new facilities and enable deliveries of water. Conveyance projects may include making improvements to or increasing capacities of existing transmission facilities or building new tie-ins or connections between existing facilities. In addition to evaluating options for building new infrastructure as needed, the AWS Program actively considers how it may utilize existing facilities that are part of the RWS and those that are owned by other agencies that may allow for efficient and cost-effective connections and deliveries. The AWS Program continues to assess existing RWS facilities for their potential for managing new supplies.

5.1.2 Supply Availability

As discussed in Chapter 3 (Future Water Supply Gap), the AWS Program has identified a significant water supply shortfall in dry years to meet 2045 demands and existing and potential obligations. As such, the focus of the AWS Plan is to identify supplies that can meet this dry-year need. Projects with different supply availability can help fill this need in different ways.

Projects that provide dry-year supply – For these projects, supplies are available only in dry years due to the type of supply available and/or the project operations. For example, storage projects may store excess surface water in reservoirs that is then available during dry years. Groundwater storage and recovery projects operate in a similar way where groundwater is allowed to accumulate in aquifers during wet periods, and then is pumped during dry periods. These types of projects are part of an important strategy in the AWS Program to augment regional supplies and improve the reliability of the RWS in dry years.

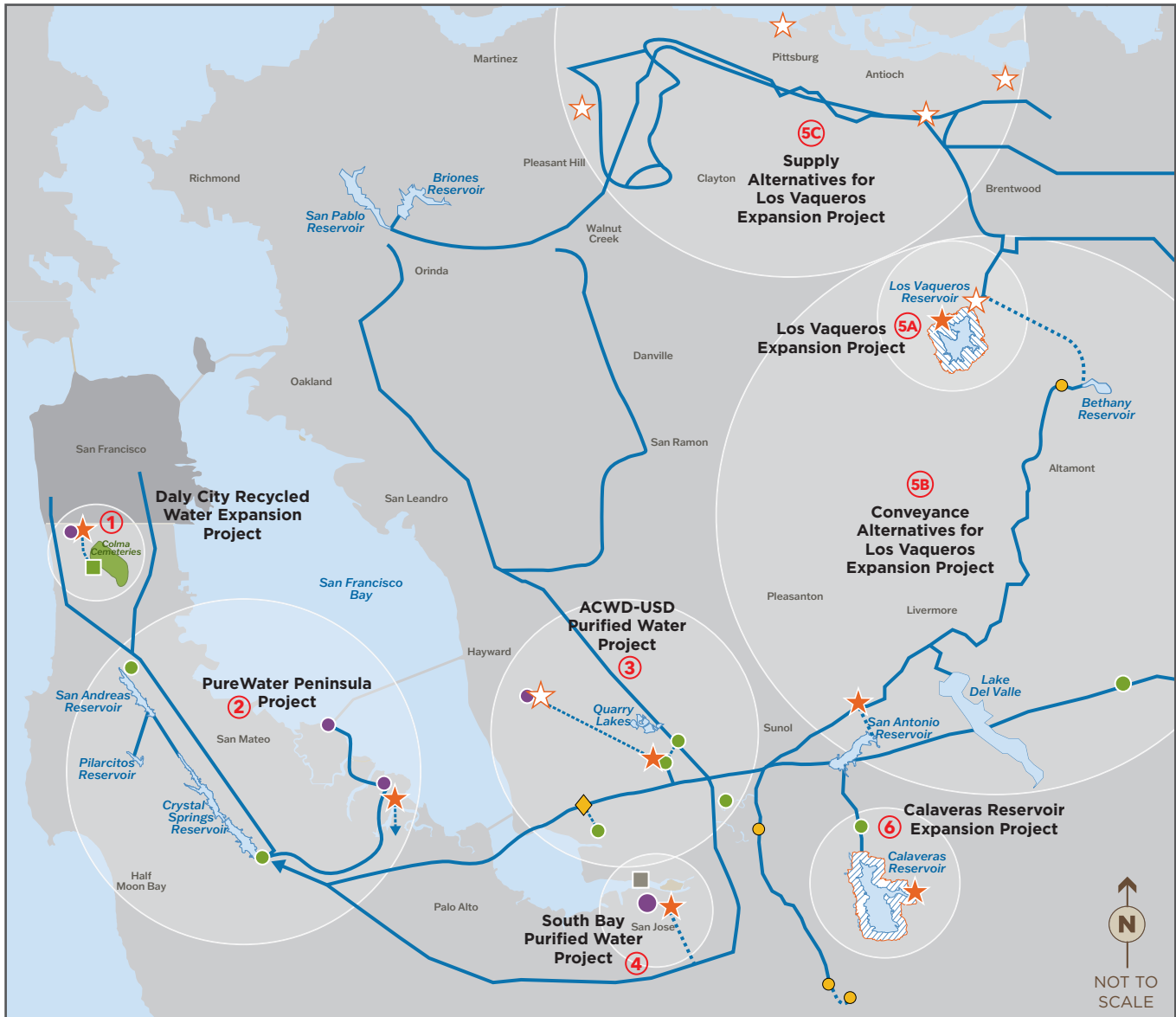
Projects that provide supplies in all years – These projects produce water in both dry years and wet/normal years. For example, purified water projects produce drinking water by taking water that has been recycled from wastewater and putting it through advanced treatment and membrane filtration processes so that it is safe to drink and meets the required health and safety standards. Because the supply is not dependent on rainfall or snowmelt, it is available in all year types. Typically, these types of membrane-based treatment projects must be operated continuously because of the sensitivity of the membranes; therefore, they provide a purified water supply regardless of need, which can create complications for storage or conveyance capacity during wet or normal periods when the RWS storage and conveyance facilities are typically at capacity with surface water supplies. So, while these projects are desirable in their ability to produce a drought-proof supply, they do have operational tradeoffs related to storage and conveyance which must be resolved to optimize their overall water supply benefit.

5.2 Overview of AWS Projects

The AWS Program has identified six projects that can help address the future water supply gap. **Figure 5-1** shows the general location of the AWS Projects. Of the six AWS Projects, one has three interlinked components associated with the expansion of Los Vaqueros Reservoir: storage, conveyance, and supply. These components are broken out in order to characterize the considerations and attributes of each component and are described separately as projects 5A, 5B, and 5C, respectively.

Table 5-1 provides key attributes for each of the AWS Projects, including SFPUC supply assumed for each project, estimated online date, and capital cost estimates. Each of these attributes are described further in Section 5.2.1 through Section 5.2.3. Section 5.3 provides a Project Description Table for each of the six AWS Projects.

Figure 5-1: Map of AWS Project Locations



LEGEND All locations and sizes shown are approximate and represent the general vicinity for potential facilities. Shaded circles serve to indicate project facilities associated with each project; they do not indicate project size or volume of water produced.

- | | | | |
|--|---|--|--|
| | Existing Pipeline | | Daly City Recycled Water Expansion Project |
| | Potential/Proposed Pipeline | | PureWater Peninsula Project |
| | Potential/Proposed Project Facility | | ACWD-USD Purified Water Project |
| | Alternate Potential/Proposed Project Facility | | South Bay Purified Water Project |
| | Water Treatment | | Los Vaqueros Expansion Project |
| | Water Storage | | Conveyance Alternatives for Los Vaqueros Expansion Project |
| | Potential New Outfall | | Supply Alternatives for Los Vaqueros Expansion Project |
| | Wastewater Treatment | | Calaveras Reservoir Expansion Project |
| | Intertie | | |
| | Turnout | | |

Table 5-1: AWS Project Summary Table

Regional AWS Project	How Project Augments RWS Dry-Year Supply	Status and Cost Estimate Classifications*	SFPUC Supply Assumed (mgd)	Estimated Online Date	Project Capacity		Total Capital Costs (\$ mil)		Estimated Capital Cost per Acre-Foot (\$/af)	Considerations for Future Cost Estimating
					mgd	acre-feet per year	Escalated	2023 \$		
RECYCLED WATER / GROUNDWATER										
1. Daly City Recycled Water Expansion	Recycled water is produced for irrigation customers, replacing groundwater pumping. In-lieu groundwater recharge will result in stored drinking water for dry years.	Design Class 3	0.7	2030	0.7	784	\$120	\$99	\$4,203	<ul style="list-style-type: none"> Recycled water produced is 1.06 mgd and equivalent modeled storage benefit in groundwater basin is 0.7 mgd, which represents 100% of the cost and benefit here Total capital costs include treatment, conveyance, and storage, escalated to the mid-point of construction No sharing of benefits among partners or cost-share determined at this time, though it is anticipated
PURIFIED WATER (POTABLE REUSE)										
2. PureWater Peninsula	Treated wastewater effluent from the City of San Mateo and Silicon Valley Clean Water can be treated to drinking water standards at a new advanced water treatment plant. A new conveyance pipeline and pump stations would deliver purified water to Crystal Springs Reservoir where it would blend with other RWS supplies. Water can be available in all years, including in dry years.	Planning Class 5	6	2039	12	13,440	\$1,168	\$753	\$1,868	<ul style="list-style-type: none"> Project includes two phases with half the water coming from each of two wastewater treatment plants No water supply sharing has been determined among partners, but SFPUC assumes 50% supply for planning Total capital costs include treatment, conveyance and pumping, escalated to the mid-point of construction
3. ACWD-USD Purified Water	Treated wastewater effluent from Union Sanitary District can be treated to drinking water standards at a new advanced water treatment plant. A new pipeline would deliver purified water to Alameda County Water District's groundwater basin for recharge. Water can be extracted and treated again for use in dry years.	Planning Class 5	5.4	2039	5.4	6,048	\$1,301	\$824	\$4,541	<ul style="list-style-type: none"> Feasibility study evaluated two distinct phases; however, the characteristics of each phase are very different and will require additional evaluation. It is unlikely that Phase 2 would be online by 2045 Only Phase 1 was assumed for cost and water supply estimating (includes treatment and conveyance); total capital costs are escalated to mid-point of construction 100% of the water supply attributed to the SFPUC for planning purposes
4. South Bay Purified Water	Treated wastewater effluent from the Regional Wastewater Facility in San Jose can be treated to drinking water standards at a new advanced water treatment plant. The new supply would be treated in accordance with new DPR regulations for distribution. New storage, conveyance, and pumping are included in the costs. While the project may produce water in all years for the region, the RWS is only expected to receive water in dry years.	Planning Class 5	3.5	2038	10	11,200	\$658	\$425	\$1,264	<ul style="list-style-type: none"> Project capacity of 10 mgd includes 6.5 mgd that would be delivered to San Jose and Santa Clara in all years The SFPUC's water supply is assumed to be 3.5 mgd in dry years only Total capital costs include treatment, storage, conveyance, and pumping for 10-mgd project Total capital costs are escalated to the mid-point of construction

* Cost Estimate Classifications are based on generally-accepted standards of project cost estimating, used to classify the degree of project definition and maturity. This system has five classes, Class 5 being the least defined and Class 1 being the most definitive.

Table 5-1: AWS Project Summary Table (continued)

Regional AWS Project	How Project Augments RWS Dry-Year Supply	Status and Cost Estimate Classifications*	SFPUC Supply Assumed (mgd)	Estimated Online Date	Project Capacity		Total Capital Costs (\$ mil)		Estimated Capital Cost per Acre-Foot (\$/af)	Considerations for Future Cost Estimating
					mgd	acre-feet per year	Escalated	2023 \$		
STORAGE WITH CONVEYANCE (AND SUPPLY, AS NEEDED)										
5A. Los Vaqueros Expansion + 5B. Conveyance Alternatives + 5C. Supply Alternatives (Transfers)	This project option reflects the cost of securing the SFPUC's portion of the project (40,000 acre-feet of storage), the associated cost of conveyance infrastructure to deliver water to the RWS, and purchase of transfer water to fill storage, which is accounted here as part of capital costs.	Design Storage, Class 2 Conveyance and Supply, Class 5	3.9	2030	3.9	4,416	\$286	\$225	\$1,700	<ul style="list-style-type: none"> Costs based on SFPUC purchase of 40,000 acre-feet of storage, not total reservoir expansion for regional benefit Water supply estimate based on drawing down from a full reservoir and taking delivery over 7½ years of the design drought Evaporative losses of 8% and 10% conveyance losses are assumed No grant or loan offsets included in capital cost calculations Capital cost includes estimate for upsizing existing turnout from South Bay Aqueduct to San Antonio Reservoir and purchase of water transfers with no new infrastructure
OR										
5A. Los Vaqueros Expansion + 5B. Conveyance Alternatives + 5C. Supply Alternatives (Desalination)	This project option reflects the cost of securing the SFPUC's portion of the project (40,000 acre-feet of storage) and a new brackish water treatment or similar water supply project that would deliver water to an expanded Los Vaqueros Reservoir through an exchange with Contra Costa Water District. Storage and conveyance components of the project would remain the same as with the transfer supply alternative.	Design Storage, Class 2 Conveyance and Supply, Class 5	3.9	2040	3.9	4,416	\$792	\$533	\$4,027	<ul style="list-style-type: none"> Several new supply alternatives are under consideration, in the event that long-term transfers are not available. Brackish water desalination is included with storage and conveyance capital costs here for illustrative purposes; no decisions have been made on the long-term source of supply for LVE Capital cost estimates for LVE with transfers as a supply and LVE with brackish water desalination as a supply are not additive, but two alternative cost scenarios for the same project assuming two different supply scenarios
OR										
6. Calaveras Reservoir Expansion (Large)	This project option represents the largest Calaveras Dam raise studied, which would raise Calaveras Dam by 890 feet and provide over 290,000 acre-feet of additional storage. It is paired with a large conveyance alternative that requires new infrastructure (new Calaveras Pipeline and Calaveras Pump Station) but also relies on increasing flow through the existing Tesla Treatment Facility. Water would be stored in wet years to augment RWS dry-year supplies.	Planning Class 5	28.6	2039	28.6	32,045	\$6,011	\$3,807	\$3,960	<ul style="list-style-type: none"> This project assumes the highest dam raise scenario and a representative conveyance alternative from the project feasibility study As with the small Calaveras Dam raise alternative, this project assumes that the reservoir is full at the start of a drought sequence and delivered over 7½ years of a design drought sequence The water supply estimate assumes 8% evaporative losses and an additional 10% conveyance loss Total capital costs are escalated to mid-point of construction No water supply cost is assumed for this project
OR										
6. Calaveras Reservoir Expansion (Small)	This project option represents the smallest Calaveras Dam raise studied, which would raise Calaveras Dam by 771 feet and provide over 22,000 acre-feet of additional storage. It is paired with a small conveyance alternative that requires limited infrastructure. Water would be stored in wet years to augment RWS dry-year supplies.	Planning Class 5	2.7	2035	2.7	2,970	\$346	\$252	\$2,831	<ul style="list-style-type: none"> This project assumes the lowest dam raise scenario and smallest conveyance alternative evaluated in the project feasibility study As with the large Calaveras Dam raise alternative, this project assumes that the reservoir is full at the start of a drought sequence and delivered over 7½ years of a design drought sequence The water supply estimate assumes 8% evaporative losses and an additional 10% conveyance loss Total capital costs are escalated to mid-point of construction No water supply cost is assumed for this project

* Cost Estimate Classifications are based on generally-accepted standards of project cost estimating, used to classify the degree of project definition and maturity. This system has five classes, Class 5 being the least defined and Class 1 being the most definitive.

5.2.1 RWS Supply Assumed and Project Capacity

The goal of the AWS Program is to increase the dry-year reliability of RWS supplies by addressing the water supply gap. The SFPUC regional water supply assumed for each AWS Project is the volume of water that would be produced in an average dry year of the design drought. For purified water projects that are operated in all years, the SFPUC's share of the project capacity can be delivered in each year of a drought. Storage projects, however, typically build up in wet/normal years and then are assumed to be delivered over the course of the design drought. As a drought is not generally declared at least until the second consecutive dry year, the total volume of storage is divided by 7½ to represent average annual availability to the SFPUC. Furthermore, because of the nature of operation of storage projects, combined evaporative and conveyance losses of 18% are assumed in the calculation of supply assumed.

Some AWS Projects may have a larger project capacity that accounts for additional water that would be produced by the project for local use by one or more project partners but not contribute to RWS supplies, or accounts for future phases of the project that are not assumed as part of current AWS planning efforts. For AWS Projects in the early planning stages, the assumed water supply produced by the project is estimated, sometimes with a range, and the assumed supply estimates will be refined as project planning proceeds.

5.2.2 AWS Staffing Considerations

Staffing for the AWS Program supports programmatic development as well as AWS Project planning, implementation, and integration with RWS operations.

Project Staffing - Staffing needs for the operation of AWS Projects have been identified at a planning level, and the timing for bringing on project staff is closely associated with the dates that projects are expected to be online. Depending on the roles and responsibilities of project partners, the need to hire staff may vary.

Estimated project staffing needs to support implementation are identified in the Project Descriptions Tables that are included in Section 5.3. Where additional staff may be needed to support projects prior to implementation for planning, such as to support purified water planning in the retail service area, those specific staffing recommendations are included in Chapter 6 (AWS Recommendations). No additional staff requests are anticipated for project planning associated with the AWS Projects described in this chapter.



Programmatic Staffing - Programmatic staffing needs are required to ensure that the SFPUC has appropriate expertise to develop and implement key strategic areas of the AWS Program. These programmatic staffing needs are not specific to any one project but rather address three strategic areas: operations, purified water, and finance. Operations expertise is needed to develop approaches for integrating new supplies into the RWS. Purified water expertise is needed to ensure that the SFPUC has the specialized skills to oversee the development of purified water projects that have emerging technological and regulatory requirements and focused community engagement needs. Finance support will consider issues such as affordability and grant funding, as well as partnership cost sharing opportunities. Programmatic staffing recommendations identified for the current phase of the program are outlined in Chapter 6 (AWS Recommendations).

5.2.3 AWS Cost Considerations

The cost estimates and associated estimate classifications for AWS Projects were presented previously in [Table 5-1](#). The associated costs for each AWS Project, with the exception of Los Vaqueros Expansion Project and the Daly City Recycled Water Expansion Project are preliminary Class 5 Level cost estimates. Class 5 Level cost estimates may vary by -50% to +100% as these are developed during the early planning phases of a project.¹ As each AWS Project is further defined, and cost components are refined, confidence in the cost estimates will increase. Planning and design for the Los Vaqueros Expansion Project is near complete and it is classified as a Class 2 Level cost estimate. The Daly City Recycled Water Expansion Project has 30% design completed, and its costs are refined to the Class 3 Level. For a detailed description of the classifications, see [Appendix C](#).

The costs presented in [Table 5-1](#) represent capital costs only, and do not include O&M costs or any offsets from grants or alternate financing. The total capital costs are presented in real dollar terms, escalated to the mid-point of construction, and adjusted to current 2023 dollars. The unit costs are expressed in current dollar terms, over the total capacity of a project over a 30-year period to match an assumed financing period. As described in Section 5.2.1, the volume of supply assumed for each project to calculate unit costs is generally the full capacity of a project, not only the SFPUC's assumed supply share, reflecting the fact that operations and final project benefits have not yet been determined for most projects. Additionally, storage projects are assumed to incur 8% evaporative losses, 10% conveyance losses, and then deliveries are averaged over 7½ years of an 8½-year design drought, assuming that there is no knowledge of a drought in the first year. This methodology is consistent with the water supply modeling for the RGSR project, which is an underground storage project operating in dry years currently under construction.

¹ This Plan uses the Association for the Advancement of Cost Engineering (AACE) Cost Estimate Classification System Level 1-5 definitions, as described further in Appendix C.

Lastly, note that the costs presented in this table may differ from feasibility study estimates due to contingencies and escalation adjusted to match SFPUC's prior WSIP projects. The inconsistencies between different methodologies used by different consultants have been corrected for in this AWS Plan. As cost-share and financing are determined for projects, costs will continue to evolve and cost modeling is part of an ongoing process in the planning of the AWS Program. The costs presented in this Plan are preliminary and conservative, and represent a snapshot in the early planning process.

While some planning funds have been included in the current capital plan (described for each AWS Project in Section 5.3), the recommendations and associated costs in this Plan are for additional funds not already included in the capital plan, financial plan, or rates projections. A staff recommendation on whether and to what extent to move forward on these AWS Project and programmatic recommendations will be refined during the regular biennial budget process and brought to the SFPUC Commission for approval as part of that process. Including these recommendations without deprioritizing other projects would likely mean an increase in the capital plan and rates.



Recycled water pipeline installation, 2019

Rate Impacts

The AWS team, in coordination with Finance, evaluated the FY 2033 cumulative rate of impact of implementing the recommendations in the Draft AWS Plan, dated June 28, 2023. The recommendations presented in Chapter 6 (AWS Recommendation) included construction and initial O&M costs for two AWS Projects (Los Vaqueros Expansion and Daly City Recycled Water Expansion), planning through environmental review and 10% design for the remaining four AWS Projects, and staffing of three program staff in strategic areas (operational integration, funding and affordability, and purified water) to support the AWS Program. In aggregate, these recommendations would have resulted in a new funding request of up to \$209 million within the 10-year period. Conservatively, this new funding request was modelled as completely cash-funded, representing the full cost of these AWS Project and programmatic recommendations for the next 10 years; they do not include any retail-only project recommendations. Based on this scenario, the AWS recommendations were projected to increase retail rates by 0.9% and wholesale rates by 7.6% above those projected in the baseline 10-year rate projection without the AWS Projects.

Since the Draft AWS Plan was published, the capital planning process for the SFPUC's 2-year budget cycle development process was underway and project planning continued. Some of the underlying project assumptions and funding needs changed, resulting in a reduction of the new funding request in the FY 2025-2034 CIP. Therefore, the rate projection analysis represents a high-end estimate of the rate impact of the AWS Program as defined to date. It should be noted that this rate assessment is only to provide a planning level understanding of the impact from the recommendations of this AWS Plan and is intended to be illustrative. It is subject to change as more information becomes available. Several factors need to be accounted for such as the addition of any projects beyond the near-term ones recommended in this Plan; O&M costs for all projects; any changes that might occur in project feasibility including partnerships involved; as well as costs of potentially financing the recommended projects with debt, which would cause the rate impact to be different and extend past the 10-year period.

5.3 Project Description Tables

The Project Description Tables that follow in this section provide an overview of the key attributes of each of the AWS Projects as they are understood based on their current status and the planning work completed to date. Each Project Description Table includes:

Overview of the Project – The overview provides a project description, location map, and summary of the anticipated new infrastructure needs for the project.

Water Supply Availability and Distribution – This section of the table describes the amount of water supply benefit to the RWS, the availability of the supply (dry-year or all-year availability), and a general description of how supply would be realized or distributed within the SFPUC service area.

Project Partners and Interests – As discussed in Chapter 4 (AWS Program Role in Addressing the Water Supply Gap), partnerships are an essential component of most AWS Projects and different partners may have different motivations and interests for participating in a project. Each project table provides a diagram of the different project partners and their interests.

Institutional Complexity and Considerations – Many of the AWS Projects must address certain institutional challenges. Multi-party partnership projects typically have complex institutional issues such as ownership, cost share, and governance; but other institutional challenges for alternative supply projects may include regulatory requirements and community acceptance.

Operational Considerations – There are a multitude of operational considerations when adding supplies to the RWS, as described in Chapter 4 (AWS Program Role in Addressing the Future Water Supply Gap). The project summary table provides an overview of some of the larger operational issues that have been identified to date for each of the AWS Projects.

Staffing and Workforce Development – The table summarizes some of the SFPUC staffing needs that could result if the project were to be implemented.

Status of Environmental Review – This section summarizes the status of the environmental review of the project.

Project Alternatives – This section summarizes alternatives that have been considered as part of the project development.

Pros and Cons – A summary of project benefits and considerations.

Cost and Schedule – An overview of the current cost estimates and a summary schedule are provided for each project.

Information to Support SFPUC Commission Actions – The table summarizes project recommendations, key milestones and decisions, and upcoming project activities.

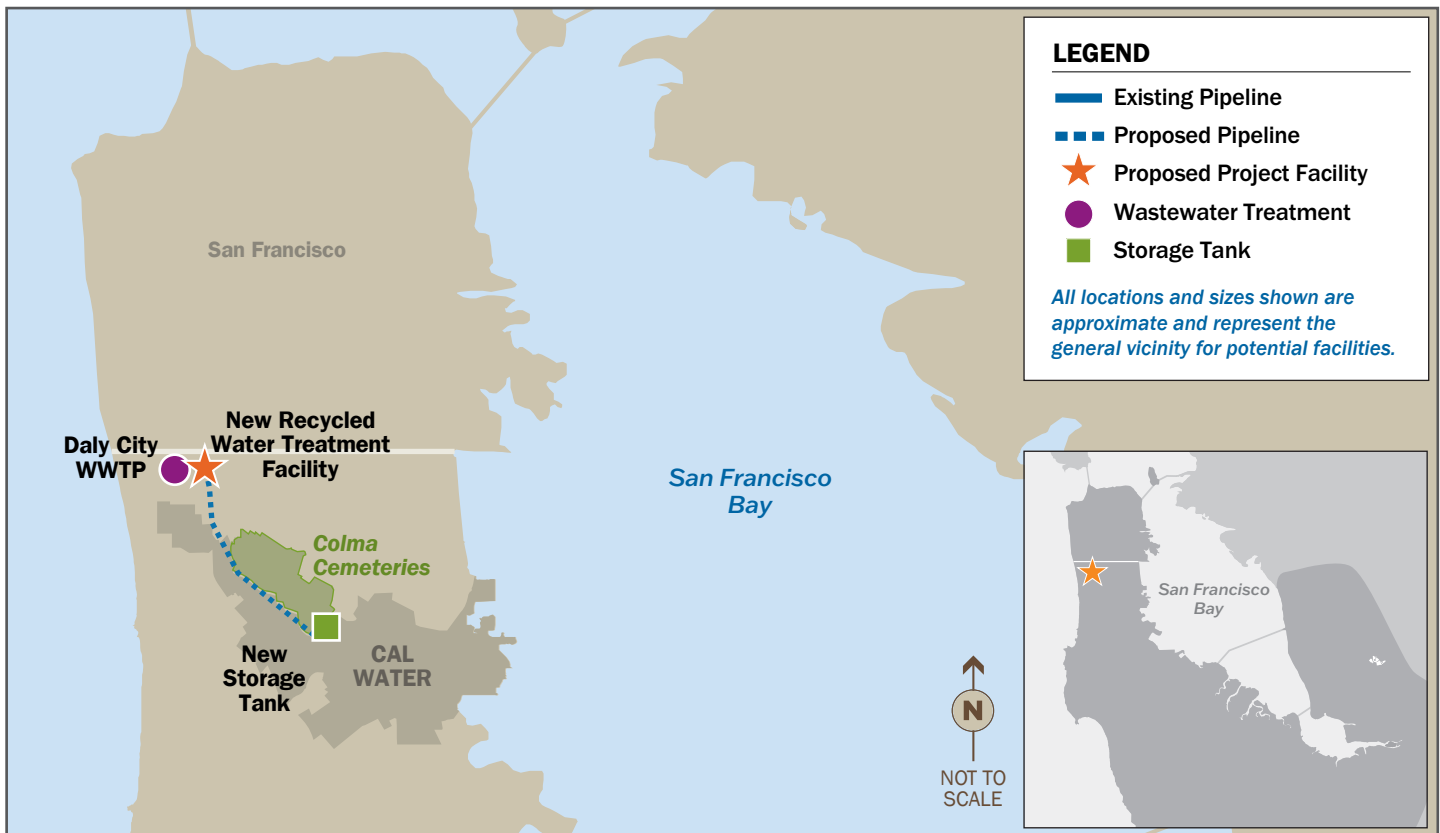
1. Daly City Recycled Water Expansion

PROJECT DESCRIPTION

This project produces recycled water for delivery to irrigation customers in the Town of Colma and Daly City. This supply will replace the irrigation customers' groundwater pumping from the South Westside Basin and result in an additional 0.7 mgd of groundwater available for dry-year supply; therefore, this project also supports the SFPUC's Regional Groundwater Storage and Recovery (RGSR) Project.

The project is envisioned to serve 7 cemeteries and other smaller irrigation customers with new recycled water supply. The project is a regional partnership between the SFPUC and two of the SFPUC's Wholesale Customers -Daly City and the California Water Service Company (Cal Water) - in coordination with the Town of Colma and the irrigation customers who are located largely within Cal Water's service area. As a private water utility, Cal Water's participation in the project is subject to approval by the California Public Utilities Commission. SFPUC customers will benefit from the increased reliability of the South Westside Basin for additional drinking water supply during droughts.

PROJECT LOCATION The project facilities would be located in San Mateo County. Treatment would occur at the Daly City Wastewater Treatment Plant (WWTP). Water would be conveyed to storage and distributed to customers in the Town of Colma.



NEW INFRASTRUCTURE NEEDS

- Tertiary recycled water treatment facility co-located at the Daly City WWTP.
- Recycled water pipeline from the new treatment building to the new storage tank.
- Storage tank at or near Holy Cross Cemetery.
- Pipeline or connections with the distribution systems in Daly City and Cal Water service area (Colma).

1. Daly City Recycled Water Expansion - *continued*

WATER SUPPLY AVAILABILITY & DISTRIBUTION

The project would generate recycled water that primarily meets the non-potable demands of users over a 7-month irrigation period each year. This supply would offset existing groundwater pumping by Colma cemeteries from the South Westside Groundwater Basin. The groundwater would thus remain in storage in the basin for dry-year use, modeled to be 0.7 mgd on average. The new recycled water supply may also be made available for additional customers and replace some potable water used for irrigation (currently estimated to be 0.05 mgd of the total).

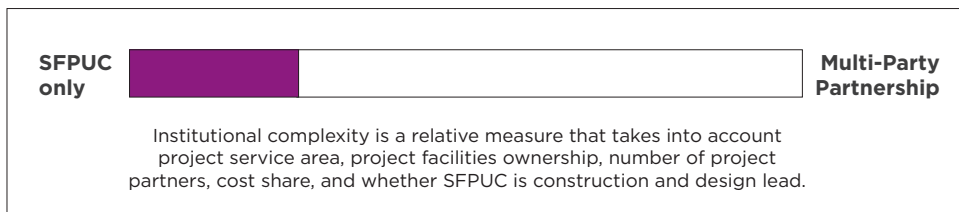
PROJECT AT A GLANCE

Supply Type	Recycled Water
SFPUC Regional Supply Assumed	0.7 mgd (groundwater stored)
Project Capacity	0.7 mgd (recycled water produced)
Earliest Service Date	2030
Estimated Capital Cost per Acre-Foot	\$4,203
Current Status	Design

PROJECT PARTNERS & INTERESTS

SFPUC	DALY CITY (SANITATION DISTRICT)	CAL WATER
Increase drought supply reliability	Reduce ocean discharges	Develop local supplies

INSTITUTIONAL COMPLEXITY



INSTITUTIONAL CONSIDERATIONS

The project has been planned as a regional partnership between the SFPUC, Daly City, and Cal Water, in coordination with the Town of Colma and the irrigation customers who are located largely within Cal Water's service area.

Each project partner, as a user of the South Westside Groundwater Basin, has a vested interest in ensuring its sustainability and reliability in dry years. However, each partner has individual constraints and priorities that will impact partner agreements. Additionally, agreements between project partners and each cemetery will vary in institutional complexity, level of interest, and ability to implement. Planning-level discussions indicate support for the project by partners and customers; however, agreements will depend on agreement on costs and allocation of project benefits.

OPERATIONAL CONSIDERATIONS

Recycled water treatment needed for the project would be through a new treatment process co-located with Daly City's existing WWTP, staffed and operated by Daly City. The project would be operated during the irrigation season (April through November) in all (wet, normal, and dry) years. For planning purposes, it is anticipated that recycled water would not be produced during the wet season. This is consistent with Daly City's current recycled water treatment operations.

The majority of potential irrigation customers for this project are located within Cal Water's service area, in the Town of Colma. The distribution of recycled water could be led by Cal Water or the SFPUC, or through a new administrative structure for the governance of this project. Operational agreements will depend on the structure and allocation of benefits for the project.

STAFFING & WORKFORCE DEVELOPMENT

The project will need up to three new staff for operation and maintenance. Any specific staffing needs for the SFPUC will be determined once the partner roles and responsibilities are established, as outlined under Operational Considerations. No SFPUC staffing needs are identified at this time.

STATUS OF ENVIRONMENTAL REVIEW

Environmental impacts and mitigation associated with the construction and operation of the project were described in the Initial Study/ Mitigated Negative Declaration prepared under the California Environmental Quality Act (CEQA) by Daly City in 2017. Environmental review may be required for new components not previously covered under the CEQA document.

PROJECT ALTERNATIVES

A second project configuration that was considered involved production of purified water that could be injected directly into the groundwater basin. However, there is insufficient space for the additional treatment requirements for purified water at the Daly City site. Furthermore, siting and operating injection wells in the groundwater basin is not feasible at this time. This may be a future opportunity if space and operational needs can be addressed.

1. Daly City Recycled Water Expansion - *continued*

+ PROS

Dry-year supply reliability. By offsetting groundwater pumping, the project helps increase available dry-year storage in the Westside Groundwater Basin.

Right water for the right use. The project replaces potable groundwater supplies with reliable non-potable recycled water supply for irrigation in Colma and Daly City.

Reduced wastewater discharges. The project would provide beneficial reuse for wastewater that would otherwise likely be discharged to the ocean.

- CONS

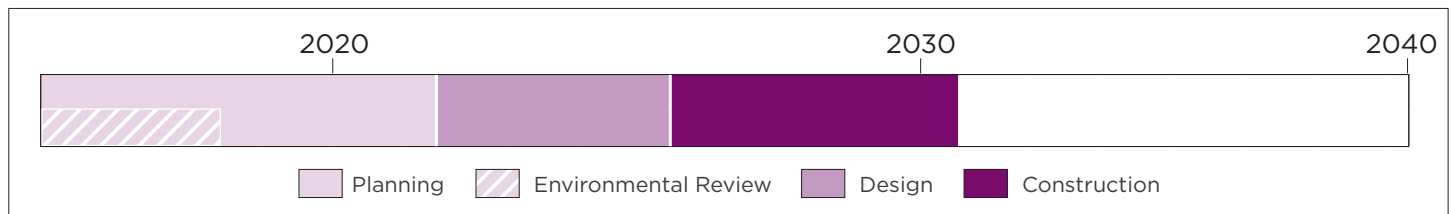
Cost sensitivity of customers. Groundwater pumping costs are low relative to the cost of producing recycled water, and the potential recycled water customers cannot absorb significant cost increases.

Institutional complexity with partners. The allocation of benefits and costs among the partner agencies will require agreement before project design can proceed.

COST

The total capital cost for this project is estimated to be \$120 million, or the equivalent of \$99 million in 2023 dollars. In anticipation of near-term approval of agreements, funding of \$114.7 million is included in the FY 2025-2034 CIP to complete the project's design and construction. O&M costs are estimated to be \$12 million.

CURRENT STATUS & SCHEDULE



INFORMATION TO SUPPORT SFPUC COMMISSION ACTIONS

PROJECT RECOMMENDATION

- Proceed with planning and coordination.
- Continue developing agreement terms with partners and potential customers.
- In anticipation of near-term approval of agreements, funding of \$114.7 million is proposed in the FY 2025-2034 CIP to complete final design and construction of the project

KEY MILESTONES/DECISIONS

- Irrigation customers (cemeteries) must agree to use the recycled water produced for this project to proceed.
- Establish construction, O&M and cost-share agreements between the SFPUC, Daly City, and Cal Water before proceeding with project design.
- *Risk of not meeting milestones:* If agreements are not in place, the project cannot move forward and neither the new recycled water supply nor the 0.7 mgd of groundwater supply stored for dry-year use will be realized.

UPCOMING PROJECT ACTIVITIES

- Determine cost- and benefit-sharing with Cal Water and Daly City and work on establishing agreement with project partners on allocation of benefits and apportionment of costs.
- Develop cost proposal for cemeteries and come to agreement on term sheets and cemeteries by 2024.

2. PureWater Peninsula

PROJECT DESCRIPTION

The PureWater Peninsula Project, formerly known as the San Francisco-Peninsula Regional PureWater Project (SPRP), or as the Crystal Springs Purified Water Project, would generate up to 12 mgd of purified water. This project would convey treated wastewater from Silicon Valley Clean Water (SVCW) and the City of San Mateo to a new advanced water treatment facility (AWTF) to produce purified water that meets State and federal drinking water quality standards.

There are currently two project alternatives. The first would likely be implemented in two phases. In Phase 1, the project would produce up to 8 mgd of purified water, which would be conveyed to the SFPUC's Crystal Springs Reservoir where it would be blended with regional surface water supplies and then treated again at the SFPUC's Harry Tracy Water Treatment Plant (WTP). In Phase 2, up to an additional 4 mgd of purified water would be produced and then added directly to the distribution systems of other project partners in the region, who are SFPUC Wholesale Customers, through treated water augmentation. The second alternative to this two-phase concept is a single-phased project producing up to 12 mgd of purified water that can all be added directly to the RWS through treated water augmentation.

PROJECT LOCATION

The project facilities would be located in San Mateo County. Treatment would occur at facilities adjacent to existing Silicon Valley Clean Water facilities and purified water would be conveyed to Crystal Springs Reservoir and/or directly to Wholesale Customers' distribution systems on the Peninsula or the RWS transmission system.



NEW INFRASTRUCTURE NEEDS

- New AWTF (needed for all alternatives).
- Raw water pipeline: SVCW and/or San Mateo wastewater treatment plants to the new AWTF (all alternatives).
- Purified water pipeline: AWTF to Pulgas Dechloramination Facility (Alternative 1, Phase 1).
- Modifications to Pulgas Dechloramination Facility within the existing building (Alternative 1, Phase 1).
- Pipeline or a connection/ turnout between the AWTF to the distribution systems in the region (Alternative 1, Phase 2 and Alternative 2).

WATER SUPPLY AVAILABILITY & DISTRIBUTION

In the first alternative, the project is anticipated to provide dry-year water supply of up to 8 mgd in Phase 1 and up to an additional 4 mgd in Phase 2 for a total of 12 mgd (13,440 acre-foot per year (AFY)). A second alternative for this project would provide 12 mgd (13,440 AFY) directly to the RWS transmission system with no phasing. Under both alternatives the project will provide a new drought-resistant water supply.

Under Alternative 1 in the first phase, the project would connect with the RWS through the Crystal Springs Reservoir. Water from the Crystal Springs Reservoir would be distributed for further treatment to 1) Coastside County Water District, and 2) Harry Tracy WTP. From Harry Tracy WTP, treated water would be distributed to San Francisco (75%) and Peninsula (25%) customers. In the second phase of Alternative 1, purified water would be blended with supplies directly in the distribution systems of partner agencies including Redwood City and Cal Water. Alternative 2 for this project envisions the production and distribution of 12 mgd of purified water directly into the RWS transmission system.

PROJECT AT A GLANCE

Supply Type	Purified Water
SFPUC Supply Assumed	6 mgd
Project Capacity	12 mgd
Earliest Service Date	2039
Estimated Capital Cost per Acre-Foot	\$1,868
Current Status	Planning

PROJECT PARTNERS & INTERESTS

SFPUC	SVCW		CAL WATER	BAWSCA
	CITY OF SAN MATEO			REDWOOD CITY
				MID-PENINSULA WD
Increase dry-year supply	Reduce Bay discharges		Develop local supplies	Increase dry-year supply

INSTITUTIONAL COMPLEXITY

SFPUC only		Multi-Party Partnership
<p>Institutional complexity is a relative measure that takes into account project service area, project facilities ownership, number of project partners, cost share, and whether SFPUC is construction and design lead.</p>		

INSTITUTIONAL CONSIDERATIONS

The SFPUC is partnering with multiple agencies on this project, including some of its Wholesale Customers. Water supply benefits from the project would be subject to sharing among the partners proportionately, which remain to be determined. For planning purposes, it is assumed that the SFPUC RWS would receive approximately 50% of the water supply from the project. The SFPUC would be the Lead Agency for environmental review, and since the project would deliver water to the RWS, the SFPUC would likely take an active ownership and operational role in the project implementation.

OPERATIONAL CONSIDERATIONS

SFPUC Operations - Water Quality

A critical consideration for storing purified water in Crystal Springs Reservoir would be the nutrient load of the new supply. To meet nutrient levels in the reservoir, the purified water would potentially need additional treatment, possibly breakpoint chlorination. Before being discharged to the reservoir, the water would undergo dechloramination at the Pulgas facility, with frequency dependent on storage time. Water quality would be tested and monitored in compliance with reservoir augmentation regulations. After meeting retention time requirements in the reservoir, the water would then be conveyed through the Harry Tracy WTP.

SFPUC Operations - Storage & Water Conveyance

Typically, the SFPUC's operating strategy in the summer would be to rely primarily upon water originating from Hetch Hetchy Reservoir and minimize drawing from local reservoirs. With the implementation of the Bay-Delta Plan Amendment and the associated shortfall in the dry-year water supply, it is anticipated that Crystal Springs Reservoir will provide the storage capacity required for purified water produced as an alternative water supply, especially during the dry periods. Operating the SPRP project in wet months - at a maximum of 50% capacity - would generate 4 to 6 mgd of purified water. At the end of summer, typically, storage levels at the reservoir would be reviewed to determine what adjustments need to be made to allow sufficient capacity to receive local rainy season runoff. Consistent with current operations, the storage levels would help determine the flow rate of the incoming purified water.

In the event that Crystal Springs Reservoir levels cannot accommodate additional water from the SPRP project, surface water from the Alameda watershed would be stored in Calaveras Reservoir, instead of being delivered to Crystal Springs, or additional storage would be needed.

STAFFING & WORKFORCE DEVELOPMENT

The project operations would shift some of the operational protocol at Pulgas Dechloramination Facility and Crystal Springs Reservoir. The project would require 17 additional staff to operate the new AWTF and/or coordinate and manage its operations with the current operations including at the current facilities. Staff training on purified water facility operations and maintenance such as Advanced Water Treatment Operator Certification would be needed. If the SFPUC takes the lead in implementing and operating this project, most or all of the staff additions would be at the SFPUC.

STATUS OF ENVIRONMENTAL REVIEW

The project is anticipated to be subject to environmental requirements associated with project facilities and operations. The project would be subject to environmental review including CEQA; possibly National Environmental Policy Act (NEPA) compliance; depending on whether federal funding would be obtained; and federal and State regulatory permits.

PROJECT ALTERNATIVES

The two primary project alternatives are described above and would be analyzed further under environmental review.

2. PureWater Peninsula - continued

+ PROS

Drought-resistant supply. The project provides a new drought-resistant water supply.

Reduce wastewater discharges. The project reduces wastewater discharge to the San Francisco Bay.

- CONS

Water quality challenges. Potential water quality challenges in Crystal Springs Reservoir or in the transmission and distribution system would need to be analyzed further and may result in operational changes.

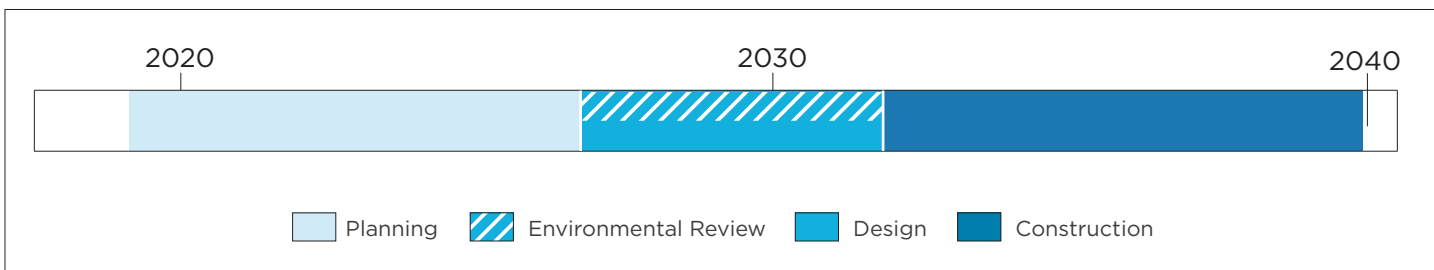
Operational impacts. During non-dry years, there is insufficient storage in the RWS to accommodate both existing supplies and new purified water supplies without also expanding storage. Reoperation of facilities or displacement of supplies may be necessary.

Community Acceptance. Purified water projects require implementation of a sustained communications and outreach program in order to facilitate information sharing and collaboration within the community.

COST

The total capital cost for this project is estimated to be \$1.2 billion, or the equivalent of \$753 million in 2023 dollars. The annual O&M cost will be determined once there is more information on operating parameters, delivery mechanisms, and water supply sharing among partners. To complete planning, environmental review and 10% design, funding of \$5.3 million is proposed in the FY 2025-2034 CIP.

CURRENT STATUS & SCHEDULE



INFORMATION TO SUPPORT SFPUC COMMISSION ACTIONS

PROJECT RECOMMENDATION

- Proceed with feasibility analysis, Basis of Design, conceptual design, environmental review, and outreach.
- Continue planning, environmental review and 10% design.
- Funding of \$5.3 million is proposed in the FY 2025-2034 CIP.

KEY MILESTONES/DECISIONS

- Upon completion of CEQA (expected in 2032), the SFPUC must commit to taking a leadership role in the project for it to move forward. It is required for a water agency to own and operate the project.
- *Risk of not meeting key milestones:* If the SFPUC does not commit to leading the project once additional planning and environmental review are complete, the project would not likely proceed and the 6 mgd water supply for the SFPUC would not be realized.

UPCOMING PROJECT ACTIVITIES

- Complete feasibility analysis, Basis of Design Study, and initiate CEQA. Engage in water quality modeling for Crystal Springs Reservoir and distribution impacts.
- To proceed beyond CEQA: model SFPUC operational impacts, complete water quality analysis for blending and for disruption, define beneficiaries and cost-sharing, identify funding opportunities and rate impacts and seek approval from leadership of partners.

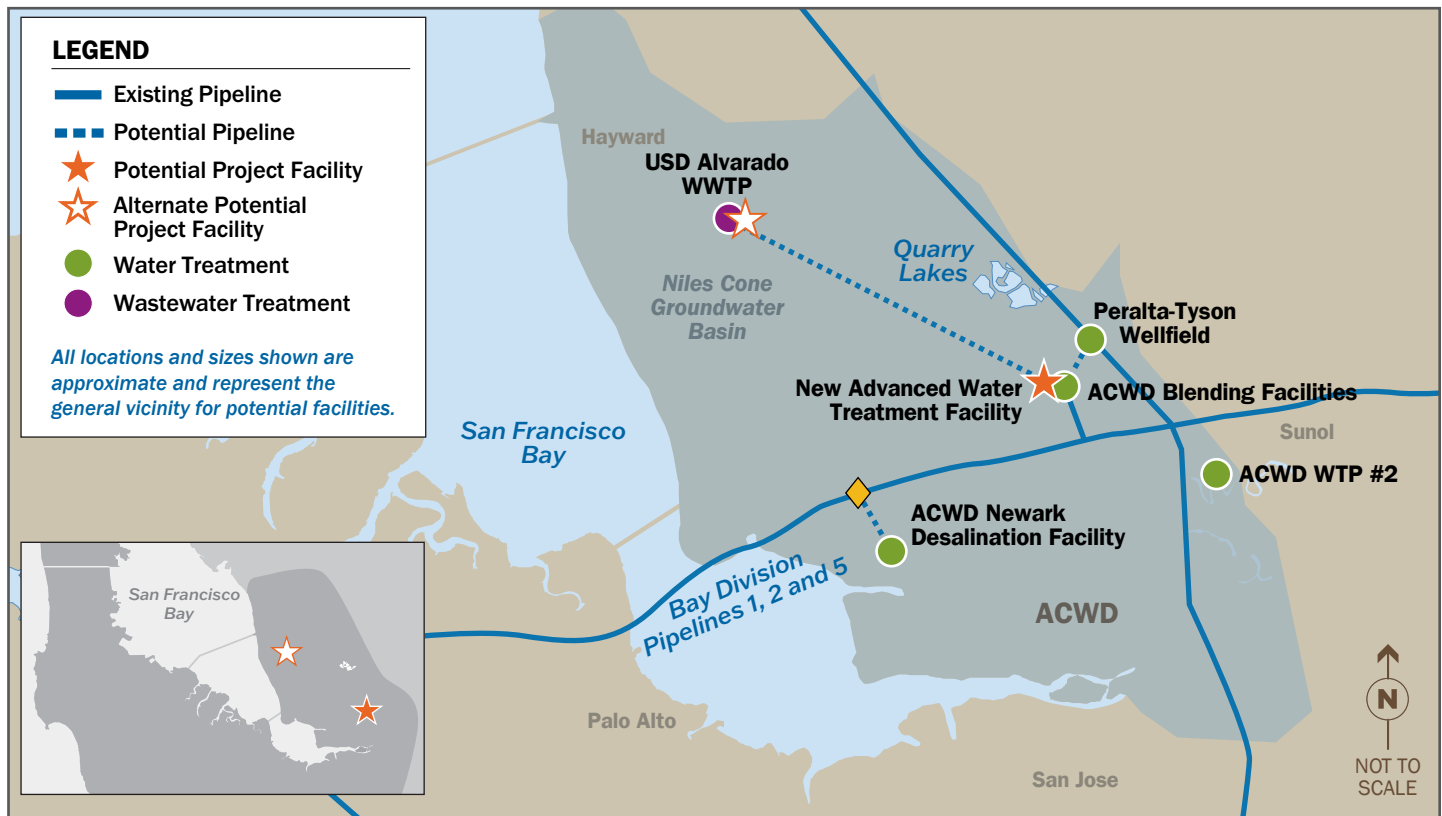
3. ACWD-USD Purified Water Project

PROJECT DESCRIPTION

This project could provide a new purified drinking water supply utilizing Union Sanitary District (USD)'s treated wastewater. Purified water produced by advanced water treatment could be transmitted to the Quarry Lakes Groundwater Recharge Area to supplement recharge into the Niles Cone Groundwater Basin. With the additional water supply produced by the project provided to Alameda County Water District (ACWD), an in-lieu exchange with the SFPUC could result in more water left in the RWS. Additional water supply could also be directly transmitted within ACWD's service area, or to the SFPUC through a new intertie between ACWD and the SFPUC's Bay Division Pipelines (BDPLs). Two alternatives, each with two phases, have been evaluated in the preliminary technical feasibility study for the project.

PROJECT LOCATION

The project facilities would be located in ACWD's service area.



NEW INFRASTRUCTURE NEEDS

- New AWTF at ACWD-owned site OR in the vicinity of USD.
- Pretreatment for denitrification at USD (Alternative B only).
- Pipeline to ACWD's Peralta-Tyson well site (Phase 1 of both alternatives).
- Purified water pipeline to ACWD's WTP #2 OR intertie to SFPUC BDPLs (Phase 2 of both alternatives).

3. ACWD-USD Purified Water Project - *continued*

WATER SUPPLY AVAILABILITY & DISTRIBUTION

The project is anticipated to provide up to 5.4 mgd (6,048 AFY) in Phase 1 and an additional 4.9 mgd (5,488 AFY) in a potential Phase 2 for a maximum of 10.3 mgd (11,536 AFY) of purified water across two phases. Because the second phase would require additional infrastructure and outreach, only the Phase 1 is assumed for water supply planning purposes at this time. Phase 1 of the project can provide a new water supply source through utilization of purified water from USD that would be blended in the groundwater basin and delivered in the ACWD service area.

PROJECT AT A GLANCE


Supply Type	Purified Water
SFPUC Supply Assumed	5.4 mgd (Phase 1 only)
Project Capacity	5.4 mgd
Earliest Service Date	2039
Estimated Capital Cost per Acre-Foot	\$4,541
Current Status	Planning

PROJECT PARTNERS & INTERESTS

SFPUC	ACWD	USD
Increase dry year supply	Reduce dependence on RWS	Reduce Bay discharges

INSTITUTIONAL COMPLEXITY

SFPUC only



Multi-Party Partnership

Institutional complexity is a relative measure that takes into account project service area, project facilities ownership, number of project partners, cost share, and whether SFPUC is construction and design lead.

INSTITUTIONAL CONSIDERATIONS

The project partners include ACWD, a Wholesale Customer of the SFPUC, and USD, a wastewater utility. Each partner agency has slightly different drivers for participation, which can affect the need and timing for the project. While the goals of the water utilities are generally aligned, the SFPUC has a need to identify solutions for system-wide dry-year shortfalls in the near-term in order to address potential shortages from the implementation of the Bay-Delta Plan Amendment and to support the SFPUC Commission's decision on whether to make San Jose and Santa Clara permanent customers. ACWD decision making may be tied to their water supply planning efforts being conducted by 2025. USD is evaluating improvements to its secondary treatment processes and considering future needs to reduce Bay discharges that are not linked to water supply needs.

Institutional considerations also play a part in the introduction of a new water supply source through purified water. While a number of purified water projects are planned throughout the region, this is the only one currently being pursued in ACWD's service area. For project implementation, internal and external outreach and engagement will be important.

OPERATIONAL CONSIDERATIONS

Given the location of facilities and distribution, the project components would likely be operated by ACWD and USD. Therefore, operation of the project will require the leadership and staffing of partner agencies, with financial support from the SFPUC. No operational impacts to the SFPUC are anticipated, except if a new intertie is constructed and direct deliveries to one or more of the BDPLs is made in the Phase 2 of the project.

Phase 1 will send purified water to Quarry Lakes to recharge the groundwater basin. Quarry lakes is an East Bay recreational area. Both phases of the project would rely on membrane-based treatment, which requires some level of continuous operation.

STAFFING & WORKFORCE DEVELOPMENT

Given the operational needs of the project, ACWD would likely incur new staffing needs for the advanced treatment facility and the operation of the distribution system. Secondary treatment improvements and operations would be carried out by USD. While no estimates have been prepared for the project studies at this time, based on industry standards, the SFPUC's financial modeling includes an estimate of eight new staff for the project. No staffing needs for the SFPUC are expected at this time.

STATUS OF ENVIRONMENTAL REVIEW

The project would be subject to environmental requirements associated with project facilities and operations. This may include CEQA review and National Pollutant Discharge Elimination System (NPDES) permit-related requirements. Federal requirements may apply if federal funds are sought to support project development and construction. No environmental review has been initiated at this time.

PROJECT ALTERNATIVES

Phase 2 is a DPR project that would treat and distribute purified water with other surface water supplies. Because of the additional infrastructure and outreach needs of the project, Phase 2 of the project is not assumed for water supply planning purposes at this time. In Phase 2, purified water would be blended at the treatment plant and delivered either in ACWD's service area or the SFPUC's distribution system. The project relies on membrane-based treatment, which requires some level of continuous operation. Phase 2 operations may not be needed in non-drought periods due to a lack of storage potential. Variable operations may impact staffing needs, fixed costs, and general treatment plant efficiency. These operational considerations, as well as infrastructure and outreach needs, will need to be evaluated further before Phase 2 proceeds.

There are also two alternatives under review in the project feasibility. The primary difference between the two alternatives is the level of secondary treatment that is assumed prior to the project start. If less treatment has been done by USD for the project feedwater, more treatment will be required as part of the project. This more conservative assumption is the baseline case assumed for cost and facility planning purposes (Alternative B).

3. ACWD-USD Purified Water Project - *continued*

+ PROS

Use of existing facilities. The project prioritizes use of existing wastewater treatment and groundwater extraction infrastructure.

Diversification of supplies. The project diversifies water supply, primarily in the ACWD service area.

Dry-year reliability. The project improves long-term dry year reliability locally in ACWD's service area and in the broader SFPUC service area.

Reduced wastewater discharges. The project reduces wastewater discharge to the San Francisco Bay.

- CONS

Infrastructure uncertainty. Wastewater treatment plant capital improvements are uncertain.

Water quality challenges. Potential water quality change to Quarry Lakes.

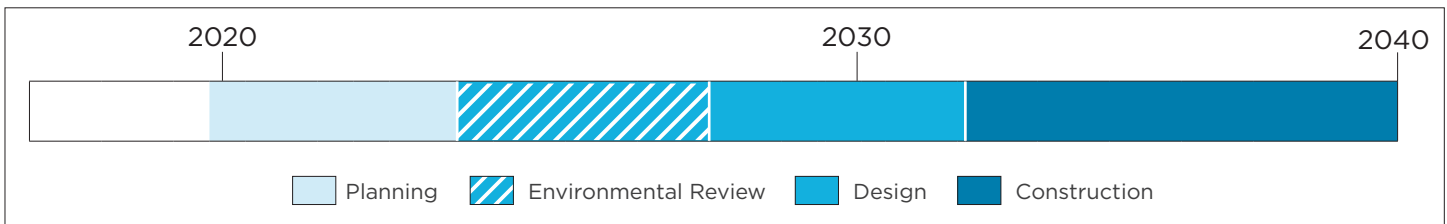
Institutional alignment. The needs and timing of commitment to the project from the partners vary.

Community Acceptance. Purified water projects require implementation of a sustained communications and outreach program in order to facilitate information sharing and collaboration within the community.

COST

The capital cost is estimated to be \$1.3 billion, or the equivalent of \$824 million in 2023 dollars. To complete planning, environmental review, and 10% design, additional funding of \$8 million is proposed in the FY 2025-2034 CIP.

CURRENT STATUS & SCHEDULE



INFORMATION TO SUPPORT SFPUC COMMISSION ACTIONS

PROJECT RECOMMENDATION

- Proceed with planning, alternatives analysis, and CEQA.
- To proceed beyond CEQA, seek direction from the SFPUC Commission.
- Funding of \$8 million is proposed in the FY 2025-2034 CIP to continue planning through environmental review and 10% design .

KEY MILESTONES/DECISIONS

- Realizing the water supply benefit relies on partnerships with ACWD and USD. The project is still in planning stages and partnership commitments are being pursued as part of the project planning activities.

UPCOMING PROJECT ACTIVITIES

- Complete preliminary feasibility study and continue with associated technical studies. Identify potential funding opportunities. Continue to track and coordinate partner commitments to pursuing the project.

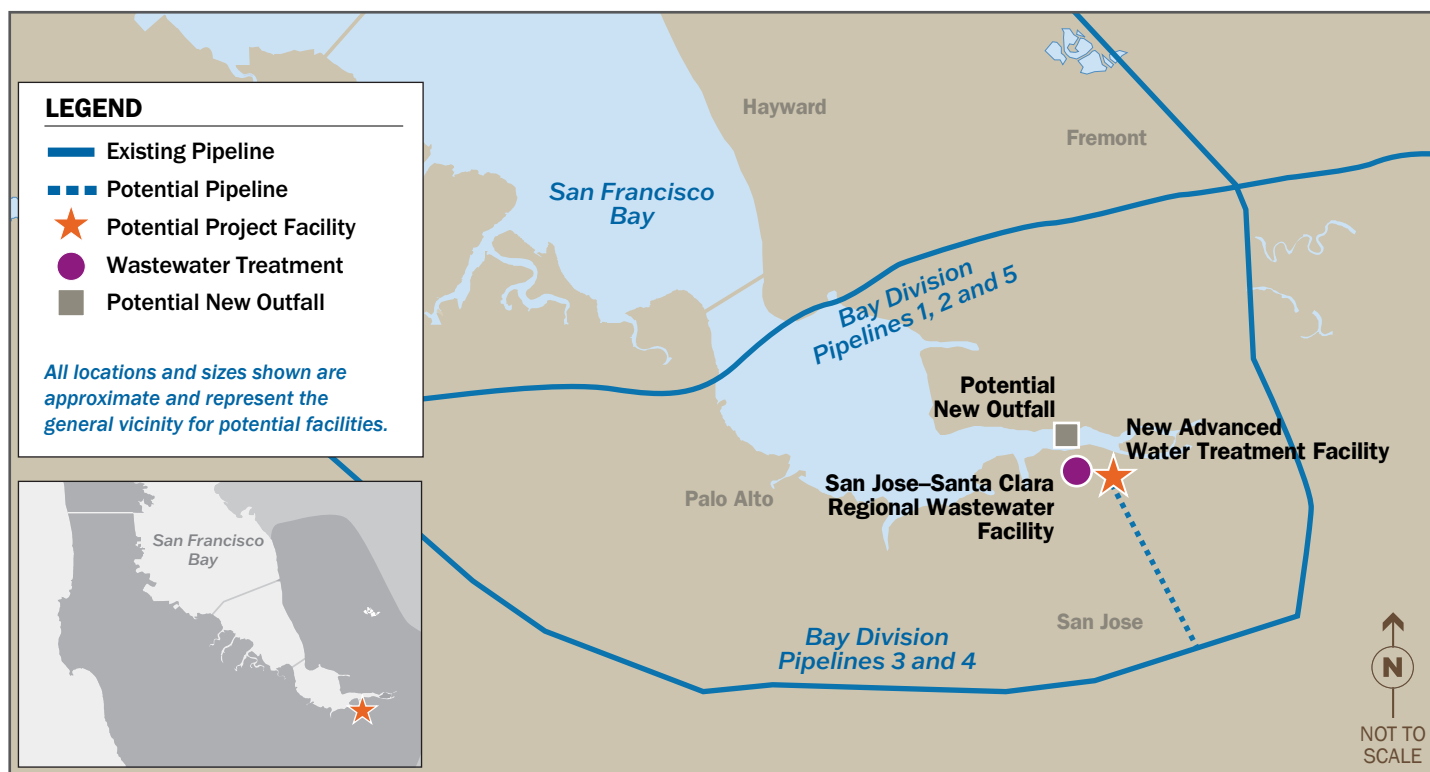
4. South Bay Purified Water Project

PROJECT DESCRIPTION

In collaboration with the cities of San Jose and Santa Clara, the SFPUC is evaluating a joint purified water project. Under the AWS Plan, this project will provide a dry-year supply of 3.5 mgd to the RWS. Additionally, this project will provide a local benefit to San Jose and Santa Clara by providing 6.5 mgd to the two cities during all water years to serve demands in their retail service areas beyond what the two cities have requested from the SFPUC as a future supply guarantee from the RWS. Only the 3.5 mgd to the RWS is considered as a regional supply under the AWS Plan. This regional benefit would be realized only if San Jose and Santa Clara are made permanent customers of the SFPUC, a decision which is to be made by the SFPUC by 2028. If San Jose and Santa Clara are not made permanent customers of the SFPUC, the regional element of this project will not be part of the AWS Plan and the 3.5 mgd water supply benefit to the RWS will not be realized. San Jose and Santa Clara jointly own a Regional Wastewater Facility in San Jose that would provide the source water for the advanced treatment project as well as the land needed for project facilities. The parties are currently evaluating the feasibility of the project in a study that will include review of the potential capacity, sharing of supply, operations and distribution. The feasibility study analysis was conducted on the basis of draft DPR regulations and may need to be revised based on the latest version of the DPR regulations adopted by SWRCB in December 2023, which are likely to become effective mid-2024.

PROJECT LOCATION

The project facilities would be located in San Jose and Santa Clara.



NEW INFRASTRUCTURE NEEDS

- AWTF, including feed water pipeline.
- Storage and blending tank.
- New pipeline or connections from the new facility to San Jose and Santa Clara distribution systems.
- Potentially new discharge outfall from the new facility to San Francisco Bay (not yet evaluated).
- New pipeline or connections from the new facility with the RWS.

4. South Bay Purified Water Project - *continued*

WATER SUPPLY AVAILABILITY & DISTRIBUTION

During normal and wet years, the project could operate at 65% capacity, producing 6.5 mgd of purified water to serve San Jose and Santa Clara beyond the two cities' purchases from the SFPUC and other sources of supply. During dry years, the facility would ramp up to 100% capacity producing 10 mgd of purified water out of which 6.5 mgd would continue to be delivered to San Jose and Santa Clara. The additional 3.5 mgd of purified water produced would serve as a new dry-year supply for the SFPUC and its other customers through the RWS.

The purified water from the project will thus deliver 1) 6.5 mgd in all years to the northern service areas of San Jose and Santa Clara via their distribution systems and 2) 3.5 mgd in dry years only via BDPLs 3 and 4 to the SFPUC's customers in the South Bay, the Peninsula and in-City retail service area.

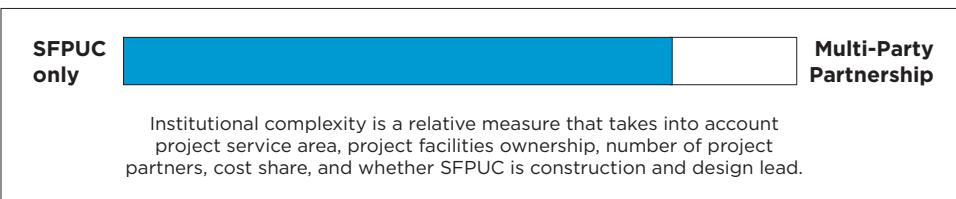
PROJECT AT A GLANCE

Supply Type	Purified Water
SFPUC Supply Assumed	3.5 mgd
Project Capacity	10 mgd
Earliest Service Date	2038
Estimated Capital Cost per Acre-Foot	\$1,264
Current Status	Planning

PROJECT PARTNERS & INTERESTS

SFPUC	CITY OF SAN JOSE
	CITY OF SANTA CLARA
Increase dry year supply	Develop local supplies, increase all-year and dry-year supplies

INSTITUTIONAL COMPLEXITY



INSTITUTIONAL CONSIDERATIONS

The cities of San Jose and Santa Clara are currently interruptible customers of the SFPUC and have requested permanent status, as discussed in Chapter 2 (Background). The two cities' combined projected demand is 15.5 mgd for the planning horizon. They have requested a guaranteed supply from the SFPUC of 9 mgd (total). In order for the SFPUC to consider granting San Jose and Santa Clara permanent status and to minimize impacts to the existing permanent Wholesale Customers, the two cities must secure a reliable supply to meet their additional demands beyond the 9 mgd that they have requested as a guarantee. This project would produce 6.5 mgd of purified water to serve the needs of San Jose and Santa Clara beyond the cities' purchases from the SFPUC, while augmenting RWS supplies by 3.5 mgd in dry years. Implementation of this project would support the SFPUC's decision to make San Jose and Santa Clara permanent customers.

Another institutional consideration for this project is the discharge of the reverse osmosis concentrate, or brine, from the new AWTF to San Francisco Bay. At this time, it appears unlikely that the existing outfall and corresponding NPDES permit for the Regional Wastewater Facility can accommodate the brine. Therefore, a new, dedicated outfall may need to be constructed and a separate NPDES permit may need to be acquired. San Jose and Santa Clara are also considering alternative brine management solutions, however regulatory requirements are unknown at this time.

OPERATIONAL CONSIDERATIONS

The new AWTF would be co-located at the existing Regional Wastewater Facility and is anticipated to be co-owned and operated by San Jose and Santa Clara. The operation of the facility will be coordinated with the operations of the RWS transmission system.

The project will be subject to the regulations governing DPR, and the purified water generated would be in compliance with federal and State drinking water standards. This project includes a storage and blending tank upstream of the connection to the SFPUC's BDPLs 3 and 4, which would provide adequate response time for operators should the purified water or resulting blend with RWS supply not meet specifications.

The AWS team will continue to work closely with the Operations and Water Quality teams within the SFPUC and San Jose and Santa Clara to identify and address any challenges and make sure that existing infrastructure can accommodate the anticipated water volume and quality from this project as well other potential purified water projects that will be supplementing RWS supply. Detailed water quality and distribution studies will be needed to determine (1) if the anticipated purified water volumes during wet, normal, and dry years can be accommodated by existing infrastructure; (2) to which portions of the service areas water will be delivered; (3) water quality measures and mitigations that will be needed; and (4) if any new infrastructure will be needed to reach desired areas of delivery.

STAFFING & WORKFORCE DEVELOPMENT

While the new AWTF is anticipated to be co-owned and operated by San Jose and Santa Clara, SFPUC staff (or a responsible entity on the SFPUC's behalf) will need to operate and maintain the storage tank, pipeline, and connection from the advanced treatment facility to BDPLs 3 and 4. While the project will likely require approximately 20 new staff to operate and maintain, SFPUC staffing would likely be 20% (4) of that total.

STATUS OF ENVIRONMENTAL REVIEW

The project is anticipated to be subject to environmental requirements associated with project facilities and operations.

PROJECT ALTERNATIVES

The feasibility of a larger facility, producing up to 20 mgd of purified water, was studied, but the primary option is the 10-mgd facility. Aside from the production capacity, other alternatives that will be considered are brine discharge methods and locations, pipeline crossing methods, and potentially storage tank capacity and locations for San Jose, Santa Clara, and the SFPUC.

4. South Bay Purified Water Project - *continued*

+ PROS

Drought-resistant supply. The project provides a new drought-resistant water supply.

Local supply. The project provides a new local supply for the cities of San Jose and Santa Clara.

Supports decision making. Assists SFPUC with its decision to make San Jose and Santa Clara permanent customers. If San Jose and Santa Clara are not made permanent customers of the SFPUC, the regional element of the project will not move forward.

- CONS

Water quality challenges. Potential water quality challenges in the transmission and distribution system would need to be analyzed further and may result in operational changes.

Operational impacts. During non-dry years, there is insufficient storage in the RWS to accommodate both existing supplies and new purified water supplies without also expanding storage. Reoperation of facilities or displacement of supplies may be necessary. Operations may need to be adjusted to accommodate changes to water quality.

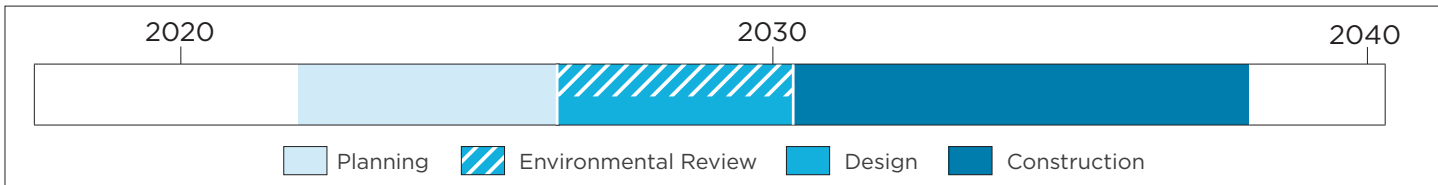
Community Acceptance. Purified water projects require implementation of a sustained communications and outreach program in order to facilitate information sharing and collaboration within the community.

COST

The capital cost for the project is estimated to be \$658 million, equivalent to \$425 million in 2023 dollars. This is a new project that is being recommended for inclusion in the CIP for the first time, so there are no appropriated or budgeted funds explicitly for this project in the current CIP. To complete planning, environmental review and 10% design, additional funding of \$6.7 million is proposed in the FY 2025-2034 CIP. This project represents a partnership with the cities of San Jose and Santa Clara, and it is anticipated that they would share the costs, which is reflected in the proposed planning and design funding.

The SFPUC would be a partial owner of the new facilities—particularly the new storage tank, pipeline, and connection from the advanced treatment facility to BDPLs 3 and 4—and would be bearing an estimated 35% of the total capital costs. While the portion of the SFPUC’s contribution to capital and O&M costs has not yet been determined, the SFPUC’s contribution will likely be limited to costs associated with constructing, operating, and maintaining a storage tank, pipeline, and BDPL connection. San Jose and Santa Clara will together bear the majority of costs for the project

CURRENT STATUS & SCHEDULE



INFORMATION TO SUPPORT SFPUC COMMISSION ACTIONS

PROJECT RECOMMENDATION

- Proceed with feasibility analysis, conceptual design, CEQA, and outreach.
- To proceed beyond CEQA: seek commitment from project partners to contribute resources for developing detailed design (100%), seek direction from the SFPUC Commission by end of 2028 to make San Jose and Santa Clara permanent customers with the condition that this project completes construction and starts operation, and identify SFPUC staff responsible for future O&M of new SFPUC assets. Plan for operating budget accordingly.
- Funding of \$6.7 million is proposed in the FY 2025-2034 CIP to complete SFPUC’s share of planning, environmental review and 10% design.

KEY MILESTONES/DECISIONS

- The SFPUC is committed to making a decision about whether to make San Jose and Santa Clara permanent customers by December 31, 2028.
- *Risk of not meeting key milestone:* If San Jose and Santa Clara are not made permanent customers of the SFPUC, the regional water supply element of this project would not move forward, and the dry year water supply of 3.5 mgd would not be realized.

UPCOMING PROJECT ACTIVITIES

- Complete feasibility studies. Conduct detailed analyses on water quality and supply distribution. Explore expansion of partnerships (e.g., other potential purified water customers in the South Bay).

5A. Los Vaqueros Expansion (LVE) Project

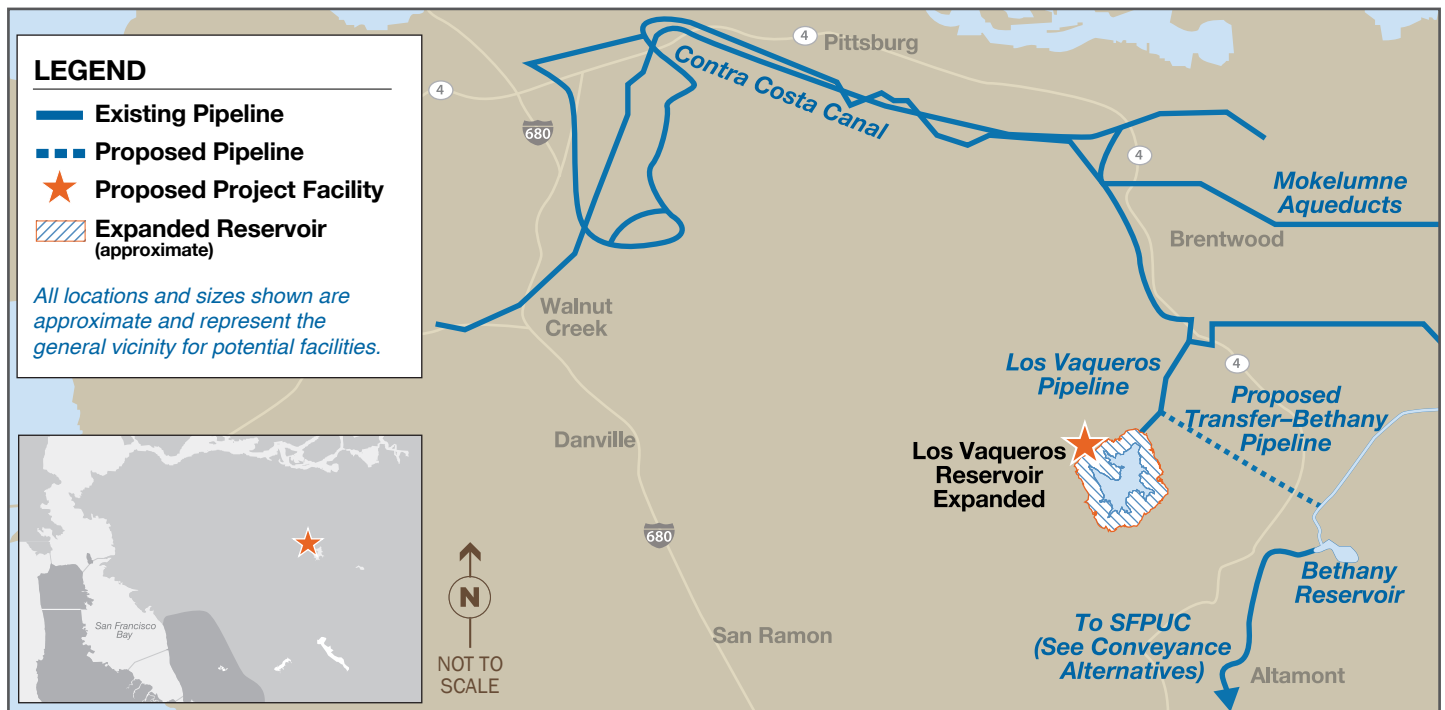
PROJECT DESCRIPTION

The Los Vaqueros Expansion (LVE) Project is a storage project that will enlarge the capacity of the existing reservoir located in Contra Costa County from 160,000 acre-feet to 275,000 acre-feet. While the existing reservoir is owned and operated by Contra Costa Water District (CCWD), the proposed expansion will have regional benefits, as other water agencies will be able to share in the additional capacity. A Joint Powers Authority (JPA) that was formed in 2021 will manage the expansion and provide the governance and administration for the project, and the JPA's members (which include the SFPUC) will assist in the design, construction, operation, and administration of the project, in coordination with CCWD.

The SFPUC's potential 40,000 acre-foot share of the project's additional storage capacity would provide a dry-year water supply benefit to the SFPUC. However, in order to realize the full water supply benefit of the project, the SFPUC must: 1) identify and secure a water supply to store in the reservoir and 2) enable conveyance from storage to SFPUC customers. The critical issues are considered as two separate AWS Projects (5B. Conveyance Alternatives for LVE and 5C. Supply Alternatives for LVE), which would ultimately need to be implemented along with this 5A. LVE Project.

PROJECT LOCATION

The LVE Project is located in eastern Contra Costa County.



NEW INFRASTRUCTURE NEEDS

- Raise the Los Vaqueros Reservoir to increase storage by 115,000 acre-feet, of which the SFPUC's share would be 30,000 - 40,000 acre-feet.
- Transfer-Bethany Pipeline to connect project facilities to the California Aqueduct.
- Upgrade and expand existing pump stations and conveyance infrastructure (not shown).

5A. Los Vaqueros Expansion Project - *continued*

WATER SUPPLY AVAILABILITY & DISTRIBUTION

The SFPUC is contemplating a purchase of up to 40,000 acre-feet of storage in the expanded Los Vaqueros Reservoir. While costs and conveyance modeling are based on this volume of storage, as of June 2023, LVE storage is oversubscribed and the SFPUC's final allocation may be less than 40,000 acre-feet.

Los Vaqueros Reservoir experiences evaporative losses of up to 8% on an annual basis. Depending on the supply source (5C. Supply Alternatives for LVE) and conveyance pathway selected for the SFPUC (5B. Conveyance Alternatives for LVE), additional transmission and transfer losses may be incurred. Stored water would be delivered to SFPUC customers in dry years through the proposed Transfer-Bethany Pipeline and then subsequently through one of the conveyance options being examined, which could include partnerships with South Bay Aqueduct contractors, or a direct connection to SFPUC facilities, as discussed under 5B. Conveyance Alternatives for LVE.

For planning purposes, it is assumed that the SFPUC could divert 4,416 AFY into its allocated storage at LVE, in wet years only. The SFPUC would then take delivery of that stored water in critical dry years, which are assumed to be two to three out of every ten years. Water deliveries would be a maximum of 20,000 acre-feet in any single year, limited by modeled conveyance constraints under 5B. Conveyance Alternatives for LVE. Based on supply and operating assumptions, the project could provide an average annual dry year benefit to the SFPUC of approximately 3.9 mgd over the design drought.

PROJECT AT A GLANCE

Supply Type	Storage
SFPUC Regional Supply Assumed	3.9 mgd
Project Capacity	3.9 mgd
Earliest Service Date	2030
Estimated Capital Cost per Acre-Foot	\$1,626
Current Status	Design

PROJECT PARTNERS & INTERESTS

CCWD	ACWD	SFPUC (with BAWSCA)	SAN LUIS & DELTA MENDOTA WATER AUTHORITY	GRASSLAND WATER DISTRICT	DWR (State)
EBMUD	ZONE 7 WATER AGENCY				USBR (Federal)
VALLEY WATER					
Increase water supply reliability		Increase Dry-Year Supply	Increase water supply for irrigation	Protect wildlife refuges	Provide approvals and funding

INSTITUTIONAL COMPLEXITY

SFPUC only 	Multi-Party Partnership	Institutional complexity is a relative measure that takes into account project service area, project facilities ownership, number of project partners, cost share, and whether SFPUC is construction and design lead.
---	--------------------------------	---

INSTITUTIONAL CONSIDERATIONS

The SFPUC is one of eight partner agencies in the LVE Project, and one of the six partner agencies that are urban water suppliers, including CCWD, East Bay Municipal Utility District (EBMUD), ACWD, Zone 7 Water Agency, and Valley Water. The other two partners represent agricultural users (San Luis & Dela Mendota Water Authority) and wildlife refuges (Grassland Water District). The wildlife refuges provide a significant environmental benefit for the project. Depending on the filling and delivery needs of individual partners, there may be times when there is insufficient capacity for all partners to move water in or out of LVE storage at the optimal time. Agreements will need to be negotiated to determine operational priorities. The majority of decisions made by the JPA will be by a simple majority, as provided in the 2021 JPA Agreement signed by the partners as JPA members, including the SFPUC. Some decisions will require a greater majority. The financial closing for the project will be achieved when the partners enter into a long-term Service Agreement with the JPA. This is a requirement for the project to secure grant funds. A JPA member's decision to sign onto the Service Agreement represents a commitment to financial participation in the project, as it represents one of the last opportunities to exit the project prior to construction. While SFPUC staff are concurrently pursuing outstanding water supply and conveyance agreements to support its participation in LVE, the decision to enter into the Service Agreement will come before those projects are fully resolved. The SFPUC will have to consider the relative risk of participating in a regional storage project outside of the SFPUC service area and without complete information about long-term water supply and conveyance. While some risks may remain, and staff continue to make progress to minimize them, securing a storage opportunity near the southern Delta would provide the SFPUC with strategic access to short- and long-term water transfers.

OPERATIONAL CONSIDERATIONS

SFPUC facilities are not directly connected to Los Vaqueros Reservoir facilities. As a result, filling its share of LVE storage and taking deliveries from LVE will require partnerships, exchanges, and close coordination with CCWD and regulating agencies. Maintaining operational flexibility in the timing of deliveries will be important to maximizing water supply benefits.

Many of the operational considerations related to new supplies from LVE are dependent on which conveyance option is selected (as discussed in 5B. Conveyance Alternatives for LVE). If direct deliveries to SFPUC facilities are made, which is the current planning assumption, Delta supplies would be introduced to the RWS. Potential for water quality challenges and the risk of introducing invasive species to the RWS will increase with project deliveries. A study completed in 2021 showed that while no additional treatment upgrades may be needed, additional monitoring and management will be needed. Furthermore, if new Delta supplies are introduced locally in the RWS, it will likely require modifications to the operations of the RWS during droughts.

STAFFING & WORKFORCE DEVELOPMENT

The project will be operated and managed by the JPA with CCWD providing technical, administrative and other support as needed. As a member of the JPA, the SFPUC will need to engage in ongoing close coordination with the JPA and CCWD staff and maintain representation on the JPA Board. It is expected these coordination activities would be handled by existing staff resources and there would be no need for additional staffing.

STATUS OF ENVIRONMENTAL REVIEW

CEQA and NEPA reviews were completed for the LVE Project in 2020.

PROJECT ALTERNATIVES

Alternatives for water sources for the 5A. LVE Project are being examined as part of 5C. Supply Alternatives for LVE, and alternatives for conveyance of supplies from LVE storage are being examined as part of 5B. Conveyance Alternatives for LVE.

5A. Los Vaqueros Expansion Project - *continued*

+ PROS

Dry-Year Supply reliability. The project provides water storage for delivery in dry years.

Leveraging existing partner facilities. The project enables regional benefits by expanding CCWD's existing reservoir.

Supply Implementation. Delivery can wait until the need is imminent.

Operational stability. The project does not impact SFPUC's ability to use existing supplies in wet/normal years.

Strategic storage potential. The project is located outside of the SFPUC's service area and can provide a strategic location for storage and access to potential new water supplies.

Incremental water supply benefits. A source of supply that is available in both wet and dry years can increase the yield of this project.

Project commitments. Planning and environmental reviews are complete. The project has secured preliminary commitments for significant grant funding.

- CONS

Water quality/invasive species. Introduction of Delta supplies to the RWS would require additional management and monitoring of water quality and invasive species.

Operational uncertainty. Filling and delivery will require reliance on Delta operations, which would be new for the SFPUC and would have some inherent uncertainty.

Allocation of grant benefits. Grant funds may be allocated based on project benefits rather than proportionate share of project costs, which can reduce the cost savings to the SFPUC.

Use of project facilities. Capacity of conveyance facilities may be limited and there may be competition at times when partner demands are high.

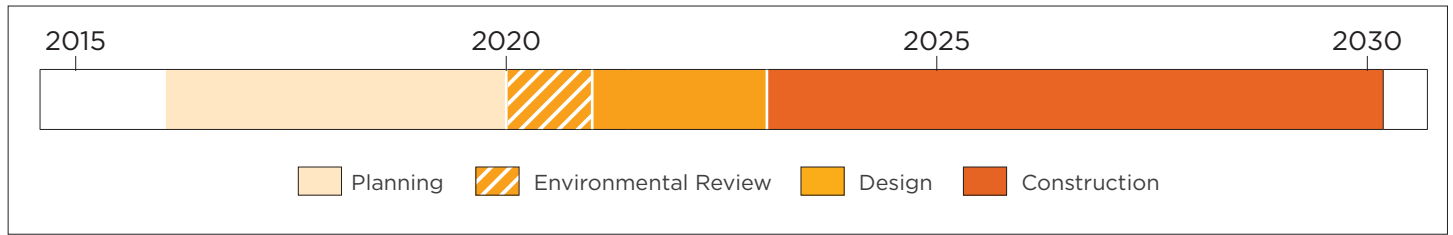
Dependence on multiple partners. SFPUC facilities are not physically connected to Los Vaqueros Reservoir. To put water into storage or take deliveries, additional partnerships will be needed.

Dependence on other projects. This project is dependent on identifying a supply source and securing conveyance pathways for filling and delivery.

COST

While the total capital cost of the project is estimated to be over \$1.2 billion, SFPUC's share of the cost for up to 40,000 acre-feet of storage is \$275 million, or in 2023 dollars, \$215 million. However, the project is expected to receive State and federal funding to offset some of the costs and reduce the SFPUC's share based on proportional benefits. SFPUC's O&M costs will vary significantly based on use of the conveyance facilities to move water into or out of storage in any given year. Overall, the SFPUC's share of conveyance facilities is expected to be less than 10% due to anticipated use in dry years only. Because debt financing is expected to be secured by the project and not separately by the SFPUC at this time, the SFPUC's annual expenditures are likely to be cash-funded capital debt repayments over time. Funding of \$42.5 million is proposed in the FY 2025-2034 CIP to complete design and construction of this project. Additionally, O&M costs within the next 10-year period are expected to total \$36 million and will be included in a future operating budget. To fully realize the benefit of this project, funding for 5B. Conveyance Alternatives for LVE and 5C. Supply Alternatives for LVE must be secured in parallel.

CURRENT STATUS & SCHEDULE



INFORMATION TO SUPPORT SFPUC COMMISSION ACTIONS

PROJECT RECOMMENDATION

- Proceed with planning and coordination on all LVE related projects.
- Continue developing a water supply strategy and agreement terms for conveyance. If State and federal grant funds are secured, annual expenditures may decrease or be deferred. Grant and loan receipts will not be confirmed until after financial commitments to the project by all partners are secured.
- Funding of \$42.5 million is proposed in the FY 2025-2034 CIP to complete implementation of the storage project
- Operating costs will be included in a future operating budget when the project is in service. Operating costs will vary depending on how and when the SFPUC fills its storage allocation and takes deliveries of water.

KEY MILESTONES/DECISIONS

- The Service Agreement, which financially commits the SFPUC to the project, must be approved for the project to proceed. The Service Agreement is expected to come before the SFPUC Commission in 2024.
- A water supply strategy is being developed as part of 5C. Supply Alternatives for LVE to support decision-making on the Service Agreement.
- *Risk of not meeting key milestone:* If the Service Agreement is not approved, this project will not move forward and the estimated 3.9 mgd water supply benefit would not materialize.

UPCOMING PROJECT ACTIVITIES

- Develop financial scenarios and work with SFPUC Capital Planning and Finance to refine annual expenditure estimates. Continue planning for related 5C. Supply Alternatives for LVE and 5B. Conveyance Alternatives for LVE and present outstanding risks to the Commission ahead of decision-making on participating in the Service Agreement for this LVE Project.

5B. Conveyance Alternatives for Los Vaqueros Expansion

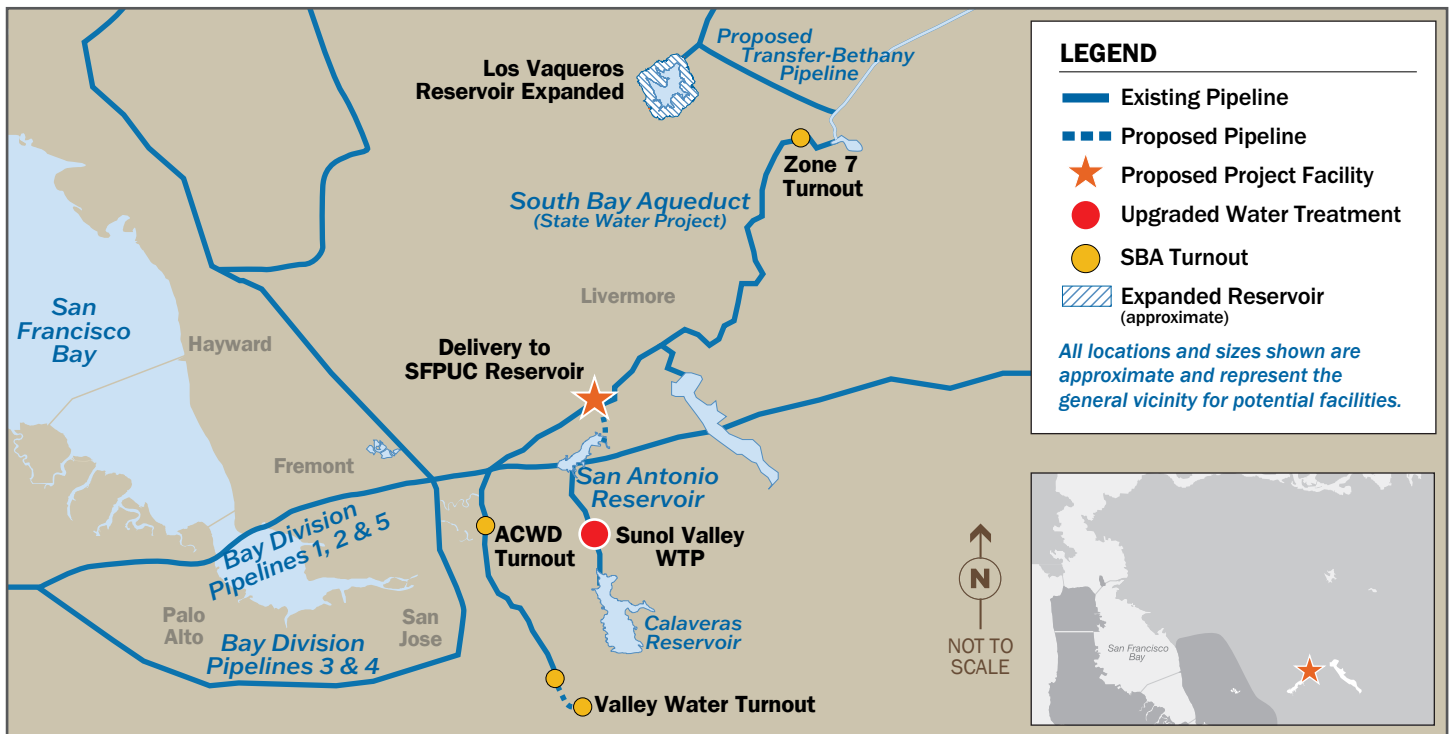
PROJECT DESCRIPTION

The SFPUC is considering its participation in the 5A. LVE Project as a storage project that can enable carryover storage in wet years for delivery in dry years. However, the reservoir is not connected to the SFPUC's RWS facilities. Therefore, additional pathways are needed both to fill the SFPUC's share of LVE storage and subsequently to deliver water from project facilities and into SFPUC's service area. The main pathway being considered for delivery is through the South Bay Aqueduct (SBA).

The SBA is a 49-mile aqueduct, which is part of the State Water Project, owned by the California Department of Water Resources (DWR). SBA Contractors maintain contract capacity for use of the SBA: Zone 7 Water Agency, ACWD, and Valley Water. The SFPUC could enter into exchanges with one or more of the SBA Contractors, who are also LVE JPA members and partner agencies. Additionally, the SFPUC's San Antonio Reservoir and Sunol Valley WTP are very close to the SBA. A connection between the SBA and San Antonio Reservoir that was constructed toward the end of the 1987-1992 drought remains in place. This connection could be upgraded to deliver LVE supplies directly to the SFPUC. For planning purposes, this is assumed to be the primary pathway for project deliveries.

PROJECT LOCATION

Conveyance Alternatives are being explored in connection with the SFPUC's participation in the 5A. LVE Project in Contra Costa County.



NEW INFRASTRUCTURE NEEDS

- Expand existing SBA connection with San Antonio Reservoir (planning assumption).

WATER SUPPLY AVAILABILITY & DISTRIBUTION

The potential conveyance alternatives do not serve as a water supply; rather they would facilitate delivery of water from the expanded Los Vaqueros Reservoir for the benefit of SFPUC customers. Since the conveyance alternatives discussed here support the separate but related 5A. LVE Project (outlined in the preceding project description section), the water supply benefit is accounted for through 5A. LVE Project, and no additional water supply benefit is accounted for in this conveyance project.

The SBA conveyance pathway can enable exchanges between the SFPUC and one of the SBA Contractors. While there is limited synergy with Zone 7, ACWD is a Wholesale Customer of the SFPUC and there are eight customers located in Valley Water’s service area that are also served by the SFPUC. Any of those agencies could be a potential exchange partner that could take delivery of the SFPUC’s stored LVE water and free up an equivalent supply to the SFPUC in its service area. The SFPUC can also take direct deliveries into San Antonio Reservoir from the SBA. Modeling analysis done by the SBA Contractors confirmed available capacity in the SBA to accommodate deliveries for the SFPUC in future dry years.

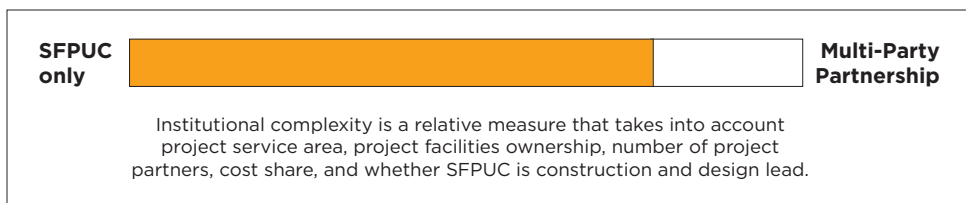
PROJECT AT A GLANCE

Supply Type	-
SFPUC Regional Supply Assumed	See 5A. LVE Project
Project Capacity	See 5A. LVE Project
Earliest Service Date	2030
Estimated Capital Cost per Acre-Foot	\$38
Current Status	Planning

PROJECT PARTNERS & INTERESTS

Partners in the project will depend on the conveyance pathway implemented. To modify the connection between the SBA and San Antonio Reservoir, the SFPUC will work with DWR (owner and operator of the SBA) and the SBA Contractors. For a new intertie alternative, the SFPUC would partner with EBMUD. Because this project is contemplated only to deliver 5A. LVE Project supplies on behalf of the SFPUC, it is assumed that the incremental supply accruing from the project will be for the SFPUC only.

INSTITUTIONAL COMPLEXITY



INSTITUTIONAL CONSIDERATIONS

The SFPUC seeks to prioritize the use of existing infrastructure and minimizing costs where possible. Therefore, conveyance through the SBA is preferred over building a new intertie with EBMUD. Exchanges with ACWD and Valley Water, or direct deliveries to San Antonio Reservoir are possible. For exchanges with ACWD or Valley Water, new agreements would be needed and would have institutional complications. Because ACWD is a Wholesale Customer of the SFPUC, for example, the parties may determine that existing agreement terms should be modified to enable ACWD to take deliveries from 5A. LVE Project in lieu of RWS deliveries. An exchange with Valley Water may require modified use of the emergency intertie that connects the SFPUC and Valley Water systems at Milpitas (Milpitas Intertie). Valley Water could also deliver supplies directly to common customers, which would require the modification of individual customer contracts.

OPERATIONAL CONSIDERATIONS

SFPUC staff have worked closely with the SBA Contractors to determine that there would be sufficient capacity available in the SBA to also deliver stored water from the 5A. LVE Project in dry years, however, the timing of those deliveries may vary across the year. Deliveries to the SFPUC would have a lower priority than deliveries to the SBA Contractors. Because the SFPUC is flexible in timing of deliveries into its system, this pathway is feasible.

Direct delivery to RWS at San Antonio Reservoir

In addition to storing local runoff, San Antonio Reservoir is currently used to store water from the Hetch Hetchy Aqueduct. Water from San Antonio Reservoir is conveyed through the San Antonio Pipeline to the Sunol Valley WTP, where it is filtered and disinfected before delivery to SFPUC customers. Addition of water from Los Vaqueros Reservoir will constitute a new source of supply and would a) potentially introduce new invasive species to the RWS and b) pose a water quality challenge. At a minimum, the introduction of a new supply will require additional water quality testing and monitoring on an ongoing basis. It would also require a change to dry-year operations of the RWS.

Exchange with ACWD

ACWD's ability to take delivery of supplies from the 5A. LVE Project in lieu of supplies from the RWS is limited by a) demand b) existing treatment capacity and c) water quality and blending requirements. It is estimated that the potential for exchange with ACWD is currently limited to 2 to 4 mgd and cannot fully replace the need for RWS supplies. Furthermore, treatment of raw water conveyed through the SBA will be required.

Exchange with Valley Water

Valley Water's turnout from the SBA is at the southern end of the existing pipeline. To enable an exchange with the SFPUC, Valley Water would have to take more deliveries from the SBA - which incurs high conveyance losses in its southern reaches - and then treat that water at one of its water treatment plants. Delivery of treated water to the RWS could be at the Milpitas Intertie or to common customers. For the latter, distribution system modifications to individual customers would be required.

STAFFING & WORKFORCE DEVELOPMENT

As noted above, the various conveyance alternatives would affect staffing needs differently. In all cases, additional coordination would be required. The greatest direct implications to SFPUC operations would be in the scenario of direct deliveries to San Antonio Reservoir. Exchanges would result in new operational needs for our partners.

STATUS OF ENVIRONMENTAL REVIEW

Implementation of the conveyance alternatives is anticipated to be subject to environmental requirements associated with the proposed facilities and operations. The infrastructure improvements and construction of facilities will vary with the conveyance alternative.

PROJECT ALTERNATIVES

An alternative of conveying water from LVE through EBMUD's system has been explored. While it appeared feasible based on a preliminary study, it would be significantly more expensive and require more infrastructure to be constructed and operated. EBMUD and the SFPUC have an existing emergency intertie, located at Hayward, which is not available for drought use; however, the two agencies evaluated a possible new intertie that could enable deliveries. This conveyance alternative would require a large new pipeline. While it would avoid any need for reoperation of Hayward's distribution system, the challenges of the alignment make it significantly more costly than using SBA for deliveries from the 5A. LVE Project.

5B. Conveyance Alternatives for Los Vaqueros Expansion - *continued*

+ PROS

Use of existing assets. The project prioritizes use of existing infrastructure.

Multiple feasible pathways for delivery. Although there is no direct connection between 5A. LVE Project and SFPUC facilities, there are both direct and indirect conveyance alternatives that are feasible.

Partners with experience. LVE introduces a new supply source to the SFPUC, but the potential exchange partners have historically used the same supply sources.

- CONS

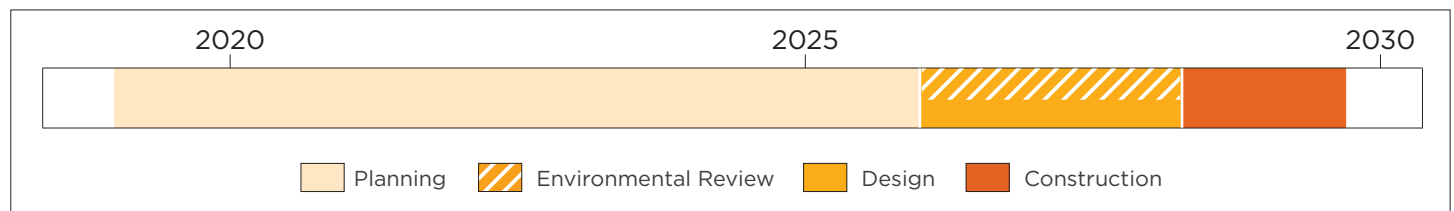
Institutional agreements. Terms of the partnership agreements needed for conveyance may not be favorable to the SFPUC, such as lower priority for a) use of the SBA or b) treatment capacity needed for exchanges.

Water quality challenges. In the case of direct delivery to San Antonio Reservoir, the new water supply into the RWS could introduce invasive species and present new water quality challenges that will require additional monitoring and potentially operational modifications.

COST

The total capital cost for this project is estimated to be \$6.2 million, or the equivalent of \$5.1 million in 2023 dollars. Funding of \$4.3 million is proposed in the FY 2025-2034 CIP to continue the planning process.

CURRENT STATUS & SCHEDULE



INFORMATION TO SUPPORT SFPUC COMMISSION ACTIONS

PROJECT RECOMMENDATION

- Continue pursuing all SBA pathway alternatives, including exchanges and the potential for direct deliveries.

KEY MILESTONES/DECISIONS

- This project would be implemented with 5A. LVE Project, which requires an approved Service Agreement to proceed. The Service Agreement is expected to come before the SFPUC Commission in 2024.
- Details of a water supply source must be identified before the SFPUC can enter into an agreement with DWR for use of capacity in the SBA in dry years.
- *Risk of not meeting key milestone:* If the Service Agreement is not approved, this project will not move forward and the estimated 3.9 mgd of water supply associated with the 5A. LVE Project would not materialize.

UPCOMING PROJECT ACTIVITIES

- Continue work toward securing a short-term water supply agreement with a transfer partner as a precursor for a conveyance agreement with DWR for use of the SBA.
- Pursue planning and preliminary design to upgrade the SBA connection to San Antonio Reservoir, and simultaneously continue working with ACWD and Valley Water to pursue exchange opportunities.
- Continue work toward determining outstanding risks related to conveyance and present them to the SFPUC Commission prior to decision-making to participate in the Service Agreement.

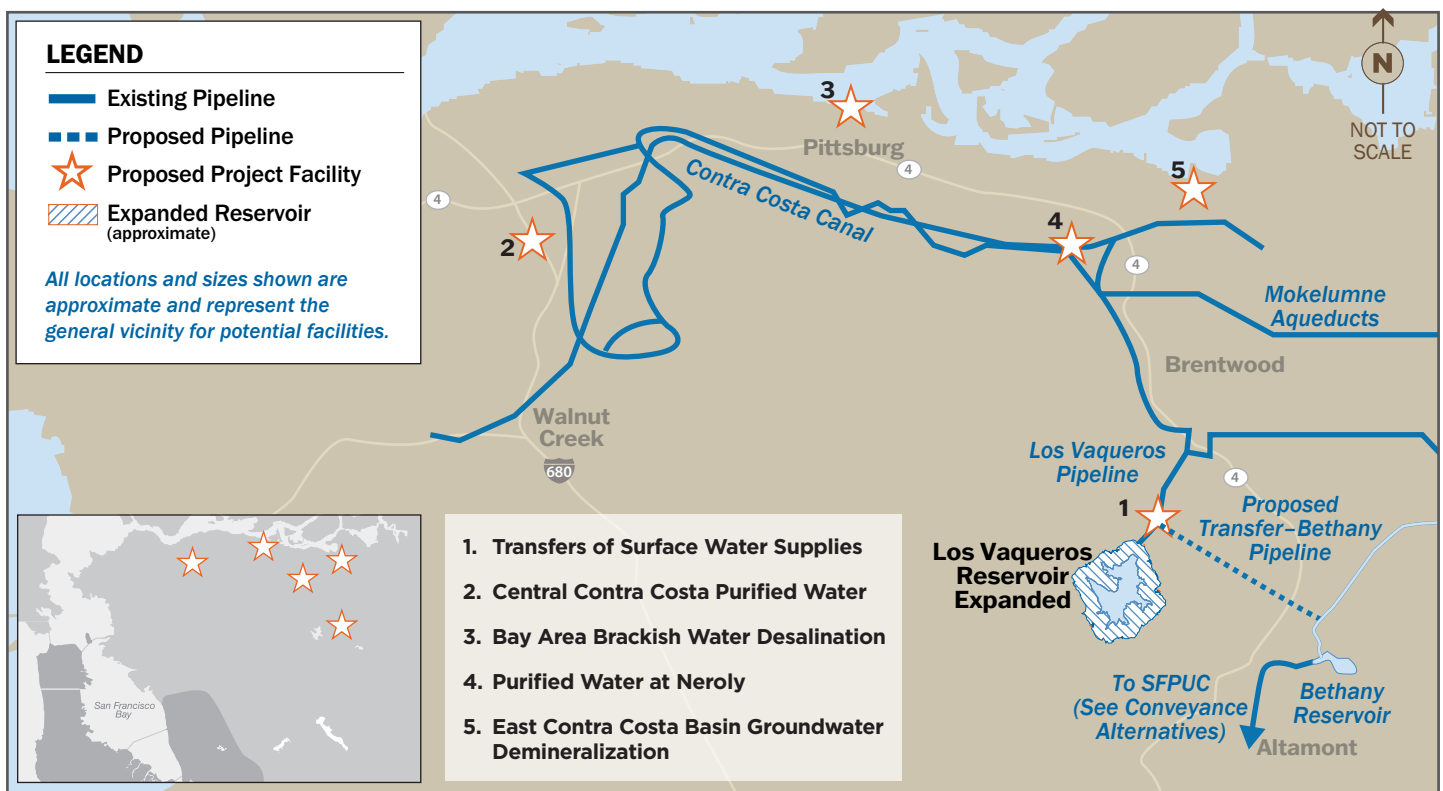
5C. Supply Alternatives for Los Vaqueros Expansion

PROJECT DESCRIPTION

This project is intended to support the SFPUC's participation in the 5A. LVE Project. Unlike other LVE project partners, the SFPUC has no direct physical connection to the LVE facilities and no water supply that can readily be stored in the proposed regional storage project. However, because the regional storage opportunity would provide benefits for the SFPUC as described in the companion project, the SFPUC is evaluating water supply alternatives that can help fill the proposed storage capacity of up to 40,000 acre-feet for use in dry years.

There are five potential supplies: 1) transfers of surface water supplies (short- or long-term), 2) new water supplies generated by advanced treatment of wastewater (Central Contra Costa Sanitary District Purified Water), 3) treatment of brackish water through Bay Area Brackish Water Desalination, 4) treatment of brackish water through Purified Water at Neroly, or 5) groundwater extraction (East Contra Costa Groundwater Demineralization). Depending on the location and conveyance pathway for the supply, it may be subject to transmission losses and capacity limitations, or subject to an additional exchange with CCWD. Regardless of the alternative, a supply of 4 to 5 mgd is needed in wet and normal years to fill the proposed storage for dry-year availability to the SFPUC.

PROJECT LOCATION



NEW INFRASTRUCTURE NEEDS

- Treatment facility (for new supply alternatives, not transfers).
- Pipelines (connecting to partners' existing infrastructure, as needed).

WATER SUPPLY AVAILABILITY & DISTRIBUTION

Storage at LVE is expected to be available by the end of 2030. Associated conveyance facilities such as the Transfer-Bethany Pipeline may be available sooner. Meanwhile, developing a new water supply capital project can take 10 to 20 years. Therefore, SFPUC staff are simultaneously evaluating short- (within 10 years) and long-term (beyond 10 years) solutions that can optimize a potential investment in the storage project.

Water supply strategy: transfers

Purchasing transfer water upstream of the CCWD’s intakes in the Delta in wet and above normal years could provide a source of water for the SFPUC’s participation in the 5A. LVE Project. The water would flow to Los Vaqueros via Delta tributary streams and be pumped into Los Vaqueros at CCWD’s intakes. With more frequent droughts and limited supply options anticipated in the future, competition for transfer opportunities may also increase over time. Therefore, pursuing transfers may be a short-term water supply strategy while the SFPUC seeks a new water supply source for long-term reliability. However, since transfers would not require large new capital investments or infrastructure, SFPUC staff are prioritizing opportunities for both short- and long-term transfers that may be feasible. Timing of the transfers, availability from year to year, and the associated transmission losses that may occur would vary by source. Discussions with potential transfer partners are ongoing.

Water supply strategy: brackish desalination, purified water, or groundwater demineralization

Between 3 and 5 mgd of average annual supplies may be available through treatment of wastewater, brackish water or groundwater. Production of these sources are likely to be in all year types. Other LVE project partners are also interested in pursuing these supply options and the SFPUC may pursue them jointly. Each potential water supply option is currently under study. Costs for a regional brackish water desalination supply are indicated as illustrative because it has been studied the most and has more data available than other alternatives currently under study.

PROJECT AT A GLANCE

Supply Type	Transfers and alternative supplies (TBD)
SFPUC Regional Supply Assumed	See 5A. LVE Project
Project Capacity	See 5A. LVE Project
Earliest Service Date	Transfers (2030); new alternative water supply (2040)
Estimated Capital Cost per Acre-Foot	\$2,319 (based on 10 mgd regional brackish desalination)
Current Status	Planning

PROJECT PARTNERS & INTERESTS

Each project alternative has different partners with varying interests. The SFPUC is at an exploratory stage for long-term water supply. However, short-term transfers can provide an interim solution to ensure that the storage in Los Vaqueros Reservoir can be fully utilized once it is completed by 2030. CCWD is working with the SFPUC on securing both short- and long- term water supply opportunities.

INSTITUTIONAL COMPLEXITY

SFPUC only

Multi-Party Partnership

Institutional complexity is a relative measure that takes into account project service area, project facilities ownership, number of project partners, cost share, and whether SFPUC is construction and design lead.

INSTITUTIONAL CONSIDERATIONS

Any water supply to be stored in Los Vaqueros Reservoir would require exchanges with CCWD and potential partnership with other agencies. SFPUC staff have begun having exploratory discussions with potential partners but recognize that securing agreements will require additional study and negotiations. As with any new infrastructure project, this process could take over 10 years, in which time the storage would be available to fill. As such, staff are simultaneously pursuing short-term transfers as a way to optimize use of storage and related facilities as they come online. CCWD is assisting the SFPUC in identifying and securing transfer opportunities as well as long-term supply options.

OPERATIONAL CONSIDERATIONS

The water supply options under consideration are outside of the SFPUC's service area. No direct operational impacts are anticipated. However, there would be operational impacts to our partners, depending on the alternative(s) pursued.

STAFFING & WORKFORCE DEVELOPMENT

The water supply options under consideration are outside of the SFPUC's service area. No direct staffing needs are anticipated for the SFPUC at this time. The SFPUC does not have experience in securing short-term transfers that can be stored in Los Vaqueros Reservoir. Expertise in this area through a contractor would be valuable support for SFPUC planning.

STATUS OF ENVIRONMENTAL REVIEW

Environmental review will be completed, as needed, based on the water supply alternative(s) pursued.

PROJECT ALTERNATIVES

There are several water supply alternatives, as described in the project description. The strategy to pursue water supply for storage in Los Vaqueros Reservoir is further broken down into long-term and short-term opportunities. The long-term supply options include desalination, purified water, and groundwater demineralization. As these are all large capital projects, they would take 10 years or more to implement. Therefore, SFPUC staff are simultaneously pursuing water transfers as a way to provide short-term water supply for the proposed storage. At this time, water transfer agreements are envisioned with willing sellers around the Delta. Short term, annual transfers are authorized through the SWRCB process and are CEQA exempt while long-term transfers that guarantee supply availability for 10 years require more rigorous analysis, including CEQA.

5C. Supply Alternatives for Los Vaqueros Expansion - *continued*

+ PROS

Drought-resistant supply. The project provides several alternatives of drought-resistant water supply.

Reduce wastewater discharges. Some long-term supply alternatives result in reduced wastewater discharge to San Francisco Bay.

Limiting infrastructure needs (transfers). Transfers can be accomplished without the need for additional infrastructure.

Access to transfer water. Beyond the advantages of stored water, participation in the project improves the SFPUC's access to the water transfer market through the Delta.

- CONS

New partnerships. Long-term water supply alternatives rely primarily on working with new partners, many of whom the SFPUC has not previously worked with.

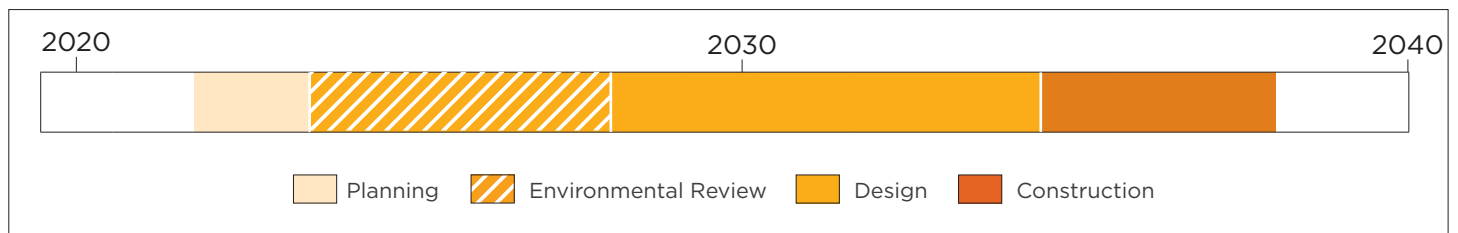
Assets outside the SFPUC's service area. Long-term water supplies will result in infrastructure being built for the SFPUC's benefit, outside the SFPUC's service area and operated by partner agencies.

Reliance on exchanges. To convey water to Los Vaqueros Reservoir, the SFPUC would have to rely on exchanges and be subject to capacity and priority constraints and regulatory approvals.

COST

The total capital cost for a new long-term supply for storage such as brackish water desalination is \$511 million for a 10 mgd project (partnership) or \$255 million for a 5 mgd project (for the SFPUC). A 10-mgd project at \$511 million is estimated to be the equivalent of \$313 million in 2023 dollars. Funding of \$6.7 million is proposed in the FY 2025-2034 CIP to continue planning this project. A new water supply capital project is not anticipated until 2040 so only funds for continued planning are anticipated in the 10-year CIP budget. Pursuing transfers in the near-term will require operating budget allocation, which will be negotiated prior to LVE storage construction.

CURRENT STATUS & SCHEDULE



INFORMATION TO SUPPORT SFPUC COMMISSION ACTIONS

PROJECT RECOMMENDATION

- Continue planning long-term water supply opportunities while simultaneously securing short-term water transfers.

KEY MILESTONES/DECISIONS

- Identify short- and long-term water supply strategy and initiate agreements for exchanges and conveyance. (Being developed under 5C. Supply Alternatives for LVE and 5B. Conveyance Alternatives for LVE).
- *Risk of not meeting key milestone:* If a water supply strategy is not developed to support approving the Service Agreement, it could jeopardize approval of the Service Agreement and 5A. LVE Project would not proceed.

UPCOMING PROJECT ACTIVITIES

- Continue feasibility analysis of all water supply options. Engage in discussions with potential partners to assess interest in synergies.
- Continue coordinating with recommendations associated with the 5A. LVE Project.

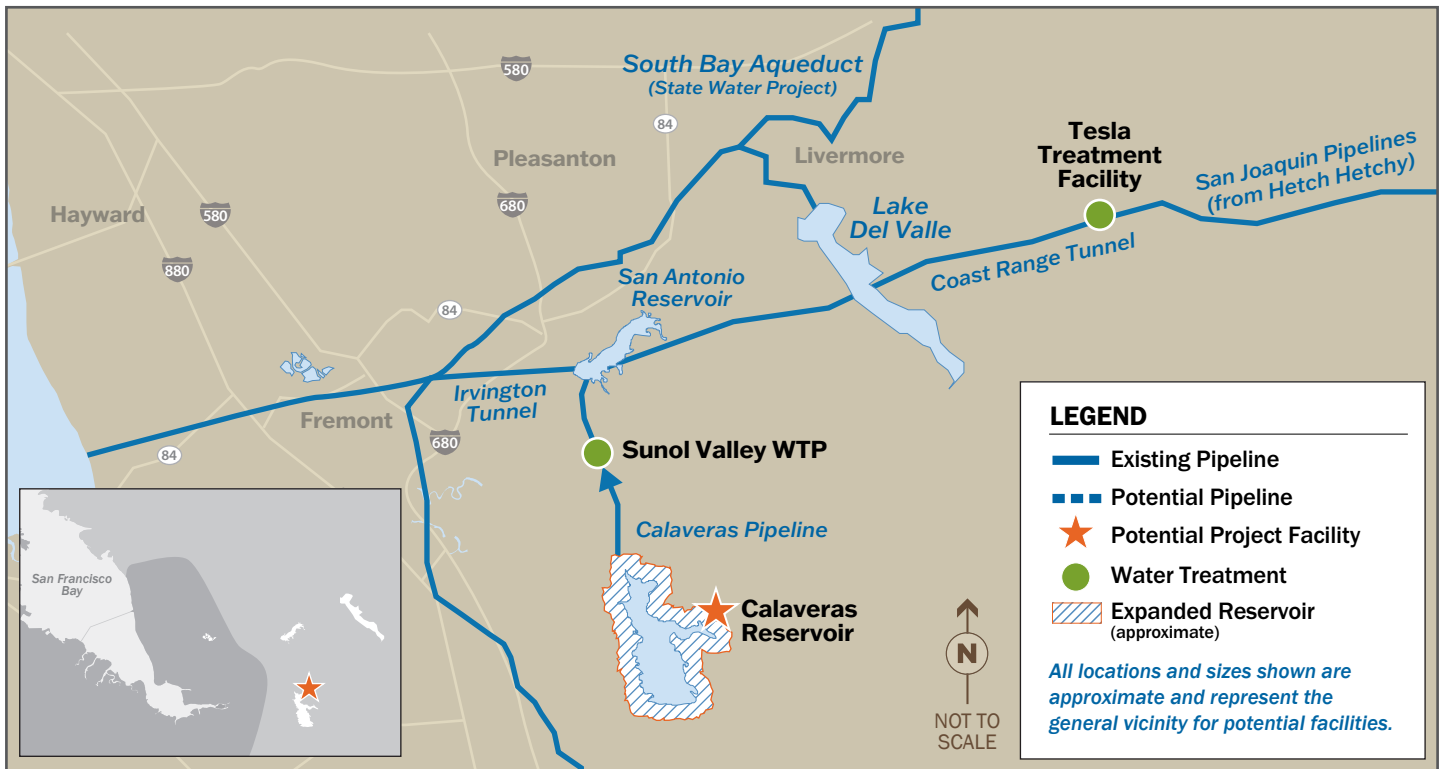
6. Calaveras Reservoir Expansion Project

PROJECT DESCRIPTION

This storage project envisions the expansion of the SFPUC's Calaveras Reservoir to store excess RWS supplies or other source water in wet/normal years. No expansion of water rights from the local watershed is anticipated. With the Calaveras Dam Replacement Project complete, Calaveras Dam currently impounds a capacity of 96,850 acre-feet or 31 billion gallons of water. By raising the dam height up to 890 feet, from its current height of 220 feet, an additional 290,000 acre-feet of storage could be realized. A smaller alternative would raise the dam to 771 feet, providing an additional 22,000 acre-feet of storage. Calaveras Reservoir is owned and operated by the SFPUC for the benefit of RWS customers. Unlike all other regional projects under review in this program, no external partners are anticipated at this time.

PROJECT LOCATION

The Calaveras Reservoir Expansion Project involves expansion of the existing Calaveras Reservoir located in Sunol Valley, Alameda County.



NEW INFRASTRUCTURE NEEDS

- Raise Calaveras Dam.
- Calaveras pipeline (construct new or reverse flow).
- San Joaquin pipeline bypass.
- Pump station.
- Upgraded dechlorination facility.
- Modifications to the Coast Range Tunnel (depending on conveyance alternative).

6. Calaveras Reservoir Expansion Project - *continued*

WATER SUPPLY AVAILABILITY & DISTRIBUTION

Four dam raise options and eight conveyance alternatives have been studied initially. Taking the smallest and largest of each as the planning bookends, the project is anticipated to provide between 2.7 mgd and 28.6 mgd of additional stored water for the SFPUC in a future dry year. The project would redirect water from the RWS downstream into storage for use during dry years. The sources of surplus water would include overflow or “spills” from the SFPUC’s Moccasin Reservoir to the Modesto and Turlock Irrigation Districts’ Don Pedro Reservoir that exceed the SFPUC’s maximum storage allocation in Don Pedro Reservoir, and secondarily, spills from the SFPUC’s Kirkwood Powerhouse. By expanding existing RWS storage, these existing sources of supply can be captured for use in dry years. The water stored in an enlarged Calaveras Reservoir will continue to be distributed to the SFPUC’s customers through the RWS.

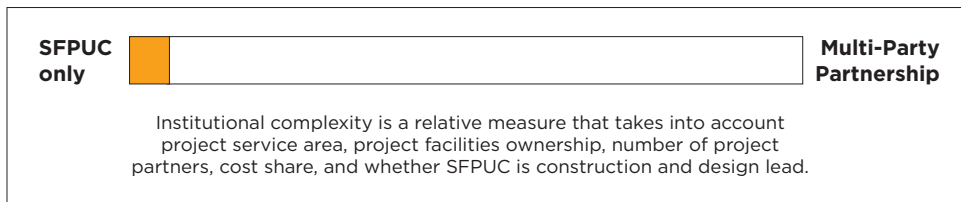
PROJECT AT A GLANCE

Supply Type	Storage (with conveyance)
SFPUC Supply Assumed	2.7 to 28.6 mgd
Project Capacity	2.7 to 28.6 mgd
Earliest Service Date	2035 or 2039 depending on size
Estimated Capital Cost per Acre-Foot	\$2,831 to \$3,960
Current Status	Planning

PROJECT PARTNERS & INTERESTS

Calaveras Reservoir is an RWS facility. There are no additional partners.

INSTITUTIONAL COMPLEXITY



INSTITUTIONAL CONSIDERATIONS

The SFPUC has no external partners for this project and the project entirely serves the SFPUC service area with the SFPUC as the design and construction lead. Therefore, compared to other projects, the project has lower institutional complexity.

6. Calaveras Reservoir Expansion Project - *continued*

OPERATIONAL CONSIDERATIONS

Calaveras Reservoir collects local runoff from the Alameda Creek Watershed primarily through rainfall events. Through this project, the reservoir will receive water from additional sources within the RWS and possibly alternative water supplies in the future. Consistent with current operations, water from the expanded Calaveras Reservoir will be conveyed by gravity to the Sunol Valley WTP before blending with water originating from Hetch Hetchy Reservoir through the Calaveras Pipeline.

There are several alternatives that continue to be under consideration in planning. Water from the Tuolumne River could be conveyed through the Upcountry system via the Coast Range Tunnel, through the new San Joaquin Pipeline 4 and Tesla Treatment Facility in Tracy. A dechlorination facility or process could potentially be added to the existing Sunol Dechlorination Facility to treat the expanded flow, which could then potentially be conveyed through the Calaveras pump station and Calaveras Pipeline before entering the Calaveras Reservoir. Existing facilities have constraints for which alternatives are also being evaluated through multiple scenarios. The project would be operated to capture water supplies under existing water rights and conveyed and treated through new infrastructure facilities. Upcountry system operations may need to be modified to accommodate deliveries to an expanded Calaveras Reservoir. This could require realigning some operational objectives such as routing a portion of the water originating from Hetch Hetchy Reservoir to the Alameda System instead of the Don Pedro Water Bank, for example.

The project would provide operational flexibility, particularly in dry years, by allowing the SFPUC to utilize Tuolumne River and other wet/normal year supply available through the increased storage, as well as additional water supply such as purified water from AWS Projects that might be stored in an expanded Calaveras Reservoir.

STAFFING & WORKFORCE DEVELOPMENT

Operation of the expanded reservoir and related facilities would be by SFPUC staff. It is estimated that six new staff would need to be added for the implementation of this project.

STATUS OF ENVIRONMENTAL REVIEW

The project is anticipated to be subject to environmental requirements associated with project facilities and operations. The project would require environmental review and permits for construction and operation of the project at least including Section 401 Water Quality Certification and for protection of special-status species and habitat. The project is also subject to Least Environmentally Damaging Practicable Alternative analysis under section 404 of the Clean Water Act and resultant State section 401 determination.

PROJECT ALTERNATIVES

SFPUC is studying feasible dam raise scenarios; conveyance alternatives, including infrastructure and operational considerations, for an expanded Calaveras Reservoir; and different water supply alternatives to be integrated to maximize efficient use of expanded storage at Calaveras.

6. Calaveras Reservoir Expansion Project - *continued*

+ PROS

Dry-year reliability and supply utilization. The project significantly increases storage capacity within the RWS, enabling the SFPUC to capture more of its system supplies in wet and normal years for use in dry years.

Operational flexibility. The SFPUC operates a storage-based system; additional storage provides greater flexibility, particularly in dry years.

Local Control. No external partnerships are required to implement this project.

- CONS

Supply availability. Tuolumne River supply to divert to storage is uncertain.

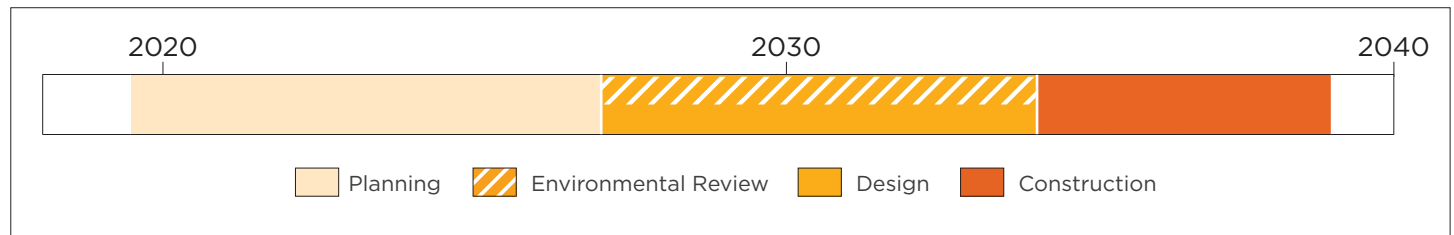
Cost and new infrastructure needs. Raising the Calaveras Dam and building associated conveyance infrastructure would have a substantial ratepayer impact and be a major infrastructure project that would likely have significant impacts.

Permitting. Expanding the Calaveras Dam and constructing the associated conveyance infrastructure would likely include complex permitting.

COST

The capital cost range for the dam raise from the minimum to the maximum possible height is estimated to be between \$265 million (\$182 million in 2023 dollars) and \$3.6 billion, or \$2.3 billion in 2023 dollars. The associated capital cost for the new conveyance would similarly range from \$81 million (\$70 million in 2023 dollars) to \$2.4 billion (\$1.5 billion in 2023 dollars). The total capital cost for the project is therefore between \$346 million (\$252 million in 2023 dollars) and \$6 billion (\$3.8 billion in 2023 dollars). Existing funds would be used to support continued planning through the Alternatives Analysis for the Calaveras Reservoir Expansion Project. Funding to complete planning, environmental review and design will be considered in a future CIP development process.

CURRENT STATUS & SCHEDULE



INFORMATION TO SUPPORT SFPUC COMMISSION ACTIONS

PROJECT RECOMMENDATION

- Proceed with planning through the Alternatives Analysis.
- To proceed beyond CEQA, seek direction from the SFPUC Commission.
- Support additional funding for planning, environmental review and design to be included in a future CIP development process.

KEY MILESTONES/DECISIONS

- This project is still in planning stages. Key milestones and decisions that affect project success and implementation will be identified as additional planning and analysis is completed.

UPCOMING PROJECT ACTIVITIES

- Initiate Request for Proposals for alternatives study and narrow down both dam raise and conveyance scenarios.



Lower Crystal Springs Reservoir, 2022

Chapter 6: AWS Recommendations

Dating back to the early 1900s, San Francisco has a history of thoughtful planning that takes a long view toward creating a sustainable water supply while being a good steward of the natural resources entrusted to its care. In addition to the ongoing risks of disruptions and emergencies, future uncertainties that may result from challenges such as new regulatory requirements to climate change are driving the need to consider investing in alternative water supplies and expanding storage.

The potential for a significant future water supply gap, combined with the lengthy development process for large new alternative water supply projects, highlights the need for urgent commitment to proactive planning, investment, and coordination to achieve the following:

1. Avoid widening the water supply gap
2. Fill the water supply gap
3. Reduce the water supply gap

The AWS Program is focused on planning and developing regional alternative water supply and storage expansion projects to fill the water supply gap (the second objective), however, investing resources in all the areas listed is important for the continued long-term sustainability of the RWS. Changes to either water availability or demand will affect the water supply gap and future planning goals.

In the sections below, specific recommendations associated with each of these three key objectives are described. Section 6.2 (Fill the Water Supply Gap) presents recommendations related to AWS Program development, including both project-specific and programmatic recommendations. Finally, there is discussion of the broader decision-making timeline for projects and the AWS Program to provide guidance for future planning activities and timing of future AWS Plan updates.

In the Draft AWS Plan published and circulated for public comment on June 28, 2023, information included in Chapter 6 was up to date as of May 2023. Between May and December, the capital planning process for the SFPUC's 2-year budget cycle was underway and project planning continued to advance. As a result, some recommendations in this Chapter have shifted. Furthermore, public comments have also resulted in some clarifications and additions to this section. Recommendations included here reflect the most current recommendations of the AWS Plan as of December 2023. Still, until a final budget is adopted by the SFPUC, any funding associated with recommendations contained in the following pages is subject to change.

While the recommendations included here are intended to address the future water supply gap, several have financial implications for the SFPUC and cannot be evaluated without the full context of all other capital investment and financial sustainability priorities of the SFPUC. Therefore, for any new funding associated with recommendations contained in this Plan, project management staff will work with Capital Planning and Finance teams to include specific recommendations as project proposals in the FY 2025-2034 Capital Improvement Plan (CIP) development process. Each proposal will be evaluated by staff considering broader priorities and may be included in the CIP as a staff recommendation when the CIP is presented to the SFPUC Commission for adoption in February 2024. Including funding for these recommendations could result in deprioritizing other projects or increasing the capital plan and rates.

6.1 Avoid Widening the Water Supply Gap

6.1.1 Water Supply Benefits of Existing WSIP Projects

The water supply gap that is being addressed through the AWS Program is based on the difference between water availability in the RWS and obligations and 2045 customer demand projections. Water availability in the RWS is determined by modeling system deliveries with several baseline assumptions including the implementation of WSIP projects and the impact of rationing in dry years. In addition, assumed implementation of the Bay-Delta Plan Amendment would impact both the water supply and rationing components of water availability in the RWS.

If **WSIP Regional Projects** including 1) the Regional Groundwater Storage and Recovery (RGSR) Project; 2) Irrigation District Dry-Year Water Transfer in the San Joaquin Valley (Dry-Year Transfer); and 3) the Alameda Creek Recapture Project (ACRP) do not achieve the dry-year water supply benefits that they are expected to achieve, water availability may be further reduced, thereby widening the water supply gap that is the focus of the AWS Plan.

In the baseline modeling of water availability for the AWS Program, the RGSR project has been assumed to deliver 6.2 mgd of average annual dry-year supply before 2045 and the ACRP is assumed to provide 5 mgd to offset instream flow requirements related to the WSIP Calaveras Dam Replacement Project within the planning horizon. No water supply has been assumed in the modeling for the Dry-Year Transfer. Meanwhile, because both the RGSR project and ACRP are in construction and could achieve the assumed dry-year benefits by 2045, recommendations for their completion are included below. The SFPUC will continue to demonstrate progress on these projects through the separate WSIP reporting process and their ultimate yield will be verified and coordinated with the modeling of water availability for the AWS Program.

Regional Groundwater Storage and Recovery Project

Supply from the RGSR Project is expected to be available for use starting in 2026. During construction, following the installation of production wells, some water quality challenges were identified that will require treatment. Additionally, a storage buffer prior to distribution may be needed to accommodate the timing and range of water quality and operational needs. Additional funding for further treatment, potential storage, and staffing for operation is needed to deliver the dry-year supply benefits that have been envisioned. Without this investment in infrastructure and resources, the water supply from this project may be reduced to 3.6 mgd.

Funding of \$30.7 million for additional treatment is proposed in the FY 2025-2034 Capital Improvement Plan (CIP). The funding will continue to be evaluated through the 10-Year CIP development process, taking into consideration all other capital investment and financial sustainability priorities before the SFPUC Commission takes action on the 10-Year CIP in February 2024.

RECOMMENDATION 1

Support funding in the FY 2025-2034 CIP to evaluate alternatives for additional treatment, infrastructure, and associated staffing needed to achieve 6.2 mgd of dry-year supply by 2045 from the RGSR project. Staffing needs will be re-evaluated in a future CIP development process.

Alameda Creek Recapture Project

In the Spring of 2023, during the initial stage of construction, the SFPUC concluded that the design of the segment of the proposed project that captures water collected in a quarry downstream of Calaveras Reservoir and conveys it back into Calaveras Reservoir needed substantial re-evaluation. The construction effort has been paused until that design re-evaluation is completed.

Funding of \$5 million is proposed in the FY 2025-2034 CIP. The funding will continue to be evaluated in the 10-year CIP development process, taking into consideration all other capital investment and financial sustainability priorities before the SFPUC Commission takes action on the 10-year CIP in February 2024.

RECOMMENDATION 2

Include the Phase 2 re-design of the Alameda Creek Recapture Project as a new project in the FY 2025-2034 CIP.

6.1.2 Other Actions Affecting Water Availability from the RWS

Proposed Voluntary Agreement

As described in Section 3.2.1 of this Plan, the SWRCB has indicated it will consider the Proposed Voluntary Agreement for adoption in 2024. The impact of the Proposed Voluntary Agreement on projected water availability will remain uncertain until the SWRCB completes its evaluation, which will ultimately determine the impact of the Bay-Delta Plan Amendment on the SFPUC's future water supply gap. While the exact quantity associated with instream flow release requirements under the Bay-Delta Plan Amendment is subject to change with the Proposed Voluntary Agreement in the future, the Bay-Delta Plan Amendment is anticipated to cause a shortfall in RWS supply during dry years. Monitoring developments related to the Proposed Voluntary Agreement will be critical to understanding the future water supply gap.

Transfers and Other San Joaquin Valley Projects

The SFPUC has pursued long-term agreements to transfer 2 mgd from Modesto Irrigation District and subsequently from Oakdale Irrigation District in dry years only. While no dry-year transfer has been secured or implemented, the SFPUC is continuing to explore potential transfer opportunities on the Tuolumne River and other collaborative projects throughout the San Joaquin Valley in conjunction with the Proposed Voluntary Agreement negotiations related to the Bay-Delta Plan Amendment. No investment is needed at this time, and staff will continue reporting developments, as appropriate. As additional planning is required, resource and funding needs will also be identified. Projects related to negotiations of the Proposed Voluntary Agreement could impact water availability which would in turn impact future water supply gap estimates.

RECOMMENDATION 3

Continue reporting progress on negotiations related to the Proposed Voluntary Agreement and potential transfers and projects in the San Joaquin Valley that could contribute to instream flow releases. Identify resource and funding needs, as and when appropriate. No new funding or additional resources are needed to support this recommendation.

Rationing

Rationing is a component of water availability and is dependent on water supply. As new supplies are added to the RWS, continuing to monitor the effects of rationing can help determine how much additional supply is needed to fill the water supply gap.

Potential Future Regulations and Climate Uncertainty

Both regulatory and climate uncertainties and their resultant impact on water supply availability make it difficult to definitively plan for the future. AWS planning efforts therefore do not currently assign a numerical shortfall with other potential future regulations but rather capture them qualitatively by recognizing the risk they pose to the SFPUC's ability to meet customers' water demand. Such regulatory requirements may be quantified in the planning efforts associated with future AWS Plan updates, as necessary.

AWS Planning Updates

Recognizing that the AWS Program is a dynamic planning process, it is intended that it will go through periodic review and update. Water availability and demand drivers will be reviewed, and the anticipated supply gap will be updated if significant changes have emerged (Chapter 3 of the AWS Plan). The AWS Project will be reviewed and updated to reflect current activities and planning (Chapter 5 of this Plan). Finally, AWS Program recommendations will be reviewed and updated as needed in response to significant changes to regulations, policies, or other conditions (Chapter 6 of this Plan). The first scheduled update would be in 2026 after the SFPUC's 2025 UWMP is developed. After that, the AWS Plan could be updated periodically to align with the biennial budget cycle of the SFPUC and anticipated AWS Project milestones.

RECOMMENDATION 4

Provide updates to the AWS Plan, beginning in FY 2026-2027 and periodically thereafter, to align with AWS Project milestones, changes to regulatory requirements, and CIP planning. No new funding or resource allocation for this effort is anticipated.

6.1.3 Baseline Demands on the RWS

Maximizing opportunities for conservation and development of local non-potable and potable supplies helps reduce water demands from the RWS and has been a top priority for the SFPUC. When the WSIP was adopted by the SFPUC Commission in 2008, Resolution 08-0200 included direction for the SFPUC to develop 10 mgd locally in San Francisco and for the Wholesale Customers to develop another 10 mgd in the wholesale service area through conservation, recycled water, and groundwater. Both the San Francisco retail and wholesale service areas have achieved the targets outlined in Resolution 08-0200. As the SFPUC plans for future reliability, reducing demands on the RWS continues to be an important factor in reducing the future water supply gap.

Demand Scenarios

The exercise of projecting future demands requires the use of a number of assumptions, including the type of methodology (e.g., end use-based, land use-based, population-based, etc.) and the inputs (socio-economic factors, population growth, new housing projections, etc.). Assumptions drive demand projections and can greatly influence the final projections. The SFPUC has historically used an econometric model that incorporates weather and socio-economic factors to project urban water demand in the SFPUC service area. As discussed in Section 3.1 and Section 3.3, customer demands are one component impacting the future water supply gap. Altering the assumptions used in the development of customer demand projections could change the water supply gap.

To account for a range of possible futures, the SFPUC is undertaking an assessment of best practices and model inputs in 2024 that will inform the development of one to two additional demand scenarios. Developing new demand scenarios will include comparing prior projections and actual deliveries to inform which inputs or other key factors are most likely to influence demand. Once inputs and other key factors are better understood, the SFPUC will vary model assumptions to produce additional scenarios. These additional scenarios will be incorporated into future AWS planning to support investment decisions in the AWS Program, which may include presenting demands as a range. The SFPUC will also coordinate with BAWSCA on demand forecast modeling for the wholesale service area so that updated data can be incorporated into future demand estimates ahead of decision-making on future AWS investment recommendations. No new funding or resource allocation for this effort is anticipated at this time.

RECOMMENDATION 5

Based on its assessment in 2024, the SFPUC will develop 1-2 additional demand scenarios for the retail service area including a sensitivity analysis as appropriate to understand the key inputs driving changes in demand. Past projections should be compared to actual deliveries to calibrate the new demand scenario(s). Staff should also collaborate closely with BAWSCA in this effort to track retail and wholesale assumptions.

Local Projects - San Francisco Retail Service Area

Over the past several years, within the retail service area, the SFPUC has expanded its conservation efforts, developed and expanded an onsite water reuse program, invested in recycled water and groundwater projects, and pursued innovative technology solutions for water supply. These efforts have contributed to reducing retail demands from the RWS to a projected 73.5 mgd in 2045. While the SFPUC is committed to reducing demands on the RWS, San Francisco could need its full retail allocation of 81 mgd in the years beyond 2045.

Like WSIP Regional Projects, implementation of local water supply projects and estimated conservation savings have an effect on the presumed gap based on current modeling. Rather than water availability, however, they are included on the demand side of the gap equation. If local projects do not result in the yield that was anticipated, demands that would have been met with local supplies may shift to the RWS, resulting in higher demands on the RWS and a larger gap to fill.

In addition to ongoing conservation, the Onsite Water Reuse Program, and local water supply projects including Harding Park Recycled Water Project and Sharp Park Recycled Water Project that are operational, there are two WSIP Local Projects that are currently in construction. These projects are the San Francisco Groundwater Supply Project, which is assumed to provide 4 mgd of local supply before 2045 and the Westside Enhanced Water Recycling Project (Westside Project) that is expected to offset potable water use of 1.8 mgd before 2045. The San Francisco Groundwater Supply Project will require treatment to address organic compounds detected at three locations. In addition to meeting water quality objectives, increased operator staffing will be needed to deliver the water supply assumed for the project.

Funding of \$13.5 million is proposed in the FY 2025-2034 CIP to support the San Francisco Groundwater Supply Project. It will continue to be evaluated in the CIP development process taking into consideration all other capital investment and financial sustainability priorities before the SFPUC Commission takes action on the 10-Year CIP in February 2024.

RECOMMENDATION 6

Evaluate infrastructure and operational needs and estimate any additional funding necessary to achieve 4 mgd of dry-year supply by 2045 from the San Francisco Groundwater Supply Project, which is a retail project in San Francisco.

Local Projects - Wholesale Service Area

Within the wholesale service area, agencies are developing and expanding their recycled water efforts, investing in the development of groundwater resources, and continuing to implement aggressive water conservation measures, resulting in an average residential per capita consumption of approximately 60.3 gpcd in FY 2021-22, 5% less than the year before. This is 48% less than the estimated peak residential per capita consumption of 114.9 gpcd in FY 1975-76.

Table 6-1 shows Wholesale Customer purchases from the RWS in FY 2008-09, when the SFPUC Commission adopted WSIP by Resolution 08-0200, compared to RWS purchases in FY 2021-22, representing a reduction of 36 mgd or 22% since FY 2008-09.

Table 6-1: Comparison of Wholesale Customer Purchases from the RWS (FY 2008-09 to present)

FY 2008-09 (mgd)	FY 2021-22 (mgd)	Total % Reduction
164	128	22%



6.2 Fill the Water Supply Gap

6.2.1 AWS Projects

As described in Chapter 5 (AWS Projects), the AWS Program is currently evaluating six projects: two storage expansion projects with associated conveyance alternatives and supply, as needed; one recycled water project that offsets groundwater pumping; and three regional purified water projects. Each of the AWS Projects increase the reliability of regional supplies in dry years when surface water supplies are most vulnerable.

These projects are at different stages of planning and design, and their need for funding and commitment for implementation will be staggered. The near-term recommendations for the AWS Projects and the AWS Program are described below.

Los Vaqueros Expansion Project

The Los Vaqueros Expansion (LVE) Project is a storage project that can provide up to 40,000 acre-feet of additional carryover storage for the SFPUC. Located outside of the SFPUC's service area, it can provide a strategic location for storage and access to potential new water supplies. Environmental review for the LVE Project is complete, and conditional funding for the project has been approved by the State. Additional federal loans and grants are likely to become available. The project provides both urban water supply benefits as well as environmental benefits. Based on early modeling, dry-year conveyance capacity in the DWR-owned South Bay Aqueduct is expected to be sufficient to accommodate SFPUC deliveries into the RWS at San Antonio Reservoir or by exchange with partner agencies. The greatest risk with this project is not having a water supply source secured for filling allocated storage. To mitigate this risk, AWS staff are pursuing both short- and long-term transfer opportunities, and simultaneously assessing opportunities to develop a new water supply project as part of the Supply Alternatives for LVE Project. A water supply strategy will be presented to the SFPUC Commission in 2024, prior to seeking commitment to participate in the LVE Project.

To meet external funding requirements, a decision on whether to participate in this storage project would need to be made by July 2024, ahead of the proposed financial closing which is scheduled for September 2024. Debt for the project will likely be issued by the JPA on behalf of the project and low interest loans are likely to be secured. As such, cash outlay for debt repayment within the 10-year financial plan horizon may be limited. Proposed funding for this project includes:

- Funding of \$42.5 million for the storage component is proposed in the FY 2025-2034 CIP to complete design and construction of this component of the project.
- Funding of \$4.3 million for the conveyance component is proposed in the FY 2025-2034 CIP to complete design and construction of this component of the project.
- Funding of \$6.7 million for the supply component is proposed in the FY 2025-2034 CIP to continue planning through environmental review and 10% design.
- Additionally, O&M costs within the next 10-year period are expected to total \$36 million and will be included in a future operating budget.

The proposal will be evaluated in the CIP development process taking into consideration all other capital investment and financial sustainability priorities before action is taken by the SFPUC Commission on the 10-Year CIP in February 2024.

Approval of participation in the LVE Project would also necessitate implementation of the companion projects: Supply Alternatives for LVE and Conveyance Alternatives for LVE, both of which are in the early planning stages of development. Because the SFPUC's system is not hydraulically connected to the Los Vaqueros Reservoir, both a supply source and delivery mechanism are critical to realizing the benefits of storage in LVE.

RECOMMENDATION 7

Following the development of a water supply strategy, AWS staff will recommend whether to approve participation in the LVE Project before scheduled financial closing in 2024. Based on feasibility analysis to date and in anticipation of a positive staff recommendation, support the SFPUC's share of funding for the full implementation of the LVE Project. Participation in the LVE Project will also require continued planning for two companion projects: Conveyance Alternatives for LVE and Supply Alternatives for LVE.

Daly City Recycled Water Expansion Project

This project provides recycled water to users who largely pump groundwater from the South Westside Basin to meet their irrigation needs. By replacing their source of supply for irrigation, there can be 0.7 mgd available in the South Westside Basin in a dry year, on an average annual basis. Another important benefit of this project is that it supports the RGSR Project by minimizing the risk that use of the South Westside Basin by irrigation customers could affect availability of supplies and groundwater operations in dry years when water is scarce. Competition for supplies and the need for mitigation of potential impacts in the South Westside Basin in dry years can be reduced or eliminated by providing an alternate supply source for non-potable uses in the South Westside Basin. Environmental review and 30% design for this project are complete. To proceed with design, agreements among the project partners and with the prospective customers are necessary. Discussions are ongoing and terms of agreement are expected to be finalized in the coming year. Once those terms of agreement are finalized, the SFPUC can better determine costs and operational impacts, if any, and pursue cost-sharing and grant funding to reduce the cost of project implementation. The prospective customers are in Cal Water's service area.

In anticipation of near-term approval of agreements, funding of \$114.7 million is proposed in the FY 2025-2034 CIP to complete the project's design and construction. It will be continue to be evaluated in the 10-Year CIP development process taking into consideration all other capital investment and financial sustainability priorities before the SFPUC Commission takes action on the 10-Year CIP in February 2024.

RECOMMENDATION 8

Continue developing terms of agreement with project partners and prospective recycled water customers. Assuming that terms of agreement will be reached, support funding for completion for final design and construction of the Daly City Recycled Water Expansion Project in the FY 2025-2034 CIP.

South Bay Purified Water Project

This purified water project is being explored in coordination with the cities of San Jose and Santa Clara as a means of delivering 3.5 mgd in dry years to the SFPUC. Separately, the project provides 6.5 mgd combined total water supply in all years to San Jose and Santa Clara directly as described in Chapter 5. By delivering dry-year supply to the SFPUC, the project can offset some of the impact of potentially providing permanent status to these interruptible customers. The SFPUC Commission has to make a decision regarding their permanent status designation by December 2028. To have the option to make that determination, environmental review of potential supplies would need to be completed prior to that decision.

This project would be operated by the cities of San Jose and Santa Clara in all years for their own use and provide water to the RWS only in dry years when there is a projected shortfall to meet the demands of SFPUC customers. While the initial feasibility study for this project is positive, additional studies such as the evaluation of brine discharge options are needed to fully determine its viability. This is a new project in the AWS Program and is not currently budgeted in the CIP. To continue developing this project through environmental review and 10% design with the cities of San Jose and Santa Clara, funding of up to \$6.7 million is proposed in the FY 2025-2034 CIP. It will continue to be evaluated in the CIP development process taking into consideration all other capital investment and financial sustainability priorities before the SFPUC Commission takes action on the 10-Year CIP in February 2024.

This project supports the evaluation needed to help the SFPUC Commission make a decision regarding the permanent status for the Cities of San Jose and Santa Clara.

RECOMMENDATION 9

Include the South Bay Purified Water Project as a new project with funding support through 10% design and environmental review in the FY 2025-2034 CIP. This project supports the evaluation needed to help the SFPUC Commission make a decision regarding the permanent status for the Cities of San Jose and Santa Clara.

PureWater Peninsula, ACWD-USD Purified Water, and Calaveras Reservoir Expansion Projects

The two purified water projects, PureWater Peninsula and ACWD-USD Purified Water, as well as the Calaveras Reservoir Expansion project are progressing through initial planning. Alternatives analyses and other technical studies are needed, and the projects will need to undergo environmental review. The two purified water projects are estimated to provide 11.4 mgd to augment RWS supplies in dry years. The potential expansion of Calaveras Reservoir can provide between 22,000 acre-feet and 290,000 acre-feet of additional storage depending on the size of the dam raise. That storage can result in available supplies of up to 2.7 to 28.6 mgd in a dry year, on average over 7½ years of an 8½-year design drought. Additional investigation is needed to make specific project recommendations.

Existing funds can be used to support an Alternatives Analysis for the Calaveras Reservoir Expansion Project; no additional funding is proposed in the FY 2025-2034 CIP to complete this work. To continue planning through environmental review and 10% design of the PureWater Peninsula and ACWD-USD Purified Water projects, funding of \$5.3 million and \$8 million is proposed in the FY 2025-2034 CIP, respectively. The proposals will continue to be evaluated in the 10-Year CIP development process taking into consideration all other capital investment and financial sustainability priorities before the SFPUC Commission takes action on the 10-Year CIP in February 2024.

RECOMMENDATION 10

Support funding in the FY 2025-2034 CIP to continue planning through environmental review and 10% design for the PureWater Peninsula and ACWD-USD Purified Water. Support the use of existing funds to continue planning through the Alternatives Analysis for the Calaveras Reservoir Expansion Project.

6.2.2 AWS Program

AWS Projects are different from projects that the SFPUC has undertaken in the past in many ways. From introducing new supply sources to the RWS to treating recycled water under a new regulatory regime for drinking water and implementing multi-party partnerships where ownership and operational responsibilities may vary, these projects will require new approaches to implementation and operation.

Successful implementation of the AWS Program relies on appropriate levels of staffing and programmatic planning funding. The FY 2025-2034 CIP includes a proposed \$37 million to continue supporting ongoing staffing and planning activities for the AWS Program, as well as the following new recommendations. These recommendations are specific to the current phase of AWS Program development, and additional programmatic recommendations will likely be identified in the future as planning progresses.

Operations Planning

Successful implementation of the AWS Program will require careful planning and coordination from an operational standpoint. This includes designing and integrating the new system with existing infrastructure, ensuring adequate and appropriately skilled staffing and resources, establishing maintenance protocols and schedules, and implementing quality control measures. Additionally, operational plans will have to be in place for emergencies and contingencies, particularly during droughts or system failures. AWS operators may be organizationally separate from RWS operations, but close coordination will be required. Ongoing monitoring and evaluation of performance and effectiveness will also be necessary to ensure long-term sustainability.

To begin planning the implementation and operation of future AWS Projects, hiring an Operations Planning Manager is an important step. The manager would serve as a liaison between the AWS and RWS systems and plan operational needs such as staffing, maintenance and logistics. Without an Operational Planning Manager in place during the planning phase of the AWS Program, the implementation of AWS Projects could face significant operational challenges, leading to delays, cost overruns, and potential water quality risks.

RECOMMENDATION 11

Prioritize planning for operational integration by working with SFPUC operations staff. Support hiring an Operations Planning Manager to begin preparing for system integration, staffing, maintenance, and planning to support development of the AWS Program in the future.

Purified Water Planning

A significant part of the AWS Program relies on implementing purified water projects throughout the SFPUC service area. Purified water projects will require a specialized set of technical, regulatory, and communication skills for successful implementation. Throughout California, implementing purified water projects is gaining traction and the SFPUC will also likely implement multiple purified water projects over the planning horizon. Hiring a Purified Water Program Manager can ensure that the SFPUC is tracking new regulations to ensure an understanding of compliance needs, establishing consistent coordination and communication with stakeholders, and establishing a technical advisory panel that can provide guidance and expertise in the design and quality control of future project demonstration and implementation.

RECOMMENDATION 12

Support hiring a Purified Water Program Manager who will be responsible for tracking and ensuring compliance with new regulations, coordination with stakeholders, and establishing a technical advisory panel to support the successful demonstration and implementation of purified water projects within the AWS Program.

Financing and Affordability

Based on preliminary estimates, the capital investment associated with the suite of regional AWS Projects could be on the order of \$4 billion to \$10 billion (escalated to the mid-point of construction) over the planning horizon, varying largely based on the size of the expansion of Calaveras Reservoir and the associated conveyance facilities.

Some of the key challenges ahead will be developing a financing strategy for AWS Projects and ensuring that the resulting rates do not severely impact affordability for SFPUC customers. To maintain access to high-quality water while keeping water rates affordable for all, in addition to prudent planning the SFPUC will also need to investigate creative and alternative methods of financing projects such as securing grants and low interest rate loans to fund projects, and considering public-private partnerships to design, build, and operate projects. Uncertainties in ownership, financing and project operations can significantly impact the cost estimates and timing of anticipated expenditures for large water supply projects. As the AWS Projects are better defined over the course of planning, costs will continue to evolve.

Budget associated with recommendations in the AWS Plan can be summarized as follows:

- Budget associated with recommendations designed to avoid widening the supply gap is \$49.2 million. This funding will support the implementation of WSIP projects.
- Budget associated with recommendations designed to fill the water supply gap is \$225.2 million in capital between FY 2025 and 2034. This amount includes \$87.4 million in funds that was approved in the prior CIP (FY 2024-2033).
- Recommendations designed to reduce the water supply gap do not have funding needs at this time.

This cost estimate includes:

- Cash-funding capital expenditures for LVE Storage and Conveyance and the Daly City Recycled Water Expansion Projects
- Planning through environmental review and 10% design for three purified water projects and a new water supply to support storage in LVE
- Continued planning for Calaveras Reservoir Expansion Project (with conveyance) through the Alternatives Analysis phase of planning
- Staffing to support continued planning for purified water

AWS staff will continue to work in close collaboration with the Finance team to explore project-specific financing options (grant funding, debt issuance, cash funding, and public-private partnerships) and rate impacts based on additional data as it becomes available. The SFPUC is committed to affordability and recognizes the importance of evaluating the financial implications of these projects to ensure that ratepayers are not unduly burdened.

RECOMMENDATION 13

Prioritize continued coordination with Finance to help track and address long-term project financing options and affordability.

6.3 Reduce the Water Supply Gap

6.3.1 New Local Supplies

There are opportunities to do more than has already been planned in San Francisco and throughout the region to potentially reduce demands on the RWS. Non-potable demands in San Francisco are limited and dispersed, which makes serving more of them challenging and costly. In recent years, the SFPUC has begun exploring the potential to reuse treated wastewater effluent through advanced purification to meet stringent drinking water standards as a potential sustainable water supply. This project concept is referred to as PureWaterSF. PureWaterSF could increase local supplies in San Francisco and thereby further reduce demands on the RWS in 2045.

PureWaterSF

PureWaterSF envisions producing 4 mgd of purified water and meeting up to 1.2 mgd of non-potable supply across two treatment plants. One treatment plant on the east side of San Francisco could deliver 2 mgd of drinking water in addition to 1.2 mgd to meet the non-potable demands associated with existing dual-plumbed buildings. A parallel plant on the west side of San Francisco could deliver up to 2 mgd of drinking water into the distribution system. To advance this project, planning funds and project management staff would need to be assigned. This is a local project in the retail service area.

RECOMMENDATION 14

Support planning the technical analyses, demonstration, and outreach for PureWaterSF, a local supply project in the retail service area. This work will be supported by the new Purified Water Program Manager and no additional staffing would be needed to support this recommendation at this time.

Regional Fund for Local Supplies

While local supply projects do not change the SFPUC's legal and contractual obligations to the Wholesale Customers or the Retail Allocation to Retail Customers, they can help improve water supply reliability and provide benefits to the entire service area when demands on the RWS are reduced. Any regional investment in local supply projects would necessarily impact individual Wholesale Customers, and therefore BAWSCA will play a significant role in planning.

The SFPUC will collaborate with BAWSCA to explore the feasibility of a regional grant program that can provide investment dollars collected through the Wholesale Revenue Requirement to support the implementation of local supply projects. Local water supply projects have the potential to reduce demand on the RWS but remain within the control of the local jurisdiction.

Examples of other incentive programs, both in California and nationwide, can be reviewed to help inform an outline for a program in the SFPUC's service area. Elements of a program to consider would include program objective(s), eligibility criteria, application and selection process, incentives, reporting, verification, funding sources and the potential role of the San Francisco Bay Area Regional Water System Financing Authority.

If feasible, the program could expand water-use efficiency programs and technologies that reduce water consumption, promote sustainable water management practices, and ultimately benefit the environment and the communities throughout the service area.

RECOMMENDATION 15

In partnership with BAWSCA, explore the feasibility of a grant program to support local projects that reduce demands on the RWS. No funding or additional resources are needed for this effort at this time.

6.4 Summary of Recommendations

This section summarizes the recommendations described above, which are based on current planning and anticipated project milestones by 2024.

Table 6-2: Summary of Recommendations

Recommendations to Avoid Widening the Water Supply Gap
Implementation of recommendations to avoid widening the supply gap would require approximately \$49.2 million over the 10-year CIP window.
1. Support funding in the FY 2025-2034 CIP to evaluate alternatives for additional treatment, infrastructure, and associated staffing needed to achieve 6.2 mgd of dry-year supply by 2045 from the RGSR project. Staffing needs will be re-evaluated in a future CIP development process.
2. Include the Phase 2 re-design of the Alameda Creek Recapture Project as a new project in the FY 2025-2034 CIP.
3. Continue reporting progress on negotiations related to the Proposed Voluntary Agreement and potential transfers and projects in the San Joaquin Valley that could contribute to instream flow releases. Identify resource and funding needs, as and when appropriate. No new funding or additional resources are needed to support this recommendation.
4. Provide updates to the AWS Plan, beginning in FY 2026-2027 and periodically thereafter, to align with AWS Project milestones, changes to regulatory requirements, and CIP planning. No new funding or resource allocation for this effort is anticipated.
5. Based on its assessment in 2024, the SFPUC will develop 1-2 additional demand scenarios for the retail service area including a sensitivity analysis as appropriate to understand the key inputs driving changes in demand. Past projections should be compared to actual deliveries to calibrate the new demand scenario(s). Staff should also collaborate closely with BAWSCA in this effort to track retail and wholesale assumptions.
6. Evaluate infrastructure and operational needs and estimate any additional funding necessary to achieve 4 mgd of dry-year supply by 2045 from the San Francisco Groundwater Supply Project, which is a retail project in San Francisco.

Table 6-2: Summary of Recommendations (continued)

**Recommendations to Fill the Water Supply Gap
(AWS Project and Program Recommendations)**

Implementation of recommendations to fill the water supply gap would require approximately \$137.8 million in new capital funding over the 10-year CIP window.

AWS Project Recommendations

7. Following the development of a water supply strategy, AWS staff will recommend whether to approve participation in the **LVE Project** before scheduled financial closing in 2024. Based on feasibility analysis to date and in anticipation of a positive staff recommendation, support the SFPUC’s share of funding for the full implementation of the LVE Project. Participation in the LVE Project will also require continued planning for two companion projects: Conveyance Alternatives for LVE and Supply Alternatives for LVE.
8. Continue developing terms of agreement with project partners and prospective recycled water customers. Assuming that terms of agreement will be reached, support funding for completion for final design and construction of the **Daly City Recycled Water Expansion Project** in the FY 2025-2034 CIP.
9. Include the **South Bay Purified Water Project** as a new project with funding support through 10% design and environmental review in the FY 2025-2034 CIP. This project supports the evaluation needed to help the SFPUC Commission make a decision regarding the permanent status for the Cities of San Jose and Santa Clara.
10. Support funding in the FY 2025-2034 CIP to continue planning through environmental review and 10% design for the **PureWater Peninsula** and **ACWD-USD Purified Water**. Support the use of existing funds to continue planning through the Alternatives Analysis for the **Calaveras Reservoir Expansion Project**.

AWS Programmatic Recommendations

11. Prioritize planning for operational integration by working with SFPUC operations staff. Support hiring an **Operations Planning Manager** to begin preparing for system integration, staffing, maintenance, and planning to support development of the AWS Program in the future. There is currently no proposed budget impact related to this recommendation.
12. Support hiring a **Purified Water Program Manager** who will be responsible for tracking and ensuring compliance with new regulations, coordination with stakeholders, and establishing a technical advisory panel to support the successful demonstration and implementation of purified water projects within the AWS Program.
13. Prioritize continued coordination with Finance to help track and address long-term project financing options and affordability. There is no budget impact associated with this recommendation.

Recommendations to Reduce the Water Supply Gap

There are no budget impacts for the FY 2025-2034 CIP associated with implementation of recommendations to reduce the water supply gap.

14. Support planning the technical analyses, demonstration, and outreach for PureWaterSF, a local supply project in the retail service area. This work will be supported by the new Purified Water Program Manager and no additional staffing would be needed to support this recommendation at this time.
15. In partnership with BAWSCA, explore the feasibility of a grant program to support local projects that reduce demands on the RWS. No funding or additional resources are needed for this effort at this time.

6.5 Planning Beyond 2024

While the near-term recommendations outlined above are appropriate for the current phase of project planning and development, the planning objectives of the AWS Program may change over time as more information becomes available. Therefore, it is important to recognize that the near-term recommendations discussed in this Plan are part of a longer decision-making timeline for the AWS Program. Taking a long view also allows SFPUC staff time to plan responsibly by taking an adaptive approach and making recommendations around investments in a phased and measured pace, while continuing to aggressively plan for alternative water supplies. This approach also involves periodically revisiting the water supply gap and its drivers as planning decisions are made. Longer-term decision making will inform future recommendations for the AWS Program.

Historically-occurring patterns are changing - whether it is the frequency of drought occurrences, regulatory curtailments, or a shift in water demands on the RWS. In response, the SFPUC must take a more forward-looking approach to water supply planning. Through the AWS Program, the SFPUC is taking steps toward mitigating and managing the risk of uncertain water availability so it can continue to provide reliable water service to its customers. Projects are being planned in phases so that they can be scaled; implementation will be prioritized based on demands over obligations, and the SFPUC is committed to updating information as new data on supply availability or demands become available. Continuing to build and plan a robust AWS Program can help prepare the SFPUC to meet the water supply challenges that lay ahead.

GLOSSARY

1984 Settlement Agreement and Master Water Sales Contract (1984 Agreement)

refers to the 1984 agreement between the City and County of San Francisco and certain Suburban Purchasers (Wholesale Customers) in San Mateo County, Santa Clara County, and Alameda County that expired on June 30, 2009. The 1984 Agreement memorialized the parties' settlement of the civil action entitled City of Palo Alto, et al. v. City and County of San Francisco (9th Cir. 1977) 548 F.2d 1374.

Alameda and Peninsula watersheds refers to the two Bay Area watersheds that supply the RWS: the Alameda Creek watershed, which is located in Alameda and Santa Clara counties, and the Peninsula watershed, which is located in San Mateo County.

Alternative Water Supply Program (AWS Program) refers to the SFPUC water supply planning program established in 2019 to develop and evaluate new long-term alternative water supply projects that address future demands in the SFPUC service area.

Alternative Water Supply Projects (AWS Projects) are projects involving new and diverse water supply options beyond the SFPUC's existing infrastructure, surface water supplies, and local groundwater sources, such as projects involving expanded surface water storage, groundwater banking, transfers, purified water (potable reuse), and desalination, as well as technological innovations and other tools that can increase supply.

BAWSCA Annual Survey is the annual publication compiled by BAWSCA containing individual Wholesale Customer service area information, water use data, and purchase projections.

Bay Area Water Supply and Conservation Agency (BAWSCA) refers to the public agency established pursuant to Division 31 of the California Water Code (Water Code §§81300-81461), which represents the interests of 26 cities, water districts, and private utilities, who purchase water wholesale from the SFPUC.

Bay-Delta Plan Amendment refers to the 2018 Amendment to the Water Quality Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary that establishes water quality objectives for which the State Water Resources Control Board may assign a measure of responsibility to upstream water rights holders to protect the beneficial uses of the San Francisco Bay/Sacramento-San Joaquin River Delta Estuary (Bay-Delta Estuary) tributary watersheds.

Calaveras Reservoir refers to the RWS reservoir located in Alameda County that collects water from the local Alameda Creek watershed.

Capital costs are one-time costs needed to plan, design, and construct a capital project to bring it to operational status.

Carryover storage refers to water stored in reservoirs that may be carried over from one water year to the next. In California's variable climate, maintaining carryover storage can help ensure a minimum level of water supply in case the next year is dry.

Conveyance facilities refers to infrastructure that connects existing or new infrastructure to enable deliveries of water.

Crystal Springs Reservoir refers to the RWS reservoir that is located in San Mateo County, collects runoff from the San Mateo Creek watershed, and also receives water from Hetch Hetchy Reservoir. The Reservoir consists of two lakes, Lower Crystal Springs Reservoir to the north, and Upper Crystal Springs Reservoir to the south.

Demand management is a water supply management approach that aims to conserve water by influencing customer demand through increased water efficiency and reduced use.

Design drought refers to the SFPUC's basis for planning and modeling of future drought scenarios, which is based on historic droughts and hydrology. The design drought is a hypothetical 8½-year sequence, which consists of the six-year drought from 1987-1992, followed by an additional 2½-year drought period from 1976-1977.

Direct potable reuse (DPR) is the planned introduction of highly treated recycled water that meets stringent regulatory standards into a drinking water distribution system. The two forms of DPR in California are raw water augmentation, which includes treatment at a drinking water treatment plant prior to connecting to the drinking water distribution system and treated water augmentation, which delivers the highly treated water directly into the drinking water distribution system.

Don Pedro Reservoir refers to the reservoir located in Tuolumne County that is owned and operated by the Modesto and Turlock Irrigation Districts, in which the SFPUC utilizes capacity as a water bank under the terms of the Fourth Agreement to support SFPUC operations during dry periods.

Drivers means factors that influence future water availability and projected demands on the RWS. The anticipated water supply gap is determined based on a number of drivers on both the supply side, which affect future water availability, and on the demand side, which consider obligations and future demands.

Extreme decentralization refers to the practice of integrating building-scale water recycling within cities with existing centralized water systems. Extreme decentralization is one example of how demand reduction efforts can be implemented to help to reduce demand and support resilient urban water systems.

Firm yield means the annual average amount of water that the RWS could deliver to the SFPUC service area under dry-year conditions over the design drought sequence.

Fourth Agreement is the 1966 agreement between the City and County of San Francisco and the Modesto and Turlock Irrigation Districts that governs the operation of the Don Pedro Reservoir water bank and other matters.

Gallons per capita per day (gpcd) is a unit of measure for the average daily consumption of water per person in gallons.

Groundwater recharge refers to the replenishment of a groundwater basin or an aquifer. Groundwater recharge can occur naturally with time or can be accomplished by spreading water at the surface of the groundwater aquifer or by directly injecting water into the groundwater basin.

Hetch Hetchy Reservoir refers to the RWS reservoir that is located in the Sierra Nevada's Tuolumne River watershed, which provides approximately 85% of RWS supplies, on average.

in-City refers to the portion of the SFPUC's retail service area located within the City and County of San Francisco.

Indirect potable reuse (IPR) is the planned blending of highly treated recycled water into a natural water source (i.e., groundwater basin or reservoir) prior to using the water for potable purposes. In California, the accepted forms of IPR include groundwater augmentation and reservoir (or surface water) augmentation.

Individual Supply Guarantee (ISG) refers to each Wholesale Customer's share of the Supply Assurance set forth in Attachment C of the WSA.

Individual Water Sales Contract refers to the individual contract between each of the Wholesale Customers and San Francisco that details customer-specific matters such as location of service connections, service area maps, and other matters specific to that customer consistent with the terms of the WSA.

Instream flow requirements represent regulated minimum flows or releases necessary to maintain the environmental health of an ecosystem. Instream flows requirements are often referred to as environmental flow requirements.

Interim Supply Limitation (ISL) refers to the 265 million gallons per day annual average limitation on water deliveries from RWS watersheds imposed by the SFPUC in its approval of the WSIP in Resolution No. 08-0200, dated October 30, 2008.

Interruptible customers refers to the cities of San Jose and Santa Clara, which San Francisco provides water to on a temporary and interruptible basis pursuant to the terms of the WSA.

Joint Powers Authority (JPA) is a legally created entity that allows two or more public agencies to jointly exercise common powers.

Legal and contractual obligations refers to obligations described in certain agreements between the City and County of San Francisco and the Wholesale Customers.

Level of Service (LOS) Goals and Objectives refers to the “Phased WSIP Goals and Objectives” adopted by the SFPUC Commission on October 30, 2008, by Resolution No. 08-0200 as part of the approval of WSIP and any amendments subsequently adopted by the Commission.

Local water supply projects refer to water supply projects and actions that increase the availability of non-RWS supplies for local use, including projects implemented by the SFPUC within the boundaries of San Francisco as well as projects implemented by Wholesale Customers to serve their respective retail service areas.

Non-potable demands are customer demands that can be met with supplies from non-potable water sources, such as recycled water, that do not meet drinking water quality requirements.

Obligations refer to commitments of the SFPUC, including: 1) legal and contractual obligations to Wholesale Customers; 2) retail service area obligations to San Francisco and suburban retail customers that are provided for through a Retail Allocation; and 3) potential future obligations for interruptible customers of the SFPUC.

Operation & Maintenance costs (O&M costs) refer to the annual operations and maintenance costs of projects, including costs related to staffing and ongoing maintenance.

Per capita water use is the average volume of water consumed per person in a given area on a daily basis.

Permanent customers refers to 24 of the 26 Wholesale Customers (excluding the cities of San Jose and Santa Clara) that share in the Supply Assurance under the terms of WSA.

Planning horizon is the length of time into the future that is accounted for in a planning document. The AWS Plan examines projected supplies and demands through a planning horizon of 2045.

Potable demands are customer demands that must be met with potable water supplies, which are treated to drinking water standards.

Pre-1914 appropriative water rights are legal entitlements authorizing water to be diverted from a specified source established prior to the adoption of the State Water Commission Act in 1914.

Proposed Voluntary Agreement refers to the proposed agreement that the SFPUC, the State, and the Modesto and Turlock Irrigation Districts are negotiating for the Tuolumne River that would implement the Bay-Delta Plan Amendment for an 8 to 15-year period, and, along with the ecological response to changes in the river flow regime over the term of the agreement, determine the impact of the Bay-Delta Plan Amendment on the SFPUC’s future water supply.

Purified water is highly treated wastewater that is used for potable purposes and includes indirect potable reuse and direct potable reuse.

Raker Act refers to the Raker Act, 38 Stats. 242, the Act of Congress, enacted in 1913, that authorized the construction of the Hetch Hetchy System on federal lands.

Rationing refers to limiting the amount of water supply available to customers to reduce demand during extended droughts.

Rationing policy refers to the level of rationing that the SFPUC developed during planning of WSIP to reflect water supply conditions simulated over the duration of the design drought. Over the 8½-year design drought, rationing is initially 0% and increases up to a maximum of 20%, with the annual average over the sequence being about 12%.

Raw water augmentation is the planned placement of purified water into a system of pipelines or aqueducts that deliver raw water to a drinking water treatment plant that provides water to a public water system. Raw water augmentation can also refer to purified water added to a surface water body with insufficient residence time to be considered reservoir augmentation.

Regional water supply projects refer to water supply projects and actions that can provide benefits to customers throughout the SFPUC service area, including both retail and wholesale customers.

Regional Water System (RWS) means the water storage, transmission, and treatment system operated by the SFPUC in Tuolumne, Stanislaus, San Joaquin, Alameda, Santa Clara, San Mateo, and San Francisco counties, including projects constructed under WSIP, but excluding assets providing water service solely to Retail Customers or solely to one or more Wholesale Customers.

Reservoir augmentation is the introduction of purified water into a surface water reservoir that is used as a source of domestic drinking water supply.

Retail Allocation refers to the SFPUC's retail service area obligations of up to 81 mgd average annual supply to San Francisco and suburban retail customers.

Retail Customers means any customers that purchase water from the SFPUC that are not wholesale customers, whether located inside or outside of San Francisco.

San Antonio Reservoir refers to the RWS reservoir located in Alameda County that collects water from the local Alameda watershed and receives and stores water from other portions of the RWS.

San Francisco Peninsula (the Peninsula) refers to the peninsula in the San Francisco Bay Area that separates San Francisco Bay from the Pacific Ocean.

SFPUC Commission refers to the five-member decision-making body of the San Francisco Public Utilities Commission.

Storage and recovery refers to projects that coordinate the management of surface water and groundwater supplies to store groundwater in normal or wet years so it may be made available for use in dry years when surface water supplies are limited.

Storage projects are projects that focus on storing water so it is available for later use in dry years and can include surface water storage or groundwater storage.

Supply Assurance means the 184 mgd maximum annual average metered supply of water dedicated by San Francisco to public use in the wholesale service area (not including San Jose and Santa Clara) in the 1984 Agreement and the WSA.

Supply projects means projects that would provide a new source of water supply to the SFPUC service area, which may include surface water, purified water, groundwater, and recycled water projects.

Total system yield represents the total water supply that the RWS can commit to provide while remaining consistent with the rationing policy. In wet or normal years, the total system yield can be provided to the service area, and additional water supply may also be available in the RWS. In dry years, the total system yield may include a combination of water supply deliveries and rationing (water availability).

Treated water augmentation is the planned placement of purified water into the water distribution system of a public water system's potable water pipelines or tanks for distribution.

Tuolumne River watershed is the watershed for the river system that includes the Tuolumne River, Cherry Creek, Eleanor Creek, and a portion of Moccasin Creek and encompasses Hetch Hetchy Reservoir, Lake Lloyd, Lake Eleanor, and Don Pedro Reservoir.

Upcountry portion of the RWS

refers to the portion of the RWS east of the Alameda East Portal.

Urban Water Management Plan (UWMP)

refers to the plan that an urban water supplier prepares and updates on a regular basis, in accordance with California Water Code §§10610-10656, which supports its long-term resource planning to ensure that adequate water supplies are available to meet existing and future water demands.

Water availability means the amount of water available to the SFPUC from the RWS; in dry years, it refers to water supply as well as rationing that can be assumed to address a portion of demands over the design drought (total system yield).

Water bank refers to the accounting system used by San Francisco and the Modesto and Turlock Irrigation Districts at Don Pedro Reservoir, which is owned and operated by the Districts. San Francisco can provide water supply credits at times when surplus supply is available and can later draw against credits to divert water at Hetch Hetchy Reservoir.

Water conservation is a reduction in water demand resulting from policies and programs such as rebates, surveys, and other incentives offered to customers.

Water Supply Agreement (WSA) refers to the agreement between the City and County of San Francisco and Wholesale Customers in Alameda County, San Mateo County, and Santa Clara County, dated July 1, 2009, as amended from time to time, which sets forth the terms and conditions under which the SFPUC supplies water to the Wholesale Customers.

Water supply gap refers to the water supply shortfall calculated as the difference between expected water supply availability from the RWS in a future dry year and the contractual obligations and anticipated demands for water supply from the RWS for all SFPUC customers.

Water System Improvement Program (WSIP)

refers to the voter-approved, multi-year capital program to upgrade the SFPUC's regional and local water systems to protect its ability to reliably provide water, as approved by the SFPUC Commission on October 30, 2008, by Resolution No. 08-0200.

WSIP Local Projects refers to projects included as part of the WSIP Program that are located in San Francisco and only benefit San Francisco residents.

WSIP Regional Projects refers to projects included in the WSIP Program that are located from the Sierra foothills to San Francisco. WSIP Regional Projects benefit both in-City customers and the wholesale agencies that receive water from the SFPUC.

Wholesale Customers means one or more of the 26 wholesale customers that purchase water from the SFPUC pursuant to the WSA and are represented by BAWSCA.

Appendix A: Customer Profiles

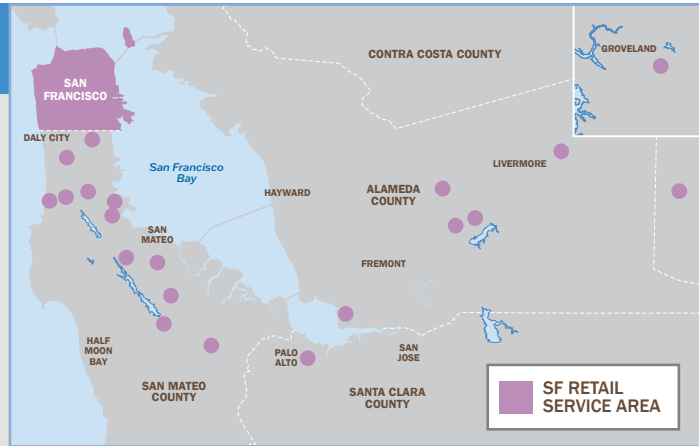
Information included in customer profiles is based on data available from the FY 2021-22 BAWSCA Annual Survey unless otherwise specified.

San Francisco Retail

CUSTOMER OVERVIEW^{1,2}:

The San Francisco retail service area includes over 177,000 in-City retail customers within the City of San Francisco along with suburban retail customers located outside San Francisco. The total population of the retail service area is about 900,000 people. About two-thirds of the total demands in the retail service area are residential customers and one-third are commercial and industrial customers. Suburban retail customers account for 7% of the total demand.

RETAIL ALLOCATION¹: 81 mgd



Dots represent approximate locations of suburban retail customers. The customers shown represent a majority of water use in the suburban retail service area but are not comprehensive.

VULNERABILITIES & OPPORTUNITIES:

San Francisco is located at the western end of the RWS and is the largest customer of the system. The east side of San Francisco is characterized by large commercial and mixed-use developments while the west side has larger irrigated spaces and smaller, dispersed residential areas. Given the density and built nature of San Francisco, opportunities for centralized recycled water are limited and best suited for large parks and golf courses. San Francisco has a robust conservation program and has also pioneered a decentralized onsite water reuse program focused on minimizing water demands from new developments and commercial and industrial applications. Additional water supply opportunities are being explored through purified water.

CURRENT & FUTURE LOCAL SUPPLIES:

San Francisco local supplies include groundwater, recycled water and treating alternative water supplies onsite for reuse. The San Francisco Groundwater Supply Project utilizes groundwater from the Westside Groundwater Basin in the City as a potable water supply by blending it with RWS supplies. Currently less than 1 mgd is blended but pumping can be increased to blend up to 4 mgd. The Harding Park Recycled Water Project was completed in 2012 and the Pacifica Recycled Water Project began supplying water for irrigation in 2014. Starting in 2024, the Westside Recycled Water Program will provide 1.6 mgd of recycled water to meet non-potable demands in Golden Gate Park and other areas on the west side of San Francisco, and the project is designed to deliver an annual average of up to 2 mgd by 2045. The PureWaterSF program is exploring the potential to provide a new, local drinking water supply to San Francisco through the use of purified water. San Francisco also has water savings from the onsite water reuse program.



WATER CONSERVATION INSIGHTS^{2,3}

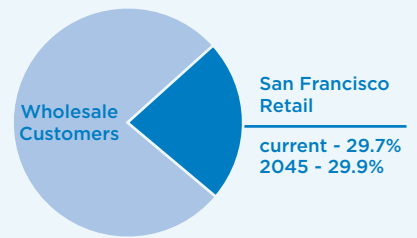
21% decrease in residential gallons per capita demand (R-GPCD) since 2010.

In 2021-2022, water conservation activities were estimated to have a potential 30-year water savings of 237 million gallons.

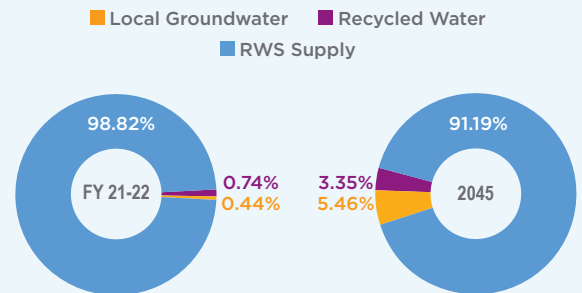
Sources: (1) 2020 SFPUC UWMP
 (2) FY21-22 SFPUC Water Resources Annual Report
 (3) FY18-19 SFPUC Water Resources Annual Report

Notes: *Recycled water includes centralized recycled water and onsite water reuse.

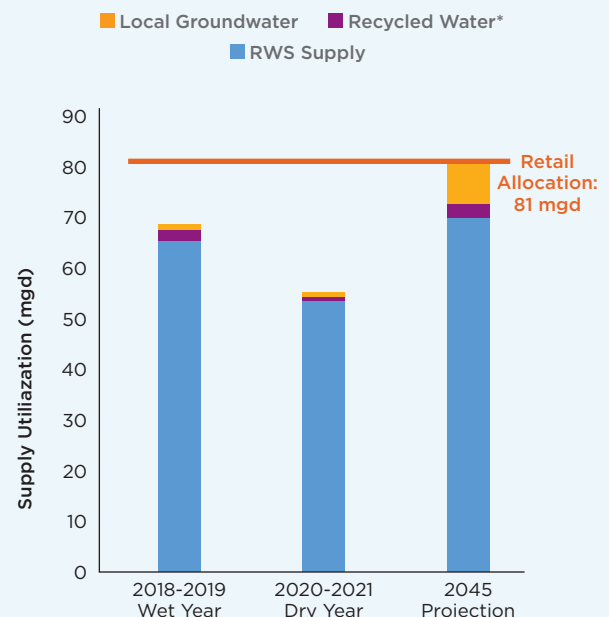
SHARE OF RWS DELIVERIES¹



CURRENT & FUTURE SUPPLY PORTFOLIOS¹



SUPPLY UTILIZATION¹



Alameda County Water District

CUSTOMER OVERVIEW¹:

Alameda County Water District (ACWD) is the SFPUC's largest wholesale customer and serves approximately 344,855 people within a service area that covers 105 square miles, which includes the cities of Fremont, Newark, Union City, and the southern portions of the City of Hayward. The customer base is mainly comprised of a mix of single-family residential, multi-family residential, commercial, and industrial customers.

INDIVIDUAL SUPPLY GUARANTEE²: 13.76 mgd

MINIMUM PURCHASE REQUIREMENT²: 7.648 mgd

VULNERABILITIES & OPPORTUNITIES³:

SFPUC RWS and State Water Project (SWP) supplies are anticipated to be significantly affected in dry year and multi-dry year conditions according to upcoming regulatory requirements. Reservoir and fresh groundwater sources vary widely from year to year, depending primarily on hydrologic conditions and availability of local runoff. The Newark Desalination Facility enables ACWD to treat brackish groundwater in the Niles Cone Groundwater Basin for potable supply while simultaneously contributing to aquifer reclamation efforts. ACWD also diverts freshwater supplies to recharge groundwater to increase short-term supply resilience during dry years and to mitigate saltwater intrusion.

AWS SYNERGIES:

Purified water, Los Vaqueros Reservoir Expansion, SBA conveyance

CURRENT & FUTURE LOCAL SUPPLIES:

To ensure long-term water supply reliability for its customers ACWD is evaluating water supply options through its Climate Adaptation Plan and the Purified Water Feasibility Evaluation in partnership with SFPUC.



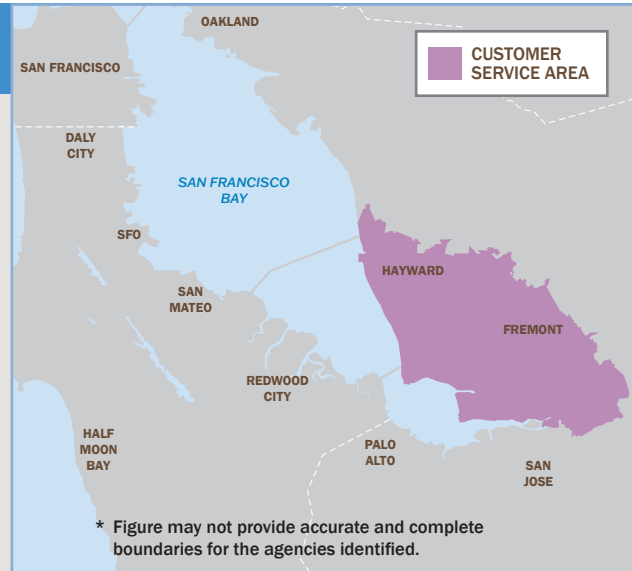
WATER CONSERVATION INSIGHTS⁴

ACWD residential gallons per capita demand (R-GPCD) has decreased by 20% since 2010 and has not returned to pre drought consumption levels.

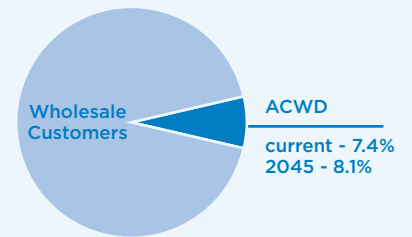
ACWD developed a Water Efficiency Master Plan which is a road map for water use efficiency out to 2050.

ACWD is deploying Automated Metering Infrastructure (AMI) to all its customers to encourage water conservation. Customers with AMI receive leak and high use alerts.

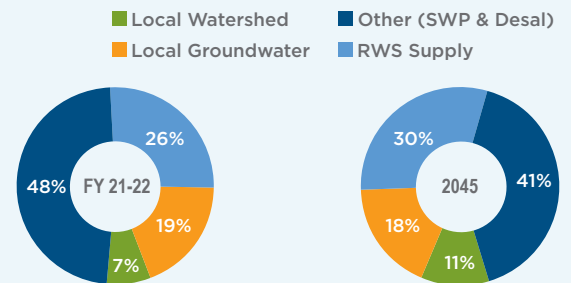
Sources:(1) 21-'22 BAWSCA Annual Survey
 (2) Amended and Restated Water Supply Agreement, 2021
 (3) ACWD 2020 UWMP
 (4) '10-11 BAWSCA Annual Survey



SHARE OF RWS DELIVERIES TO WHOLESALE CUSTOMERS¹

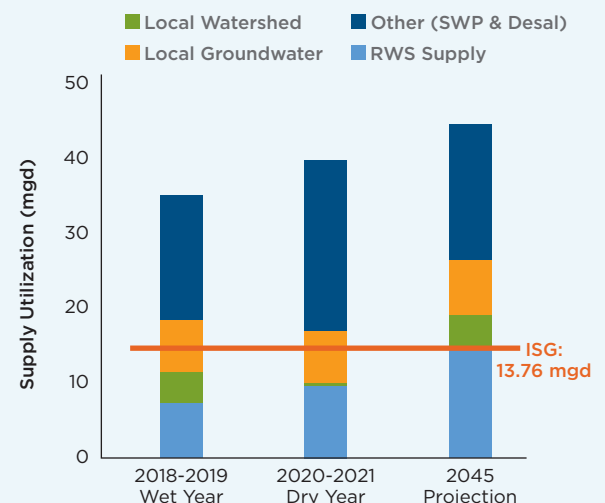


CURRENT & FUTURE SUPPLY PORTFOLIOS¹



SUPPLY MIX IN MULTIPLE YEAR TYPES¹

Reductions in SWP supplies will result in an increased use of RWS supplies.



City of Brisbane & Guadalupe Valley Municipal Improvement District

CUSTOMER OVERVIEW¹:

The City of Brisbane operates the Brisbane Water District and the Guadalupe Valley Municipal Improvement District (GVMID). The City serves 4,851 people over a 3.4-square-mile service area, which in addition to the original primarily residential city core also includes an industrial park with a small adjoining residential neighborhood, and an office development on a closed landfill. While residential connections account for approximately 32% of total water usage, commercial and industrial customers represent 28% of water use, followed by dedicated irrigation connections with an average of 24% of water use.

INDIVIDUAL SUPPLY GUARANTEE²: 0.98 mgd

VULNERABILITIES & OPPORTUNITIES³:

The City of Brisbane & GVMID rely exclusively on RWS supplies for its water needs. Due to the service area's geographical location and the absence of underlying productive aquifers, access to alternative water supplies such as groundwater or surface water is limited. New large developments to be located within the service area are in the planning stages and Brisbane is considering alternative water supplies that would improve system reliability and supply the anticipated increase in water demands.

CURRENT & FUTURE LOCAL SUPPLIES:

The City of Brisbane & GVMID continue to participate in various studies investigating the viability of limited alternative water resources in order to supplement future potable water supply.

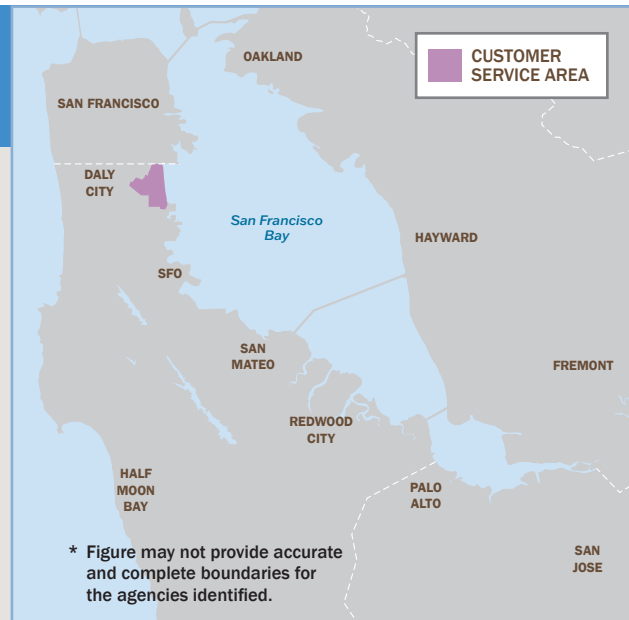


WATER CONSERVATION INSIGHTS^{4,4}

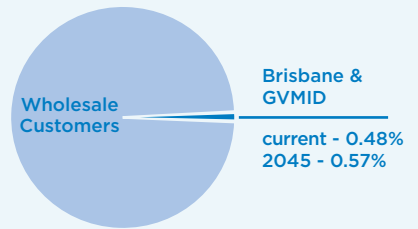
There has been a 19% reduction in per residential gallons per capita per day (R-GPCD) since 2010-2011 due to continued conservation savings.

Sources: (1) '21-'22 BAWSCA Annual Survey
 (2) Amended and Restated Water Supply Agreement, 2021
 (3) Sierra Point Phase 3 Project SB 610 Water Supply Assessment
 (4) '10-'11 BAWSCA Annual Survey

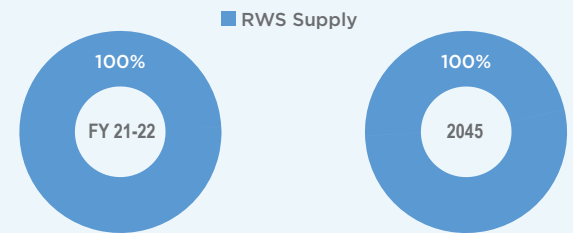
Notes: * ISG represents the sum of the City of Brisbane ISG (0.46 mgd) and GVMID ISG (0.52 mgd)



SHARE OF RWS DELIVERIES TO WHOLESALE CUSTOMERS¹

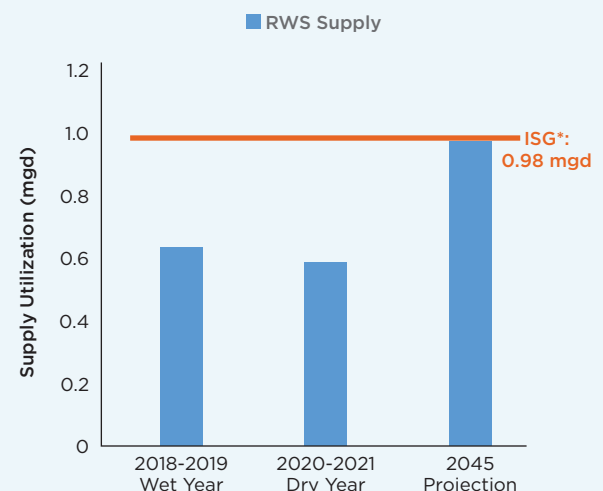


CURRENT & FUTURE SUPPLY PORTFOLIOS¹



SUPPLY MIX IN MULTIPLE YEAR TYPES¹

Reliance on RWS supply will increase to meet increasing demands and will reach ISG by 2045.



City of Burlingame

CUSTOMER OVERVIEW¹:

The City of Burlingame is a municipal utility that serves 32,407 people over an area of 5.5 square miles located within the Burlingame city limits, unincorporated areas in the Burlingame Hills and a few properties in the City of San Mateo and the Town of Hillsborough. The system supplies approximately 57% of its water usage to residential connections, and 22% to commercial and industrial customers.

INDIVIDUAL SUPPLY GUARANTEE²: 5.23 mgd

VULNERABILITIES & OPPORTUNITIES³:

The City of Burlingame relies on RWS supplies to fulfill its water needs. Burlingame is continuing to evaluate the feasibility of expanding recycled water supplies within its supply portfolio, but this water supply alternative is not currently included in long-term supply planning.

AWS SYNERGIES:

Purified water, Los Vaqueros Reservoir Expansion, SBA conveyance

CURRENT & FUTURE LOCAL SUPPLIES:

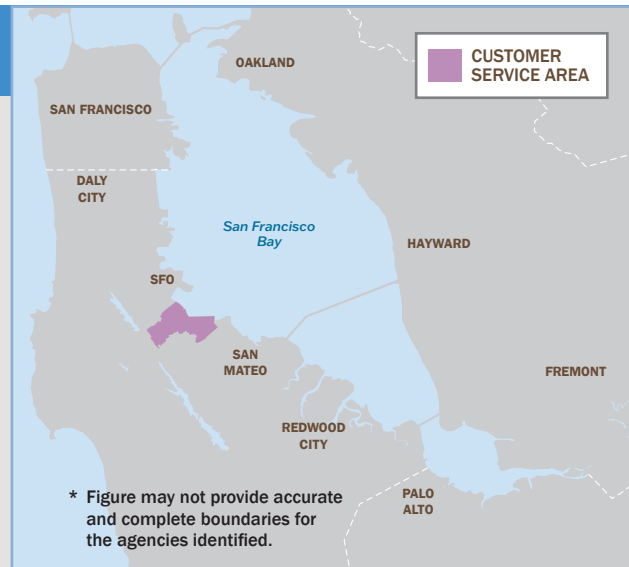
Recycled water use was evaluated as part of the City of Burlingame's Wastewater Treatment Plant Master Plan in 2016. Burlingame is continuing to evaluate the feasibility of implementing this project or partnering with a neighboring jurisdiction to supply recycled water. However, there are no definitive plans to date.



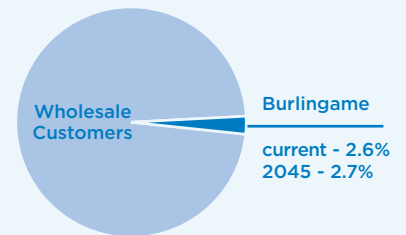
WATER CONSERVATION INSIGHTS^{4,4}

23% decrease in residential gallons per capita demand (R-GPCD) since 2010. While the city population has continued to grow, per capita water usage has not returned to pre-2015 drought levels.

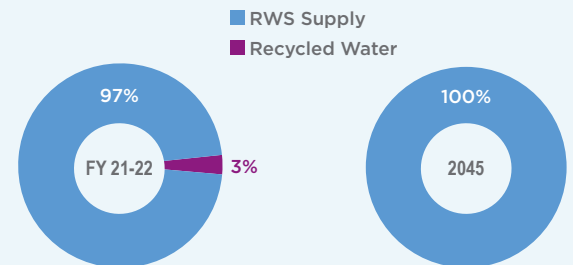
Sources: (1) '21-'22 BAWSCA Annual Survey
 (2) Amended and Restated Water Supply Agreement, 2021
 (3) City of Burlingame 2020 UWMP
 (4) '10-'11 BAWSCA Annual Survey



SHARE OF RWS DELIVERIES TO WHOLESALE CUSTOMERS³

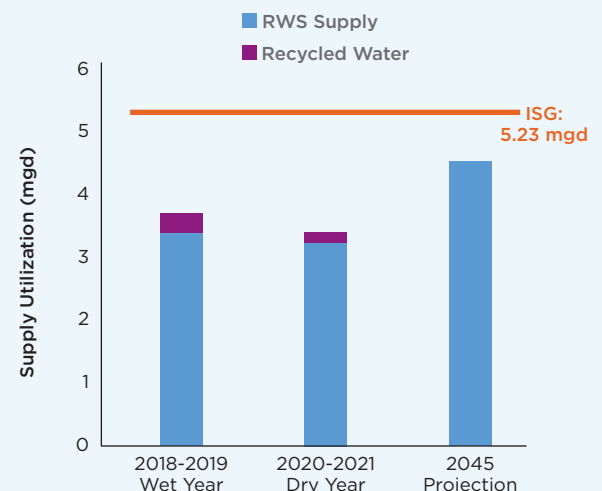


CURRENT & FUTURE SUPPLY PORTFOLIOS³



SUPPLY MIX IN MULTIPLE YEAR TYPES³

RWS supply is anticipated to increase by 2045 to match water demands.



California Water Service

CUSTOMER OVERVIEW^{1,3}:

California Water Service (Cal Water) is a regulated utility that operates water systems throughout California, three of which are SFPUC wholesale customers – Cal Water Bear Gulch (BG), Cal Water South San Francisco (SSF) and Cal Water Mid-Peninsula (MPS). Cal Water is the largest SFPUC wholesale customer, which supplies 262,095 people and relies on a mix of local surface water and groundwater supplies. Cal Water BG and MPS mainly serve residential customers, while commercial and industrial connections represent up to 53% of Cal Water SSF's demand.

INDIVIDUAL SUPPLY GUARANTEE²: 35.68 mgd

VULNERABILITIES & OPPORTUNITIES³:

Supply sources for the Cal Water BG water system include the perennial Bear Gulch Creek, which are constrained by drought conditions, diversion limits and minimum instream flow requirements. Cal Water SSF has 8 groundwater wells tapping into the Westside Basin, which are operated based on hydrologic conditions and can feed up to 20% of the system's demand. Cal Water SSF is part of the pilot conjunctive use program with SFPUC and has been receiving supplemental RWS deliveries in lieu of pumping groundwater in order to preserve groundwater supplies for use during dry periods and increase the aquifer's resilience.

AWS SYNERGIES:

Daly City Recycled Water Expansion, PureWater Peninsula Project

CURRENT & FUTURE LOCAL SUPPLIES:

Cal Water has established a Development Offset Program to account for projected delivery shortfalls during dry years and the need for new local water supplies. The Development Offset Program includes a new, non-refundable special facilities fee that will be used to accelerate local water supply projects and expand conservation programs designed to offset the net demand increase of proposed developments.

Cal Water is planning on developing a well in the Bear Gulch District to provide local supply for the system and is investigating water transfers and the potential of a brackish water desalination project, among other supply options.

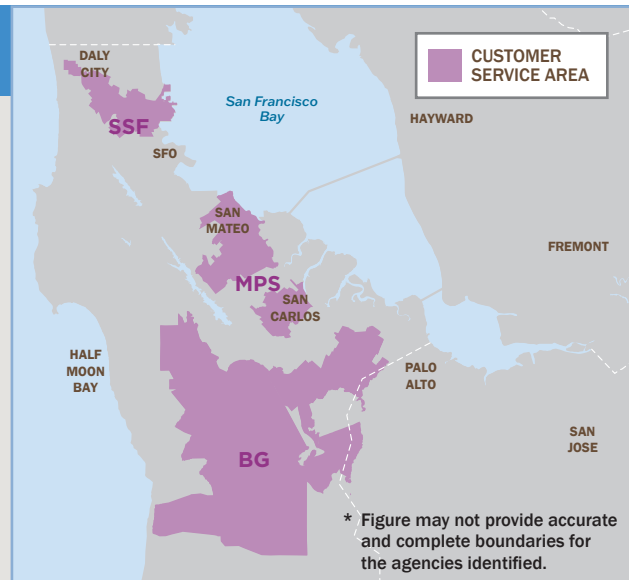


WATER CONSERVATION INSIGHTS^{1,4}

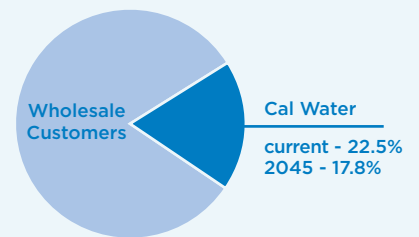
The average residential gallons per capita demand (R-GPCD) of the three Cal Water service areas has reduced by 18% since 2010.

Sources: (1) '21-'22 BAWSCA Annual Survey
 (2) Amended and Restated Water Supply Agreement, 2021
 (3) Cal Water 2020 UWMP
 (4) '10-'11 BAWSCA Annual Survey

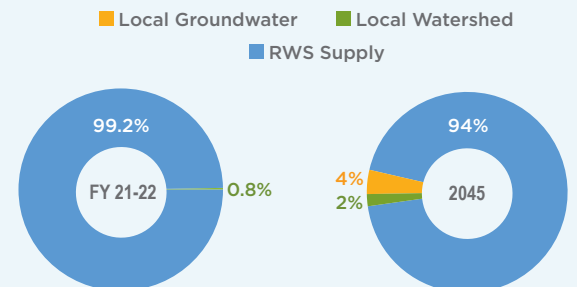
Note: * The average R-GPCD of Cal Water BG, Cal Water SSF, and Cal Water MPS service areas is shown here.



SHARE OF RWS DELIVERIES TO WHOLESALE CUSTOMERS¹

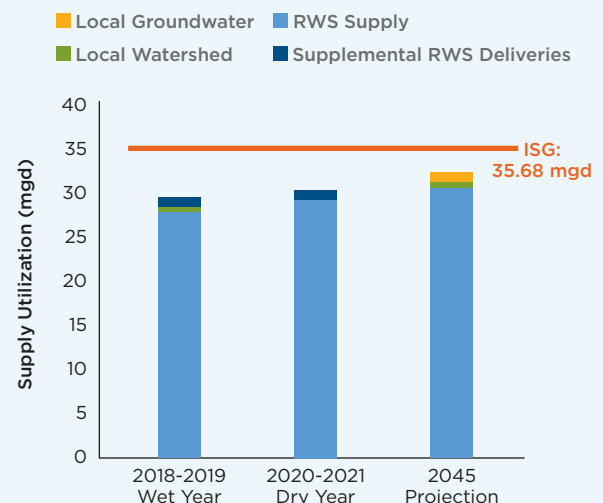


CURRENT & FUTURE SUPPLY PORTFOLIOS¹



SUPPLY MIX IN MULTIPLE YEAR TYPES¹

Local groundwater supplies can support reduced reliance on RWS.



Coastside County Water District

CUSTOMER OVERVIEW^{1,3}:

Coastside County Water District (Coastside CWD) is a special district that serves the City of Half Moon Bay and the unincorporated coastal communities of El Granada, Miramar, Moonridge, and Princeton in San Mateo County. Coastside CWD supplies water to 18,839 people located within a 14-square-mile service area. Coastside CWD serves various types of water demands, with an average of 55% of its water usage serving residential customers.

INDIVIDUAL SUPPLY GUARANTEE²: 2.18 mgd

VULNERABILITIES & OPPORTUNITIES³:

Production yields from local watersheds, which include a surface water diversion on Denniston Creek and surface water infiltration wells on Pilarcitos Creek, are impacted by drought conditions and water rights limitations. Coastside CWD plans to invest in its groundwater facilities in the Half Moon Bay Terrace basin and to explore the feasibility of developing water reuse to improve water supply resilience.

CURRENT & FUTURE LOCAL SUPPLIES:

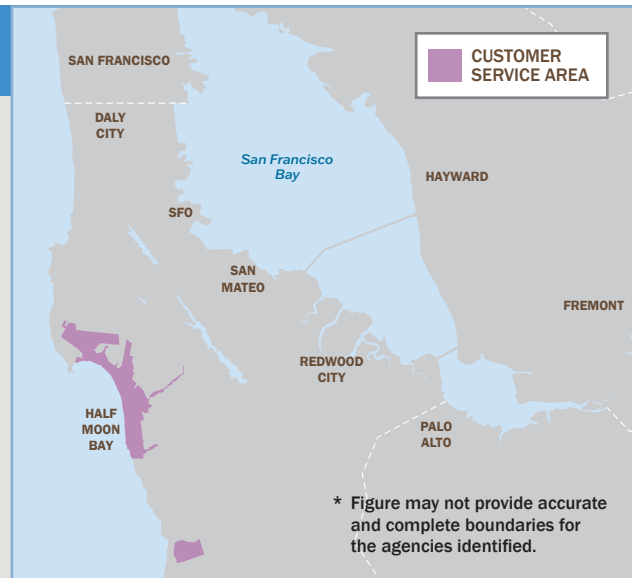
Coastside CWD continues to invest in local water resources, including efforts to perfect secondary water rights on San Vicente Creek and Denniston Creek. Coastside CWD is replacing aging infrastructure and ancillary facilities to reduce water loss and upgrading water treatment facilities to improve treatment efficiency for both local and RWS supplies.



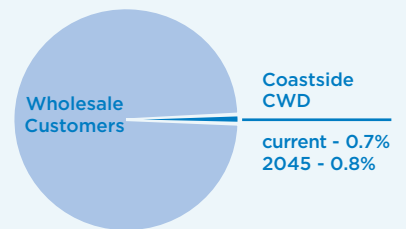
WATER CONSERVATION INSIGHTS^{1,4}

Coastside CWD has seen a 15% decrease in residential gallons per capita demand (R-GPCD) since 2010 and an 11.8% decrease in gross per capita water use since 2015 due to continued conservation savings.

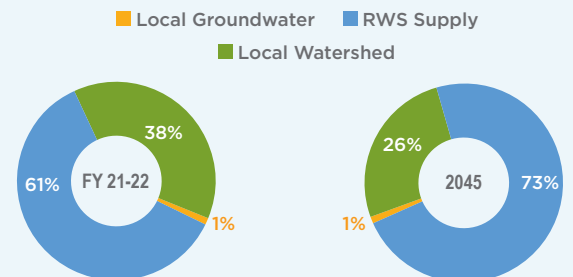
Sources: (1) '21-'22 BAWSCA Annual Survey
 (2) Amended and Restated Water Supply Agreement, 2021
 (3) Coastside CWD 2020 UWMP
 (4) '10-'11 BAWSCA Annual Survey



SHARE OF RWS DELIVERIES TO WHOLESALE CUSTOMERS¹

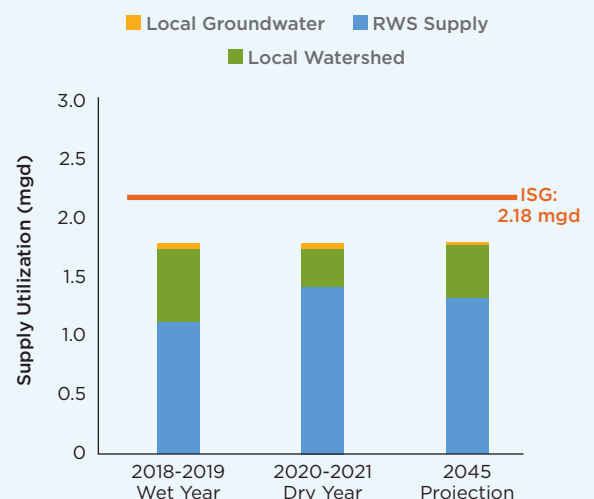


CURRENT & FUTURE SUPPLY PORTFOLIOS¹



SUPPLY MIX IN MULTIPLE YEAR TYPES¹

There will be continued reliance on local watershed supplies.



City of Daly City

CUSTOMER OVERVIEW¹:

The City of Daly City is a municipal utility that serves 107,197 people within Daly City and designated unincorporated areas in San Mateo County. The system's service area covers approximately 7.4 square miles and primarily includes residential connections, which account for 67% of total water usage.

INDIVIDUAL SUPPLY GUARANTEE²: 4.29 mgd

VULNERABILITIES & OPPORTUNITIES³:

Daly City's supply portfolio includes RWS supply, five groundwater wells from the Westside Basin aquifer, and recycled water from the North San Mateo County Sanitation District (NSMCSD) for irrigation purposes. Daly City has been receiving supplemental RWS deliveries in lieu of utilizing their groundwater supplies from the Westside Basin aquifer in accordance with agreements with SFPUC and other local municipal pumpers to increase the aquifer's drought resilience. Daly City serves recycled water for irrigation purposes to golf courses, city parks, public landscaping and is planning the expansion its recycled water production, which would limit reliance on RWS supply, serve irrigation customers in Colma and provide supplies for groundwater recharge.

AWS SYNERGIES:

Daly City Recycled Water Expansion

CURRENT & FUTURE LOCAL SUPPLIES:

Daly City operates four groundwater wells and one emergency well that produce approximately 2 million gallons per day (mgd). Daly City has two groundwater capital projects that are projected to increase local supplies by approximately 1.0 mgd.

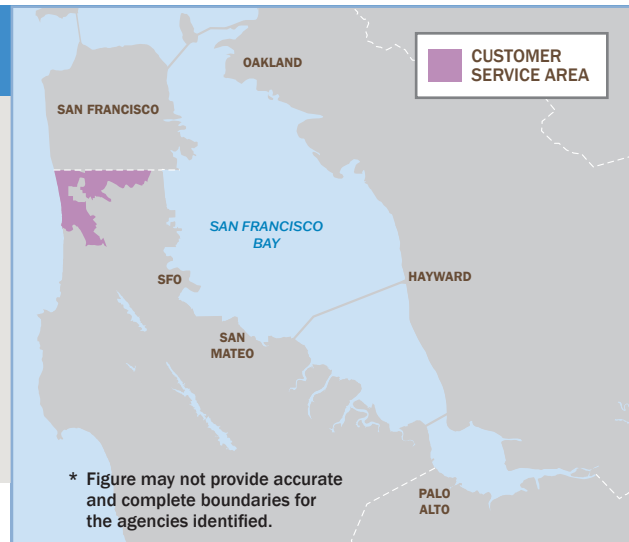
Daly City agreed to accept an increased amount of surplus RWS supply at a reduced rate and reduce groundwater from the Westside Basin to study the response of the basin recharge.



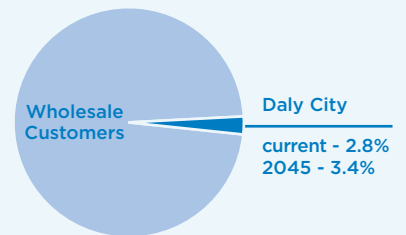
WATER CONSERVATION INSIGHTS⁴

Daly City has had a 19% decrease in residential gallons per capita demand (R-GPCD) since 2010 due to continued water conservation savings.

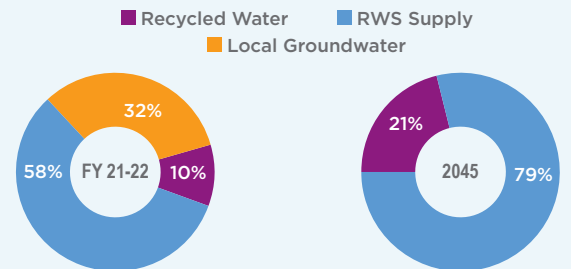
Sources: (1) '21-'22 BAWSCA Annual Survey
 (2) Amended and Restated Water Supply Agreement, 2021
 (3) Daly City 2020 UWMP
 (4) '10-'11 BAWSCA Annual Survey



SHARE OF RWS DELIVERIES TO WHOLESALE CUSTOMERS¹

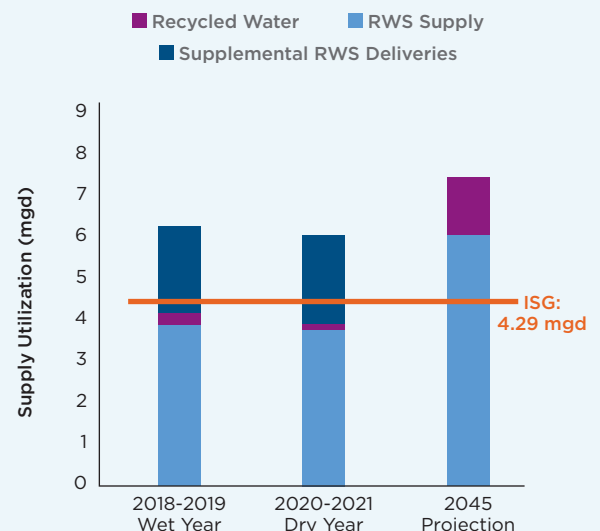


CURRENT & FUTURE SUPPLY PORTFOLIOS¹



SUPPLY MIX IN MULTIPLE YEAR TYPES¹

Expansion of recycled water supplies will limit reliance on RWS and supplemental deliveries will help protect local groundwater supplies.



City of East Palo Alto

CUSTOMER OVERVIEW¹:

The City of East Palo Alto's water utility is managed and operated by a private contractor (Veolia North America). East Palo Alto serves 25,935 people over a 2.5-square-mile service area. Residential and commercial/industrial connections account for approximately 78% and 16% of total water demand, respectively. Supply portfolio includes RWS supply and one active production well as alternate potable water supply.

INDIVIDUAL SUPPLY GUARANTEE²: 3.46 mgd

VULNERABILITIES & OPPORTUNITIES³:

East Palo Alto currently relies almost exclusively on RWS supply. The city is planning the implementation of new groundwater supply sources from the relatively underutilized and stable San Mateo Plain Subbasin, and is committed to the long-term sustainable management of the basin in collaboration with neighboring overlying cities. East Palo Alto negotiated permanent ISG transfers of 1 mgd and 0.5 mgd from the City of Mountain View and the City of Palo Alto, respectively. East Palo Alto has also established an agreement with the City of Mountain View to assume 0.25 mgd of their Minimum Purchase Obligation in exchange for the right of first refusal on any drought transfers by the City of Mountain View.

CURRENT & FUTURE LOCAL SUPPLIES:

East Palo Alto has identified a project to construct a 500 gallons per minute (gpm) groundwater well and associated iron-manganese treatment system to supplement the city's existing water supply. This project will create an emergency source of water supply for the city by drawing groundwater from the Santa Clara Valley Groundwater Basin and San Mateo Sub-Basin. Treatment of the groundwater would be necessary to enable its use for domestic purposes.

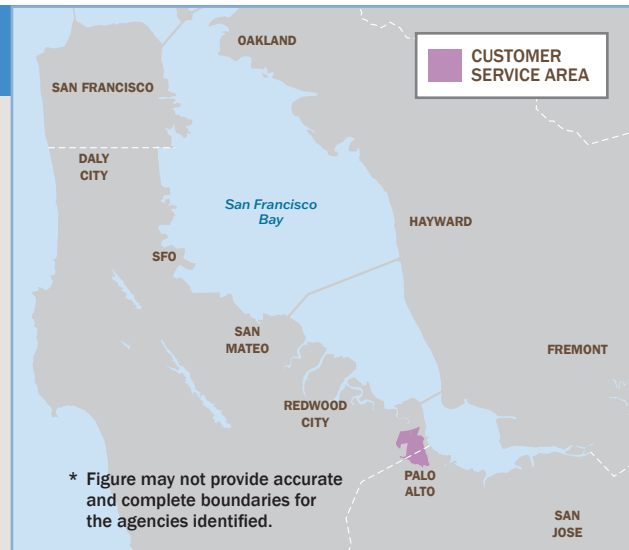
Implementation of this project would provide a secondary source of water in the event that the city's existing water supply is unable to meet demand during drought events or emergency conditions. The project is fully designed and CEQA is complete. The city is seeking construction funding for the project.



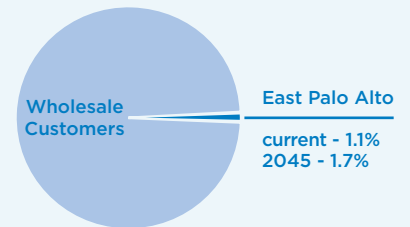
WATER CONSERVATION INSIGHTS^{1,4}

15% reduction in residential gallons per capita demand (R-GPCD) since 2010 due to continued conservation savings.

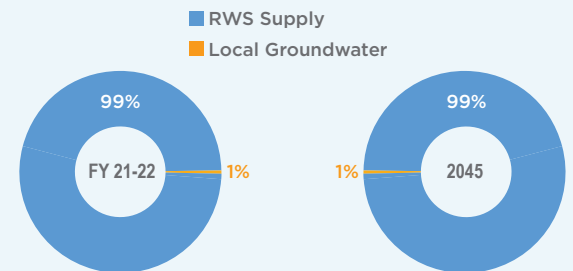
Sources: (1) '21-'22 BAWSCA Annual Survey
 (2) Amended and Restated Water Supply Agreement, 2021
 (3) East Palo Alto 2020 UWMP
 (4) '10-'11 BAWSCA Annual Survey



SHARE OF RWS DELIVERIES TO WHOLESALE CUSTOMERS¹

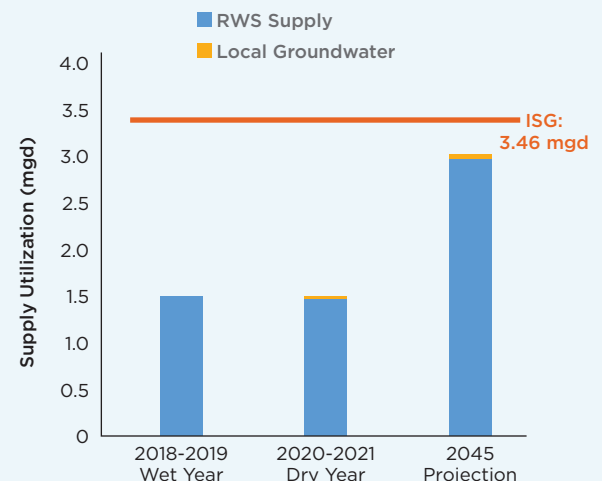


CURRENT & FUTURE SUPPLY PORTFOLIOS¹



SUPPLY MIX IN MULTIPLE YEAR TYPES¹

RWS and groundwater supplies will address the anticipated increase in commercial water use by 2045.



Estero Municipal Improvement District

CUSTOMER OVERVIEW¹:

The Estero Municipal Improvement District (EMID) serves 36,556 people in Foster City and a section of the City of San Mateo. The service area spans 4 square miles and is bound by the San Francisco Bay, the Seal Slough and the Belmont Slough. Residential customers account for approximately 57% of water usage, and irrigation demands represent up to 26% of water use.

INDIVIDUAL SUPPLY GUARANTEE²: 5.9 mgd

VULNERABILITIES & OPPORTUNITIES³:

EMID has limited local hydrologic resources and has been relying solely on RWS supply to feed water demands. EMID has been committed to improve supply reliability through its water conservation program and is exploring the feasibility of recycled water opportunities within its service area and on a regional level in collaboration with the City of San Mateo.

CURRENT & FUTURE LOCAL SUPPLIES:

EMID relies solely on the RWS and plans to continue conservation efforts to reduce demands.

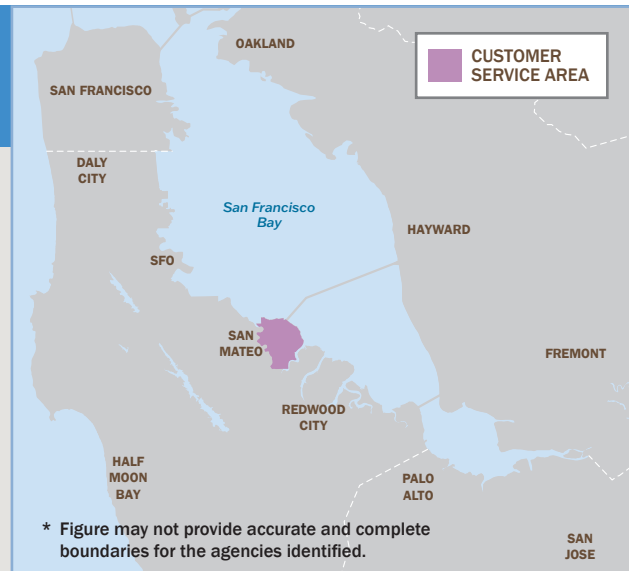


WATER CONSERVATION INSIGHTS^{1,4}

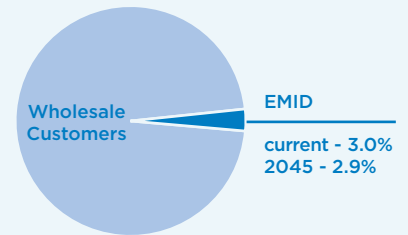
17% decrease in residential gallons per capita demand (R-GPCD) since 2010 due to post-drought conservation savings.

EMID has several helpful water conservation and water saving tips available for the public online.

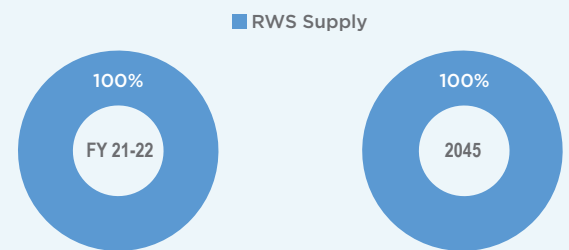
Sources: (1) '21-'22 BAWSCA Annual Survey, updated population provided by EMID (June 2023)
 (2) Amended and Restated Water Supply Agreement, 2021
 (3) EMID 2020 UWMP
 (4) '10-'11 BAWSCA Annual Survey



SHARE OF RWS DELIVERIES TO WHOLESALE CUSTOMERS¹

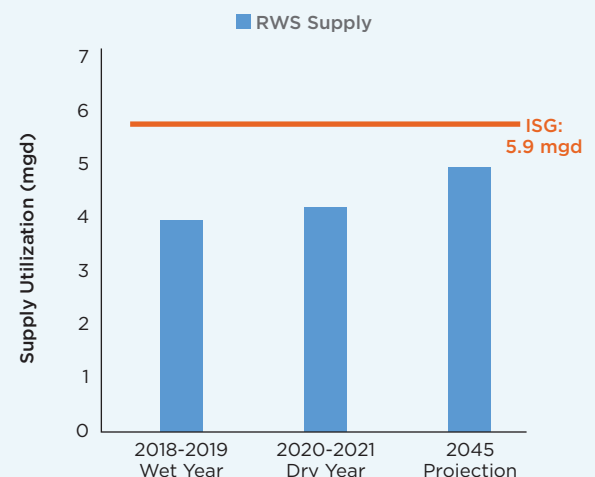


CURRENT & FUTURE SUPPLY PORTFOLIOS¹



SUPPLY MIX IN MULTIPLE YEAR TYPES¹

Reliance on RWS supply will remain below ISG level and is not planned to increase, mainly due to anticipated conservation savings.



City of Hayward

CUSTOMER OVERVIEW¹:

The City of Hayward owns and operates its water system, which currently serves a population of 160,591 people within a 62.5-square-mile service area, including the City of Hayward and a small unincorporated area in Alameda County. Residential connections account for approximately 53% water usage. The municipality's supply portfolio includes RWS supply and recycled water.

INDIVIDUAL SUPPLY GUARANTEE²: N/A

VULNERABILITIES & OPPORTUNITIES³:

Hayward relies primarily on RWS supply to meet its water demands and is not limited by a specific ISG level. The Hayward Water Pollution Control Facility has been supplying secondary level wastewater to the Russell City Energy Center, which further treats the water to a tertiary level and utilizes it for cooling and washdown. Phase 1 of Hayward's Recycled Water Project was initiated in March 2022 and currently delivers an average of 0.2 mgd of tertiary treated recycled water to about 30 irrigation customers, with future potential expansion phases. Hayward currently has groundwater supplies for short-term emergency use and is a Groundwater Sustainability Agency in collaboration with East Bay Municipal Utility District for the stewardship of the East Bay Plain Subbasin aquifer.

CURRENT & FUTURE LOCAL SUPPLIES:

Hayward anticipates continuing to rely primarily on the RWS to supply its water demands, supplemented by recycled water for some irrigation and industrial use. The city will be preparing a Recycled Water Plan to evaluate potential future customers, demand, and infrastructure needs.

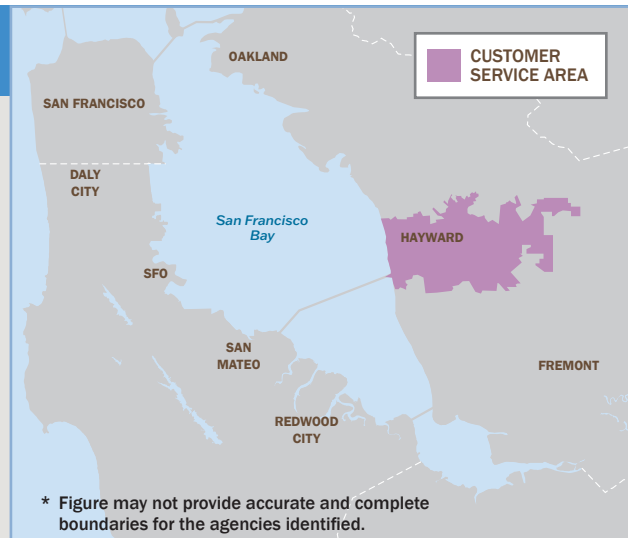


WATER CONSERVATION INSIGHTS^{1,4}

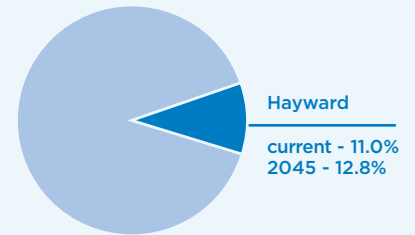
23% decrease in residential gallons per capita demand (R-GPCD) since 2010 due to continued conservation savings. Hayward's per capita usage is among the lowest of all agencies that purchase water from the RWS.

- Sources: (1) '21-'22 BAWSCA Annual Survey
 (2) Amended and Restated Water Supply Agreement, 2021
 (3) Hayward 2020 UWMP
 (4) '10-'11 BAWSCA Annual Survey

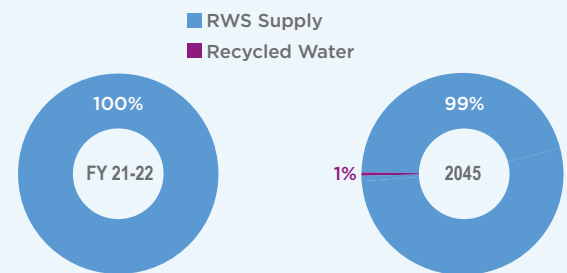
Note: * Recycled water deliveries in 2018-2019 included deliveries of secondary-treated wastewater to Russell City Energy Center and Skywest Golf Course. These deliveries are no longer included in Hayward's recycled water data.



SHARE OF RWS DELIVERIES TO WHOLESALE CUSTOMERS¹

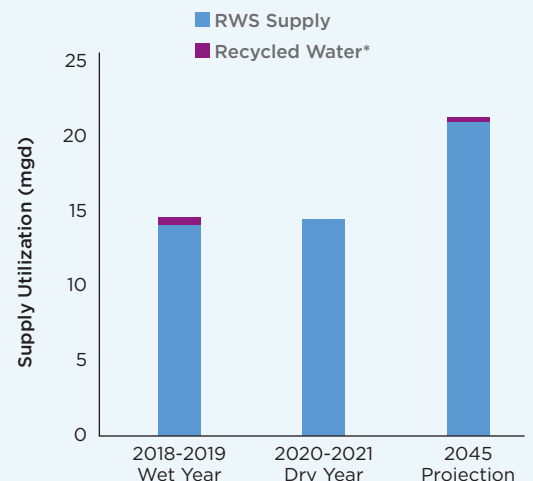


CURRENT & FUTURE SUPPLY PORTFOLIOS¹



SUPPLY MIX IN MULTIPLE YEAR TYPES¹

Need for RWS supply is anticipated to increase by approximately 8 mgd to meet anticipated residential and industrial growth.



Town of Hillsborough

CUSTOMER OVERVIEW¹:

The Town of Hillsborough operates its water utility and serves 11,397 people living within the Town of Hillsborough and unincorporated areas of San Mateo County. The utility's service area covers 6.25 square miles of highly varied topography. The utility serves a residential community, with approximately 93% of water usage attributed to single-family homes connections.

INDIVIDUAL SUPPLY GUARANTEE²: 4.09 mgd

VULNERABILITIES & OPPORTUNITIES³:

The service area's high variability of topography represents a challenge. A 2016 study indicated that Hillsborough has a lack of availability of groundwater supplies adequate for municipal use. Recycled water/non-potable water reuse opportunities within Hillsborough are limited due to the almost exclusively residential water usage and its wastewater flows being treated at two wastewater treatment plants that are outside of its jurisdiction and that do not produce recycled water.

CURRENT & FUTURE LOCAL SUPPLIES:

Hillsborough is 100% reliant on RWS supplies for potable water and does not have viable access to current or future local supplies.



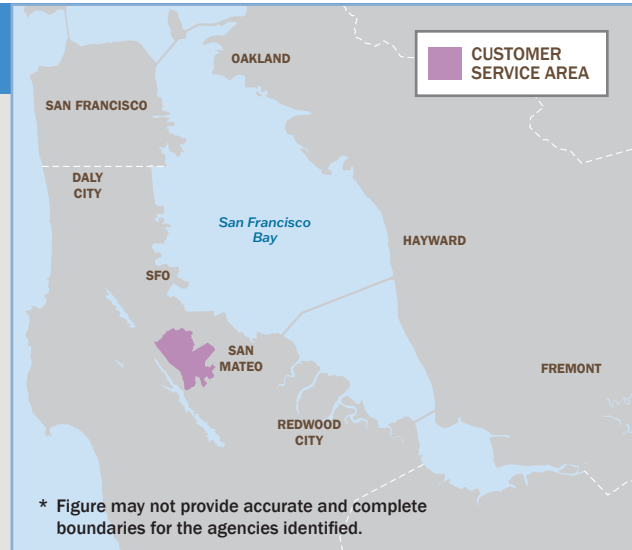
WATER CONSERVATION INSIGHTS^{4,4}

27% decrease in residential gallons per capita demand (R-GPCD) since 2010 due to continued water conservation savings.

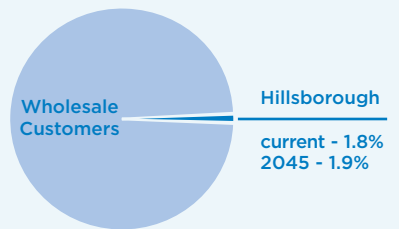
Hillsborough replaced its aging water meters with advanced metering infrastructure (AMI) in 2017. Nearly 90% of its water customers use the AMI customer service portal to respond to leak alerts and to monitor their water use – an industry-wide best.

Hillsborough also purchased the first of its kind mobile water flushing and filtration unit called NO-DES. Traditional water flushing activities result in millions of gallons of water being discharged from fire hydrants into storm drains. Hillsborough's NO-DES unit captures, filters, treats and returns that water back into the water distribution system for use instead of discharging it into storm drains.

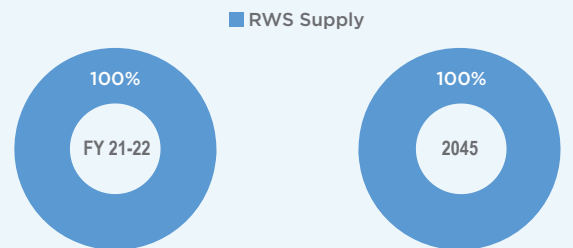
Sources: (1) '21-'22 BAWSCA Annual Survey
 (2) Amended and Restated Water Supply Agreement, 2021
 (3) Hillsborough 2020 UWMP
 (4) '10-'11 BAWSCA Annual Survey



SHARE OF RWS DELIVERIES TO WHOLESALE CUSTOMERS¹

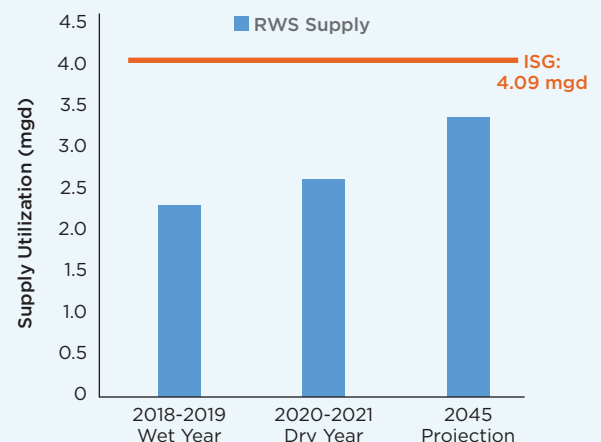


CURRENT & FUTURE SUPPLY PORTFOLIOS¹



SUPPLY MIX IN MULTIPLE YEAR TYPES¹

Supply projections follow the stable predicted population increase based on the planned addition of housing units. RWS supply needs will remain below ISG.



Menlo Park Municipal Water

CUSTOMER OVERVIEW¹:

The City of Menlo Park owns and operates Menlo Park Municipal Water. Menlo Park supplies water to approximately half of the City to about 21,000 residents over a 4-square-mile service area located within City limits. Residential and commercial/industrial water demands account for an average of 43% and 35% of the City's water usage, respectively.

INDIVIDUAL SUPPLY GUARANTEE²: 4.46 mgd

VULNERABILITIES & OPPORTUNITIES³:

Menlo Park receives 100% of its supply from RWS supply and has purchased between 52% and 66% of its ISG between 2016 and 2020. Menlo Park currently has one emergency groundwater well and is planning to double its groundwater emergency supply (up to 3,000 gpm capacity) in the medium term. The West Bay Sanitary District (WBSD) Recycled Water Facility started supplying 20 million gallons to the Sharon Heights Golf and Country Club in 2020 and an expansion of the WBSD's recycled water capacity is in the planning stages.

CURRENT & FUTURE LOCAL SUPPLIES:

Menlo Park is implementing an AMI project that is capable of automatically transmitting hourly meter reads. Doing so will improve meter read accuracy, enhance customer service, enable staff and water users to identify leaks earlier so corrective actions can be taken, and reduce water loss. With AMI, Menlo Park will also implement a new customer user-friendly WaterSmart portal. Menlo Park is also planning to construct one or two more wells in order to meet the 3,000 gpm capacity goal and is in the process of evaluating other possible well locations. Menlo Park expects water demands to decrease after WBSD expands their recycled water system, as current potable water users convert to recycled water for irrigation use.

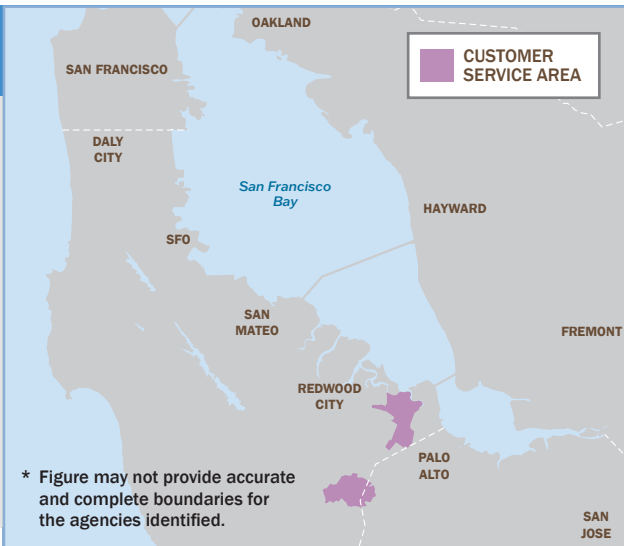


WATER CONSERVATION INSIGHTS^{4,4}

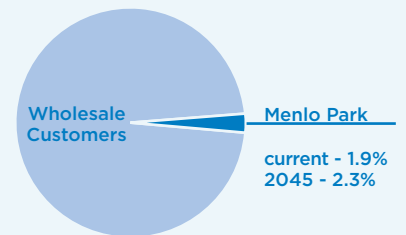
With the addition of recycled water, irrigation water demand decreased from 12% in 2019 to 9% in 2022 of Menlo Park's total water usage.

50% decrease in residential gallons per capita demand (R-GPCD) since 2010 due to continued water conservation savings.

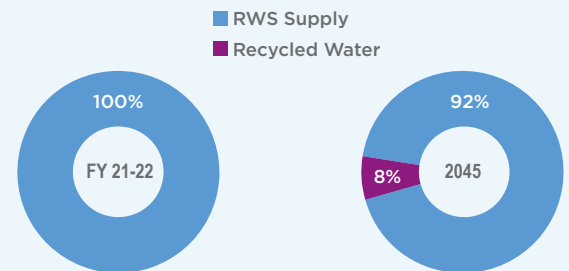
Sources: (1) '21-'22 BAWSCA Annual Survey
 (2) Amended and Restated Water Supply Agreement, 2021
 (3) Menlo Park 2020 UWMP
 (4) '10-'11 BAWSCA Annual Survey



SHARE OF RWS DELIVERIES TO WHOLESALE CUSTOMERS¹

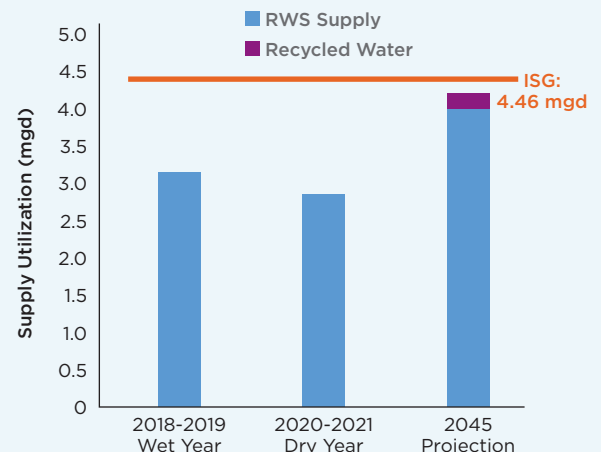


CURRENT & FUTURE SUPPLY PORTFOLIOS¹



SUPPLY MIX IN MULTIPLE YEAR TYPES¹

Potable water demands are anticipated to increase by 28% by 2040, led by a boom in multi-family and commercial water usage. Increased RWS supply use will remain below the ISG.



Mid-Peninsula Water District

CUSTOMER OVERVIEW^{1,3:}

Mid-Peninsula Water District (MPWD) is a special district that serves 31,159 people within a 5-square-mile service area that covers the City of Belmont, portions of the City of San Carlos, and unincorporated county areas within San Mateo County. Residential connections account for 71% of water usage.

INDIVIDUAL SUPPLY GUARANTEE^{2:} 3.89 mgd

VULNERABILITIES & OPPORTUNITIES^{3:}

MPWD relies on RWS supplies for 100% of its water needs. The District is anticipating an increase in multi-family residential and commercial developments. Due to its location and relatively small urban service area, access to alternative groundwater or surface water supplies is limited. MPWD has assessed opportunities for recycled water use within its service area, and has encountered financial and constructability constraints.

CURRENT & FUTURE LOCAL SUPPLIES:

In September 2022, MPWD joined as a partner to the PureWater Peninsula Project and continues to move forward in support of this project. In 2021, MPWD conducted a preliminary assessment of groundwater production potential, which found that limited potential for groundwater development may exist in a portion of its service area, particularly as an emergency drought supply. MPWD intends to continue to evaluate the potential use of groundwater and the funding sources available to support such development.

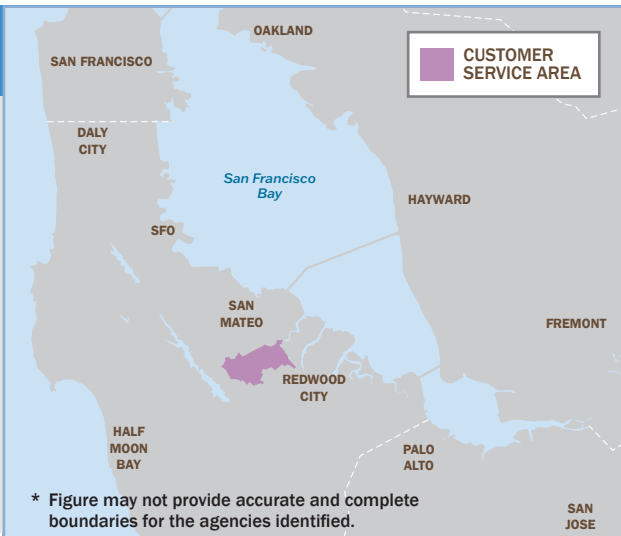


WATER CONSERVATION INSIGHTS^{4,4}

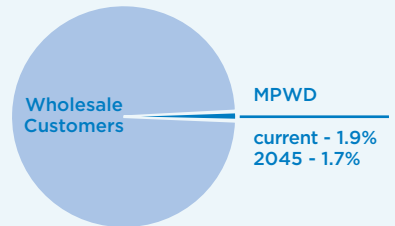
28% decrease in residential gallons per capita demand (R-GPCD) since 2010.

In response to the current drought, customers have reduced their gross water use to 85 GPCD, consistent with 2015.

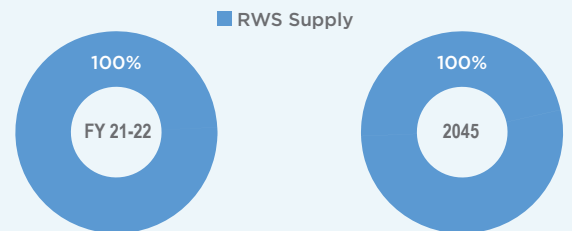
Sources: (1) '21-'22 BAWSCA Annual Survey, updated population provided by MPWD (June 2023)
 (2) Amended and Restated Water Supply Agreement, 2021
 (3) Mid-Peninsula Water District 2020 UWMP
 (4) '10-'11 BAWSCA Annual Survey



SHARE OF RWS DELIVERIES TO WHOLESALE CUSTOMERS¹

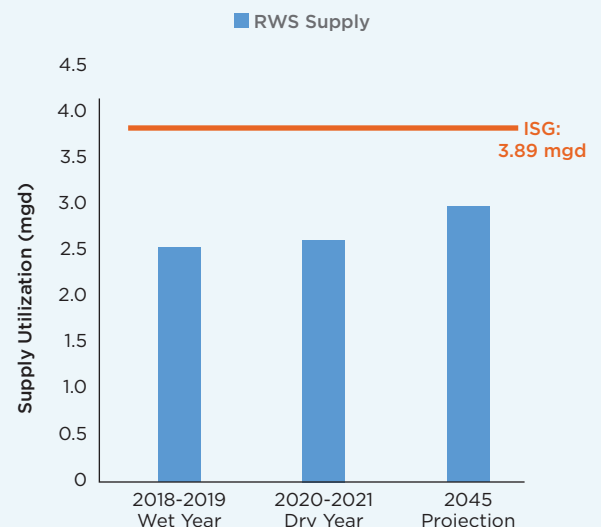


CURRENT & FUTURE SUPPLY PORTFOLIOS¹



SUPPLY MIX IN MULTIPLE YEAR TYPES¹

Despite the expected growth from the residential and CII sectors, demands on RWS supplies are projected to remain below MPWD's ISG.



City of Millbrae

CUSTOMER OVERVIEW¹:

The City of Millbrae owns and operates its water system, which serves 22,277 people. The 3.2-square-mile service area is primarily residential, with residential connections and commercial/industrial customers that account for approximately 61% and 8% of Millbrae's total water usage, respectively.

INDIVIDUAL SUPPLY GUARANTEE²: 3.15 mgd

VULNERABILITIES & OPPORTUNITIES³:

The City of Millbrae relies almost exclusively on RWS supply to serve its water demands. A groundwater exploration study was conducted in the mid-1990s, but no potential viable groundwater supplies were identified. The City of Millbrae operates the Waste Pollution Control Plant (WPCP), and the limited amount of recycled water produced is used for onsite maintenance applications. The City is evaluating the feasibility of expanding its recycled water production and use to include irrigation, construction dust control and commercial applications, depending on resources and funding availability.

CURRENT & FUTURE LOCAL SUPPLIES:

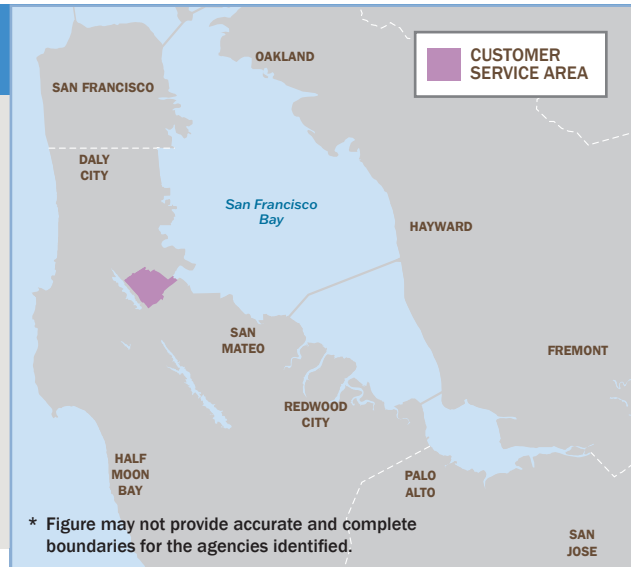
The City of Millbrae is in the early planning phase of a new recycled water program. Millbrae is preparing a feasibility study to be completed in 2023 to evaluate implementation of a city-wide recycled water program. The City would produce and deliver recycled water for the irrigation of existing landscape sites and future development. A recycled water market assessment has been completed and estimated potential recycled water demands of city parks and schools, as well as a privately-owned golf course and planned new development within Millbrae. A total city-wide demand of 62 million gallons was identified. A regional partnership with neighboring communities is also being explored.



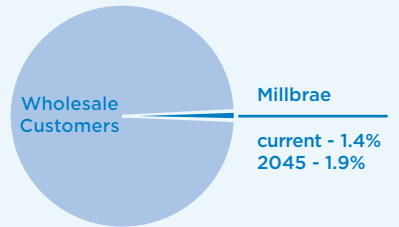
WATER CONSERVATION INSIGHTS^{4,4}

26% decrease in residential gallons per capital demand (R-GPCD) since 2010.

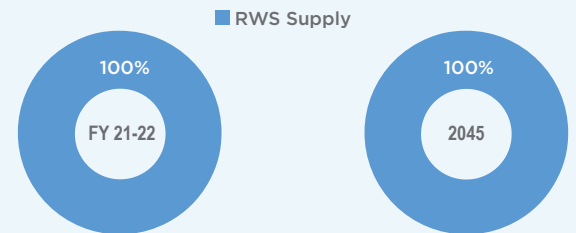
Sources: (1) '21-'22 BAWSCA Annual Survey
 (2) Amended and Restated Water Supply Agreement, 2021
 (3) City of Millbrae 2020 UWMP
 (4) '10-'11 BAWSCA Annual Survey



SHARE OF RWS DELIVERIES TO WHOLESALE CUSTOMERS¹

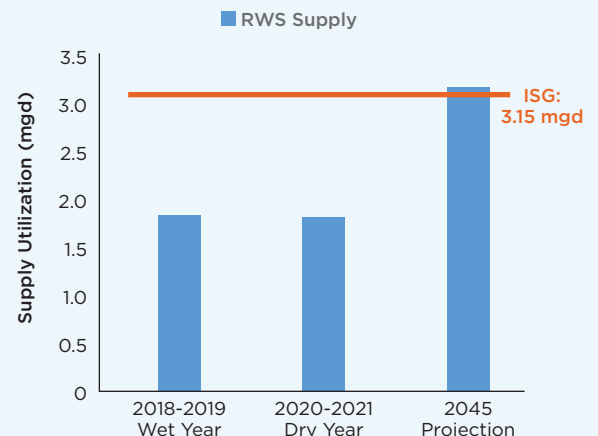


CURRENT & FUTURE SUPPLY PORTFOLIOS¹



SUPPLY MIX IN MULTIPLE YEAR TYPES¹

The anticipated increase in multi-family residential and commercial connections will result in an increase in RWS supply purchases.



City of Milpitas

CUSTOMER OVERVIEW¹:

The City of Milpitas is a municipal water utility, which serves 80,839 people, over 13.6 square miles within Santa Clara County. The utility's customer base includes approximately 85% of residential connections and 5% of commercial and industrial connections. Supply sources include imported water from the RWS and Valley Water, recycled water and groundwater for emergency and drought conditions.

INDIVIDUAL SUPPLY GUARANTEE²: 9.23 mgd

MINIMUM PURCHASE REQUIREMENT²: 5.341 mgd

VULNERABILITIES & OPPORTUNITIES³:

Milpitas receives up to 90% of its supply from RWS and Valley Water, which feed their respective areas of the system. Both of these supply sources are sensitive to hydrologic variability, conveyance limitations, water quality variations and environmental regulations. Milpitas has a diverse supply portfolio, including one existing standby well and two additional wells coming online by 2040 for emergency conditions and dry-year conditions. Milpitas uses non-potable recycled water from the South Bay Water Recycling Program (SBWRP) for landscape irrigation and industrial purposes. There are opportunities to expand its recycled water use (cooling towers, irrigation uses, etc.) but they are limited by the SBWRP's future supply allocations.

CURRENT & FUTURE LOCAL SUPPLIES:

Currently, Milpitas gets its potable water supply from RWS and Valley Water, and non-potable supply from SBWRP. The City has emergency interties with San Jose Water and Alameda County Water District (ACWD). Milpitas currently has one groundwater well, Pinewood Well, which has a capacity of 1.7 mgd and is activated only during emergencies. In 2020, the City began redesigning Curtis Well and early construction of McCandless Well, which are both expected to be completed by 2040. The initial estimated capacity from both wells is 0.58 mgd and both will only operate under emergency or dry-year conditions.

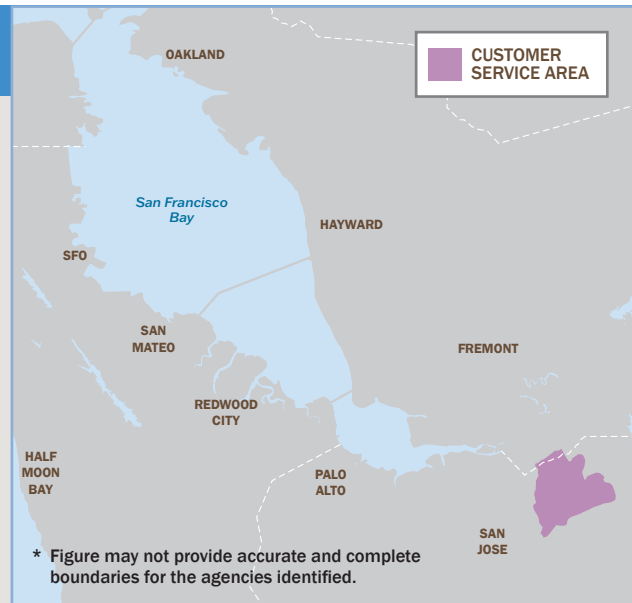


WATER CONSERVATION INSIGHTS^{4,4}

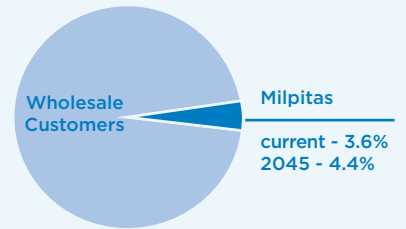
18% decrease in residential gallons per capita demand (R-GPCD) since 2010 due to continued water conservation savings.

In 2022, Milpitas implemented AMI and launched the WaterSmart Customer Portal.

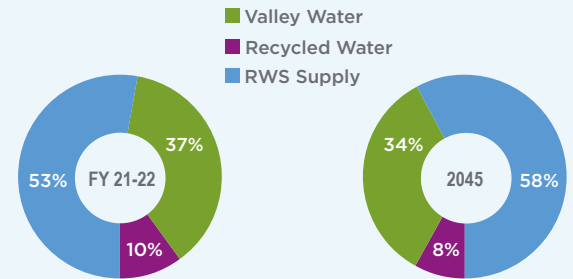
Sources: (1) '21-'22 BAWSCA Annual Survey
 (2) Amended and Restated Water Supply Agreement, 2021
 (3) City of Milpitas 2020 UWMP
 (4) '10-'11 BAWSCA Annual Survey



SHARE OF RWS DELIVERIES TO WHOLESALE CUSTOMERS¹

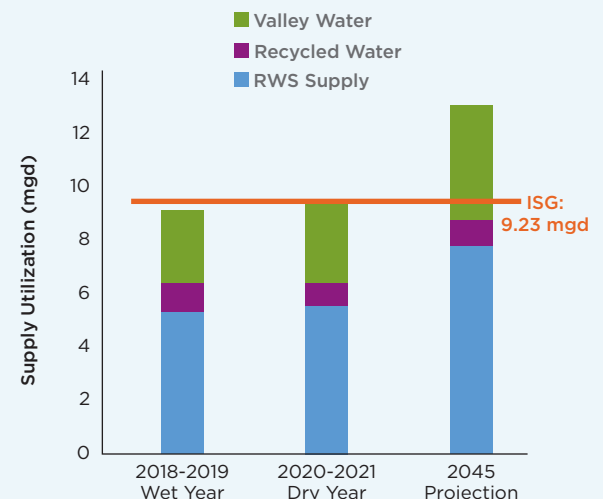


CURRENT & FUTURE SUPPLY PORTFOLIOS¹



SUPPLY MIX IN MULTIPLE YEAR TYPES¹

The City's growth is anticipated to occur within areas served by Valley Water, therefore increasing the need for Valley Water supply.



City of Mountain View

CUSTOMER OVERVIEW¹:

The City of Mountain View owns and operates the municipal utility covering a 12-square-mile service area on the peninsula in north Santa Clara County. The utility serves 81,764 people and supplies 57% of its total water usage to residential connections and 27% to irrigation connections, and 15% to commercial, industrial, and institutional connections.

INDIVIDUAL SUPPLY GUARANTEE²: 12.46 mgd

MINIMUM PURCHASE REQUIREMENT²: 8.930 mgd

VULNERABILITIES & OPPORTUNITIES³:

Mountain View has a diversified supply portfolio. The RWS is its largest water supply. Mountain View also operates four active groundwater wells from the Santa Clara Basin aquifer and purchases treated water from Valley Water. Mountain View receives recycled water from the Regional Water Quality Control Plant (RWQCP) in Palo Alto for non-potable uses in the North Bayshore area (such as irrigation and toilet flushing). Mountain View is a signatory to the Partnership Agreement with Palo Alto and Valley Water, which aims to advance water reuse programs in Santa Clara County.

CURRENT & FUTURE LOCAL SUPPLIES:

Mountain View recently updated its Recycled Water Feasibility Study and continues to build-out its recycled water distribution system to serve new customers.

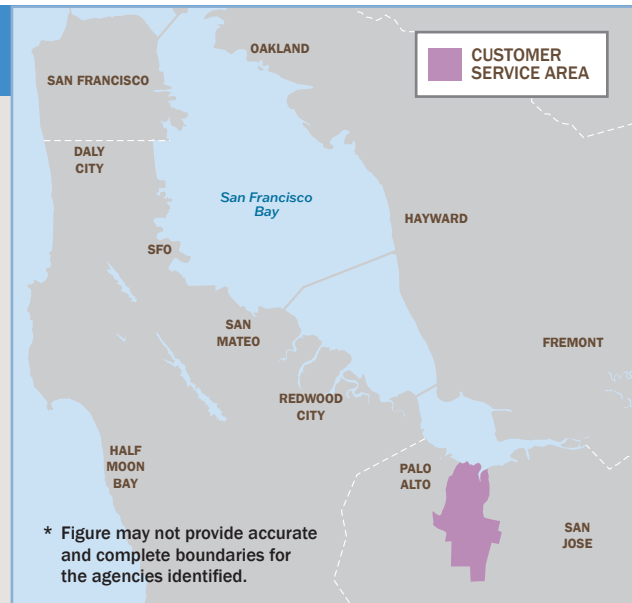


WATER CONSERVATION INSIGHTS^{4,4}

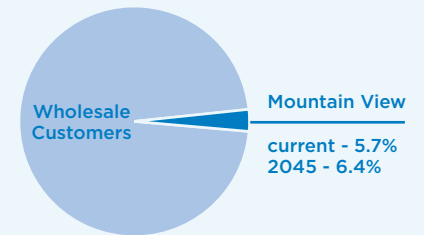
20% decrease in residential gallons per capita demand (R-GPCD) since 2010 due to continued conservation.

Mountain View partners with Valley Water on conservation programs such as rebates for lawn replacement. The City is also pursuing advanced metering infrastructure.

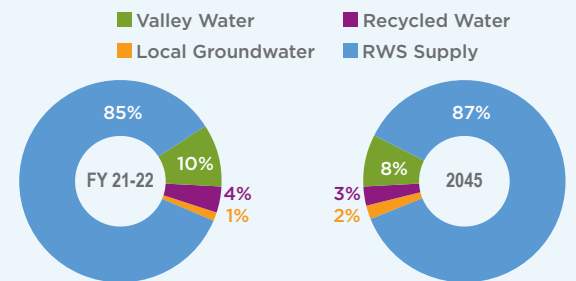
Sources: (1) '21-'22 BAWSCA Annual Survey, updated sector demand percentages provided by Mountain View (June 2023)
 (2) Amended and Restated Water Supply Agreement, 2021
 (3) City of Mountain View 2020 UWMP
 (4) '10-'11 BAWSCA Annual Survey



SHARE OF RWS DELIVERIES TO WHOLESALE CUSTOMERS¹

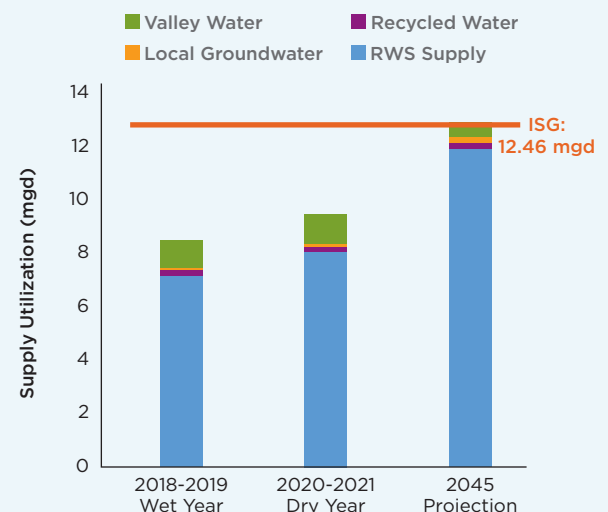


CURRENT & FUTURE SUPPLY PORTFOLIOS¹



SUPPLY MIX IN MULTIPLE YEAR TYPES¹

Alternative supplies will partly serve the anticipated 46% increase in population by 2045. RWS supply use will remain below ISG.



North Coast County Water District

CUSTOMER OVERVIEW¹:

The North Coast County Water District (NCCWD) is a special district that serves 37,533 people in San Mateo County. NCCWD's service area covers 13.6 square miles, including the City of Pacifica and small unincorporated areas within San Mateo County. For FY 2021-2022, residential connections account for 74% of total potable water use, while commercial connections represent only 8% of potable water usage.

INDIVIDUAL SUPPLY GUARANTEE²: 3.84 mgd

VULNERABILITIES & OPPORTUNITIES³:

NCCWD relies heavily on the RWS supply but is exploring multiple opportunities to further diversify its supply portfolio. As such, NCCWD is working to develop groundwater supplies from the San Pedro Valley Basin. In 2022, the District was awarded a grant from the Department of Water Resources to pursue its groundwater project. The District's surface water rights to South Fork San Pedro Creek are currently being conserved, but could represent an alternative supply source in future years. NCCWD also distributes tertiary recycled water from the Calera Creek Water Recycling Plant for landscape irrigation purposes and supplies recycled water to two schools, a ballfield, highway medians and Sharp Park Golf Course, a SFPUC retail customer. In addition, the District operates a residential recycled water fill station for customers to utilize at no charge. The expansion of NCCWD's recycled water use is also being considered.

CURRENT & FUTURE LOCAL SUPPLIES:

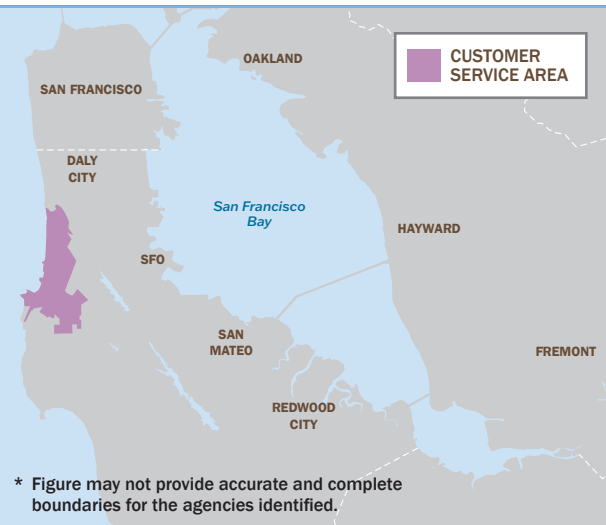
The District's groundwater project is estimated to be able to supply 70 acre-feet annually to supplement potable water received from the RWS. Information from the test well phase of the project is anticipated to further define the potential quantity of water available. Given the District's location within foggy Pacifica, it is also exploring fog water collection with researchers at University of California Santa Cruz and California State University Monterey Bay. While using fog water for potable purposes may not be feasible, it could be used as a supplemental non-potable supply in the service area. Work is being done to quantify the amount of water that can be collected and define the per unit costs.



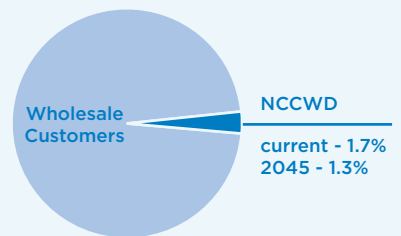
WATER CONSERVATION INSIGHTS^{4,4}

35% decrease in residential gallons per capita demand (R-GPCD) since 2010 due to conservation efforts.

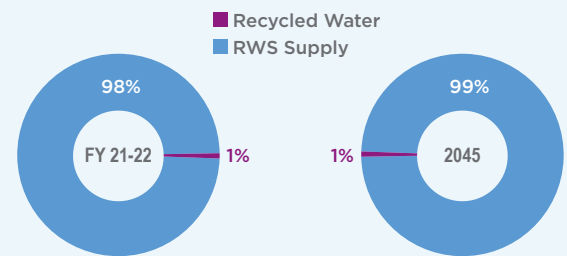
Sources: (1) '21-'22 BAWSCA Annual Survey
 (2) Amended and Restated Water Supply Agreement, November 2021
 (3) NCCWD 2020 UWMP
 (4) '10-'11 BAWSCA Annual Survey



SHARE OF RWS DELIVERIES TO WHOLESALE CUSTOMERS¹

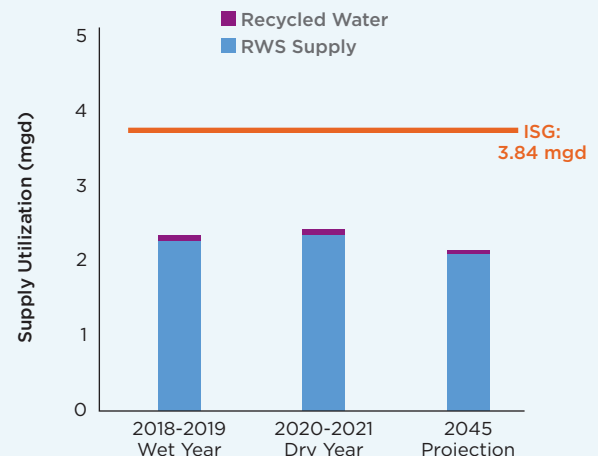


CURRENT & FUTURE SUPPLY PORTFOLIOS¹



SUPPLY MIX IN MULTIPLE YEAR TYPES¹

The need for RWS supply is planned to slightly decrease due to the continued passive conservation savings and use of recycled water supplies.



City of Palo Alto

CUSTOMER OVERVIEW¹:

The City of Palo Alto owns and operates its water system and serves approximately 68,000 people located within a 26-square-mile service area, which includes the City of Palo Alto and a few connections in Los Altos Hills and Portola Valley. Approximately 53% of total water (potable water, recycled water and non-revenue water) is used by residential customers, 16% by commercial and industrial customers, and 14% by irrigation-only customers. The remaining 17% of water includes recycled water used primarily for irrigation purposes and industrial process use, city and public agency uses of water as well as other and non-revenue water. Palo Alto completed a permanent ISG transfer of 0.5 mgd to the City of East Palo Alto in 2018.

INDIVIDUAL SUPPLY GUARANTEE²: 16.57 mgd

VULNERABILITIES & OPPORTUNITIES³:

Palo Alto relies on RWS supply for 100% of its potable water supply. Palo Alto currently has standby groundwater wells available for emergency purposes and as a possible supplemental temporary drought supply. The groundwater basin is managed by Valley Water. Palo Alto operates the Regional Water Quality Control Plant (RWQCP), which supplies recycled water to mostly irrigation customers in Palo Alto and Mountain View. A Partnership Agreement between Palo Alto, Mountain View and Valley Water provides funding for a small salt removal facility at the RWQCP in Palo Alto to improve the quality and enable increased use of non-potable recycled water used in Palo Alto and Mountain View and provides Valley Water an option to receive about half of the treated wastewater from the RWQCP for use in the county south of Mountain View.

CURRENT & FUTURE LOCAL SUPPLIES:

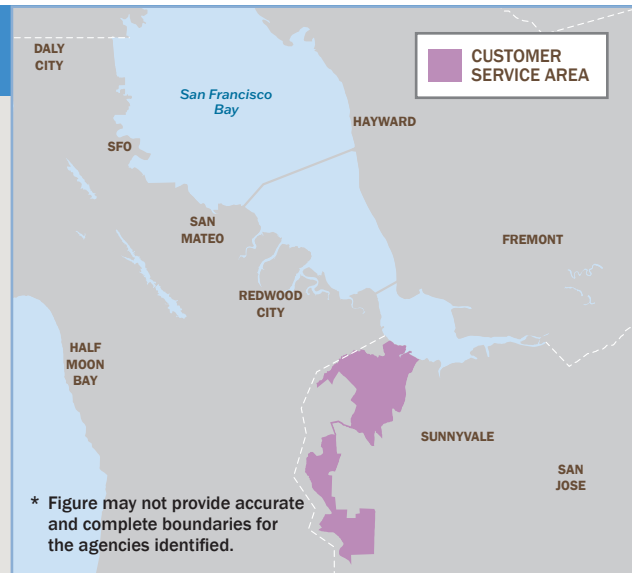
Palo Alto currently receives 100% of its potable water from the SFPUC through the RWS. In case of emergency, a system of local groundwater wells and storage can be utilized. The City is currently developing a One Water Plan, which will take a broad, comprehensive look at water supply options over a 20-year planning horizon. The One Water Plan is currently considering various alternative water supply options including direct and indirect potable reuse, graywater capture and reuse, stormwater capture, desalination, and other non-potable water sources to supplement and preserve the potable water supply. The One Water Plan will produce a recommended supply and conservation portfolio which will be taken to council for consideration of adoption. The One Water Plan is expected to be completed by Fall of 2023.



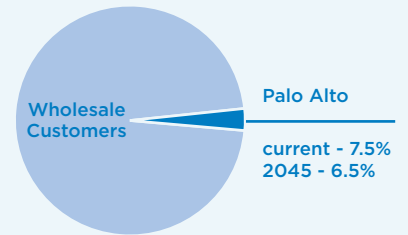
WATER CONSERVATION INSIGHTS^{4,4}

Palo Alto has reduced residential gallons per capita demand (R-GPCD) by 16% since 2010 and continues to realize water conservation savings. Palo Alto partners with Valley Water to offer a variety of water efficiency rebate programs and resources.

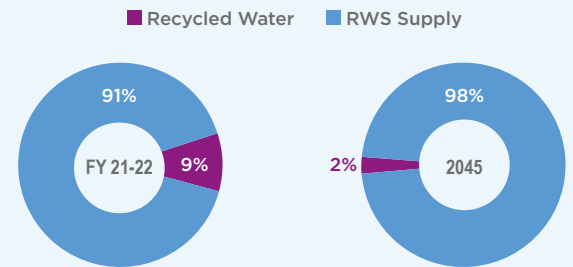
Sources: (1) '21-'22 BAWSCA Annual Survey
 (2) Amended and Restated Water Supply Agreement, 2021
 (3) City of Palo Alto 2020 UWMP
 (4) '10-'11 BAWSCA Annual Survey



SHARE OF RWS DELIVERIES TO WHOLESALE CUSTOMERS¹

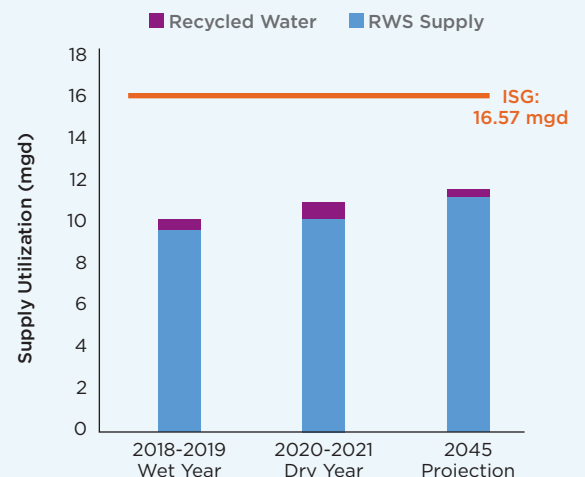


CURRENT & FUTURE SUPPLY PORTFOLIOS¹



SUPPLY MIX IN MULTIPLE YEAR TYPES¹

Recycled water use and conservation savings will limit the increase in RWS supply, which will remain below ISG.



Purissima Hills Water District

CUSTOMER OVERVIEW¹:

Purissima Hills Water District (PHWD) is the smallest SFPUC wholesale customer, which serves a population of 6,150 located within two-thirds of the Town of Los Altos Hills and an unincorporated area to the south. Its service area spans a relatively rural area of approximately 7.2 square miles spread over a high elevation differential. The customer base is mainly comprised of single-family homes, with residential connections accounting for over 90% of water demand.

INDIVIDUAL SUPPLY GUARANTEE²: 1.62 mgd

VULNERABILITIES & OPPORTUNITIES³:

PHWD relies exclusively on RWS supply for its water demands. Due to its small service area, the District is limited in the viable alternative water supply alternatives. Its small customer base renders the implementation of recycled water opportunities within its service area challenging. Based on the estimated residential water usage, PHWD has implemented a conservation campaign focused on outdoor water use and targeting the customers with highest usage, with a 32% reduction target over 2020-2021.

CURRENT & FUTURE LOCAL SUPPLIES:

PHWD is working with EKI, Inc. to research groundwater and opportunities of multiple working wells in the District. PHWD is exploring an ISG purchase with another Wholesale Customer. Additionally, PHWD is in discussions with Valley Water assessing “wheeling water” through Cal Water Los Altos as well as becoming a permanent customer of Valley Water.

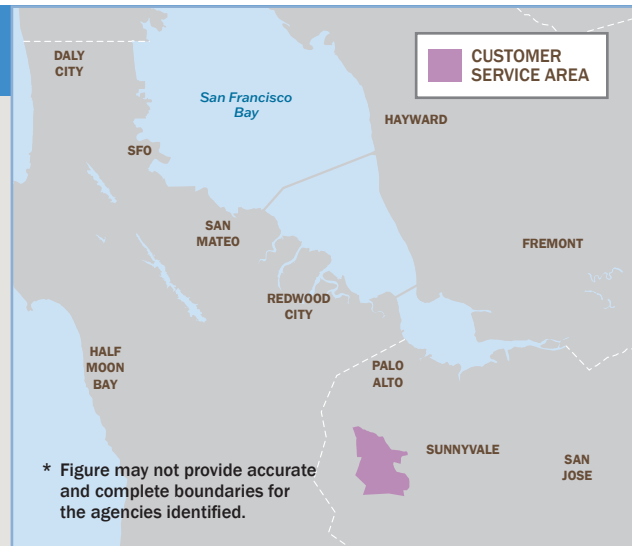


WATER CONSERVATION INSIGHTS^{1,4}

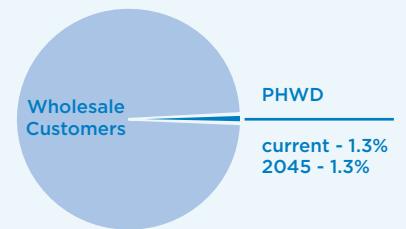
5% decrease in residential gallons per capita demand (R-GPCD) since 2010.

PHWD’s conservation efforts have resulted in a 13% usage reduction in FY21-22.

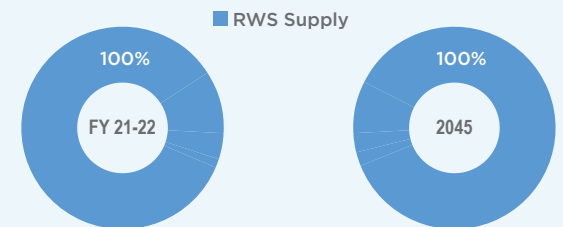
Sources: (1) '21-'22 BAWSCA Annual Survey
 (2) Amended and Restated Water Supply Agreement, 2021
 (3) Purissima Hills Water District 2020 UWMP
 (4) '10-'11 BAWSCA Annual Survey



SHARE OF RWS DELIVERIES TO WHOLESALE CUSTOMERS¹

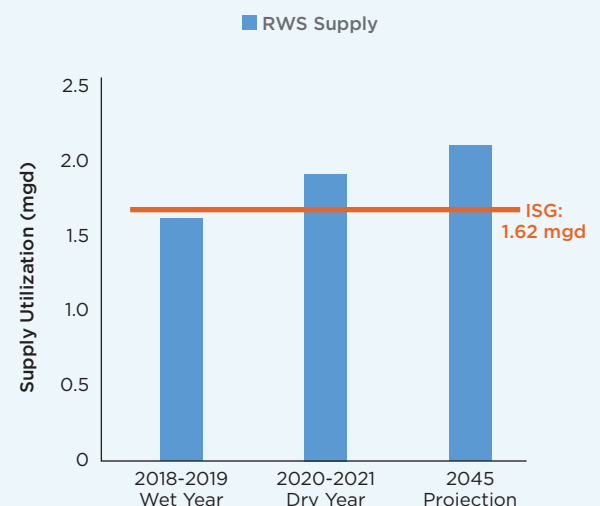


CURRENT & FUTURE SUPPLY PORTFOLIOS¹



SUPPLY MIX IN MULTIPLE YEAR TYPES¹

Limited water supply alternatives and increasing water demands will lead to a RWS supply need that exceeds ISG by 0.53 mgd.



City of Redwood City

CUSTOMER OVERVIEW¹:

The City of Redwood City owns and operates its water system, which covers 35 square miles and serves approximately 90,000 people located within Redwood City, portions of the Town of Woodside, the City of San Carlos and unincorporated areas of San Mateo County. The utility's water system primarily serves residential connections, which account for 61% of water usage. Commercial and industrial customers account for 14% and dedicated irrigation accounts for 15% of the system's potable water usage.

INDIVIDUAL SUPPLY GUARANTEE²: 10.93 mgd

VULNERABILITIES & OPPORTUNITIES³:

Redwood City relies on RWS supply for the majority of its water demands and is exploring alternative water supplies options. The utility is evaluating groundwater supplies from San Mateo Plain Subbasin as a potential future emergency and backup supply source. The water system receives recycled water from Silicon Valley Clean Water and has been expanding its recycled water distribution system. Redwood City is planning to build flexibility into the system to facilitate the reach of additional identified non-potable water customers.

AWS PROJECT SYNERGIES:

PureWater Peninsula Project

CURRENT & FUTURE LOCAL SUPPLIES:

Redwood City intends to leverage its local supply of recycled water to maximize non-potable uses within its Recycled Water Service Area and reduce reliance on imported drinking water from the RWS. To promote this goal city code requires the use of recycled water for landscape irrigation and toilet flushing for new development projects. Planning efforts to expand the recycled water system throughout the downtown area to meet the needs of new and existing water users and growth within the city are ongoing.

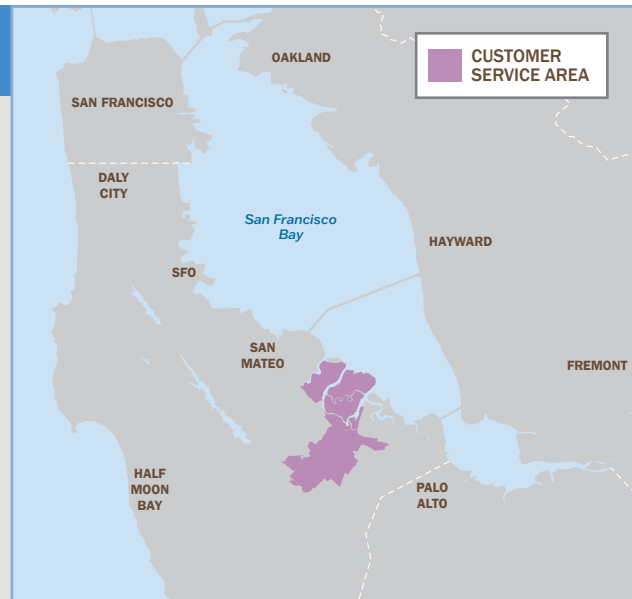


WATER CONSERVATION INSIGHTS^{4,4}

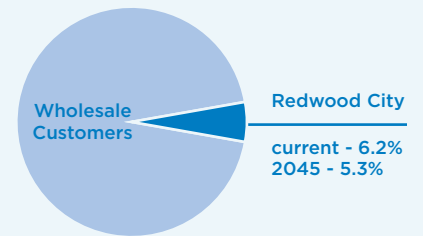
21% decrease in residential gallons per capita demand (R-GPCD) since 2010.

Redwood City has long been a champion in water conservation and offers many programs promoting water use efficiency and education. This includes a poster contest for grades K-5th since 1995.

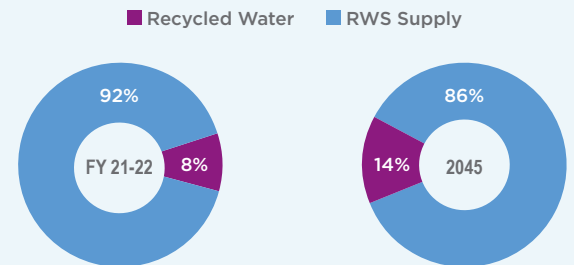
Sources: (1) '21-'22 BAWSCA Annual Survey
 (2) Amended and Restated Water Supply Agreement, 2021
 (3) City of Redwood City 2020 UWMP
 (4) '10-'11 BAWSCA Annual Survey



SHARE OF RWS DELIVERIES TO WHOLESALE CUSTOMERS¹

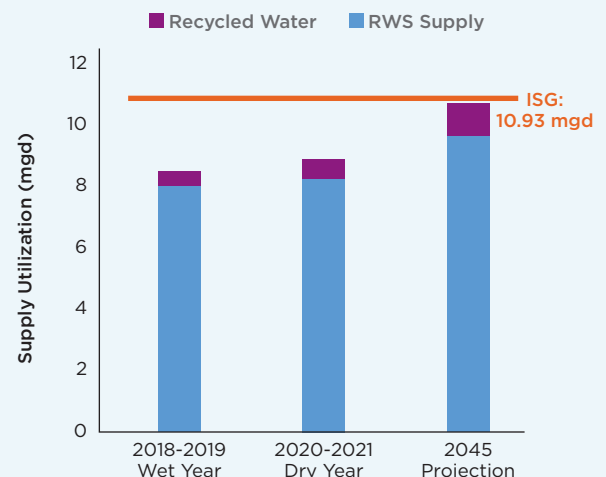


CURRENT & FUTURE SUPPLY PORTFOLIOS¹



SUPPLY MIX IN MULTIPLE YEAR TYPES¹

Expansion of recycled water and conservation savings will limit Redwood City's use of RWS supply, which will remain below ISG.



City of San Bruno

CUSTOMER OVERVIEW¹:

The City of San Bruno owns and operates its water system which serves 44,409 people located within a 6.1-square-mile service area covering the city limits and unincorporated areas of San Mateo County. The system's water supplies primarily serve residential and commercial/industrial connections, which represent 70% and approximately 18% of the system's water usage, respectively.

INDIVIDUAL SUPPLY GUARANTEE²: 3.25 mgd

VULNERABILITIES & OPPORTUNITIES³:

San Bruno's supply portfolio includes RWS supply, supply from North Coast County Water District (NCCWD), and local groundwater supplies. The City of San Bruno owns multiple wells that extract groundwater from the Westside Basin. San Bruno has reduced its groundwater use (from 50% to 10% of total water use after 2016) and has been receiving RWS supplemental deliveries in lieu of utilizing its local groundwater supplies to preserve the aquifer's drought resilience. San Bruno is assessing future use of local groundwater supplies based on groundwater quality, sea water intrusion risks and agreements with local municipal utilities. San Bruno has explored the feasibility of implementing recycled water supplies, which will be considered depending on future water supply availability and costs.

CURRENT & FUTURE LOCAL SUPPLIES:

San Bruno's water supply comes from three different sources – surface water purchased from SFPUC, surface water purchased from NCCWD, and local groundwater produced from City owned wells. San Bruno is already working to maximize use of existing supplies, researching potential new sources, encouraging conservation and investing in infrastructure. The City of San Bruno is investing in the future of water supply, to meet growing projected demands and reliability by increasing its groundwater sources.



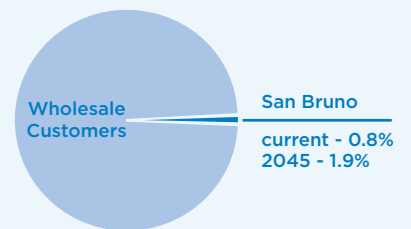
WATER CONSERVATION INSIGHTS⁴

San Bruno has reduced the residential gallons per capita demand (R-GPCD) by 20% since 2010 due to continued water conservation savings.

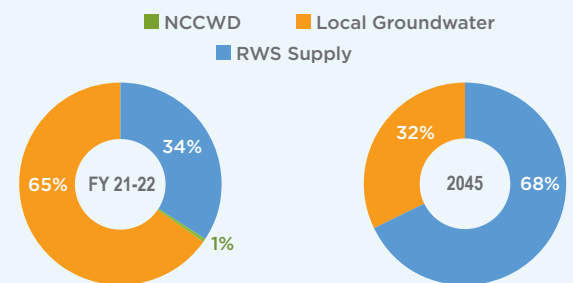
Sources: (1) '20-'21 BAWSCA Annual Survey
 (2) Amended and Restated Water Supply Agreement, 2021
 (3) City of San Bruno 2020 UWMP
 (4) '10-'11 BAWSCA Annual Survey



SHARE OF RWS DELIVERIES TO WHOLESALE CUSTOMERS¹

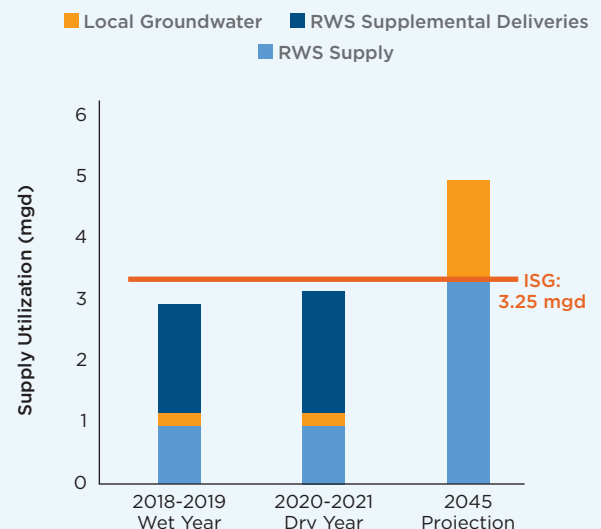


CURRENT & FUTURE SUPPLY PORTFOLIOS¹



SUPPLY MIX IN MULTIPLE YEAR TYPES¹

Sustainable use of groundwater supplies and RWS supply will fulfill the anticipated increase in water demand.



City of San Jose - North

CUSTOMER OVERVIEW¹:

The City of San Jose Municipal Water System (SJMWS) serves two public water systems, including the North San Jose/Alviso water system, which receives RWS supply. The North San Jose/Alviso water system serves 40,514 people within the northern area of City of San Jose. The 5.3-square-mile service area includes a large industrial customer base, in addition to residential and commercial customers. SJMWS does not currently have an ISG and receives up to 4.5 mgd of interruptible RWS supply, since it is not a permanent wholesale customer (SFPUC decision pending in 2028).

INDIVIDUAL SUPPLY GUARANTEE²: N/A

VULNERABILITIES & OPPORTUNITIES³:

Supply sources include RWS supply, four local groundwater sources (two active production sources and two sources for emergency use purposes) from the Santa Clara Basin and recycled water from the South Bay Water Recycling Program (SBWRP) produced at the San Jose-Santa Clara Regional Wastewater Facility. The use of groundwater supplies is limited by the aquifer's hydrologic conditions and the groundwater basin's available supply is based on Valley Water's groundwater recharge efforts. The City of San Jose is exploring expanding production of its existing water supply alternatives to cater to the anticipated industrial water demand growth.

AWS PROJECTS SYNERGIES: South Bay Purified Water

CURRENT & FUTURE LOCAL SUPPLIES:

SJMWS relies on multiple sources of supply: surface water from SFPUC, groundwater from the Santa Clara groundwater basin, and recycled water from the SBWRP. Supply sources received by SJMWS are generally considered consistent sources in normal years. SJMWS is planning to construct additional groundwater wells to support increased demands due to development, as well as to provide emergency supply availability to the existing customer base.

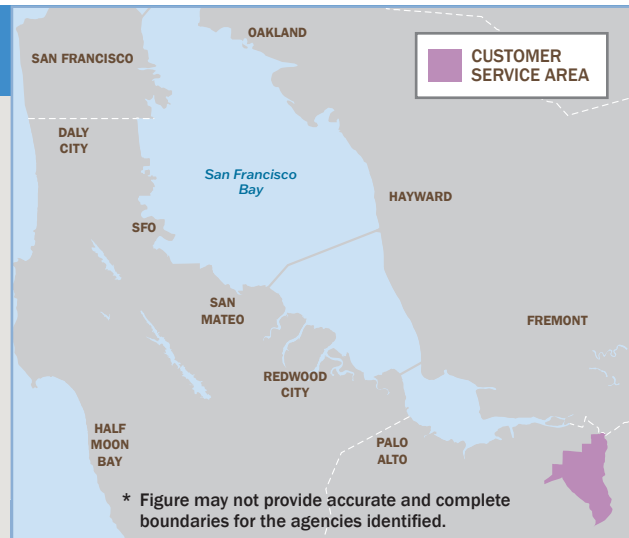
Climate change poses challenges in water resources management, although the full extent and associated impacts are uncertain. Statewide and local changes in precipitation and temperature could significantly impact wholesaler-managed supplies and water usage patterns.



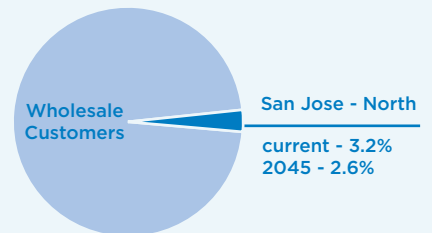
WATER CONSERVATION INSIGHTS^{1,4}

47% decrease in residential gallons per capita demand (R-GPCD) since 2010. SJMWS is transitioning to an Advanced Metering Infrastructure and encouraging customers to convert to low water use landscapes.

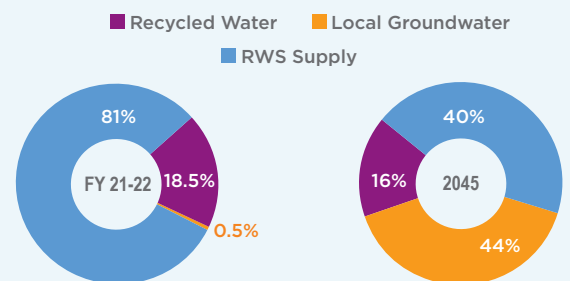
Sources: (1) '21-'22 BAWSCA Annual Survey
 (2) Amended and Restated Water Supply Agreement, 2021
 (3) City of San Jose 2020 UWMP
 (4) '10-'11 BAWSCA Annual Survey



SHARE OF RWS DELIVERIES TO WHOLESALE CUSTOMERS¹

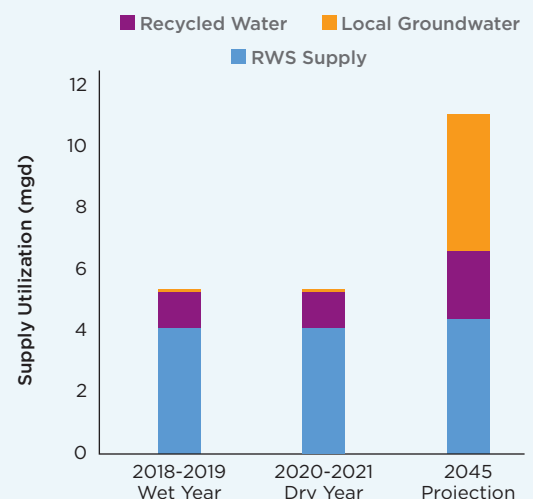


CURRENT & FUTURE SUPPLY PORTFOLIOS¹



SUPPLY MIX IN MULTIPLE YEAR TYPES¹

The expansion of groundwater and recycled water supplies will support the increased water demands caused by new developments and growing industrial demands.



City of Santa Clara

CUSTOMER OVERVIEW¹:

The City of Santa Clara owns and operates its water utility, which serves 130,746 people over a 19.3-square-mile urban and suburban service area. The City of Santa Clara has a large commercial and industrial customer base, which accounts for 47% of its total water use. Santa Clara does not currently have an ISG since it is not a permanent wholesale customer (SFPUC decision pending in 2028) and receives up to 4.5 mgd of interruptible RWS supply.

INDIVIDUAL SUPPLY GUARANTEE²: N/A

VULNERABILITIES & OPPORTUNITIES³:

The City of Santa Clara has a diversified water supply portfolio, which includes imported water from SFPUC and Valley Water, recycled water from the Regional Wastewater Facility under the South Bay Water Recycling Program (SBWRP) and 21 local groundwater wells (19 active) that tap into the Santa Clara subbasin. The local groundwater supplies are managed by Valley Water and their use is constrained to prevent excessive subsidence and promote long-term resilience of the aquifer. Recycled water uses in Santa Clara include irrigation, industrial processes, cooling purposes and toilet flushing. The existing recycled water distribution system facilitates the expansion of the service to new large potential customers.

AWS PROJECTS SYNERGIES:

South Bay Purified Water Feasibility Study

CURRENT & FUTURE LOCAL SUPPLIES:

Santa Clara takes part in regional water supply planning efforts in coordination with its wholesale and regional partners that include SFPUC, Valley Water and BAWSCA. The City embraces a One Water approach to a water supply planning, providing a roadmap for implementing real world strategies to secure and maintain current water supplies and developing new supplies with key programs focused on well rehabilitation, potable reuse, recycled water and conservation. The City has made substantial efforts towards expanding the use of recycled water for irrigation, industrial uses and dual plumbed facilities. As part of the City's overall sustainability strategy, the City is working with regional partners on the use of purified water to supplement local water supplies, including a feasibility study with SFPUC, City of San Jose and project with Valley Water.

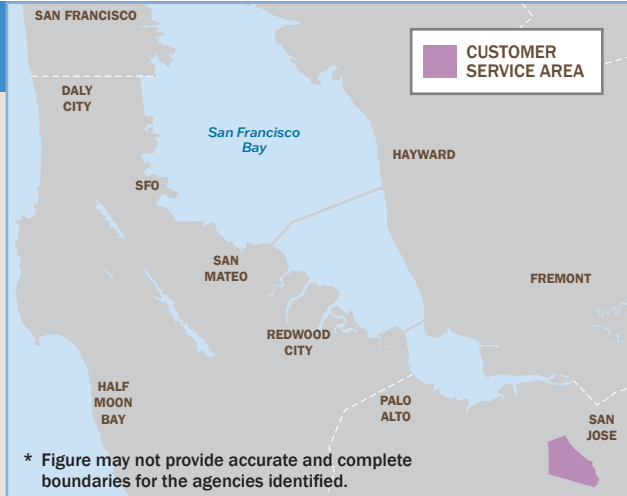


WATER CONSERVATION INSIGHTS^{4,4}

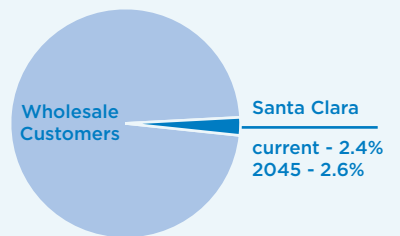
27% reduction in residential gallons per capita demand (R-GPCD) since 2010 due to continued water conservation savings.

The City is partnering with Valley Water on programs such as rebates for lawn replacements, using the WaterSmart customer portal, hiring permanent Utility Conservation/Efficiency Coordinator position to promote water conservation.

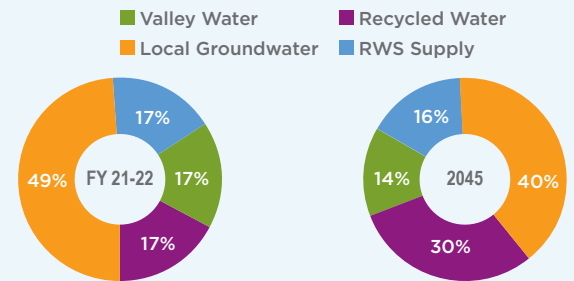
Sources: (1) '21-'22 BAWSCA Annual Survey
 (2) Amended and Restated Water Supply Agreement, 2021
 (3) City of Santa Clara 2020 UWMP
 (4) '10-'11 BAWSCA Annual Survey



SHARE OF RWS DELIVERIES TO WHOLESALE CUSTOMERS¹

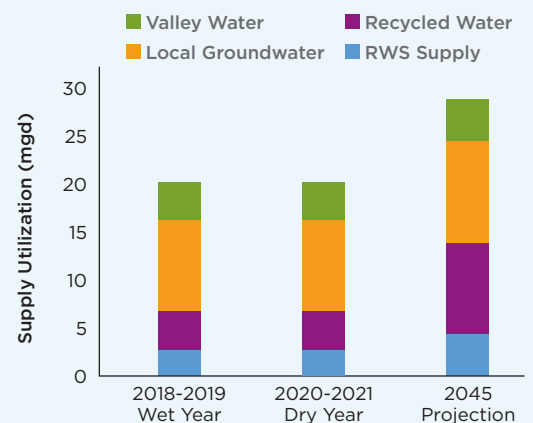


CURRENT & FUTURE SUPPLY PORTFOLIOS¹



SUPPLY MIX IN MULTIPLE YEAR TYPES¹

Local existing groundwater and expanded recycled water supplies will ramp up to feed the anticipated increase in commercial water demands and limit reliance on imported supplies.



Stanford University

CUSTOMER OVERVIEW¹:

The Water Resources and Civil Infrastructure Group within the Sustainability and Energy Management Department manages the Stanford University water systems. The domestic water system covers approximately 3.1 square miles and serves approximately 30,000 people on the Stanford campus and nearby unincorporated areas. Stanford University's unique customer base is reflected in its water usage; dedicated irrigation and single family connections represent approximately 9% and 24% of total domestic water usage, respectively. Local supply sources include local surface water, groundwater and stormwater capture for non-potable water uses and are conveyed in a separate non-potable water system (primarily irrigation of the golf course, sports fields, and campus landscaping).

INDIVIDUAL SUPPLY GUARANTEE²: 3.03 mgd

VULNERABILITIES & OPPORTUNITIES³:

Stanford relies on RWS supply to fulfill its potable drinking water demands and is utilizing multiple water supply alternatives to feed most of its irrigation needs. Stanford diverts surface water from San Francisquito Creek and Los Trancos Creek and stores water in Felt Lake. Five groundwater wells feed into the non-potable water system and supplement local surface water supplies during dry conditions. Since 2019, two stormwater capture and use facilities have been installed, which capture and filter storm runoff which is then pumped into the non-potable irrigation system and Felt Lake for storage. Four of the groundwater supply wells could be used in the domestic system in the event of an emergency. Regular use of groundwater in the domestic system, through blending with SFPUC supplied water, is being studied.

CURRENT & FUTURE LOCAL SUPPLIES:

Stanford is currently using half of its RWS allocation and potable demand projections show adequate supply until 2059 without additional sources or additional water conservation. Stanford will continue to minimize water demand with conservation programs. Stanford has established a graywater policy and will continue to explore conversion of some irrigated areas to recycled water. Additionally, Stanford will begin expanding stormwater capture and use facilities to increase the capture volume of water used in the non-potable irrigation system.

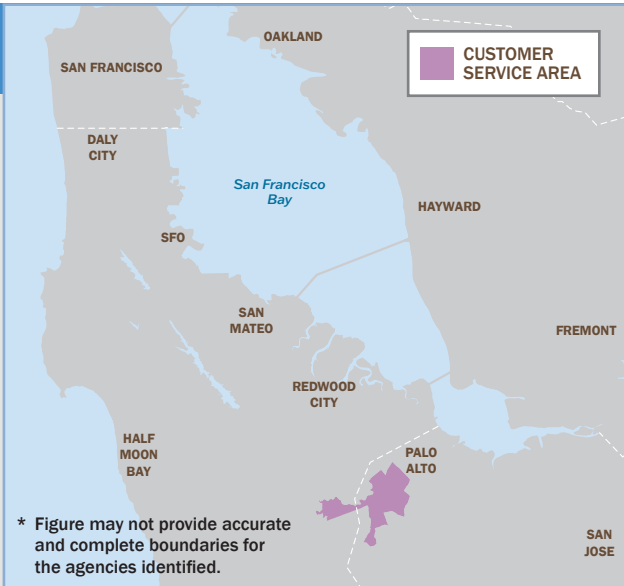


WATER CONSERVATION INSIGHTS^{1,4*}

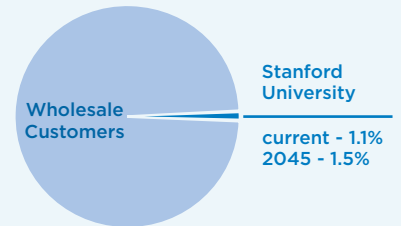
Despite campus growth, Stanford has reduced potable water demand by 50% since 2001 through water conservation, source shifting, and significantly improved efficiency for campus heating and cooling which minimizes the use of cooling towers.

Sources: (1) '21-'22 BAWSCA Annual Survey
 (2) Amended and Restated Water Supply Agreement, 2021
 (3) Stanford University Water Resources Website
 (4) '10-'11 BAWSCA Annual Survey

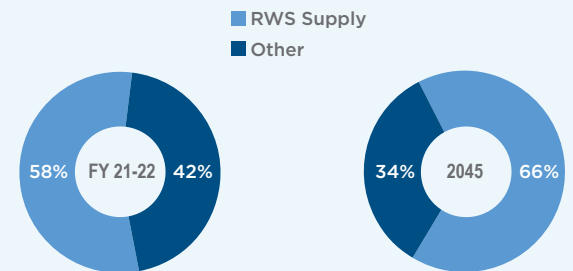
Note: *Due to abnormal campus populations during COVID-19, gross per capita water demand is calculated using potable water use.



SHARE OF RWS DELIVERIES TO WHOLESALE CUSTOMERS¹

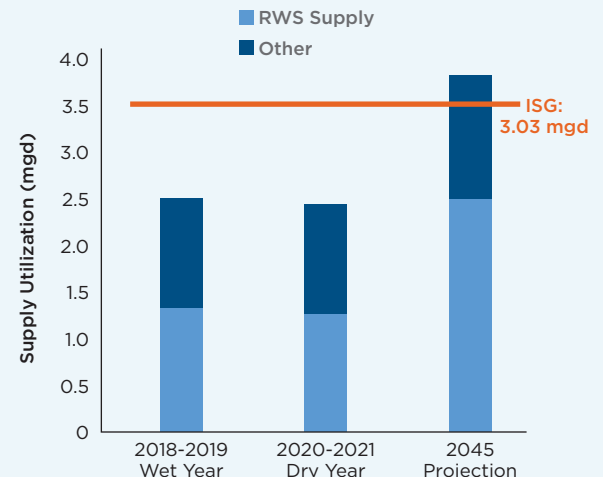


CURRENT & FUTURE SUPPLY PORTFOLIOS¹



SUPPLY MIX IN MULTIPLE YEAR TYPES¹

RWS reliance will remain below ISG and local supplies will expand and continue to fulfill growing non-potable irrigation demands.



City of Sunnyvale

CUSTOMER OVERVIEW¹:

The City of Sunnyvale, located at the north end of Santa Clara County, owns and operates its water utility which serves 156,317 people within a 24-square-mile service area. The water system supplies a majority of residential connections. The utility's supply sources include imported surface water from the RWS, Valley Water, local groundwater sources and recycled water.

INDIVIDUAL SUPPLY GUARANTEE: 12.58 mgd

MINIMUM PURCHASE REQUIREMENT²: 8.93 mgd

VULNERABILITIES & OPPORTUNITIES³:

The City of Sunnyvale has a diversified water supply portfolio. The imported surface water from the RWS and Valley Water is subject to future restrictions due to climate change impacts, drought conditions and potential regulatory changes. Sunnyvale's groundwater wells are not used in priority but provide an alternative water source during drought conditions or in the event of imported supply interruption. The production of recycled water at the Sunnyvale's Water Pollution Control Plant supplies irrigation and landscaping needs at parks, golf courses, and specific industrial customers, and will be expanded to increase the Sunnyvale's supply resilience.

CURRENT & FUTURE LOCAL SUPPLIES:

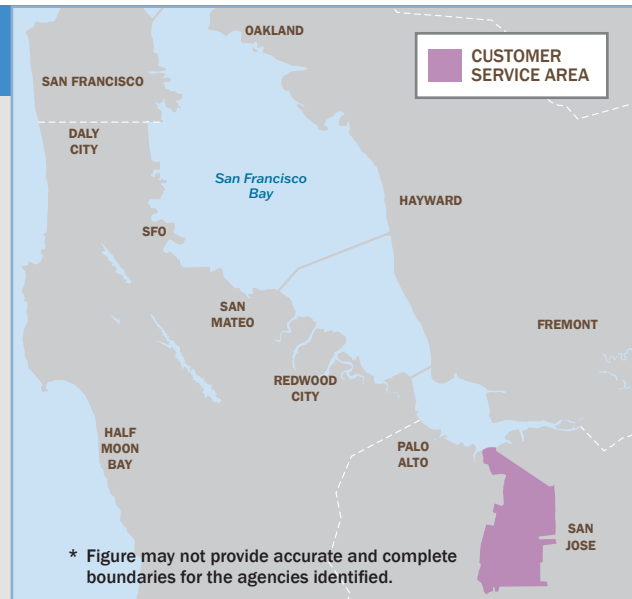
Sunnyvale has a project underway to prepare a Recycled Water Master Plan to evaluate opportunities to expand recycled water use. In addition, Sunnyvale has \$3.5 million budgeted in 2027-29 for the construction of a new well at the Central Water Plant.



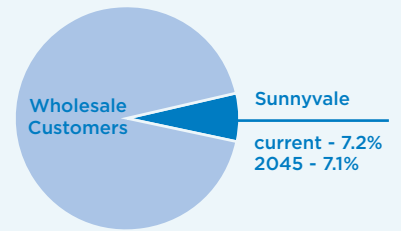
WATER CONSERVATION INSIGHTS^{3,4}

27% decrease in residential per capita (R-GPCD) water use since 2010.

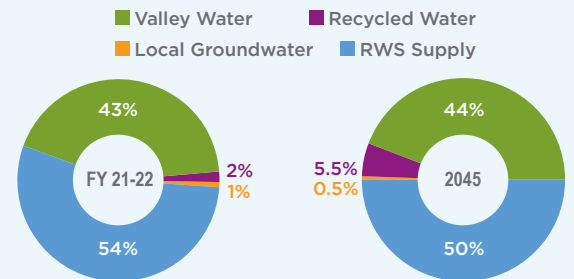
Sources: (1) '21-'22 BAWSCA Annual Survey, updated population provided by Sunnyvale (June 2023)
 (2) Amended and Restated Water Supply Agreement, 2021
 (3) Sunnyvale 2020 UWMP
 (4) '10-'11 BAWSCA Annual Survey



SHARE OF RWS DELIVERIES TO WHOLESALE CUSTOMERS¹

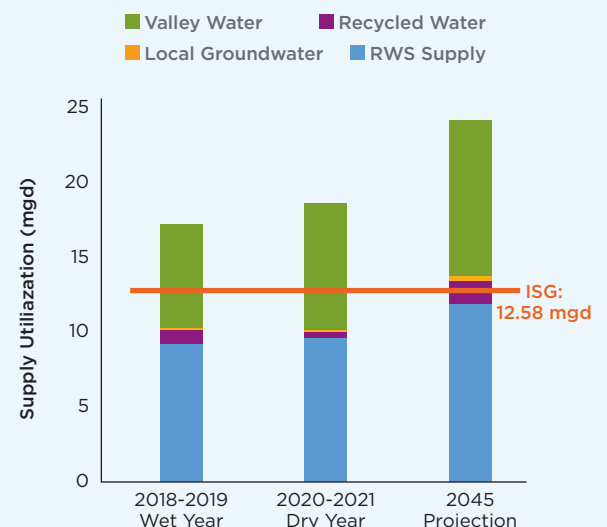


CURRENT & FUTURE SUPPLY PORTFOLIOS¹



SUPPLY MIX IN MULTIPLE YEAR TYPES¹

An increase in imported water from Valley Water will cover most of the planned increase in water demands



Westborough Water District

CUSTOMER OVERVIEW¹:

Westborough Water District supplies 13,486 people within the Westborough area, which represents approximately 20% of the City of South San Francisco. Residential use accounts for approximately 83% of total water usage. Westborough relies on RWS supply as its only supply source.

INDIVIDUAL SUPPLY GUARANTEE²: 1.32 mgd

VULNERABILITIES & OPPORTUNITIES³:

Westborough has limited opportunities for alternative water supply within its service area and relies on RWS supply for 100% of its water use. However, Westborough purchased between 56% and 68% of its ISG between 2016 and 2020. Since Westborough's service area is almost fully built-out, the system is therefore not anticipating significant growth in the residential or commercial sectors in the long-term and is not currently in urgent need of additional supplies based on their long-term planning

CURRENT & FUTURE LOCAL SUPPLIES:

Westborough is 100% reliant on RWS Supply, as it has limited opportunities for alternative water.

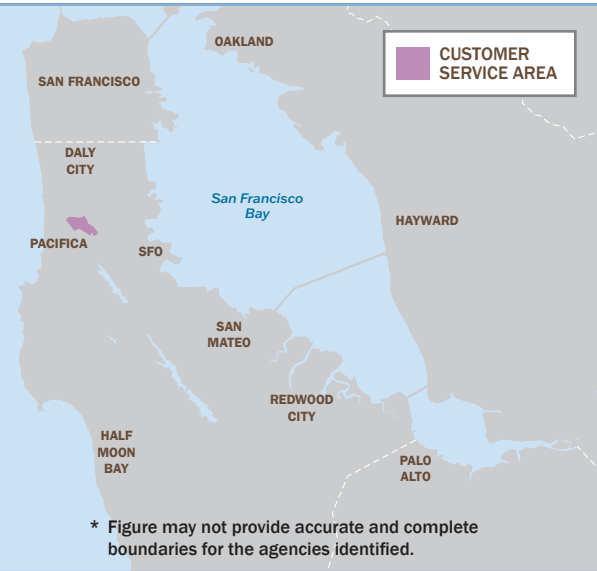


WATER CONSERVATION INSIGHTS^{1,4}

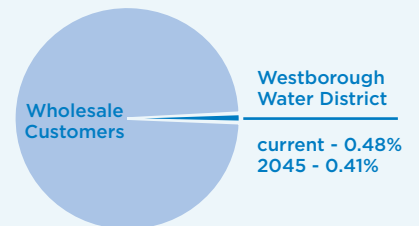
5% decrease in residential gallons per capita demand (R-GPCD) since 2010 due to a post-drought rebound in water usage.

Due to the drought and a continuous call for conservation including implementation of Stage 2 of the 2020 WSCP calling for a voluntary 15% reduction, for the FY 20-21, the gross GPCD went down to 57 R-GPCD.

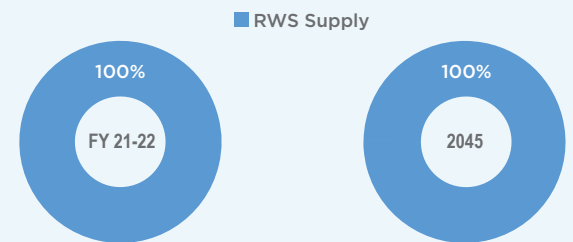
Sources: (1) '21-'22 BAWSCA Annual Survey
 (2) Amended and Restated Water Supply Agreement, 2021
 (3) Westborough Water District 2020 UWMP
 (4) '10-'11 BAWSCA Annual Survey



SHARE OF RWS DELIVERIES TO WHOLESALE CUSTOMERS¹

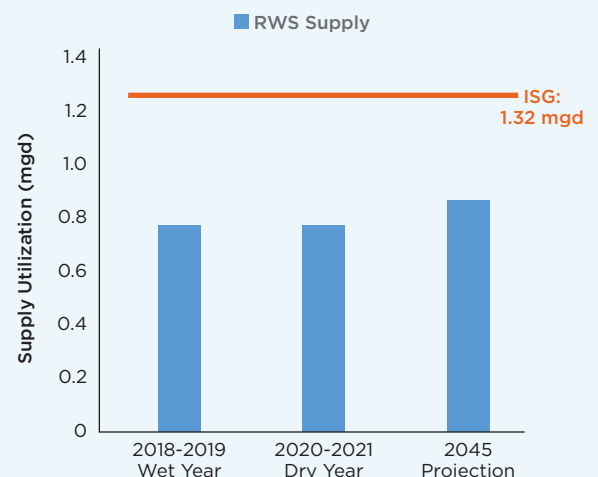


CURRENT & FUTURE SUPPLY PORTFOLIOS¹



SUPPLY MIX IN MULTIPLE YEAR TYPES¹

Anticipated passive conservation savings will lead to a decrease in the RWS supply needs, which will remain below ISG.



Appendix B: Water Availability Modeling

APPENDIX B. WATER AVAILABILITY MODELING

Purpose of this Appendix

This appendix presents supporting information and relevant details for modeling associated with Water Availability described in Chapters 2 and 3 of the AWS Plan.

Water System Modeling

The SFPUC uses a water supply planning methodology that was developed during and after the six-year drought that occurred in California from 1987 – 1992. This methodology includes using a water system simulation model (Hetch Hetchy/Local Simulation Model) and also includes the use of a planning drought simulation referred to as the “design drought”. Excerpts from Hetch Hetchy/Local Simulation Model) documentation are presented below to describe the model and the design drought simulation procedure.

Model Overview (Excerpted from Hetch Hetchy/Local Simulation Model)

The SFPUC has developed a computerized mathematical model to simulate system operations. The model, known as the Hetch Hetchy/Local Simulation Model, simulates the operation of San Francisco's Hetch Hetchy facilities, the Don Pedro Project, and the Bay Area reservoir, conveyance, and treatment systems.

The model simulates system operations over the course of an 82-year sequential hydrologic period from July 1920 through September 2002 [now extended to 2017]. The model incorporates actual historical information about the hydrology (the amount of runoff as snowmelt and rainfall) that occurred in each year over the [97]-year record for each of the three watershed areas under consideration: the Tuolumne River system, the Alameda Creek system, and the Peninsula watershed system. This [97]-year period includes many different types and sequences of actual hydrological events that have occurred ranging from flood events to droughts of different magnitude and duration. The long-term [97]-year historical record is used in the model to represent the range of hydrologic conditions that could occur in the future. The model is used to assess how the system would perform as the result of an assumed system configuration and assumed operational objectives.

The model uses actual historical hydrology for the depiction of runoff within the watersheds. However, the model is not expected to explicitly replicate observed historical operations in all cases. The past operation of the system in an actual year will differ to some degree from the operations simulated by the model for that year as a result of many factors. These factors include the anomalies in past operation that required system operators to adjust operations throughout the year to respond to prevailing, changing conditions of weather, demand, and facility conditions (maintenance or unplanned facility outages). Also, the model does not incorporate the dynamic physical and institutional changes that have occurred to the system throughout history. Rather, the model is intended to depict operations with an assumed consistent set of systematic operational

rules and objectives with a defined system configuration. This steady state of system configuration and operation is then evaluated over a broad range of hydrologic conditions. The utility of the model is the comparison of system performance that changes due to altering the assumptions for the operational rules and objectives, and system configuration.

Planning Methodology and Design Drought (Excerpted from Hetch Hetchy/Local Simulation Model)

Under normal conditions there are sufficient water supplies from rainfall, snowmelt, and storage such that water deliveries fulfill customer purchase requests and no systemwide water delivery reduction (rationing) is required.

System operations during drought periods require more complex planning and system management than during non-drought years. SFPUC drought planning uses as a backdrop the concepts of a "design drought" and "system firm yield." System firm yield is a measure of the amount of water that can be delivered to customers without shortages during all anticipated hydrologic sequences, including drought periods when rainfall, snowmelt, and/or streamflow conditions are substantially below normal for consecutive years. For planning purposes, the SFPUC uses a design drought that contemplates a more severe drought than historical events and evaluates the system firm yield assuming the system is experiencing the design drought. This premise is founded on experience that illustrates that drought sequences can get more extreme as our hydrologic record lengthens. The design drought is a planning tool developed by the SFPUC used to anticipate and plan for drought; the SFPUC uses a design drought based on the hydrology of the six years of the worst sequential historical drought (1987-1992) plus the 2½ years of the 1976-1977 drought for a combined total of an 8½ year design drought sequence.

The Regional Water System has experienced drought periods in the last 30 years: most notable are the droughts that occurred from 1976 through 1977, and from 1987 through 1992. [More recently, droughts have occurred in 2012-2016 and 2020 – 2022.] During the 1987–1992 drought, even with the implementation of customer rationing, the amount of carryover storage in the regional system was more severely depleted than during any previous period of time, and the SFPUC had to adjust its normal operating procedures to avoid 'running out of water'.

The 1987–1992 drought began at the end of the 1986 rainy season. Subsequent annual flows in the Tuolumne River were about 50 percent of average. The SFPUC's entitlement to Tuolumne River flow was reduced to about 16 percent of the total river flow, and less than 50 percent of the normal amount of water delivered to customers was available from the river. As the drought progressed, the SFPUC developed and implemented short-term procedures to impose rationing on customers that resulted in a near 25 percent annual systemwide reduction in water deliveries. The extended drought resulted in the SFPUC adopting a mandatory rationing program from 1988 to 1989 and again

from 1990 to 1993. Based on the experience of the 1987–1992 drought, the SFPUC modified its operational procedures with regard to drought planning.

The SFPUC system operations currently include a process for declaring a water shortage and a method for allocating reductions. The general protocol links total reservoir storage conditions to suggested delivery reductions. Each year, during the spring snowmelt period, the SFPUC evaluates the amount of total water storage throughout the system and determines if there is enough water available to serve full deliveries to customers within the context of the current year's supply and the design drought. At a certain reservoir storage, the SFPUC may impose delivery reductions. If reservoir storage becomes further depleted in a following year, the SFPUC may need to impose further delivery reductions. Currently with existing purchase requests there are three stages of delivery reduction: the first stage involves a 5 to 10 percent systemwide delivery reduction and is achieved by voluntary rationing; the second stage imposes an 11 to 20 percent systemwide delivery reduction and requires mandatory rationing; and, at the third stage of response, a 20 percent or greater systemwide delivery reduction would result in mandatory rationing with further reduced allocations. Prior to the initiation of any water delivery reductions, the SFPUC would hold a public meeting, open for public comment, to outline the water supply situation, the proposed water use reduction objectives, alternatives to water use reduction, and compliance monitoring methods.

The SFPUC quantifies water availability through the performance of two types of analyses. Each of these analyses provides a statement of the ability of the SFPUC Regional Water System to deliver water. The first type of analysis defines the system firm yield of the SFPUC system. As stated above, system firm yield is a measure of the amount of water that can be delivered to customers without shortages during all anticipated hydrologic sequences. System firm yield is the average annual water delivery that can be sustained without shortage throughout the 8½ year design drought. The second type of analysis identifies the reliability of the SFPUC Regional Water System during a recurrence of a long record of hydrologic conditions. The hydrologic record used for these analyses is the [97]-year sequence of hydrology previously described. A system firm yield study will identify the rules of operation and delivery rationing that maximizes water deliveries during the design drought. Those rules are then applied within a system performance study to identify the reliability of water deliveries and system operation over a long sequence of hydrology.

The system firm yield study is focused on operations and water deliveries during drought sequences. As described previously, the SFPUC uses a design drought that contemplates a more severe drought than historical events and defines the system firm yield assuming the system is experiencing the design drought. To quantify the system firm yield, operation of the SFPUC system is tested during the design drought with increasing levels of delivery and varying protocols for rationing until useable reservoir storage is depleted at the end of the design drought. These deliveries are the metric of the amount of water available after satisfying all of the other commitments of the system such as required stream releases and flow obligations to the Districts. Since the level of delivery

(percentage of full purchase request) can vary year to year within the design drought, the system firm yield is expressed as the average annual water delivery that can be sustained throughout the entire 8½ year design drought. The analysis that defines system firm yield simulates system reservoir storage being fully depleted at the end of the design drought sequence.

In 2020, SFPUC developed the Water Supply and Demand Worksheet, which provides a simplified presentation of some important elements of the water supply planning methodology; it was developed to make the water supply planning methodology more accessible to decision-makers and interested members of the public. The Alternative Water Supply Program has used some of the presentation metrics from the worksheet for the evaluation of water availability. The worksheet allows users to view and modify assumptions about RWS system demand, water supply projects and obligations, and RWS operation during the design drought, to see the effect on available RWS water supply and rationing. Links to the [Water Supply and Demand Worksheet](#) and companion [Worksheet User Guide](#) can be found on the SFPUC website (<https://www.sfpuc.org/programs/future-water-supply-planning/planning-tools-and-documents>).

Appendix C: AWS Program Cost Development Approach

APPENDIX C. AWS PROGRAM COST DEVELOPMENT APPROACH

Purpose of this Appendix

This appendix presents supporting information and relevant details for the AWS Program costs shown in the AWS Plan.

AWS Proforma Modeling

To begin to understand the level of investment needed for the AWS Program, the SFPUC has undertaken financial analysis to evaluate the costs for implementing the AWS Program. In conjunction with preliminary feasibility analyses and cost estimates that are being prepared for individual projects within the AWS Program, a Proforma Model is being developed to assess the costs for the AWS Program (AWS Proforma Model) over the 2045 planning horizon. The intent of the model is to use a uniform set of planning assumptions to provide a framework that would allow staff to incorporate updates on a continuing basis including adding new projects in the AWS Program portfolio.

While development of the AWS Proforma Model is not complete at the time of publication of this AWS Plan, initial estimates derived from the model have been used to reflect potential capital costs and unit costs for each AWS project, where the costs represent a snapshot as of May 2023.

Cost Estimating Considerations for the AWS Plan

The AWS Program portfolio includes a diverse set of projects. The projects vary widely in terms of their location, water production, operation, and capital infrastructure needs. The range of complexity also varies among projects, with one (Calaveras Reservoir Expansion) undertaken entirely by the SFPUC to those such as the Los Vaqueros Expansion (LVE) Project that include multiparty arrangements between various agencies with different interests. Further, the projects are in different stages of planning and vary in their individual schedules to deliver water. The projects thus present a unique set of challenges for cost estimating.

Project-level planning, including feasibility studies and alternatives' analyses, are ongoing and continue to proceed in parallel with the development of the AWS Proforma Model. As costs are updated in project planning, those changes are reflected in the AWS Proforma Model, but there may be a lag. Additionally, the cost estimate for a project in its feasibility study may be based on different or incomplete assumptions compared to the AWS Proforma Model, which uses some uniform assumptions, which were standardized to the extent possible, based on past SFPUC infrastructure projects.

As noted previously, five of six AWS Projects involve multiparty partnerships. For most, cost-sharing among partners and other offsets such as state and federal grants have not been determined at this time and will only be available as project-level planning proceeds. The intent of the financial analysis at the present time is generally to develop the total capital costs or

100% of the costs for capital investment toward the projects, notwithstanding the potential cost-sharing and cost offsets or cost of integrating or operating projects in the future.

Cost Estimate Classifications

The cost estimates developed at the project-level are generally based on Association for the Advancement of Cost Engineering (AACE, Inc., 2005)¹ standards of project cost estimating used to classify the degree of project definition and maturity (see **Table C-1**). As each AWS Project is further defined and cost components are refined, the expected range of cost accuracy will also continue to improve, moving the project into a different cost classification. The cost estimates for the AWS Projects are currently predominantly Class 5 estimates except for the LVE Project and Daly City Recycled Water Expansion Projects, which are further along in planning and therefore have a higher degree of specificity. The cost estimate for the LVE Project is a Class 2 cost estimate and that for the Daly City Recycled Water Expansion Project is a Class 3 cost estimate. The table below describes the standard classifications for infrastructure cost estimating.

Table C-1: COST ESTIMATE CLASSES

Cost Estimate Class	Description	Expected Range of Accuracy*
Class 5	Class 5 estimates are prepared for any number of strategic business planning purposes, such as but not limited to market studies, assessment of initial viability, evaluation of alternate schemes, project screening, project location studies, and long-range capital planning. They are generally prepared based on very limited information and subsequently have wide accuracy ranges.	- 20% to -50% on the low side, and +30% to +100% on the high side
Class 4	Class 4 estimates are typically used for project screening, determination of feasibility, concept evaluation, and preliminary budget approval. They are generally prepared based on limited information and subsequently have fairly wide accuracy ranges.	-15% to -30% on the low side, and +20% to +50% on the high side
Class 3	Class 3 estimates are generally prepared to form the basis for budget authorization, appropriation, and/or	-10% to -20% on the low side, and

¹ AACE, Inc. AACE International Recommended Practice No. 18R-97, Cost Estimate Classification System – As Applied in Engineering, Procurement, and Construction for the Process Industries, 2005.

	funding. As such, they typically form the initial control estimate against which all actual costs and resources will be monitored. Class 3 estimates are typically prepared to support full project funding requests and become the first of the project phase “control estimates” against which all actual costs and resources will be monitored for variations to the budget. They are used as the project budget until replaced by more detailed estimates.	+10% to +30% on the high side
Class 2	Class 2 estimates are generally prepared to form a detailed control baseline against which all project work is monitored in terms of cost and progress control. For contractors, this class of estimate is often used as the “bid” estimate to establish contract value.	-5% to -15% on the low side, and +5% to +20% on the high side
Class 1	Class 1 estimates are generally prepared for discrete parts or sections of the total project rather than generating this level of detail for the entire project. Class 1 estimates are typically prepared to form a current control estimate to be used as the final control baseline against which all actual costs and resources will now be monitored for variations to the budget and form a part of the change/variation control program.	-3% to -10% on the low side, and +3% to +15% on the high side

* Expected range of accuracy provided depends on the technological complexity of the project, appropriate reference information, and other risks (after inclusion of an appropriate contingency determination). Ranges could exceed these shown in unusual circumstances.

Source: AACE, Inc, 2005

AWS Project Cost Calculations

The **bolded** terms described in this section are the terms used in **Table 5-1** of the AWS Plan.

Each AWS Project has its own schedule with anticipated phases including planning, engineering design, environmental review and permitting, construction, and construction management The AWS Plan provides a **Status** for each project by stating the phase the project is in as of May 2023 (at the time the AWS Plan was prepared) with the **Cost Estimate Classification** as described in **Table C-1**. The table then identifies the **SFPUC Supply Assumed**, which estimates the volume of water that may be available to address dry year needs for the SFPUC toward the identified gap. For most projects, this supply assumed demonstrates a current assumption of potential benefit and is not used in the calculation of costs. The **Estimated Online Date**

identifies a projected date when the project could begin deliveries. This date and the corresponding schedule for construction help determine the level of escalation costs assumed for a project, which is typically to the mid-point of construction. If the project construction schedule is delayed, additional escalation costs may be incurred.

The **Total Capital Costs** are presented in two ways in **Table 5-1** of the AWS Plan. First, the **Escalated** costs reflect the real costs anticipated over multiple years of planning and construction. As broken down in **Table C-2** below, the capital costs include Construction Costs, Owner’s Administrative Costs, and Development Costs. These categories of costs include contingencies and escalation factors, as shown. For the Daly City Recycled Water Project, which has a Class 3 cost estimate a 30% contingency is assumed. For other projects that have Class 5 cost estimates, a 35% contingency is assumed. The Los Vaqueros Expansion Storage project utilizes a different contingency calculation based on its project proforma model.

Total capital cost is the sum of Construction, Owner’s Administrative Costs, and Development Costs. It includes contingency and escalation factors as part of construction cost estimating and other costs (Owner’s Administrative and Development) are based on percentages of those total construction costs.

Table C-2: CALCULATION OF ESCALATED CAPITAL COSTS

Cost Component	Definition	Cost Basis and Calculation
Construction Cost	Cost associated with building a project. Components: <hr/> Direct costs associated with construction of proposed project facilities and connections and updates to existing structures or facilities, as applicable and <hr/> Indirect costs associated with construction such as contractor general conditions, overhead and profit, and insurance	Based largely on project-level feasibility studies and may include additional assumptions for land, etc. if not included in study
Contingency	A contingency is intended to account for changes in costs over a project timeline	A contingency of 30% applied to construction cost for Class 3 estimate <hr/> A contingency of 35% applied for Class 5 estimates

		Additional contingency of 10% on the escalated construction cost described below
Escalation	Escalation accounts for planning and construction anticipated to occur in the future and varies with the project schedule.	Escalation factor is applied to construction cost after a contingency of 30% or 35% Escalation factor is based on project schedule and SFPUC's standard rates (i.e., yearly escalation rate of 6% for 2023 and 2024 and 4% for 2025 and thereafter)
Owner's Administrative Cost	Costs associated with administration during construction. Components: <hr/> Environmental avoidance & mitigation (0.1%) <hr/> Security upgrades (0.5%) <hr/> Project management (3%) <hr/> Environmental construction compliance (0.5%) <hr/> Construction management - engineering support (4%) <hr/> Construction management - contract management and administration (12%) <hr/> Legal project support (0.5%) <hr/> Operations and water quality support (1.5%)	Calculated as 22.1% of escalated construction cost with contingencies Cost components based on past SFPUC infrastructure projects

Development Cost	Costs associated with developing and planning a project anticipated to be incurred prior to construction.	Calculated as 15% of the construction cost
	Components:	Cost components based on past SFPUC
	Land and right-of-way (ROW) acquisition (0.5%)	infrastructure projects and standard industry practice
	Project management (1%)	
	Pre-design planning (2%)	
	Environmental review and permitting (1%)	
	Engineering design (10%)	
	Legal ROW support (0.5%)	

The calculation of **Estimated Capital Cost per Acre-Foot** is the unit cost based on the total capital cost in current terms or the **2023 \$ Capital Costs** divided by the **Project Capacity** in acre-feet over a period of 30 years. While the project life of many of these projects may be greater than 30 years, convention on SFPUC-financed projects has been to consider costs over the standard 30-year financing period.

$$\text{Capital Cost Per Acre-Foot} = \frac{\text{Total Capital Cost in 2023 \$ X 1,000,000}}{\text{Project Capacity in Acre-Feet per Year X 30 (financing period)}}$$

For most projects, the Project Capacity represents the maximum yield of the project, regardless of whom may receive deliveries as that may not be confirmed. In some instances, assumptions have been made for the purpose of this Plan. For the ACWD-USD Purified Water Project, only the first phase evaluated in the Feasibility Study is assumed in the AWS Plan although a subsequent phase could be implemented. However, due to the complexity of the project and the distinct nature of the second phase relative to the first phase, it is not assumed. The LVE Project, as an exception, only reflects costs and capacity related to the presumed SFPUC share of the regional storage project. This is because the project is further along in identifying cost allocations and potential benefits. While these costs and volumes may still change as the project progresses, key cost components are known and the project has its own detailed proforma model that has been reviewed and vetted among project partners. Because the SFPUC will

definitively not lead project construction or operation on its own, applying SFPUC standard cost metrics was not appropriate for this project.

For storage projects, the project capacity is the annual average water supply available over 7½ years of the SFPUC's 8½ year design drought accounting for evaporative (8%) and conveyance (10%) losses. As has been assumed for the Regional Groundwater Storage and Recovery Project, dry year storage is not typically drawn down in the first years of a drought when a drought is not yet declared, so available supply is assumed over 7½ years. As an example, the 3.9 mgd capacity for the LVE Project represents average annual deliveries of a full reservoir over 7½ years of the design drought.

Future AWS Project Cost Factors

The AWS Proforma Model remains under development. Meanwhile, project planning will continue to progress in parallel and costs will continue to be updated and detailed. This could include information that is not available as of May 2023 such as, but not limited to, the following cost categories:

- **Grants and Loans:** The estimated costs for the AWS Program do not account for or include any reductions from grants or other funding sources.
- **Operations & Maintenance (O&M) costs:** The costs shown in the AWS Plan do not include (O&M costs, which will be estimated for AWS Projects as part of the continuing financial analysis for the AWS Program. **Table C-3** shows potential O&M costs anticipated for an AWS Project.
- **Ownership and Financing:** The estimated costs do not account for or include plan of financing. Actual financing strategies, financing instruments, and cost of funds are yet to be determined and may be dependent on the ownership structure for a project. The costs will be updated to incorporate the ownership structure and financing mechanisms for the project as they are known. AWS staff will continue to work with the Finance team to identify capital planning and budgeting options.
- **Cost share:** Except for the Calaveras Reservoir Expansion Project, all AWS Projects involve multiparty partnerships. The costs estimated at this time represent total capital costs and do not represent the share of individual partners. The cost share is not known at this time and will be determined in collaboration with project partners. As the financial analysis continues, additional costs will also be included such as those associated with the connection of the AWS Projects with the local systems, project operations and benefits from the projects and as they are apportioned among partners.
- **Project operations and benefits:** Details on project operations and benefits are not available for most projects. Delivery schedules of water would vary significantly with time, precipitation (dry or wet years), type of project (e.g., water supply, storage, conveyance), and other factors which will need to be coordinated with project partners and assessed for benefits and operations. As planning progresses, cost-shares for projects will also reflect the benefits for the SFPUC associated with project implementation.

- **Alternatives' Analyses:** For most projects, several scenarios are being assessed. As alternatives are selected, the infrastructure and operational requirements will likely shift affecting the costs and schedule for projects.

Table C-3: POTENTIAL O&M COSTS

Total O&M Cost	
O&M Costs: Costs to operate the project to produce and deliver water, here assumed over 30 years and the maintenance of facilities and equipment.	
Calculated as total of components listed above over the 30-year project operation (components based mostly on industry practices and SFPUC's past project data)	Chemicals usage
	Staffing
	Insurance costs
	Electricity
	O&M contingencies
	Renewal and Replacement
Contingencies and Escalation	

Appendix D: Response to Comments

APPENDIX D. RESPONSE TO COMMENTS

This Appendix D was prepared between September 2023 and January 2024 and represents a new component of the Final AWS Plan. It includes a copy of each of the 14 written comment letters received during the public review period for the Draft AWS Plan (June 28 to August 31, 2023), with over 160 specific comments marked and coded for ease of reference (e.g., A-1, A-2, A-3 through N-1, N-2, N-3). All formal comment letters received and included in this appendix are shown in **Table 1** below. Each comment letter is followed immediately by responses to the corresponding comments prepared by SFPUC staff. The responses are largely contained within this appendix; any edits or other modifications to the AWS Plan are referenced in the specific response. Acronyms that are used in other parts of the document are not defined again in this section but can be found in the main body and/or Glossary of the AWS Plan.

Table 1: Comments Received on the Draft AWS Plan

Commenter	Date Received	Comment Letter Designation
Alameda County Water District (ACWD)	August 31, 2023	I
Bay Area Water Supply & Conservation Agency (BAWSCA)	August 31, 2023	F
California Water Service (Cal Water)	August 31, 2023	J
City of Santa Clara	August 31, 2023	K
Coastside County Water District	August 15, 2023	C
Dave Warner, Member of the Public	August 30, 2023	E
David Happs, Member of the Public	August 31, 2023	H
Restore Hetch Hetchy	August 31, 2023	N
San José Municipal Water System (SJMWS)	August 31, 2023	L
SFPUC Citizens' Advisory Committee (CAC) Water Subcommittee	August 29, 2023	M
Sierra Club, California; Tuolumne River Trust; San Francisco League of Conservation Voters; Golden State Salmon Association; California Sportfishing Protection Alliance; Sierra Club, San Francisco Bay	August 31, 2023	G
Steve Lawrence, Member of the Public	July 11, 2023	B
Tuolumne River Trust	August 31, 2023 (includes some comments sent via email on July 10, 2023)	A
William L. Martin, Member of the Public	August 30, 2023	D

Preceding release of the draft document for public comment, the AWS Plan was presented to the SFPUC Commission at a public meeting on June 27, 2023. The AWS Plan was also presented at the following that were open to the public:

- BAWSCA Board Policy Committee, June 14, 2023
- Bay Area Water Stewards (BAWS), June 15, 2023
- SFPUC Citizens' Advisory Committee (CAC) Water Subcommittee, June 27, 2023
- BAWSCA Board of Directors, July 20, 2023

On August 22, 2023, the CAC Water Subcommittee discussed comments and questions on the AWS Plan in a public meeting where AWS staff was present and available to provide clarifications or respond to comments in person. A transcript of that meeting was submitted as a formal comment letter and is included in this appendix (Comment Letter M).

Some topics received numerous comments across individual letters. For such common topics, staff have prepared Global Responses that are provided ahead of all individual comment letters and responses. These Global Responses are referenced in individual responses, as appropriate. The topics with Global Responses include:

1. Demands
2. Design Drought
3. Rationing
4. Projects with Irrigation Districts

Global Response 1: Demands

The SFPUC has received numerous comments requesting changes to how regional water demands are estimated and projected. Like other planning tools, demand projections are developed outside of the AWS planning process and are used for estimating needs broader than those represented in the AWS program. Furthermore, the SFPUC is responsible for forecasting only retail demands, while Wholesale Customer demands are projected by individual customers and analyzed and reported by BAWSCA. Nevertheless, ensuring that demand projections reflect the best available data and assumptions is critical for a program that identifies a water supply gap and potential solutions largely based on demands of retail and wholesale customers 20 years in the future.

The SFPUC's demand forecasting methodology has evolved over time to reflect its planning needs. For over a decade, the SFPUC used an end-use model, which more accurately reflected the impact of changing plumbing codes and conservation measures than a land use demand model would be able to do, for example. More recently, the SFPUC has been using an econometric model to forecast water demands. An econometric model focuses on the relationship between economic variables - such as employment growth, economic trends, and policy changes - and water demand. Moving to an econometric model has helped improve the quality of demand projections. BAWSCA has similarly moved from an end-use model to an econometric model to reflect Wholesale Customer demand projections.

As the SFPUC faces significant future decisions to invest in alternative water supplies, staff recognize the need to continue improving the quality and accuracy of its demand forecasting. To this end, the AWS Plan includes a new Recommendation 5 in Chapter 6 to revisit the SFPUC retail demand modeling. Staff would also work closely with BAWSCA as it updates Wholesale Customers' demand projections. Implementation of changes to the demand modeling will be a significant undertaking but would be completed before the AWS Plan is updated in 2026.

As part of this effort, the following improvements to the water demand forecasting will be evaluated:

- Compare prior estimates to delivery and sales data to identify key factors that may need to be recalibrated, changed, or added;
- Review model assumptions and the sensitivity of select factors such as estimated housing units and residents per unit; and
- Consider presenting demands as a range or reflecting more than a single potential outcome;

The resulting demand scenario(s) would be incorporated into future AWS gap estimates to support future investment recommendations.

Global Response 2: Design Drought

The SFPUC has received comments calling for a risk analysis on the use of an 8.5-year design drought or for a reduction in the design drought duration from 8.5 to 7.5 years. The design drought is an important planning tool used by the SFPUC for various water supply planning, including but not limited to, the AWS Plan.

By putting two historically significant droughts together, the design drought creates a planning scenario that helps the SFPUC maintain reliable water supply infrastructure and delivery that can withstand extreme and prolonged periods of reduced snowmelt and precipitation. While the SFPUC acknowledges the low probability of an 8.5-year drought occurring, according to what we know about the historic hydrology of the region, we also recognize that the global climate is changing, and that California weather may become more variable as a result. Preparing for this type of scenario helps the SFPUC safeguard the water supply needs of our customers.

The SFPUC remains committed to adaptive management practices that enable responsiveness to changing conditions and will continue to revisit its planning tools periodically. At this time, the SFPUC will not modify its design drought as part of the AWS planning process.

Global Response 3: Rationing

The SFPUC received multiple comments expressing either confusion or disagreement with how rationing is quantified and how it relates to the volume of water available (i.e., total system yield as described in Section 2.3.1).

Rationing is expected to be necessary on the RWS during droughts, and it is included in water supply planning as part of the SFPUC's approach to drought management. Section 2.3.1 describes the baseline water availability from the RWS during dry years and includes rationing that would be needed with the WSIP program completed. The level of rationing that is identified in this section is approximately 12% of the total system yield, which is consistent with what was developed for and adopted under the WSIP PEIR. While it is not a standalone policy, it was developed for the WSIP program using the standard water supply planning methodology employed by the SFPUC and described in Appendix K of the 2020 UWMP.

In Section 3.2.1, the AWS Plan describes how both water supply (i.e. firm yield) and the volume associated with rationing would change with the implementation of the Bay-Delta Plan Amendment by keeping the level of rationing constant at 12% of the total system yield. Maintaining the same level of rationing isolates the Bay-Delta Plan Amendment as the only variable, demonstrating the impact of its implementation as compared to the baseline scenario described in Chapter 2. This comparison is shown in Table 3-1. As described in the 2020 UWMP, another way to look at the effect of the Bay-Delta Plan Amendment scenario in the absence of new supplies could be to increase rationing to 40%-50%. However, the AWS planning effort focuses on exploring options to reduce the need for such rationing measures back down to the 12% level that is expected to be achievable, even as conservation continues to drive down per capita consumption. While each drought is unique and future rationing decisions may be affected by State mandates or the need to fill a near-term supply shortfall, for AWS planning, 12% continues to be a reasonable long-term planning assumption. During the most recent drought that ended in 2023, the SFPUC called for 10%-11% system-wide water use reductions compared to Fiscal Year 2019-2020 levels.

While rationing can be thought of as a function of demand, it can also be represented as a volume of unrationed deliveries, or avoided deliveries. Analogous to thinking of conservation as a supply, by thinking of it this way, rationing can be counted on as part of water availability in dry years. In other words, customer demands aren't altered across wet and dry years, only water available (the combination of delivered water and avoided deliveries [rationing]) changes in dry years. For AWS planning, keeping water demands constant avoids potential confusion associated with having different numbers for both demand and water availability in calculating the water supply gap.

Global Response 4: Projects with Irrigation Districts

The SFPUC has committed to working with irrigation districts in the Central Valley to explore opportunities to increase supply reliability and fishery protection in the Tuolumne River. Conjunctive use opportunities and other improvements to storing wet year water for dry year use in the basin are expected to be evaluated in addition to opportunities of inter-basin San Joaquin tributary exchanges. The SFPUC will continue to work with its partners in the San Joaquin basin to reach the shared goals of supply reliability and fishery protection through the creation of additional water resources. The SFPUC is prepared to contribute financially to the development of these resources. Community support in the San Joaquin basin for these types of projects will be critical to their successful implementation and the SFPUC recognizes the necessity of this support and stands ready to play its appropriate role. Recommendation 4 in Chapter 6 includes providing periodic updates to align with AWS Project milestones.

August 31, 2023

AWS Planning Team
SFPUC
aws@sfgwater.org

OFFICES
San Francisco

Modesto

Sonora

Mailing Address
P.O. Box 3727
Sonora, CA 95370

Phone
(415) 882-7252

Website
www.tuolumne.org

BOARD MEMBERS
John Kreiter, Chair
Harrison "Hap" Dunning,
Vice Chair
Cindy Charles, Treasurer
Marek Robinson, Secretary
Jose Borroel
Eddie Corwin
Eric Gonzalez
Camille King
Marty McDonnell
Homer Meja
John Nimmons
Eric Riemer
Iris Stewart-Frey
Bart Westcott
Brad Wurtz

Re: Draft Alternative Water Supply Plan

Dear Manisha, Steve and Others:

Please accept the following comments on the SFPUC's draft Alternative Water Supply Plan. I would appreciate responses to the questions I raise.

1) Problems with Figure 2-6.

The historic purchases graph appears to have several problems.

- a) It is missing FY 14-15. A-1
- b) The bars for FY 09/10, 12/13 and 13/14 appear to be about the same, but the purchases are different (significantly for FY 13/14). A-2
- c) Purchases for FY 20/21 are higher than reported in the Water Resources Annual Report (195 mgd). A-3

Figure 2-6: Historical Retail and Wholesale Purchases from the RWS (2000-2022)



Source: BAWSCA San Francisco RWS Purchases (<https://bawsc.org/water/supply/purchases>) (Wholesale Customer demands)

Please correct Figure 2-6.

2) Rationing should be based on demand, not supply.

The following statement from Table 3-1 is confusing, and potentially incorrect. Rationing is based on a percentage of demand, not supply.

- b The water supply benefit realized through rationing represents the average annual volume of water delivery reductions in an extended drought. The volume of delivery reduction is proportional to the available water supply, or firm yield. Because the instream flow requirements called for in the Bay-Delta Plan Amendment would reduce the firm yield, the supply benefit realized through rationing would also be reduced.

Look at it this way. Imagine your salary is \$100,000/year, and you spend \$90,000/year on living expenses, banking \$10,000/year for your retirement. \$100,000 is your annual “supply,” and \$90,000 is your annual “demand.”

The economy experiences a recession, and your boss is forced to cut your salary by 20%, bringing your annual income (supply) down to \$80,000/year. You now need to cut costs and reduce your spending (demand) by \$10,000/year in order to preserve your retirement fund. This is the equivalent of rationing.

Reduced spending (rationing) is based on your spending (demand), not your salary (supply). The statement in the Plan that “The volume of delivery reduction is proportional to the available water supply” appears incorrect, or at least misleading.

Please explain.

3) Water supply loss figures related to the Bay Delta Plan don't match.

The AWS Plan states:

The Bay-Delta Plan Amendment, if implemented as adopted in 2018, would result in new instream flow requirements that would reduce the SFPUC's available water supply by an estimated 93 mgd per year. (p. 36)

And:

The Bay-Delta Plan Amendment, if implemented as adopted in 2018, would result in new instream flow requirements that would reduce projected water availability from the RWS in dry years from 257 mgd to 152 mgd. (p. XII)

The second statement suggests the Bay Delta Plan would reduce supply by 105 mgd (257 mgd minus 152 mgd). One would think the two figures should match up, but there's a difference of 12 mgd. Why is this?

Could it be that the 105 mgd figure was calculated using the SFPUC's “rationing policy” rather than its rationing methodology?

Please explain.

4) How was the SFPUC's “rationing policy” adopted?

The AWS Plan states:

The SFPUC estimates that the water demand addressed through rationing is 30 mgd, **based on the adopted rationing policy that was adopted under the WSIP Programmatic Environmental Impact Report (PEIR) in 2008**. This policy assumes that rationing is approximately 12% as an

A-5

A-6

annual average over the 8.5-year design drought sequence. Over the 8.5 years of simulated drought, rationing is initially 0% and increases up to a maximum of 20%, with the annual average over the sequence being about 12%. (p. 23)

Resolution 08-0200, which codified the WSIP, does not mention the SFPUC's "rationing policy." Please explain how it was adopted.

5) Several BAWSCA agencies are requesting more water than their ISGs allow.

I looked at the BAWSCA agencies' purchase request projections for 2045 (provided in 2021), and discovered that four agencies requested more water than they are entitled to under their Individual Supply Guarantees (ISG). Following are those agencies.

Agency	ISG (mgd)	Purchase Request	Difference (mgd)
ACWD	13.76	13.80	0.04
Daly City	4.29	5.81	1.52
Purissima Hills	1.63	2.15	0.52
San Bruno	3.25	4.78	1.53

A-7

The total difference between ISGs and requests is 3.61 mgd. If this is correct, shouldn't 3.61 mgd be subtracted from the 244 mgd cited as "Demands" in the AWS Plan?

6) The South Bay Purified Water Project would widen the water supply gap.

The first goal listed in Chapter 6 of the AWS Plan is to "Avoid widening the water supply gap." (p. 111)

Most people who follow SFPUC issues have been under the impression the South Bay Purified Water Project was conceived to meet the current demand of 9 mgd from San Jose and Santa Clara. We assumed this was aimed at making the decision on whether to make the cities permanent customers without increasing BAWSCA's Water Supply Assurance a little easier. It turns out this is not the case. The Plan states:

The cities of San Jose and Santa Clara are currently interruptible customers of the SFPUC and have requested permanent status, as discussed in Chapter 2 (Background). The two cities' combined projected demand is **15.5 mgd** for the planning horizon. They have requested a guaranteed supply from the SFPUC of 9 mgd (total). In order for the SFPUC to consider granting San Jose and Santa Clara permanent status and to minimize impacts to the existing permanent Wholesale Customers, the two cities must secure a reliable supply to meet their additional demands beyond the 9 mgd that they have requested as a guarantee. This project would produce 6.5 mgd of purified water to serve the needs of San Jose and Santa Clara beyond the cities' purchases from the SFPUC, while augmenting RWS supplies by 3.5 mgd in dry years. Implementation of this project would support the SFPUC's decision to make San Jose and Santa Clara permanent customers. (Appendix A)

A-8

The project would produce 6.5 mgd to meet the additional requests from San Jose and San Jose in all years. In dry years, the project would produce an additional 3.5 mgd for use by the SFPUC. Assuming the SFPUC would use its 3.5 mgd to help meet the cities' existing demands (9 mgd) from the RWS, the water supply gap would still be 5.5 mgd (9 mgd minus 3.5 mgd).

Making San Jose and Santa Clara permanent customers would widen the SFPUC's water supply gap.

7) Which AWS projects are covered by the \$4 billion to \$10 billion cost estimate?

Does the \$4 billion to \$10 billion cost estimate cited on page 124 apply only to the AWS projects listed in Table 1? How many mgd would the \$4 to \$10 billion produce?

A-9

8) Will more than half of the initial AWS Plan funding be used for the Daly City Recycled Water Project?

I find it hard to believe that \$116 million of the recommended \$209 million for the AWS Project and Programmatic Recommendations would be used to develop only 0.7 mgd of recycled water in Daly City.

A-10

Am I reading the Plan correctly?

9) Why isn't a partnership with the Irrigation Districts a top priority?

The AWS Plan makes it appear that the SFPUC and Irrigation Districts are holding collaboration on water supply projects in Stanislaus County hostage to the Tuolumne River Voluntary Agreement. Collaboration has tremendous potential, and failing to at least analyze opportunities in the AWS Plan is a lost opportunity. The Plan states:

A-11

These projects [joint projects with Irrigation Districts] are part of the Proposed Voluntary Agreement and are not the focus of the AWS Program. These projects may be included as part of future updates to the AWS Program. However, the results of Proposed Voluntary Agreement negotiations will determine how these actions may progress and potentially reduce the impact of the Bay-Delta Plan Amendment on SFPUC's future water supply gap and are therefore an essential component of the SFPUC's long-term water supply planning efforts. (p. 52)

In 2012, while attempting to gain public support for the proposed water transfer between the Modesto Irrigation District and the SFPUC, MID staff gave a presentation to their board titled "Comprehensive Water Resources Management Plan." Staff identified 25,000 to 40,000 acre feet of water that could be saved if they had the funding for infrastructure improvements. It was proposed that the funding would come through the sale of water to the SFPUC. The total estimated cost of all the proposed improvements was \$115 million.

The AWS Plan should at least analyze the potential for water conservation and groundwater recharge in the Irrigation Districts' service areas.

Thank you for the opportunity to provide comments and raise questions.

Sincerely,

A handwritten signature in blue ink that reads "Peter Drekmeier". The signature is written in a cursive style with a large initial 'P'.

Peter Drekmeier
Policy Director

Response to Comment Letter A

Tuolumne River Trust

Peter Drekmeier, Policy Director

August 31, 2023

- A-1** Figure 2-6 has been updated in Final AWS Plan to reflect this comment, adding data for FY14-15.
- A-2** Figure 2-6 has been updated in Final AWS Plan to reflect this comment, correcting the size of the bars to more accurately reflect the data.
- A-3** Purchase numbers shown in the FY 2020-21 Annual Report do not include losses. A new footnote to Figure 2-6 has been added to clarify that retail numbers include losses.
- A-4** See Global Response 3.
- A-5** The difference calculated in the comment (105 mgd) represents the impact of not only the Bay-Delta Plan (93 mgd) but the impact of implementing rationing. See Global Response 3. The 12-mgd difference between 93 mgd and 105 mgd is the difference between the water demand addressed through rationing in the with and without Bay-Delta Plan scenarios (30 mgd versus 18 mgd) with the level of rationing (12% of total system yield) being held constant across the two scenarios.

The second statement referenced in the comment will be updated to clarify that this reduction in projected water availability is expressed as total system yield. The statement will be updated to read: "The Bay-Delta Plan Amendment, if implemented as adopted in 2018, would result in new instream flow requirements that would reduce projected water availability from the RWS in dry years, expressed as total system yield, from 257 mgd to 152 mgd."

- A-6** See Global Response 3.
- A-7** While individual Wholesale Customers have ISGs, the SFPUC has a perpetual obligation to provide up to the Supply Assurance of 184 mgd to Wholesale Customers. The WSA allows for the transfer of ISGs between customers. Therefore, as long as the collective demand of the Wholesale Customers is below the Supply Assurance, the SFPUC plans to be able to meet aggregate demands.
- A-8** The South Bay Purified Water does not widen the water supply gap of 92 mgd in 2045, it would reduce that gap by 3.5 mgd. The Cities of San Jose and Santa Clara have been purchasing water from San Francisco since 1975. Their historical purchases from San Francisco have been approximately 4.5 mgd each, or 9 mgd cumulative demand for the two cities. These historic deliveries are consistent with the projected demands through 2045, which are included in the calculation of the projected water supply gap. The cities of San Jose and Santa Clara are classified as Interruptible Customers of San Francisco. This means that their supply can be suspended by the SFPUC with 10 years of notice.

The policy decision of whether to make San Jose and Santa Clara permanent will not reduce or eliminate their demands on the RWS, it will only address the question of new obligations. The South Bay Purified Water Project is a partnership among Santa Clara, San Jose, and the SFPUC. Based on current project planning, this project would be owned and operated by San Jose and Santa Clara and would provide a dry-year supply to the SFPUC of at least 3.5 mgd to help address the dry year shortfall on the RWS for all customers. If San Jose and Santa Clara are made permanent customers of the SFPUC, the South Bay Purified Water project may partially offset the dry year delivery needs from the RWS by 3.5 mgd. San Jose and Santa Clara are motivated to partner with the SFPUC in this project due to their desire to become permanent customers. In the absence of a decision to make these cities permanent customers, San Jose and Santa Clara will not be inclined to support the implementation of this project and make 3.5 mgd available to supplement RWS deliveries in dry years.

- A-9** The \$4 billion to \$10 billion cost estimate in the AWS Plan reflects the current estimated total capital costs for the projects listed in Table 5-1. The estimates are based on current capital planning estimates used for the AWS projects, including the expansion of Calaveras Reservoir, which includes two scenarios ranging from 2.7 mgd to 28.6 mgd. The \$4 billion estimate reflects projects totaling 22.2 mgd and the \$10 billion estimate reflects projects totaling 48.1 mgd. Note that these capital cost estimates are based on early planning studies and do not account for any potential cost-share or potential future federal or state funding.
- A-10** The single largest funding request is for the Daly City Recycled Water Expansion Project because the full cost of this project would be incurred within the next 10 years. Unit costs for this project, as shown in Figure 5-1, are in line with other AWS Projects. Much of the cost associated with the other project recommended for potential implementation, the Los Vaqueros Expansion Project, will be incurred outside of the 10-year CIP window.
- A-11** As referenced in the comment, Section 4.3 discusses joint projects with Irrigation Districts. To clarify that outcomes of the Voluntary Agreement will be included in future AWS Plan updates, the last three sentences in that section have been edited to state: *"These projects are part of a broader cooperative effort with the Irrigation Districts in parallel with the Voluntary Agreement process. Developments and any resultant effects on the supply gap will be included in future AWS Plan updates."* See Global Response 4 and updated Recommendation 3 in Chapter 5 for additional information.

From: Steve Lawrence <steveinsf@outlook.com>
Sent: Sunday, July 9, 2023 4:52 PM
To: Alternative Water Supply <aws@sflower.org>
Subject: Draft Alternative Water Supply Plan

CAUTION: This email originated from **outside** of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

It seems firm yield is 227 mgd, +30 rationing, = 257 "firm yield." But that doesn't consider the elephant in the room: Bay Delta Plan and state's curtailment of SFPUC's right to divert as it has been doing for many years (until curtailment). Why not? Is there a settlement yet? If so, what is it? If not, well, it's important that there be one for AWS to be meaningful, no?

B-1

I read that the expected/forecast demand in 2045 is 244, and also read that the gap (shortfall) is 92, suggesting/implying that 152 is expected from...I can only guess from upcountry sources. Is that right? And that's before considering actions that might reduce the shortfall, such as enlarging Calaveras, expanding Los Vaqueros, and developing pure/purified water? (Any others now known?)

B-2

In sum, I'm confused about the numbers, and assumptions that apply to them, which seem inconsistent (not the same throughout)--is that right? I wish there were more clarity and simplicity so that a reader could follow, as: we expect this supply from upcountry and storage we now have in place, we plan and here assume we'll develop this set of projects reducing shortfall by x, which leaves y to be made up; here are some possibles we might develop, together with estimates of how much we think they'll yield if we do.

B-3

Steve Lawrence
(per offer to ask in email of July 6)

Response to Comment Letter B

Steve Lawrence, Member of the Public

July 11, 2023

- B-1** Table 2-2 describes dry year availability in the RWS with completion of WSIP projects as part of the background for the AWS Plan. Chapter 3 introduces the Bay-Delta Plan Amendment as a driver for the future water supply gap that is the focus of the AWS Plan. Table 3-1 provides a side-by-side comparison of the two scenarios. Negotiations on the Voluntary Agreement continue to be in progress. As more information becomes available, it will be reflected in future updates to the AWS Plan.
- B-2** The 152 mgd is the total system water yield in dry years with the implementation of the Bay-Delta Plan, as shown in Table 3-1. The projected gap of 92 mgd does not account for candidate AWS Projects that are described in Chapter 5 including storage expansion and water supply projects that could help fill that gap.
- B-3** The AWS Plan describes dry year water supply availability under different conditions and over time. Chapter 2 is intended to provide baseline information on water supply availability. With WSIP implemented, the RWS can deliver 227 mgd in dry years and up to an additional 30 mgd can be achieved through rationing; this would be sufficient to meet 2045 demands of 244 mgd. Chapter 3 builds on the baseline and describes how dry year water supply availability could change with the implementation of the Bay-Delta Plan Amendment, creating a gap of 92 mgd based on 2045 demands under drought conditions. Table 3-3 shows that of this gap, 11 mgd could be met with additional rationing, leaving 81 mgd to be met with new supplies or other actions that can reduce the gap. Chapter 5 then describes the potential projects that could fill 22-48 mgd of the gap. The AWS Plan acknowledges that the identified AWS Projects alone do not fully close the gap. It also recommends actions in Chapter 6 to continue to address the gap through project development and programmatic actions.

For greater clarity on the distinction between the information presented in Chapter 2 and 3, the following statements have been added in the opening paragraph of each chapter, respectively:

"Chapter 2 is intended to provide baseline information on water supply availability. Chapter 3 builds on this baseline and describes how dry-year water supply availability could change with the implementation of the Bay-Delta Plan Amendment."

"This chapter builds on the information presented in Chapter 2 and layers on an analysis of how dry-year water supply availability could change with the implementation of the Bay-Delta Plan Amendment."

August 15, 2023



Steven Ritchie
Assistant General Manager, Water Enterprise
San Francisco Public Utilities Commission
525 Golden Gate Avenue, 13th Floor
San Francisco, CA 94102

Sent via email: aws@sfwater.org | sritchie@sfwater.org | mkothari@sfwater.org

Re: Draft Alternative Water Supply Plan, June 28, 2023

Dear Mr. Ritchie,

Coastside County Water District ("Coastside CWD") is a wholesale water customer of the SFPUC and has been diligent in securing local water supplies. During normal to wet water years, Coastside CWD maximizes its reliance on local water supplies and reduces purchases from the Regional Water System ("RWS"). By maximizing local water supplies during wet to normal water years, there is more water available in storage at Pilarcitos Reservoir and in Upper Crystal Springs Reservoir for the benefit of the RWS during dry years. During dry years when local surface water is not available, Coastside CWD relies on the RWS with water storage in Upper Crystal Springs Reservoir and Pilarcitos Reservoir. Dry year water supply from the RWS is critical to Coastside CWD, since Coastside CWD does not have water storage options and relies on storage in the RWS.

Coastside CWD supports the Alternative Water Supply Program and is providing brief comments on the draft Alternative Water Supply ("AWS") Plan.

Dry Year Supply

Coastside CWD supports projects that augment regional water supplies and improve the reliability of the RWS.

C-1

Project Locations

Coastside CWD supports efforts to locate projects through the RWS and to consider the benefits and impacts throughout the RWS.

C-2

Recommendation 3

Coastside CWD supports SFPUC's efforts to have the State Water Resources Control Board adopt a Tuolumne River Voluntary Agreement for the Sacramento-San Joaquin Bay Delta Water Quality Plan.

C-3

Recommendation 4

Coastside CWD supports providing timely updates to the AWS Plan.

C-4

Recommendations 10, 11, 12, and 13

Coastside CWD supports hiring additional staff for the AWS Program.

C-5

Recommendation 14

Coastside CWD supports SFPUC exploring the feasibility of grant programs or low interest loans to support wholesale customer local water supply projects to reduce reliance on the RWS, especially during dry years. Letters of support and letters of recommendation to local leaders on the need for local water supply projects would be a type of additional support that Coastside CWD would find helpful.

C-6

C-7

San Francisco-Peninsula Regional Pure Water Project

This project, as described in phase I, would supply advanced treated (purified) wastewater to Upper Crystal Springs Reservoir and possibly Pilarcitos Reservoir. This project would potentially impact Coastside CWD's water supply from SFPUC since Coastside CWD takes raw water from these two reservoirs and treats it. Coastside CWD would like to be listed as an interested party or partner for this project.

C-8

Bay Area Water Supply and Conservation Agency ("BAWSCA")

BAWSCA will also be providing comments to SFPUC on behalf of its member agencies. Coastside CWD reviewed a draft of their comments and supports their comments.

C-9

Coastside CWD appreciates being provided with an opportunity to provide written comments on the Draft AWS Plan. Please contact me with any questions.

Best,



Mary Rogren
General Manager
(650) 726-4405

Response to Comment Letter C

Coastside County Water District

Mary Rogan, General Manager

August 15, 2023

- C-1** This comment expresses support for the SFPUC's efforts to evaluate projects that augment regional water supplies and improve the reliability of the RWS through the AWS Program. The SFPUC recognizes this comment.
- C-2** This comment expresses support for the SFPUC's efforts to locate projects through the RWS and to consider the benefits and impacts throughout the RWS through the AWS Program. The SFPUC recognizes this comment.
- C-3** This comment expresses support for the SFPUC's efforts toward adoption of the Proposed Voluntary Agreement by the State. The SFPUC recognizes this comment.
- C-4** This comment expresses support for the SFPUC to provide regular updates to the AWS Plan, as identified as a recommendation in Chapter 6 of the AWS Plan. The SFPUC recognizes this comment.
- C-5** This comment expresses support for the SFPUC to hire additional staff for the AWS Program, as identified as a recommendation in Chapter 6 of the AWS Plan. The SFPUC recognizes this comment.
- C-6** This comment expresses support for the SFPUC in exploring the feasibility of grant programs or low interest loans to support wholesale customer local water supply projects to reduce reliance on the RWS, as identified as a recommendation in Chapter 6 of the AWS Plan. The SFPUC recognizes this comment.
- C-7** Stakeholders, community members, and other local leaders are welcome to submit letters of support to aws@sflower.org.
- C-8** The SF-Peninsula Regional PureWater Project description in Chapter 5 lists out the current project partners, but not all interested parties are listed. The SFPUC will work closely with CCWD as an interested party as project planning progresses. The SFPUC remains open to working with CCWD as a project partner on this project in the future.
- C-9** This comment expresses support for the comments submitted by BAWSCA on the Draft AWS Plan. The SFPUC recognizes this comment. SFPUC's responses to BAWSCA's comment letter are included in this Appendix.

August 29, 2023

William L. Martin
San Francisco, CA 94112
Wlmartin361@gmail.com

San Francisco Public Utilities Commission

Submitted via email to aws@sfgwater.org

Public Comment submitted regarding the proposed Alternative Water Supply Plan

1. Population Growth and Total Water Demand

On August 9, 2023, the San Francisco Chronicle published an article entitled “San Francisco Exodus: City may never recover population as other parts of Bay Area grow.” The article cites the California Department of Finance (CDOF) projections, showing both San Francisco and San Mateo counties losing population between now and 2060. The CDOF projects a population gain of about 636,000 for the entire Bay Area.

In contrast, the Association of Bay Area Governments (ABAG) projects a Bay Area population gain of 2 million. A major reason for the discrepancy between the Department of Finance and ABAG concerns Plan Bay Area 2050’s projection of increased housing development, leading to a stronger economy and thus greater population.

The draft Alternative Water Supply Plan (“the AWS Plan”) fails to consider population growth properly. That failure leads the Plan to specify levels of water demand which are highly uncertain to occur. The Plan should be amended to reflect a range of possible outcomes. For example, the range of population growth cited in the Chronicle article for the entire Bay Area is 636,000 to 2,000,000. However, both San Francisco and San Mateo counties are projected to grow more slowly if at all than the rest of the Bay Area. This is the SFPUC’s service area, and it’s projected to be the slowest growing part of the Bay Area. The Plan needs to be amended to consider a range of possible outcomes for population growth in the service area.

D-1

Once amended in this way, the AWS Plan needs to be further adjusted to consider a range of total water demand. Generally, fewer people means less water consumed. However, more people does not mean more water consumed. A review of the population growth experienced by San Francisco and San Mateo counties from 1980 (just after one of the most severe droughts on record) to 2020 (right before the pandemic) shows significant growth. But total water demand in the service area did not increase accordingly. In fact, it went down – significantly - and remains down today, at about 190 million gallons per day (mgd). Please also note that past SFPUC projections for total water demand have overestimated demand; it is highly likely that the Plan does so once again.

D-2

D-3

Thus the AWS Plan fails to fully account for two of its most important variables, population growth and total water demand. A much larger range of outcomes for both independent variables need to be included in the Plan, meaning that they need to be fully modeled across all possible combinations to ensure that the best possible combination of alternative water supply projects are undertaken.

D-4

2. Effluent Treatment and Water Recycling and Reuse

On August 21, 2023, the San Jose Mercury News published an article entitled “Fighting Future ‘Red Tides’ in San Francisco Bay.” San Francisco Bay suffered a significant harmful algal bloom (HAB) on August 31, 2022, killing thousands of fish and endangering people and their pets. A second less severe bloom occurred in July 2023.

In response, Eileen White, Executive Director of the San Francisco Bay Water Quality Control Board (SF Bay Water Board), said, as quoted in the Mercury News article, “The science is telling us that we need to reduce nutrient loads as quickly as possible. What has happened is a game changer.”

According to various reports, San Francisco’s discharges into San Francisco Bay are responsible for about 20% of the nutrient loading. The Mercury News article states that San Francisco and the East Bay Municipal Utilities District (EBMUD) are running behind other municipalities in dealing with this problem. The article also states that some of the South Bay agencies have reduced nitrogen releases by about 85% from previous levels.

This is an opportunity for the SFPUC, but the AWS Plan fails to address it. The SFPUC can accomplish two of its goals at the same time: reducing nutrient loading and creating a new alternative water supply. As noted in the Mercury News article, some of the newer technologies for reducing nutrients do not always result in excess water. The SFPUC should avoid using these technologies unless they are proven to be very cost-effective on a short-term basis. The long-term plan should be a combination of reduced nutrient loading and water recycling and reuse.

D-5

D-6

Given the critical nature of HABs, and the fact that the SF Bay Water Board is now looking at this issue, the AWS Plan should be amended to prioritize the combination of reduced nutrient loading and water recycling and reuse as its primary alternative water supply. This “double-barreled” action will have two long-term positive results:

D-7

- A new, permanent source of water for use in San Francisco
- Greatly reduced nutrient loading, which has the added benefits of helping the SF Bay Water Board meet its obligations of protecting San Francisco Bay and improving the SFPUC’s environmental credibility.

The Mercury News article also addresses the high costs associated with reduced nutrient flows. The SFPUC should be partnering with the SF Bay Water Board and the other agencies surrounding the San Francisco Bay to pool their resources. It is highly likely that a concerted, organized effort could generate some of the funds required for upgrading all of the systems together. As a major contributor of nutrient flows, the SFPUC should take the lead position in solving this problem. The AWS Plan should be amended to specifically make this a goal of the plan.

D-8

Thank you for including these issues in the revised AWS Plan.

Best regards,

William L. Martin
Wlmartin361@gmail.com

Response to Comment Letter D

William L. Martin, Member of the Public

August 30, 2023

- D-1** No demand projections were developed specifically for the AWS Plan. The SFPUC demand forecasting model is an econometric model that incorporates inputs from San Francisco's Planning department – including population projections – and applies economic factors to estimate water demands. The SFPUC recognizes the importance of continuing to improve demand forecasts. See Global Response 1. A new Recommendation 5 is being added to the AWS Plan to evaluate potential modifications to its retail demand forecasting model, including the consideration of a range of possible future demand scenarios to support future AWS planning and recommendations.
- D-2** Historically, population has increased while water demand has decreased, indicating that each person is becoming more efficient with their water use and using less gallons per day than in the past. However, this historical trend cannot be expected to continue due to a concept known as demand hardening: at some point, individual water use will become so efficient that no additional reduction can be achieved. At this point, as population increases, demand will also increase. Recommendation 5 in the AWS Plan will consider a range of possible future demand scenarios that may account for this phenomenon. See Global Response 1 for more information on the SFPUC's demand forecasting model.
- D-3** See Global Response 1. The new Recommendation 5 in Chapter 6 includes review of past projections compared to deliveries in order to better calibrate the demand forecasting model for the future.
- D-4** Any updates to the retail demand forecasting model and coordination with BAWSCA will be reflected in future AWS Plan updates, beginning in FY 2026-2027 with the intent of supporting future AWS investment recommendations. The new Recommendation 5 includes development of a range of potential demand scenarios and evaluation of potential modifications to the retail demand forecasting model.
- D-5** The SFPUC's Wastewater Enterprise, as well as wastewater agencies around the Bay Area, are working with State regulators to address water quality issues including nutrient loading. Purified and recycled water projects described in the AWS Plan would reduce total wastewater discharges. Such projects would be required to meet water quality regulations at the time of implementation, including nutrient standards to meet objectives in the Basin Plan.
- D-6** The selection of technologies for purified water treatment will be based on a number of factors including effectiveness, regulatory and permitting requirements, cost, and other factors. Performance criteria for purified water projects will be developed prior to completing alternatives' analyses.
- D-7** While the primary goal of AWS projects described in the AWS Plan is to improve dry year supply availability, additional benefits such as impact to nutrient loading in receiving waters

can be identified during the project planning process for each AWS project and reflected in future AWS Plan updates.

- D-8** The stated goal of the AWS Plan (pg. 7) is to "identify water supply projects that increase the dry-year reliability of RWS supplies and address the long-term water supply gap in alignment with the LOS Goals and Objectives." Of the six AWS Projects highlighted in the AWS Plan, three purified water projects and one recycled water project include partnerships with wastewater agencies around the San Francisco Bay. While not an explicit goal of the Plan, project-specific impacts to nutrient flows can be included in the considerations for each project as they are evaluated in the future.

August 30, 2023

AWS Plan – Progress but missing valuable context for understanding

Dear SFPUC AWS Team,

The Draft June 2023 Alternative Water Supply Plan is a significant advance from the quarterly reports, but it is missing key data which leads to a flawed executive summary and conclusion. As potentially billions of dollars of investment are at stake in the context of already high water rates, providing missing data and improving the executive summary is well worthwhile.

- 1) **Need to add a more conservative demand scenario:** Few people believe that we will have anywhere close to a 92 mgd water supply gap in 2045 should the Bay Delta Plan be implemented as is. This is in part because SFPUC Urban Water Management Plans and BAWSCA’s demand projections 20 years out have consistently over projected demand by a wide margin. Two potential scenarios to consider using are i) the SFPUC Finance Department demand projections along with a variant of BAWSCA’s Scenario E from its demand sensitivity analysis, and ii) demand projections based on current per capita demand projections and the latest population projections from California’s Department of Finance. See Exhibit A for calculation and presentation of such a scenario.

E-1

Adding a more realistic demand scenario in the executive summary better supports the more realistic AWS strategy mentioned in the body of the report, a better supports modular implementation of additional supply if and when long term demand increases appear more probable.

- 2) **Need to consider risk and consumer resilience:** Understanding how responsive customers are to a reduced water supply helps inform both the need for and urgency of alternative water supplies. At one time there was a claim that a 20% reduction in water supply would result in \$2 billion in lost sales to the Bay Area economy.¹ However during the 2012-2016 drought, rationing reached ~23% and the economy thrived both in terms of economic activity and job growth. The Bay Area economy has demonstrated that it is remarkably resilient to rationing in the 20% range and possibly higher.

E-2

- 3) **Need to better understand rate impact of AWS alternatives:** For each alternative the impact to water rates, both wholesale and retail should be identified for two scenarios, 3a) where demand causes the AWS alternative to be fully utilized and 3b) where the AWS alternative ends up to be excess supply. If fixed costs go up while demand stays flat, rates have to unnecessarily increase which in turn drives demand down further. Knowing such information helps decision makers and the public better understand AWS investment risks and trade-offs.

E-3

The AWS plan provides a good start at such information when discussing financing and affordability on pages 124-125 of the document. Here it states that for a proposed incremental

¹ David Sunding, “Draft Report: Socioeconomic Impacts of Water Shortages within the Hetch Hetchy Regional Water System Service Area prepared for San Francisco Public Utilities Commission” (March 13, 2014), page 62, table 5-3

E-4

\$209 million investment, retail rates would increase 0.9% above current 10 year rate projections and wholesale rates would go up 7.6%. While some of the funds are used for planning for other projects, the majority of the funds are used for the Los Vaqueros expansion (LVE 5a, b & c) and Daly City projects (1), which combined would have a 4.6 mgd increase in dry year supply. It would be valuable to put this data in the context of scenarios 3a & 3b described above.

- 4) **Need to remove alarmist climate change statements.** The statement in section 3.2.3 regarding climate change exacerbating impacts from other drivers of change is alarmist, hard to understand and leaves out an important part of the sentence it is taken from. The rest of the sentence states, “and is not the single most important driver of vulnerability for the San Francisco Public Utilities Commission’s (SFPUC’s) Regional Water System (RWS).” In the executive summary of the 2021 Long Term Vulnerability Assessment (LTVA), the first result listed in the executive summary (ES.4) is, “According to climate projections and expert elicitations, there is a central tendency of warming of +2°C and +4°C by 2040 and 2070 (Representative Concentration Pathway [RCP] 8.5 respectively, with no clear direction of change in mean annual precipitation over the planning horizon.” There is a wealth of data in the LTVA that supports this statement, including tables that show drought recurrence intervals getting longer.

E-5

A better sentence to finish that paragraph would be something like, “The 2021 LTVA found no significant climate change exposure to the RWS, but the SFPUC remains vigilant as climate science continues to advance.”

- 5) **Need to mention other means of reducing the water supply gap:** i) Reducing the design drought’s recurrence interval from once in 70,000 years to once in 10,000 years would reduce the need for AWS by at least 20 mgd. In other words there should be a formal risk analysis on the design drought. Note that the recurrence interval goal for San Francisco’s sewer system overflowing is once in 100 years. The intent of the comparison is to show that constituents would likely prefer an investment in the sewer system rather than investing in AWS to keep a 70,000 year design drought recurrence interval ii) The current rationing policy should be reviewed in the context of the strong positive consumer and economic responses to recent droughts and could result in several additional mgd of supply.

E-6

E-7

- 6) **Need to show AWS needs in the executive summary:** A 92 mgd water supply gap translates to 81 mgd of AWS as shown in figure 3-3. This information should be included in the executive summary so that AWS needs are better understood. See section 4 of Exhibit A for how the executive summary table could be improved to show this.

E-8

- 7) **When mentioning environmental stewardship, the Tuolumne ecological situation needs to be included.** Section 1.2 of the report has this sentence: “Sustained stewardship of the environment from which RWS supplies are drawn is vital to the work of the SFPUC and a part of its mission.” If such a sentence is included, there should be an acknowledgement of the environmental damage in the lower Tuolumne and some discussion about how the SFPUC is addressing it. Doing so would provide useful context, particularly if the discussion tied to the Bay Delta Plan

E-9

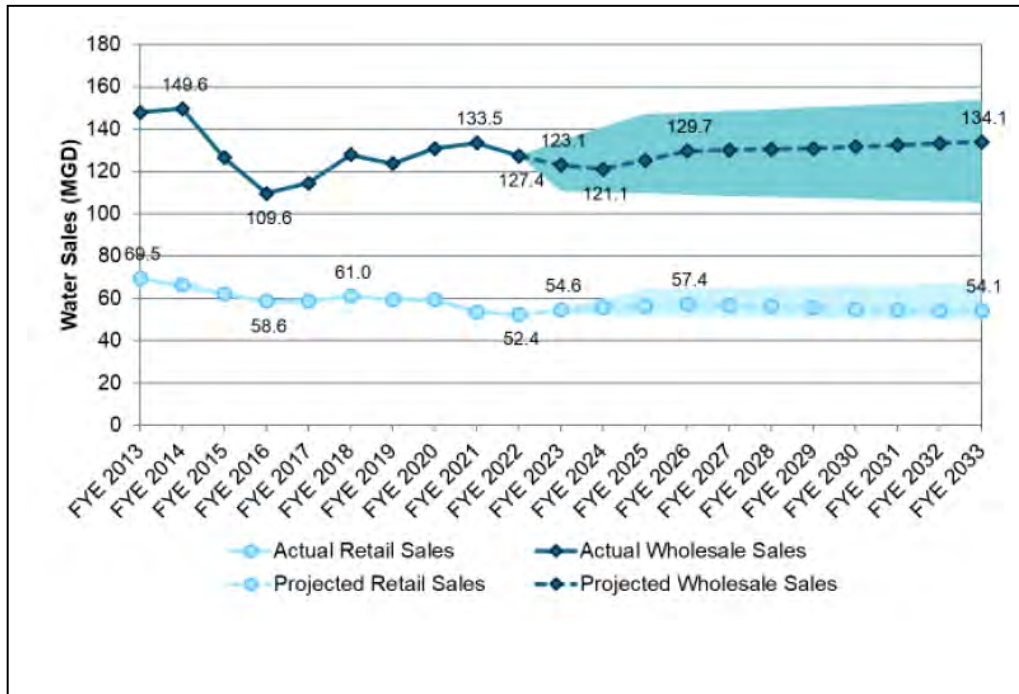
Sincerely,

Dave Warner

Exhibit A: Two other Demand Scenarios; A look at Demand Forecasting Accuracy; Improving Executive Summary Table

1) 2045 Demand based upon SFPUC finance department sales projections

As part of its budget presentation at the February 14, 2023 commission meeting the SFPUC’s finance department presented these water sales projections:



E-1

Extrapolating these projections to 2045:

Wholesale sales:	142 mgd
Retail sales	48 mgd
Water loss ²	6 mgd

Total 2045 demand	196 mgd

This is 20% lower than the 244.1 mgd of demand used in the Draft AWS plan. Using a demand figure of 196 mgd leads to a water supply gap of 44 mgd. After deducting the rationing benefit of 12% or 5 mgd, this comes to 39 mgd of AWS needed.³

² Retail sales projections exclude water losses, hence estimated retail water losses are included here.

³ See section 3.1.1 and figure 3.3 (pages 35-36) of the draft AWS plan for rationing’s contribution to reducing the water supply gap.

2) 2045 Demand based on July 2023 California Dept of Finance population projections

The July 2023 California Department of Finance population projections are significantly lower than those used in the UWMP/AWS plan demand projections. In BAWSCA’s recent innovative demand sensitivity analysis, the study found that population was the most significant factor affecting demand. Adjusting the AWS demand projections for the lower population projections reduces 2045 RWS demand from 244.1 mgd to 187.2 mgd which leads to a water supply gap of 35 mgd. After deducting the rationing benefit of 12%, this comes to 31 mgd of AWS needed. The table below shows the differences in population projections and the proportional impact on demand.

E-2

2020-2045 Demand Projections Based on CA Department of Finance July 2023 Population Projections								
	2020 Service area population	2045 AWS projected population	25 year growth	Population Growth based on CA Dept of Finance estimates	Revised population projections	Percent of AWS 2045 projected population	AWS demand (mgd)	Population adjusted demand projection (mgd)
BAWSCA	1,868,090	2,456,566	31.5%	5.9%	1,978,424	81%	170.6	137.4
SF Retail	899,732	1,251,214	39.1%	-5.8%	847,256	68%	73.5	49.8
Total	2,767,822	3,707,780	34.0%		2,825,680	76%	244.1	187.2

2045 water demand of 187.2 mgd is 23% lower than the 244.1 mgd of demand used in the AWS plan.

These two 2045 demand projections may still be high.

3) Demand Forecasting Accuracy

There’s precedence that the SFPUC and BAWSCA have been consistently overestimating demand. The chart below compares 2020 water demand for both the SFPUC and BAWSCA against what they projected 2020 water demand to be 5, 10, 15 and 20 years prior. In their 2015 UWMP’s, 5 years earlier, they projected 2020 demand to be 19% higher than it was. In their 2000 UWMP’s, 20 years earlier, they expected demand to be 47% higher than it was.

E-1

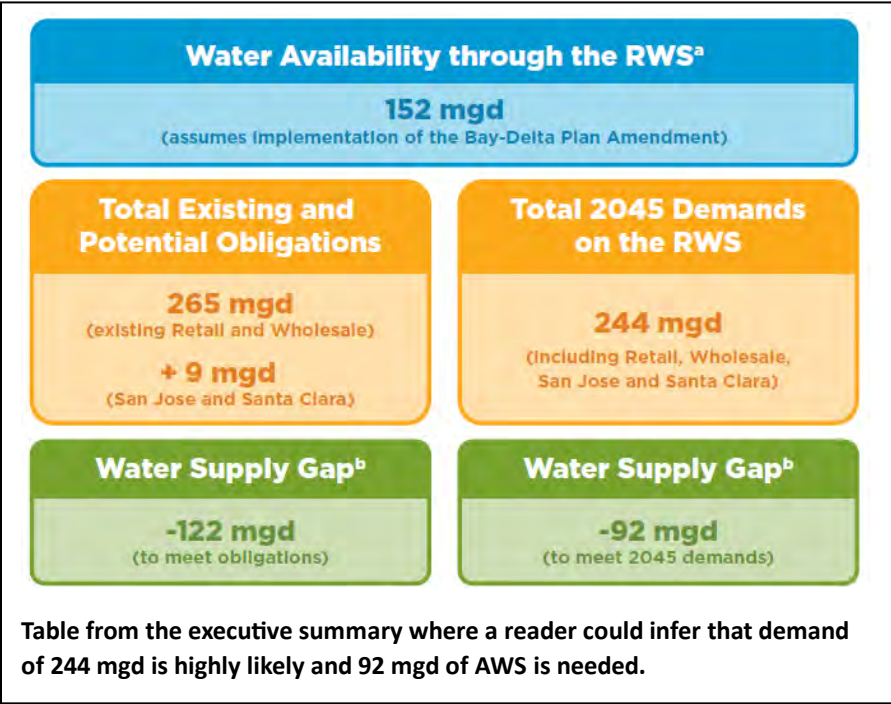
Variances in the Projections to 2020 Projected as a Percent of Actual: Over/(under) estimated				
	5 years prior	10 years prior	15 years prior	20 years prior
Water demand (mgd)				
San Francisco	17%	19%	38%	38%
BAWSCA from RWS	20%	36%	50%	52%
Combined	19%	30%	46%	47%

In 2000, 20 years earlier, demand for 2020 was projected to be 292 mgd. People likely would have been laughed out of the room if they said that demand would be under 200 mgd in 2020. "There was no way demand could be that low."

If the 2045 AWS projections turn out to also be overstated by 47%, that would mean demand on the RWS in 2045 would be 166 mgd. This would mean the water supply gap would be only 14 mgd, and after adjusting for the rationing benefit AWS needed would come to 12-13 mgd.

4) Improving a Key Table in the Executive Summary

The executive summary of the AWS plan makes it appear that demands on the RWS in 2045 are



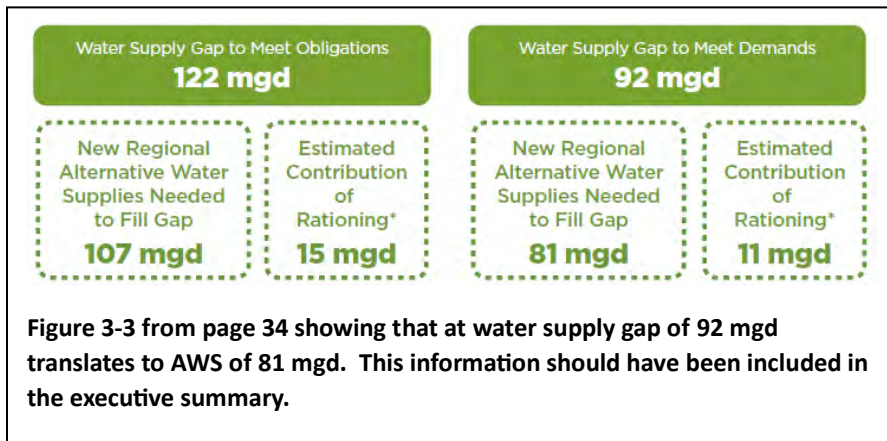
E-8

expected to be 244 mgd as shown in this table from page xii: But as you know from the above analysis, level of demand in 2045 is highly uncertain. Readers should understand this.

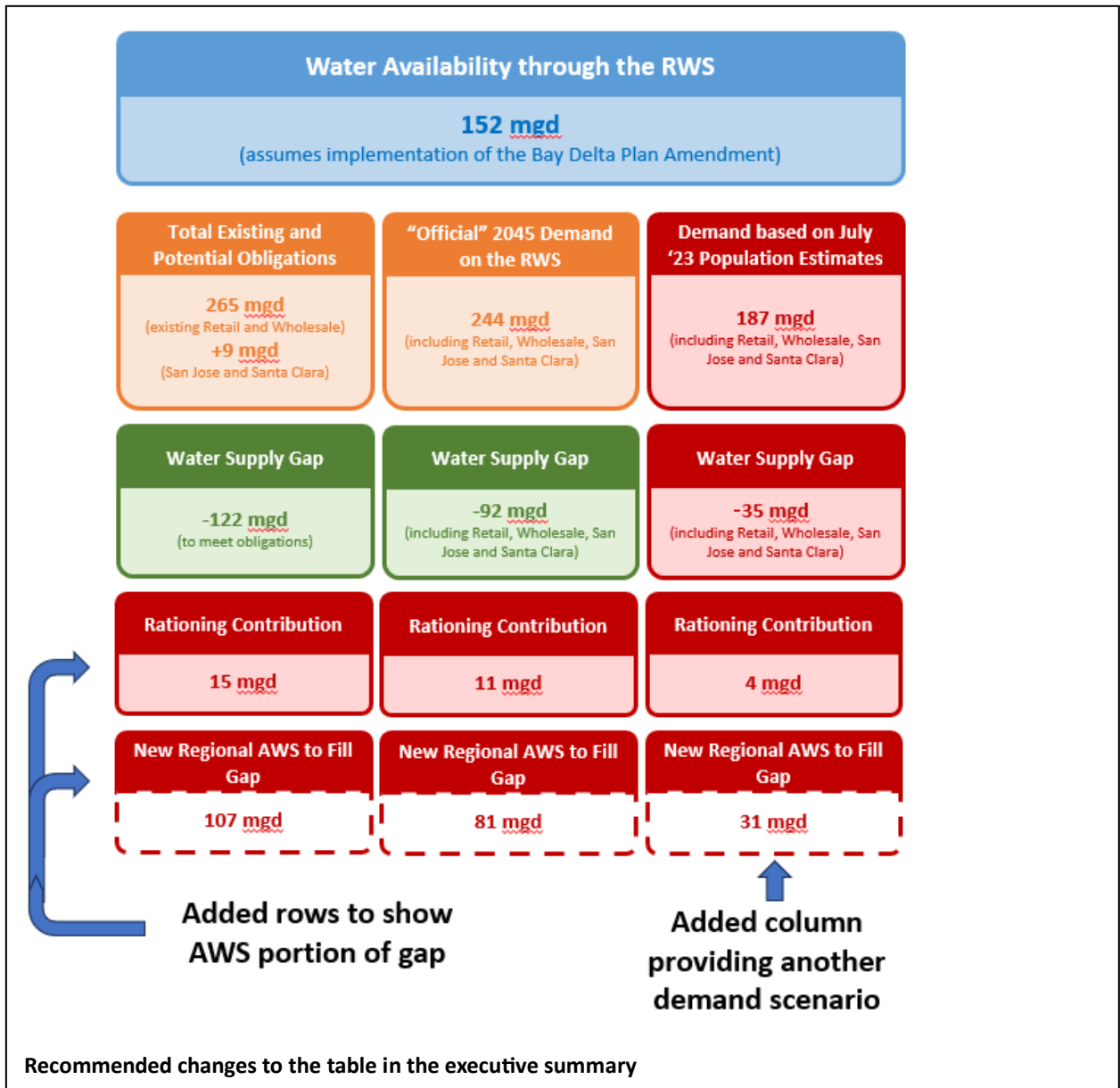
A second problem is that the table leadsthe reader to infer that the 92 mgd would all come from AWS. This isn't the case, as shown in figure 3-3 on page 34:

Two changes should be made to the table in the executive summary (and the text of the executive summary should change accordingly):

- 1) A column should be added with one of the above demand scenarios, or one similar in order to give the reader a better understanding of the uncertainty associated with projecting 2045 demand.
- 2) Rows should be added at the bottom of the table to take the reader from the water supply gap to the AWS impact of each scenario. As the report is about AWS, the executive summary should reflect potential AWS needs.



The table below proposes how these two changes might be made.



Being prudent about our AWS investment is important because of our already very high water rates that are projected to increase further without substantial investments in AWS.

If the gap were to turn out to be 31 mgd, there are a number of other ways to cover that gap without having to invest in AWS. But that’s another topic.

Improving the executive summary to better show the uncertainty of demand projections benefits of all retail and wholesale ratepayers. Please consider making this a part of your recommendations.

Response to Comment Letter E

Dave Warner, Member of the Public

August 31, 2023

- E-1** See Global Response 1. There is a new corresponding Recommendation 5 in Chapter 6 of the AWS Plan that includes considering the inclusion of additional demand scenario(s) in future AWS Plan updates.
- E-2** Sensitivity to economic factors in the demand forecasting model will be considered as part of a new Recommendation 5 in Chapter 6. It is also described in Global Response 1. However, as consumer behavior and water efficiency measures continue to drive demands down throughout the service area, there is less flexibility in water use. Therefore, SFPUC staff consider the LOS goal of no greater than 20% rationing to be prudent. Achieving greater sustained reductions is unlikely outside of an extreme drought emergency.
- E-3** Rate impacts are briefly addressed in Section 5.2.3, AWS Cost Considerations, of the AWS Plan. The AWS team will continue to coordinate with SFPUC rate analysts to understand the impact of fixed and variable costs of implementing AWS Projects under updated demand scenario(s) as they are developed (see Recommendation 5 in Chapter 6) and project planning progresses. Staff agree that this kind of analysis will be important to support future investment decisions.
- E-4** See response to comment E-3. Recommendation 5 in Chapter 6 directs the SFPUC to prepare additional demand scenarios that will be used to support future investment decisions.
- E-5** While the statement that climate change “is not the single most important driver of vulnerability” for the RWS is true (from Section 3.2.3 in the AWS Plan), the LTVA did not find that “there is no significant climate change exposure to the RWS” (from commentor). The statement in Section 3.2.3 that reads “climate change exacerbates impacts from other drivers of change such as increased instream flow requirements and increased demands on the system” combines the first and fifth key findings of the LTVA. The SFPUC is aware that climate change studies need to be a continuous process when new information and data are available and the last sentences of paragraph 1 and 3 of Section 3.2.3 of the AWS Plan reflect this commitment.
- E-6** See Global Response 2.
- E-7** See Global Response 3. Furthermore, refer to response to Comment E-2 regarding customer response to droughts. The SFPUC does not consider a long-term reduction in water supply beyond 20% to be sustainable outside a drought emergency.
- E-8** The water supply gap described in the AWS Plan is defined as the difference between projected dry year supply availability and anticipated demands, or 92 mgd as shown in Table 3.4 and the corresponding table in the Executive Summary. Rationing can fill some of that gap, as detailed in Section 3.1.1 and shown visually in Figure 3-3. To provide greater clarity, a footnote has been added both Table 3-4 and the corresponding table in the Executive Summary to clarify that up to 11 mgd of the 92 mgd gap can be filled by rationing. As rationing is a function of water supply availability, it does not definitively make up for 11 mgd of supply unless the full 81 mgd

of new supplies are developed. Regarding the additional request to add a column with new demand scenarios, that comment has been noted and can be considered once SFPUC staff have completed an evaluation of appropriate demand scenario(s) to include in future AWS Plan updates.

- E-9** Environmental stewardship is embedded in several SFPUC policies and practices, especially with respect to the protection of watersheds and water quality; it is not exclusive to the Tuolumne River. The purpose of Voluntary Agreement negotiations in concert with the Irrigation Districts is to address the environmental needs in the lower Tuolumne River. The statement cited in the comment is a reflection of the importance the SFPUC places broadly in the protection of all of its watersheds.



August 31, 2023

Via email

Steven Ritchie
Assistant General Manager, Water Enterprise
San Francisco Public Utilities Commission
525 Golden Gate Avenue, 13th Floor
San Francisco, CA 94102

RE: BAWSCA’s Review of the SFPUC’s Draft Alternative Water Supply (AWS) Plan

Dear Mr. Ritchie,

BAWSCA has reviewed the SFPUC’s Draft Alternative Water Supply (AWS) Plan made available for public review on June 28, 2023. BAWSCA commented on earlier versions of key sections of the AWS Plan and appreciates that most of these earlier comments have been incorporated or adequately considered by the SFPUC. This letter focuses on significant comments BAWSCA views as meriting further attention by the SFPUC.

General Comments

BAWSCA strongly supports both the AWS Plan and the overall AWS Program. The SFPUC must be prepared to face potential future reductions to its existing water supply that could require the development of new supplemental sources to improve long-term water supply reliability in order to meet its legal and contractual obligations to the BAWSCA Member Agencies as well as the water needs of its Retail Customers in San Francisco. Climate change and future regulatory uncertainties could exacerbate the need for new diversified and distributed water supply sources. The AWS Plan meets these critical planning needs.

F-1

Components of the AWS Plan provide the roadmap for the development of projects needed to address the water supply shortfall (gap) that is calculated to be present through the planning horizon (2045). That gap is acutely related to shortage of supply during times of drought.

F-2

The AWS Plan presents detailed information regarding estimated project costs and development times and estimated rate impacts to both SFPUC Retail and Wholesale Customers for the AWS planning work estimated to take place within the SFPUC’s 10-year Capital Improvement Plan (CIP). While BAWSCA agrees that the presented rate impacts are correct for the purposes of the SFPUC’s 10-year CIP, the full rate impact of the implementation of the suite of AWS Plan projects has not been estimated at this time as more details are needed that can only be provided following further planning work.

F-3

This complete cost and rate impact information will be necessary for the SFPUC and BAWSCA to support future decision making.

The AWS Plan includes recommendations for the Commission to consider that, if embraced, will work to: 1) Avoid widening the water supply gap; 2) Fill the water supply gap; and 3) Reduce the water supply gap. BAWSCA supports those recommendations, particularly those that call for additional staffing as needed to better implement the AWS Program.

F-4

There remains uncertainty related to how regulatory and other pressures can widen the supply shortfall. The AWS Plan is clear that, although implementing the projects listed can contribute substantially to lessening that gap, additional projects beyond those documented in the Plan will be necessary to fill the water supply gap.

F-5

BAWSCA recognizes that efforts by both the SFPUC and BAWSCA's Member Agencies have and can continue to result in lowered water demands. It also must be recognized that demand hardening is not simply a concept, but a reality that must be addressed as part of long-term water supply planning. Our respective agencies continue to be committed to water use efficiency, and the fundamentals of continued population growth coupled with realistic expectations as to what level of per capita water use can be achieved, further support the need for the AWS Plan.

F-6

The AWS Plan better positions San Francisco to fulfill its contractual obligation under the 2021 Amended and Restated Water Supply Agreement between San Francisco and the Wholesale Customers (WSA) to decide, by December 31, 2028, whether to make the cities of San Jose and Santa Clara permanent Wholesale Customers of the SFPUC. It is appropriate for the AWS Plan to acknowledge and be informed by the requirement that the SFPUC make this decision.

F-7

Specific Comments

1. Section 1.3.2 – Role of Wholesale Customers and BAWSCA in the AWS Program Development and Implementation

The SFPUC's responsibility to inform the Wholesale Customers of the actions and progress of the AWS Program stems not only from the SFPUC's role as a regional supplier (as the first paragraph of Section 1.3.2 notes), but also from the SFPUC's contractual obligations under the Amended and Restated 2021 Water Supply Agreement between San Francisco and the Wholesale Customers (WSA). BAWSCA requests the first paragraph of Section 1.3.2 be revised to emphasize this point.

F-8

2. Section 2.2.4 – RWS Infrastructure and WSIP

The second paragraph of Section 2.2.4 mentions that the SFPUC will use Level of Service (LOS) Goals and Objectives to inform the SFPUC's approach to future water supply planning and the AWS Program. San Francisco's perpetual obligation to provide the Supply Assurance to the Wholesale Customers is another critical factor

F-9

that must inform the SFPUC's approach to future water supply planning and the AWS Program, and should be acknowledged in this specific discussion. BAWSCA requests that Section 2.2.4 be revised to acknowledge that San Francisco's perpetual obligation to provide the Supply Assurance to the Wholesale Customers will also inform the SFPUC's approach to future water supply planning and the AWS Program's efforts.

3. Section 2.4.3 – Current and Historical Demands

While BAWSCA acknowledges that the AWS Plan is focused on the SFPUC's obligations through the 2045 planning horizon (which may or may not include the City of San Jose and the City of Santa Clara as permanent Wholesale Customers), it is important that the AWS Plan captures the SFPUC's existing contractual obligations to San Jose and Santa Clara under the WSA, including but not limited to, (i) SFPUC's contractual obligation to supply San Jose and Santa Clara with a combined annual average of 9 mgd through 2028, and (ii) the 10-year notice requirement to terminate San Jose and Santa Clara if such a decision regarding their status is reached. BAWSCA requests that the following sentence be added to the end of the first paragraph in Section 2.4.3 to clarify the SFPUC's contractual obligation to San Jose and Santa Clara: "Additionally, the AWS Program must account for the SFPUC's contractual obligation to supply San Jose and Santa Clara with a combined annual average of 9 mgd through 2028."

F-10

4. Section 5.2.2 - AWS Staff Considerations

BAWSCA supports the SFPUC's identification of additional staffing needs as required for the implementation of the AWS Plan, including at both the project level and programmatic level. As AWS Projects move toward implementation, BAWSCA anticipates that additional staffing, beyond that included in the AWS Plan's Recommendations, may be needed.

F-11

5. Section 5.2.3 - AWS Cost Considerations

BAWSCA understands that the development of project cost estimates are based on the stage of the planning and development cycle that a particular project is in, and further understands that greater detail on how those estimates were developed has been provided in Appendix C of the AWS Plan. BAWSCA notes, however, that the SFPUC will continue to refine these costs as more project information is developed.

F-12

With respect to the Rate Impacts discussion in Section 5.2.3, BAWSCA understands that the rate impacts in the AWS Plan provide a planning level assessment and are only representative of the portion of the AWS Plan's total project costs that will be expended during the SFPUC 10-year CIP term. Rate impacts are of great interest to BAWSCA's Member Agencies and their water customers. As more cost information is developed as part of the implementation of the AWS Plan, BAWSCA will expect the SFPUC to provide the necessary additional clarity on total costs and potential rate impacts.

F-13

6. Section 6.1.1 - Recommendation 1

The Regional Groundwater Storage and Recovery (RGSR) Project's yield of 6.2 mgd listed in the Recommendation 1 in Section 6.1.1 is less than the project yield in the adopted Water System Improvement Program. This difference needs to be reconciled by the SFPUC. If and when the SFPUC proposes to adjust the RGSR Project's yield, the SFPUC will need to comply with AB 1823 and BAWSCA recommends the SFPUC provide a formal process involving BAWSCA, stakeholders, and the public to evaluate alternatives for treatment, infrastructure, and staffing needed to achieve the RGSR Project's proposed dry-year supply by 2045.

F-14

7. Section 6.1.2 - Recommendation 3

BAWSCA requests Recommendation 3 be revised to specifically mention groundwater banking and conjunctive use opportunities. In particular, BAWSCA requests that the first sentence of Recommendation 3 be revised as follows: "Continue reporting progress on negotiations related to the Proposed Voluntary Agreement, a possible groundwater banking and conjunctive use project in partnership with Groundwater Sustainability Agencies in the San Joaquin Valley, and other potential transfers and projects in the area that could contribute to instream flow releases."

F-15

8. Section 6.1.3 - Local Projects – Wholesale Service Area

Section 6.1.3 notes that in 2008, when the SFPUC Commission adopted WSIP by Resolution 08-0200, the Commission directed the SFPUC to offset demand by 10 mgd in the retail service area through additional conservation or the development of new recycled water or groundwater sources. The Commission also asked the same of the Wholesale Customers. To illustrate the Wholesale Customers' compliance with this request, BAWSCA asks that a table (or Figure) be added to Section 6.1.3 documenting that, since FY 2008-09, Wholesale Customer SFPUC purchases have been reduced by 35.6 mgd or 22%. The table would include the following data:

F-16

- FY 2008-09 SFPUC purchases – 80,034,009 Ccf (164.01 mgd)
- FY 2021- 22 SFPUC purchases – 62,647,759 Ccf (128.38 mgd)
- Increase/Decrease in 2021-22 purchases compared to 2008-09 – 22% reduction

9. Glossary – Bay Area Water Supply and Conservation Agency (BAWSCA)

The text incorrectly states that BAWCA is an "entity". BAWSCA is a public agency, and the term "entity" should be replaced as such.

F-17

10. Appendix C – AWS Program Cost Development Approach

BAWSCA appreciates the inclusion of Appendix C in the AWS Plan. However, as noted in Appendix C, the SFPUC is still in the process of developing program costs, and in particular preparing a Proforma Model to more fully assess program costs. BAWSCA will reserve comments on individual project costs until the Proforma Model is completed and its results are shared with BAWSCA.

F-18

BAWSCA appreciates this opportunity to provide comments on the SFPUC's AWS Plan and looks forward to continuing to work with the SFPUC as the AWS Plan is finalized and the AWS Program is implemented.

Sincerely,

A handwritten signature in black ink that reads "Nicole Sandkulla". The signature is written in a cursive, flowing style.

Nicole Sandkulla
CEO / General Manager

NS/tf:le

cc: SFPUC Commission
SFPUC Citizens' Advisory Committee
Manisha Kothari, SFPUC, Manager, Alternative Water Supply (AWS) Program
Alison Kastama, SFPUC, BAWSCA Liaison
Board of Directors
Water Management Representatives
Allison Schutte, Hanson Bridgett, LLP, Legal Counsel

Response to Comment Letter F

Bay Area Water Supply & Conservation Agency (BAWSCA)

Nicole Sandkulla, CEO/ General Manager

August 31, 2023

- F-1** This comment expresses support for the AWS Plan and overall AWS Program. The SFPUC recognizes this comment.
- F-2** This comment describes the water supply gap and how the AWS Plan and AWS Projects can address the water supply gap. The SFPUC recognizes this comment.
- F-3** The AWS Plan incorporates preliminary capital costs, as they are known as of the drafting of this document (May 2023). Based on proposed budgeting recommendations at that time, the SFPUC analyzed potential rate impacts over the next 10-year period. Updated budget information as of December 2023 is included in Chapter 6. Because the December budget numbers are still in draft form and lower than what was analyzed, no changes were made to the rate analysis. As additional cost information is developed, associated rate impacts will continue to be evaluated. Results will be shared with BAWSCA and included in future updates to the AWS Plan.
- F-4** This comment expresses support for recommendations made in Chapter 6 of the AWS Plan. The SFPUC recognizes this comment.
- F-5** The SFPUC recognizes the uncertainty around regulatory and other drivers that may impact the water supply gap. Changes to either water availability or demand will affect the water supply gap and future planning goals. SFPUC staff continue to identify new project opportunities while also tracking developments that could change the gap through the completion of WSIP projects, Voluntary Agreement negotiations, and/or demand updates.
- F-6** The SFPUC recognizes the commitment of both retail and wholesale customers to water use efficiency and agrees that demand forecasting should consider feasible scenario(s) and demand elasticity. SFPUC staff will work with BAWSCA as it considers updates to its demand modeling as part of a new Recommendation 5 presented in Chapter 6 of the AWS Plan.
- F-7** Comment noted. The policy decision of whether to make the cities of San Jose and Santa Clara permanent customers is one of the drivers affecting future potential obligations, as described in Section 3.3.2.
- F-8** Section 1.3.2 of the AWS Plan has been revised to include SFPUC's contractual obligations to underscore its responsibility to keep Wholesale Customers informed of progress on the AWS Program.

The language has been updated as follows: "*As a regional supplier and owing to its contractual obligation, the SFPUC has a responsibility to keep its wholesale customers informed of the actions and progress of the AWS Program.*"

- F-9** Section 2.2.4 of the AWS Plan has been revised to acknowledge SFPUC's obligations to Wholesale Customers in informing the SFPUC's approach to future water supply planning.

Revised text now reads: "Consistent with the SFPUC's contractual obligations to the Wholesale Customers, estimated demands, and long range planning processes, the LOS Goals and Objectives continue to inform the SFPUC's approach to future water supply planning and the AWS Program's efforts."

- F-10** The SFPUC is committed to delivering up to 9 mgd to San Jose and Santa Clara through 2028 and acknowledges that a 10-year notice is required to terminate supplies, if such a decision is made by the SFPUC.

The following sentence has been added to the end of the first paragraph of Section 2.4.3: "*Additionally, the AWS Program accounts for the requirement in the WSA to supply San Jose and Santa Clara with up to 9 mgd through 2028.*"

- F-11** This comment expresses support for the SFPUC's identification of additional staffing needs as required for the implementation of the AWS Plan, as described in Chapter 6 of the AWS Plan. The SFPUC recognizes this comment.

- F-12** The SFPUC agrees that it will continue to refine costs as project planning progresses. As information is updated, the SFPUC will share that information in future AWS Plan updates.

- F-13** See response to comment F-3.

- F-14** The AWS Plan identifies that a yield of 6.2 mgd by 2045 is assumed for the RGSR project as part of the baseline that has been included in the calculation of the future water supply gap. Reporting for the project will continue through the WSIP reporting process, including any changes to the project. Furthermore, the SFPUC will comply with AB 1823, as needed.

- F-15** The SFPUC will continue to report on the progress of the Proposed Voluntary Agreement and any groundwater banking and conjunctive use opportunities.

Language for Recommendation 3 has been updated to incorporate the suggested text: "*Continue reporting progress on negotiations related to the Proposed Voluntary Agreement and potential transfers and projects in the San Joaquin Valley that could contribute to instream flow releases. Identify resource and funding needs, as and when appropriate. No new funding or additional resources are needed to support this recommendation at this time.*"

- F-16** Section 6.1.3 of the AWS Plan has been revised to acknowledge that both retail and wholesale customers achieved the targets outlined in Resolution 08-0200. New text in this section states: "*Both the San Francisco retail and wholesale service areas have achieved the targets outlined in Resolution 08-0200.*"

Additionally, a new table (Table 6-1) has been added to the Plan, which presents the Wholesale Customer RWS purchase data identified in this comment. New text has been added: "**Table 6-1** shows Wholesale Customer purchases from the RWS in FY 2008-09, when the SFPUC

Commission adopted WSIP by Resolution 08-0200, compared to RWS purchases in FY 2021-22, representing a reduction of 35.6 mgd or 22% since FY 2008-09."

- F-17** The glossary of the AWS Plan has been updated to refer to BAWSCA as a "public agency."
- F-18** See response to comment F-3.



August 31, 2023

President Newsha Ajami and Commissioners
San Francisco Public Utilities Commission
525 Golden Gate Ave.
San Francisco, CA 94102
Via Email

Re: Comments on the SFPUC’s Draft Alternative Water Supply Plan.

Dear President Ajami and Commissioners:

The Sierra Club, Tuolumne River Trust, Golden State Salmon Association, San Francisco League of Conservation Voters and California Sportfishing Protection Alliance appreciate the opportunity to comment on the SFPUC’s draft Alternative Water Supply Plan (AWS Plan). While we appreciate that the SFPUC is undertaking this exercise, we think the Plan has a lot of room for improvement. Of utmost concern is the lack of a robust assessment of how much alternative water supply the SFPUC might reasonably need to develop.

G-1

I. The Plan Must Include a Sensitivity Analysis, and Model Alternative Scenarios

The AWS Plan states, “Identifying future demand is critical to planning for long-term supply reliability of the RWS.” (p. 30) Yet it fails to include alternative scenarios that consider a more realistic drought planning horizon and reasonable demand projections.

G-2

It goes on to say:

Successful implementation of the AWS Program requires a balance between securing future reliability and maintaining affordability, both of which are critical SFPUC goals. The AWS Program must focus on implementing water supply projects that will address long-term customer demands and obligations without over-building or overcommitting capital funding. (p. 57)

G-3

This comment emphasizes the importance of not overinvesting in AWS that will not be needed, but the Plan fails to accurately identify future water supply needs. The Plan acknowledges that changes in assumptions related to the Design Drought and projected water demand would have a profound impact on the SFPUC’s water supply deficit, yet there is no modeling of how such changes would affect “Demands.” It states:

The SFPUC relies on planning assumptions and modeling to project future water availability in dry-year conditions. ***The SFPUC design drought and adopted rationing policy...are assumptions that affect the estimates of water availability during dry-year conditions. Changes to the assumptions around the design drought or rationing would change total system yield estimates.*** For the purposes of this AWS Plan, these planning assumptions are being held constant as part of the SFPUC planning methodology for projecting future water supplies. This allows a direct comparison to the planning that was done for the WSIP program. (p. 39)

In BAWSCA’s 2022 “Regional Water Demand and Conservation Projections Update,”¹ a sensitivity analysis was included that looked at slower population growth.² The SFPUC should include a similar sensitivity analysis in the AWS Plan, especially considering that the California Department of Finance (CDOF) recently reduced its population growth projections, predicting population declines in both San Francisco and San Mateo Counties.³

Despite raising concerns about overinvesting in expensive alternative water supplies, the AWS Plan fails to consider alternative scenarios, such as reducing the length of the Design Drought or using CDOF population growth projections, both of which would reduce “Demands” significantly. The Commission should be informed on how these changes would impact the perceived water supply deficit.

Recommendations:

- 1) Direct staff to model “Demands” (water supply deficit) using a 7.5-year Design Drought.
- 2) Direct staff to model “Demands” using CDOF population growth projections, similar to BAWSCA’s sensitivity analysis (see Attachment A).
- 3) Direct staff to model “Demands” using a combination of a 7.5-year Design Drought and CDOF population growth projections.
- 4) Amend Figure 3-4 (Obligations and Demands) to include a third column titled “Lower Demands” that is based on a 7.5-year Design Drought and CDOF population growth projections. Rename the current “Demands” column “Upper Demands.”

II. Why It’s Important To Do This Right?

Alternative water supplies can be expensive, so investing wisely is important. According to the AWS Plan:

¹ BAWSCA Regional Water Demand and Conservation Projects Update, December 5, 2022 – [https://bawasca.org/uploads/userfiles/files/BAWSCA%202022%20Demand%20Study%20Update%20Final%20Report\(1\).pdf](https://bawasca.org/uploads/userfiles/files/BAWSCA%202022%20Demand%20Study%20Update%20Final%20Report(1).pdf)

² Please see Attachment A.

³ *San Francisco exodus: City may never recover population loss as other parts of the Bay Area grow*, San Francisco Chronicle, August 9, 2023.

Based on preliminary estimates, the capital investment associated with the suite of regional AWS Projects could be on the order of \$4 billion to \$10 billion (escalated to the mid-point of construction) over the planning horizon, varying largely based on the size of the expansion of Calaveras Reservoir and the preferred conveyance facilities.⁴ (p. 124)

The amount of alternative water supplies the AWS Plan cites as needed – 92 million gallons per day (mgd) – is inflated and would be extremely expensive. On the low end, at \$3,000 per acre foot, developing 92 mgd would cost \$300 million per year, which would have to be passed on to ratepayers. As you know, ratepayers (especially low income) are already heavily stressed by water and wastewater rates.

G-7

Even without these AWS investments, water and wastewater rates are expected to increase substantially in coming years, as demonstrated by the following slide presented at the February 14, 2023 budget hearing.



Near-Term Rate Increases

Enterprise	FY 2023-24	FY 2024-25	FY 2025-26	10-Year Annual Avg.
Retail Water	5.0%	5.0%	5.0%	3.9%
Wholesale Water	11.6%	0.0%	0.0%	2.5%
Wastewater	9.0%	9.0%	9.0%	8.5%
Hetch Hetchy Power	14.0%	10.0%	9.0%	6.7%
CleanPowerSF Generation	15.0%	0.0%	0.0%	1.1%

- Hetch Hetchy Power rates were approved in May 2022
- Other rates will be brought to the Commission in May
 - Wholesale water rates updated annually per contract
 - Three years of retail water and wastewater rates will be proposed from ongoing 2023 rate study
 - CleanPowerSF rates are currently being adopted annually to respond to power market price volatility

G-8

*Hetch Hetchy Power rates shown are for retail, non-municipal customers
CleanPowerSF rate increase is only the generation portion of the bill; the FY 2023-24 increase in the total bill, including PG&E delivery charges, is approximately 5%*

The AWS Plan would increase rates further. The first phase alone (2% to 5% of the full implementation cost)⁵ would raise rates as follows:

AWS staff have worked with the Finance team to evaluate the rate impact of adding the AWS Project and Programmatic recommendations in this Plan, which would add

⁴ Note that the \$4 billion to \$10 billion range is for capital investments only, and does not include operations and maintenance. Table 5-1 should include at least a range of O&M costs to give a better sense of the full cost of the projects.

⁵ The first phase of the AWS Plan would cost \$209 million. Full implementation would cost \$4 billion to \$10 billion.

approximately \$209 million in capital and operating expenses between FY 2025 and 2034...The financial modeling showed that retail rates would need to increase by about 0.9% above the current projected rate plan by FY 2033 and wholesale rates would increase by 7.6% in the same time period...Rate impacts would also extend past the 10-year timeframe analyzed. (pp. 124 & 125)

Higher rates will continue to send a strong price signal to consumers, leading them to use water more efficiently in order to reduce their bills. At the July 16, 2021 SFPUC workshop, staff stated that in response to a 10% rate increase, single-family demand decreases 1.4%, multi-family demand decreases 2%, and commercial demand decreases between 1.4% and 3%.⁶

It should be of great concern to the Commission that if the AWS Plan is implemented, water rates will skyrocket, driving a dramatic increase in conservation. There would be more water infrastructure to pay for, but less demand to cover the costs. This would exacerbate the “death spiral” – rates increase to cover fixed costs, consumers use less water, rates increase again, and the economic situation continues to worsen.

III. Impacts on Water Supply

The AWS Plan erroneously states:

The most pronounced driver affecting water availability is the potential implementation of the 2018 Amendment to the State Water Resources Control Board’s San Francisco Bay/Sacramento-San Joaquin Delta Estuary Water Quality Control Plan. (p. XII)

According to the SFPUC’s \$743,000 Long-Term Vulnerability Assessment (LTVA), this statement is incorrect. The LTVA states:

Climate change is not the single most important driver of vulnerability for the RWS. Under current RWS infrastructure conditions, either state-amended WQCP [Bay Delta Plan] for additional IFR [instream flow requirement] on the Tuolumne River or an increase in demand by 15% have significant impacts on the RWS performance that are equivalent to a decrease in mean annual precipitation of around 15%. (LTVA, p. 250)

In other words, the Bay Delta Plan instream flow requirement is equivalent to either a 15% increase in demand, or a 15% decrease in precipitation.

RWS demand has been under 200 mgd for the past nine years. Assuming demand remains flat at around 200 mgd, the 244 mgd projection for 2045 in the AWS Plan would increase demand

⁶ SFPUC workshop on Water Demand Projections and Demand Management, July 16, 2021 – https://sanfrancisco.granicus.com/player/clip/38991?view_id=22&redirect=true&h=28ea534dd1acf1e58ebb0321a7db1492 (22:40).

G-9

G-10

by 22%. This inflated demand projection is the most pronounced driver affecting water availability.

The baseline demand figure used in the LTVA is 227 mgd, which is 15% greater than what RWS demand has been for the past nine years. This means that results included in the LTVA based on the baseline demand figure are essentially incorporating the Bay Delta Plan instream flow requirement into actual current demand. Furthermore, most of the analysis in the LTVA is based on 240 mgd demand, which is 20% greater than 200 mgd demand. The LTVA suggests there is an extremely small chance the SFPUC would run out of water unless water demand grows substantially, which is very unlikely to happen (see comments on demand projections below).

G-11

IV. The AWS Plan Needs to Address the Design Drought

Despite numerous references to “climate uncertainty,” the AWS Plan dedicates a mere three paragraphs to the LTVA, with no citations to justify the Design Drought. The AWS states, “Impacts related to climate change are not currently quantified in the AWS planning efforts;” (p. 39)

G-12

Removing one year from the Design Drought, which is justified by the LTVA, would have a big impact on the perceived need to invest in expensive alternative water supplies. Removing the final year from the Design Drought would reduce “Demands” in the AWS Plan by about 25 mgd. This would reduce costs (passed on to ratepayers) by at least \$90 million per year – an opportunity that is certainly worth exploring.

G-13

The LTVA found that the Design Drought is extremely unlikely to occur, yet the SFPUC continues to use it as its primary planning tool. The LTVA included return periods (likelihood of occurrence) for the known droughts, but inexplicably did not include a return period for the Design Drought. A Public Records Act request uncovered a document revealing that the study authors had produced a return period for the Design Drought of once-in-25,000 years,⁷ but this information was not included in the final report. Information that was included in the final report suggests the Design Drought is even less likely to occur. We addressed this at the August 23, 2022 SFPUC workshop, and SFPUC staff had no response. Please review the workshop video.

G-14

The Design Drought was conceived following the 1987-92 drought of record. It was arbitrary and has never been backed up by supporting evidence. Much has changed since the 1987-92 drought. For example:

- Heading into the drought, water demand was at an all-time high of 293 mgd. It has been under 200 mgd for the past nine years.
- The SFPUC adopted its Water First Policy, prioritizing water supply over hydropower generation. According to an SFPUC presentation, precipitation in 1976/77 was 39.14

⁷Hydrological Drought Frequency Analysis for the Upper Tuolumne River, December 8, 2020.

inches, and was similar in 2020/21 at 39.28 inches. Yet, while total system storage was 563,298 acre feet on June 10, 1977, it was substantially higher at 917,455 acre feet on the same date in 2021.

- Cherry Lake, the SFPUC's second largest reservoir in the Tuolumne watershed (3/4 the capacity of Hetch Hetchy) was drained for maintenance in 1989, and that storage was lost.

The LTVA states, "According to climate projections and expert elicitations, there is a central tendency of warming of +2°C and +4°C by 2040 and 2070 (Representative Concentration Pathway [RCP] 8.5), respectively, with no clear direction of change in mean annual precipitation over the planning horizon." (LTVA, p. xxii)

In other words, we might expect wetter years and drier years, but on average precipitation isn't expected to change much. In fact, the report suggests that the Hetch Hetchy watershed is more likely to experience slightly more precipitation in the future. Interestingly, earlier runoff projected by the study would likely benefit the SFPUC's water entitlements based on how water rights were established on the Tuolumne River under the Raker Act. Based on the study's projection that runoff will likely come three weeks earlier by 2070, if the Design Drought were to occur, the SFPUC would pick up an additional year's-worth of water over the course of the 8.5-year drought. We explained this at the August 23, 2022 workshop.

G-15

V. The AWS Plan Needs to Address Inflated Water Demand Projections

The issue of inflated water demand projections has been raised many times, and was addressed at the July 16, 2021 workshop. AGM Steve Ritchie stated:

I want to make sure it's clear that the Urban Water Management Plan is not intended to be an actual projection of demands, because plan developments may or may not occur or may be delayed for a variety of reasons...and the projections presented in the 2020 Urban Water Management Plan are closer to an outside envelope of what the demands may be in 2045 rather than actual demands.

The accuracy of water demand projections was again addressed in an SFPUC report titled "Water Enterprise and Finance Bureau Water Demand Projections," dated July 5, 2022. The report stated:

It [UWMP Act] was not intended to establish the projected water demands that would be used for all operational and planning purposes...the projections represent an outside bound of whatever demand will occur in the next 25 years...These demands will likely always be greater than actual demands because not all developments materialize, or they materialize slower than projected.

G-16

And:

By contrast, for the purpose of financial planning and for short term water system management, we estimate the demand that we are likely to experience. For budgeting and rate setting we use demand projections that are as close to actual as we can make them.

The report included graphs showing that both the SFPUC Water Enterprise and Finance Bureau have historically over-projected demand, but Finance has always been closer to the actuals. The Finance Bureau currently projects sales will remain flat for at least the next decade.

The primary driver for current inflated water demand projections is inflated population growth projections. This issue came up at the July 16, 2021 workshop, to which then SFPUC President Anson Moran gave the following directive:

...we be given information about the differences between Department of Finance and the Plan Bay Area and what those differences really are, and within that, what portion of that reflects legal mandates such as affordable housing targets and what is more aspirational.

After a ninth month delay, staff finally provided two paragraphs explaining how the CDOF and ABAG (Plan Bay Area) determine population growth projections, but ignored the question raised by President Moran.⁸

The latest CDOF projections (July 2023) suggest that the populations of San Francisco and San Mateo Counties will likely decline over the coming decades.

VI. SFPUC “Rationing Methodology” Vs. “Rationing Policy”

The AWS Plan should explain the difference between the SFPUC’s “rationing methodology” and “rationing policy.” The rationing methodology is explained in Appendix K of the 2020 Urban Water Management Plan as follows:

In applying its water supply planning methodology, the SFPUC performs an initial model simulation of the system for the design drought sequence and then reviews the ability of the system to deliver water to the service area through the entire design drought sequence. If the projected water supply runs out before the end of the design drought sequence in the initial model run, system-wide water use reduction is added and the scenario is re-run. This process continues iteratively until a model simulation of the system is achieved in which the water supply in storage at the end of the design drought sequence is brought to the system “dead pool,” where no additional storage is available for delivery (currently simulated as 96,775 acre-feet). Drawing system storage down to

⁸ *Department of Finance and Plan Bay Area Projections*, email from AGM Steve Ritchie to Anson Moran dated April 14, 2022 (included in the April 26, 2022 SFPUC correspondence log).

the dead pool without going below it indicates that water supply delivery, including the adjusted amount of water use, is maintained through the design drought sequence.

The rationing methodology was not used to produce the 122 mgd of “Obligations” nor the 92 mgd of “Demands” cited in the AWS Plan. Instead, the SFPUC used rationing figures produced in 2008 for the WSIP using the rationing methodology. Back then, what staff now refers to as the “rationing policy” conformed with the rationing methodology. Now that the State Water Board adopted the Bay Delta Plan, it no longer does. Staff should have rerun the numbers using the rationing methodology, which is the SFPUC’s true rationing policy. Doing so would require rationing to begin earlier in the Design Drought and increase more rapidly.

G-18

SFPUC staff explained the “rationing policy” as follows:

The estimate of SFPUC water supply without Bay Delta Plan contributions is 257 MGD of total yield, which is the sum of the system firm yield of 227 MGD and the volume associated with the rationing policy established for the WSIP program. That rationing policy includes 3 years of 10% rationing and 3.5 years of 20% rationing over the 8.5-year design drought. The volume associated with the rationing policy changes as the firm yield changes, as noted above. In this case, the volume of the rationing policy is 30 MGD. That gives a total yield (firm yield + rationing) equal to 227+30 or 257 MGD.⁹

G-19

In other words, the rationing figures used to determine “Demands” in the AWS Plan assume no rationing in Years 1 and 2 of the Design Drought, 10% rationing in Years 3 to 5, and 20% rationing in Years 6 to 8.5.

The rationing numbers and timing that was determined necessary to manage the Design Drought at the time the WSIP was approved would fail to enable the SFPUC to manage the Design Drought under the Bay Delta Plan. In fact, the SFPUC has argued it could not manage the Bay Delta Plan flows without exceeding its Level of Service Goal of limiting rationing to no more than 20%.

It is clear that starting rationing at 10% in Year 3, and not increasing it to 20% until Year 6 is not how the SFPUC would impose rationing if the Bay Delta Plan is implemented. Imposing rationing earlier and at higher levels would reduce “Demands” substantially. Starting 20% rationing in Year 3 rather than Year 6 would have an incremental favorable impact on water available in storage, which should be factored when considering alternative water supplies.

G-20

The AWS Plan acknowledges this in a hidden way. Figure 3-3 includes “Estimated Contribution of Rationing,” which is another way of saying “using the SFPUC’s rationing methodology.” The 81 mgd “Demands” cited in Figure 3-3 should be the upper demand used in the AWS Plan, saving at least \$36 million per year in unnecessary investments.

⁹ Email from Matt Moses (SFPUC) to Peter Drekmeier (TRT), October 26, 2022.

VII. Alternative Water Supply Investments

As discussed above, we believe that, particularly with a modest adjustment to the Design Drought and the use of realistic demand projections, even with full implementation of the Bay Delta Plan, the SFPUC could maintain a highly reliable water supply. Under this approach, the SFPUC would not face the need for a large scale investment in alternative water supplies.

G-21

The AWS Plan, however, follows a different path with regard to the Design Drought and demand projections. We recommend that the SFPUC develop multiple scenarios for analysis in this document. At one end, this should include the assumptions we have suggested regarding the Design Drought and demand projections. At the other end, if the SFPUC chooses to use higher demand projections, that assumption should be paired with a greater investment in alternative water supplies. For example:

G-22

Denitrification and Direct Potable Reuse

It is likely that in coming years Bay Area wastewater treatment plants will be required to reduce nutrient discharges into the Bay through investments in denitrification. At the same time, the State Water Board is developing regulations for direct potable reuse. We believe water agencies, particularly the SFPUC, are presented with an important opportunity to develop a cost-effective solution to two problems – excessive nutrient discharges and ensuring long-term reliable water supplies. We urge the SFPUC to include, as needed in the scenario approach discussed above, significant investments in purified water and denitrification.

G-23

On August 21, 2023, the San Jose Mercury News published an article titled “Fighting Future ‘Red Tides’ in San Francisco Bay.” San Francisco Bay suffered a significant harmful algal bloom (HAB) in August 2022, killing thousands of fish and endangering people and their pets. A second less severe bloom occurred in July 2023.

In response, Eileen White, Executive Director of the San Francisco Bay Water Quality Control Board (SF Bay Water Board), is quoted, “The science is telling us that we need to reduce nutrient loads as quickly as possible. What has happened is a game changer.”

San Francisco’s discharges into San Francisco Bay are responsible for 20% of the nutrient loading. The Mercury News article states that San Francisco and the East Bay Municipal Utilities District (EBMUD) are running behind other municipalities in dealing with this problem. The article also states that some of the South Bay agencies have reduced nitrogen releases by about 85% from previous levels. As a major contributor of nutrient pollution, the SFPUC should take the lead in solving this problem. The AWS Plan should be amended to specifically make this a priority goal.

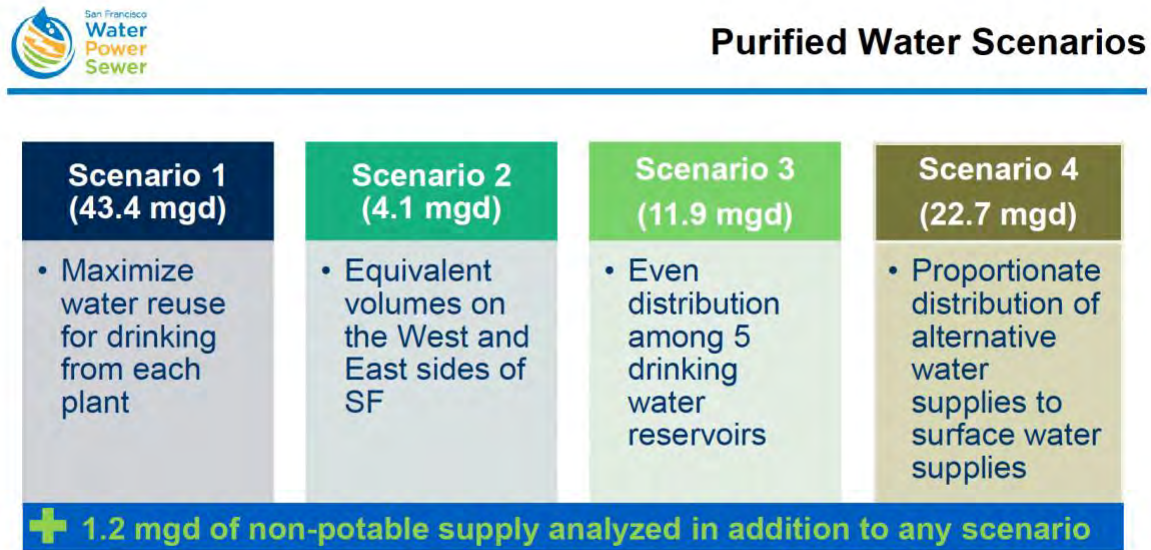
G-24

As noted in the Mercury News article, some of the newer technologies for reducing nutrients do not always result in available water. The SFPUC should avoid using those technologies unless

G-25

they are proven to be very cost-effective on a short-term basis. The long-term plan should be a combination of reducing nutrient loading and water recycling and reuse.

An SFPUC presentation on the “San Francisco Purified Water Opportunities Study” (Carollo, May 2022) included the following slide. Despite mentioning that staff were preparing a recommendation, it is not included in the AWS Plan. This is a lost opportunity.



G-26

SFPUC staff are currently reviewing scenarios to prepare recommendation

Collaboration with the Irrigation Districts on Groundwater Banking

Implementation of the Sustainable Groundwater Management Act (SGMA) is leading Central Valley water agencies to invest in significant groundwater recharge programs. Implementing these programs on a large scale will be expensive, and may lead the Modesto and Turlock Irrigation Districts to be receptive to collaborating with the SFPUC. We continue to urge the SFPUC to explore a conjunctive use partnership in Stanislaus County that could assist with SGMA implementation while providing the SFPUC with additional storage and reliability benefits.

G-27

Collaboration with the Irrigation Districts on More Efficient Water Delivery

Similar to groundwater banking, the SFPUC could partner with the Irrigation Districts on developing pressurized water systems that enable more efficient delivery of water to farms. The SFPUC could fund the infrastructure for a share in the savings. Conserving agricultural irrigation water is far less expensive than developing alternative water supplies in the Bay Area, and the opportunity is huge. For example, a pilot project implemented by the South San Joaquin Irrigation District installed a pressurized water system on 2,000 acres of farmland that decreased water use by 30% while increasing crop yield by 30%.

G-28

For the above water supply scenarios, we recommend the following:

- The document’s scenarios should explicitly pair higher growth assumptions with higher investments in alternative water supplies.
- The document should include a scenario that would include ambitious direct potable reuse and denitrification of wastewater effluent in the service area.
- The document should include the potential for a conjunctive use program partnership between the SFPUC and the Irrigation Districts, as well as an analysis of the potential to partner on water efficient delivery to farms.

G-29

VIII. Conclusion

In order to greatly improve the AWS Plan, we recommend the following:

- 1) Direct staff to model “Demands” using a 7.5-year Design Drought.
- 2) Direct staff to model “Demands” using CDOF population growth projections.
- 3) Direct staff to model “Demands” using a combination of a 7.5-year Design Drought and CDOF population growth projections.
- 4) Amend Figure 3-4 (Obligations and Demands) to include a third column titled “Lower Demands” that is based on a 7.5-year Design Drought and CDOF population growth projections. Rename the current “Demands” column “Upper Demands.”
- 5) Pair higher growth assumptions with higher investments in alternative water supplies, specifically direct potable reuse and denitrification, groundwater banking in Stanislaus County, and collaboration with the Irrigation Districts on water delivery efficiency.

G-30

Thank you for the opportunity to share our thoughts and recommendations.

Sincerely,



Molly Culton
Chapter Organizing Manager
Sierra Club California



Peter Drekmeier
Policy Director
Tuolumne River Trust



Scott Artis
Executive Director
Golden State Salmon Association



Chris Shutes
Executive Director
California Sportfishing Protection Alliance



Chance Cutrano
Chapter Chair
Sierra Club, SF Bay Chapter



Kristina Pappas
President
San Francisco League of Conservation Voters

CC: San Francisco Board of Supervisors
San Francisco Capital Planning Committee
BAWSCA Board of Directors
SFPUC Citizens Advisory Committee

Please scroll down for Attachment A.

Attachment A – BAWSCA’s Water Demand Sensitivity Analysis

BAWSCA’s 2022 Regional Water Demand and Conservation Projections Update¹⁰ assessed how different factors affect demand projections. The study looked at alternative future scenarios based on:

- Population and jobs growth
- Housing density
- Water rates
- Water conservation
- Climate change

Scenarios A through E are summarized in the following table.

Table 6-6. Variables Included in Scenarios A Through E

Variable	Scenario A	Scenario B	Scenario C	Scenario D	Scenario E
Population and Economic Growth	1.1% Pop 1.0% Job	0.84% Pop 0.74% Job	1.1% Pop 1.0% Job	0.84% Pop 0.74% Job	0.52% Pop 0.42% Job
Housing Density	Continue historical 2015–2020 patterns	10% more MF, 10% less SF	15% more MF, 15% less SF	Continue historical 2015–2020 patterns	10% more MF, 10% less SF
Long-Term Climate Change	1.6°F	1.6°F	2.2°F	2.2°F	2.2°F
Water Rates	0% rate increase above CPI	1.8% rate increase above CPI	2.3% rate increase above CPI	2.3% rate increase above CPI	2.3% rate increase above CPI
Water Conservation	0.5% annual GPCD reduction	0.5% annual GPCD reduction	0.625% annual GPCD reduction	0.5% annual GPCD reduction	0.625% annual GPCD reduction
Seasonal Weather	Included for all scenarios to set baseline demand				
Economic Cycles	Included for all scenarios to set baseline demand				

Among other assumptions, Scenario E used California Department of Finance population growth projections (prior to the recently released numbers). Scenario E is presented in the following table.

¹⁰ BAWSCA Regional Water Demand and Conservation Projections Update, December 2022 – [https://bawasca.org/uploads/userfiles/files/BAWSCA%202022%20Demand%20Study%20Update%20Final%20Report\(1\).pdf](https://bawasca.org/uploads/userfiles/files/BAWSCA%202022%20Demand%20Study%20Update%20Final%20Report(1).pdf)

Table 6-5. Basis for Projection in Scenario E

Scenario E				
Variable	Basis for Projection			
1. Population and Economic Growth	Annual growth rate for future population and jobs	Population: 0.52% (DOF) Jobs: 0.42% (DOF)	0.84% (Historical) 0.74% (Historical)	1.1% (ABAG) 1.0% (ABAG)
2. Housing Density	New housing built (at retail level through 2045)	Continued recent (2015-2020) patterns (% SF, % MF)	Increased density in future (10% more MF, 10% less SF)	Increased density in future (15% more MF, 15% less SF)
3. Long-Term Climate Change	°F warming	1.6°F RCP4.5: global CO2 emissions peak by 2045		2.2°F RCP8.5: global CO2 emissions continue to rise through 21st century
4. Water Rates	Future increase to individual BAWSCA agency water rates above CPI	0%	1.8%	2.3% (75% rate increase by 2045)
5. Conservation	% Annual Demand Reduction	0.5% (Programs selected in BAWSCA's 2020 Demand Study to meet anticipated water use targets)		0.625% (Assuming agencies achieve an additional 25% savings beyond anticipated water use targets)
6. Seasonal Weather 7. Economic Cycles	Applied to all scenarios to set baseline demand (Normalizes demand for seasonal weather fluctuations and short-term economic cycles)			

The table below shows projected water demand for Scenarios A through E. Note that under Scenario E, BAWSCA’s total water demand in 2045 is projected to be 204 million gallons per day (mgd). To put this in perspective, BAWSCA’s total water use in FY 2020/21 was 205.4 mgd.¹¹ Note that these figures are for total BAWSCA demand, including water provided by sources other than the SFPUC.

¹¹ BAWSCA Annual Survey, March 2023, Table 3B: Historical Total Water Use among BAWUA/BAWSCA Agencies, 1975-76 to Present. -- https://bawsc.org/uploads/userfiles/files/Annual%20Survey_FY21-22_FINAL.pdf

Table 7-1. Future BAWSCA Region-Wide Water Demands (in MGD) Under Scenarios A Through E

Year	Scenario A	Scenario B	Scenario C	Scenario D	Scenario E
2025	218	216	218	216	213
2030	222	214	217	214	207
2035	229	214	217	214	204
2040	238	216	220	215	201
2045	254	223	228	223	204

Table 7-2. Future BAWSCA Region-Wide Population Under Scenarios A Through E

Year	Scenario A	Scenario B	Scenario C	Scenario D	Scenario E
2025	1,974,169	1,949,292	1,974,169	1,949,292	1,919,754
2030	2,073,412	2,023,826	2,073,412	2,023,826	1,966,197
2035	2,188,305	2,107,557	2,188,305	2,107,557	2,016,617
2040	2,304,144	2,191,015	2,304,144	2,191,015	2,066,227
2045	2,456,565	2,302,236	2,456,565	2,302,236	2,133,051

Response to Comment Letter G

Sierra Club, California; Tuolumne River Trust; San Francisco League of Conservation Voters; Golden State Salmon Association; California Sportfishing Protection Alliance; Sierra Club, San Francisco Bay

Molly Culton, Chapter Organizing Manager; Peter Drekmeier, Policy Director; Kristina Pappas, President; Scott Artis, Executive Director; Chris Shutes, Executive Director; Chance Cutrano, Chapter Chair

August 31, 2023

- G-1** The AWS Plan was developed based on the latest available information as of May 2023. The AWS Plan acknowledges that information continues to evolve on water availability, demand projections, and AWS Projects. As such, Recommendation 4 of the AWS Plan is to provide periodic updates to the Plan beginning in FY 2026-2027. Investment decisions related to planning and development of AWS Projects are also staggered to reflect a need to take a stepwise approach to implementation.
- G-2** A new Recommendation 5 has been added to the AWS Plan to include a process to refine demand forecasting, which will include additional scenario(s) to capture a range of potential futures. See Global Response 1 for additional discussion on demand forecasting.
- G-3** Recommendation 5 includes reviewing demand forecasting model assumptions and the sensitivity of inputs, as well as coordinating with BAWSCA. See Global Responses 2 and 3 for more information on the design drought and rationing, respectively.
- G-4** As outlined in Recommendation 5, the SFPUC is planning to consider developing additional water demand scenario(s) prior to making large future investment decisions on projects identified in the AWS Plan. The AWS Plan, along with the water supply gap and recommendations, will be updated periodically and provided to the Commission to keep them informed ahead of critical decision milestones. Refer to Global Response 1 for more information on demands and Global Response 2 for more information on the design drought.
- G-5** For recommendations 1 and 3 in the comment, see Global Response 2. For recommendation 2 in the comment, see Global Response 1.
- G-6** Any additional demand scenario(s) resulting from the implementation of Recommendation 5 will be included in future updates to the AWS Plan, beginning in FY 2026-2027.
- G-7** The cost of the AWS Program is an important part of ongoing planning. The AWS Program will continue refining costs as more project information becomes available and will be undertaking rate analyses to determine customer impacts. Because the AWS Projects are in their early planning phases, low interest loans, grants, and cost shares have not yet been factored in, which have the potential to significantly reduce costs and ratepayer impacts. The methodology used to calculate the future water supply gap is described in further detail in Appendix B.

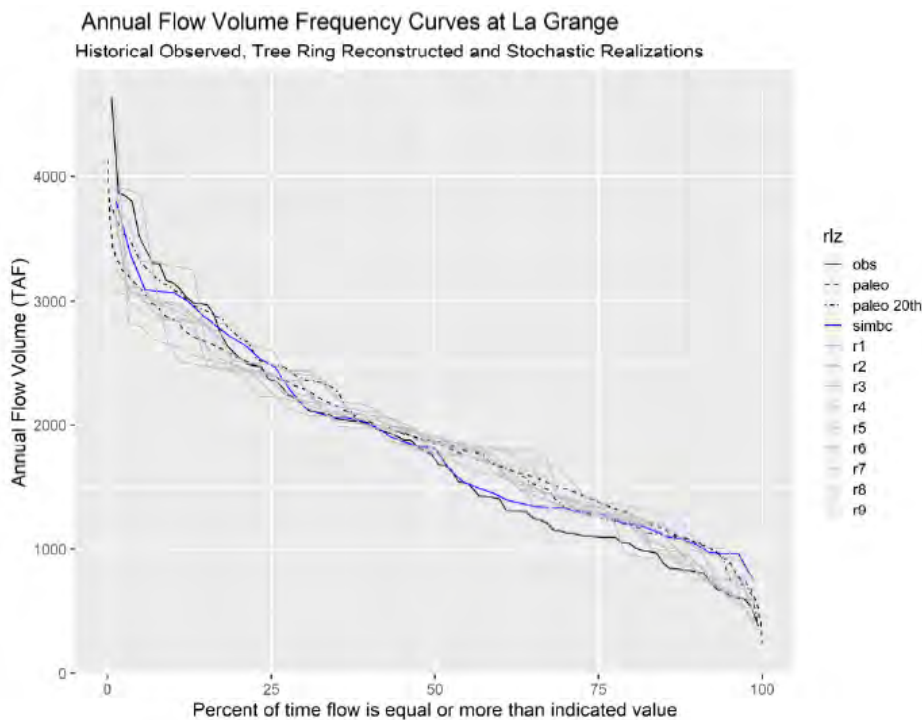
- G-8** The AWS Program recognizes that planning and implementing alternative water supplies is expensive and acknowledges the need for continued analysis of rate impacts in conjunction with future investment recommendations. The cost of AWS projects has been and will continue to be an important factor in decision-making as the SFPUC moves forward. The SFPUC will continue to share information in public documents as project costs develop and alternatives for financing are identified.
- G-9** The SFPUC recognizes this comment. The language in the AWS Plan has been updated as follows to reflect the intended meaning: *"One of the most pronounced drivers affecting water availability is the potential implementation of the 2018 Amendment to the State Water Resources Control Board's San Francisco Bay/Sacramento-San Joaquin Delta Estuary Water Quality Control Plan (Bay-Delta Amendment). Unlike other factors that could affect SFPUC water supply, such as climate change, the effect of implementing the Water Quality Control Plan update would be immediate."*
- G-10** Retail demand projections are based on the SFPUC's econometric demand forecasting model and the Wholesale Customer demand projections are based on their projected purchase requests, as provided most recently in the BAWSCA's 2022 Annual Survey. The new Recommendation 5 in Chapter 6 will enable staff to review modeling assumptions to refine future demand projections. See Global Response 1 for additional information on demand projections.
- G-11** See Global Response 1 for the rationale behind the AWS demands forecast involving retail and wholesale customers. LTVA is a modeling exercise focused on assessing the extent of climate change threat to the Regional Water System which involves many assumptions and model limitations including uncertainties around climate change projections. Please also see the response to comment G-14 to understand the nature of such limitations. While SFPUC's demand has reduced in recent years primarily due to various actions (such as voluntary or mandatory rationing) taken during two droughts covering 2014 to 2016 and 2019 to 2022, SFPUC's long-term planning cannot rely on such short-term changes influenced by drought management actions. Forecasting water demand is highly uncertain and is influenced by macro-level socioeconomic and climatic factors, as well as the local behavior of consumers. Understanding the changing long-term demand is crucial in AWS planning along with the adaptation of a reasonable conservative planning approach to safeguard the SFPUC's water supply. SFPUC has invested significantly in tracking the demand as accurately as possible and will continue to put effort into continuously improving such measurements.
- G-12** The SFPUC recognizes that climate change and other changes to external conditions may jeopardize the future ability of the RWS to meet the desired levels of service, hence the preparation of the LTVA. However, evaluating the design drought was not the purpose nor objective of the LTVA. Thus, the LTVA is agnostic to its use and does not make any such justifications (see Global Response 2 for more information on using the design drought as a planning tool). The SFPUC is aware that climate change studies need to be updated periodically as part of a continuous process when new information and data are available. The last sentences of paragraph 1 and 3 in Section 3.2.3 of the AWS Plan reflect this commitment.
- G-13** Evaluating the design drought was not the purpose nor objective of the LTVA. Thus, the LTVA is agnostic to any changes to the design drought and does not make any such

recommendations or justifications. Future water supply planning cannot solely rely on historical events, it must also consider scenarios outside of those already experienced. See Global Response 2 for more information on using the design drought as a planning tool.

- G-14** The SFPUC provided a memo to the Tuolumne River Trust describing issues with return period calculation (and why it was not included in the final LTVA report) in response to public records requested by the Tuolumne River Trust on 5/3/2022. These issues were related to (1) an error in Upcountry hydrologic models, and 2) a large uncertainty in drought frequency analysis for extreme drought events. The portions of the memo describing these two issues, clarifying the calculation related to the design drought, are included below. See Global Response 2 for more information on the design drought and its use.

Issue 1: Error in Upcountry hydrologic models

Description: The PRMS hydrologic models for the Tuolumne River show underprediction of annual volume in wet years and overprediction in dry years. The simulated flows do not have distributional properties that mimic those of the observed flows. This is illustrated in the figure below for annual flow volume of the Tuolumne River at La Grange. This discrepancy has repercussions for the Water Available to the City (WAC) and therefore on drought operation in the reservoir system model SFWSM.



Resolution: Given the importance of a good reproduction of the WAC for the RWS, UMASS HRG collaborated with SFPUC to correct the PRMS simulations across the Upcountry region. A post-processing model was developed by SFPUC to correct the PRMS daily streamflow. The considered method attends to correct the residual model errors using meteorological indices. More details about the post-processing model, including calibration and validation, are provided in the Technical Report 2 on hydrology.

Updated resolution: As shown in the final report, even after the post-processing correction, the PRMS hydrologic model used to simulate the streamflow on the Tuolumne watershed in response to

precipitation and temperature overestimates streamflow during dry years. For example, the flow computed at the Tuolumne River at La Grange is overestimated, and therefore San Francisco's allocation is also overestimated by about 482,000 acre-feet during the drought sequence 1987-1992 (observed is 813,000 acre-feet versus simulated is 1,295,000 acre-feet). This volume of water is significant and is about equal to the volume of rationing that was required by customers during the six-year period, and so overstating the RWS water supply reliability. An effort of re-building and re-calibration of hydrologic models for the Upcountry watersheds is underway by HHWP.

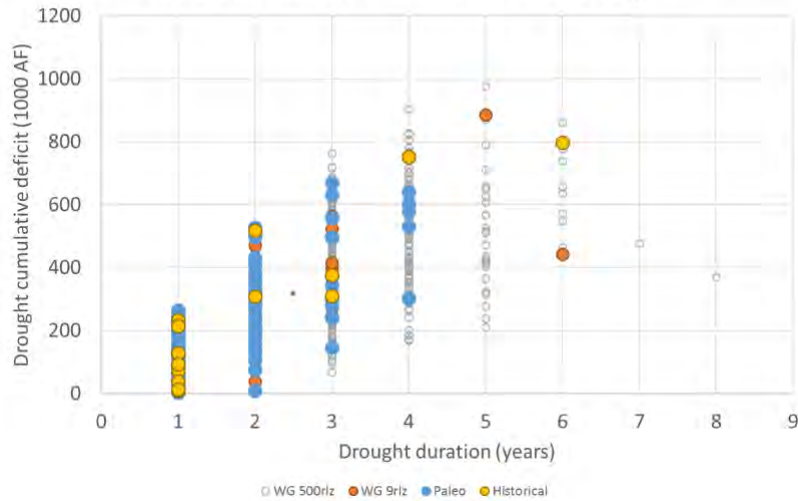
Issue 2: Large uncertainty in drought frequency analysis for extreme drought events

Description: Droughts, even more than floods, are rare events. As such, long time series are crucial for inferring model parameters to model drought frequency. Three sources of hydrological data are available for this analysis:

- 95-year-long historical natural flow at La Grange (1921-2015)
- paleo record at La Grange reconstructed from tree rings for the period 900-2012
- 9 representative climate realizations of 50-year long streamflow simulated using PRMS model plus 500 other stochastic realizations using PRMS.

For the flow at La Grange, about 100 years of reconstructed historical is available, which is rather small since droughts are rare and last multiple years. For that reason, we attempted to use the tree-ring reconstructed flow record and the simulated flow time series from the LTVA stochastic rainfall simulations. The advantage of the stochastic datasets is that a very long time series of simulated hydrologic flows is available to extract drought events. However, the PRMS hydrologic model used to simulate the streamflow on the Tuolumne watershed in response to precipitation and temperature overestimates streamflow during dry years (see issue 1). The drought events identified in the working draft final report are represented below using the severity (cumulative flow deficit) and duration (number of years). The largest ensemble of drought events is created using the stochastic flow time series from PRMS. Since the model overestimates flows in dry years, the number of drought events in the figure below is biased and underestimated. The small sample of events with duration greater or equal to 6 years results in large uncertainty bounds around the frequency curve, which means a poor confidence in the frequency estimate (i.e. the return period). This is shown in the working copy of return period estimates of historical drought and the design drought. The uncertainty bounds represent about 100% of the estimated return period, which means that the "real" value could be the estimate divided by 2 or multiplied by 2. Such a large uncertainty bound renders the estimate unusable. If the error is too large, what good is the estimate. The uncertainty bounds on historical droughts (76-77, 87-92, 2012-16) are significantly smaller.

Drought events cumulative deficits and durations for SFPUC on the Tuolumne River at La Grange



Return periods of historical drought

Drought Event	Deficit (TAF)	Duration (Year)	Return Period (Year)		
			(best estimate and 95% confidence interval)		
			Deficit	Duration	Deficit and Duration
1976-77	517	2	217 (188; 255)	30 (29; 31)	316 (273; 371)
1987-92	797	6	1,456 (1,031; 2,140)	486 (422; 563)	20,406 (14,589; 29,851)
2012-16	752	4	1,093 (820; 1,520)	121 (110; 133)	4,250 (3,190; 5,899)
Design Drought	1,309	8	25,293 (12,940; 56,679)	1,954 (1,620; 2,376)	1,371,578 (720,390; 2,997,390)

Resolution: The drought frequency analysis was redone using the post-processed PRMS simulated flows (Issue 1). We found that the estimated frequency curve is sensitive to the considered dataset. Therefore, the estimates for the return period for the historical drought events depends on the chosen dataset for the analysis. We also found that we still had very large uncertainty bounds around the frequency curve (see the following figure). This means that we still have very large uncertainty around the estimated return period of extremely rare drought events.

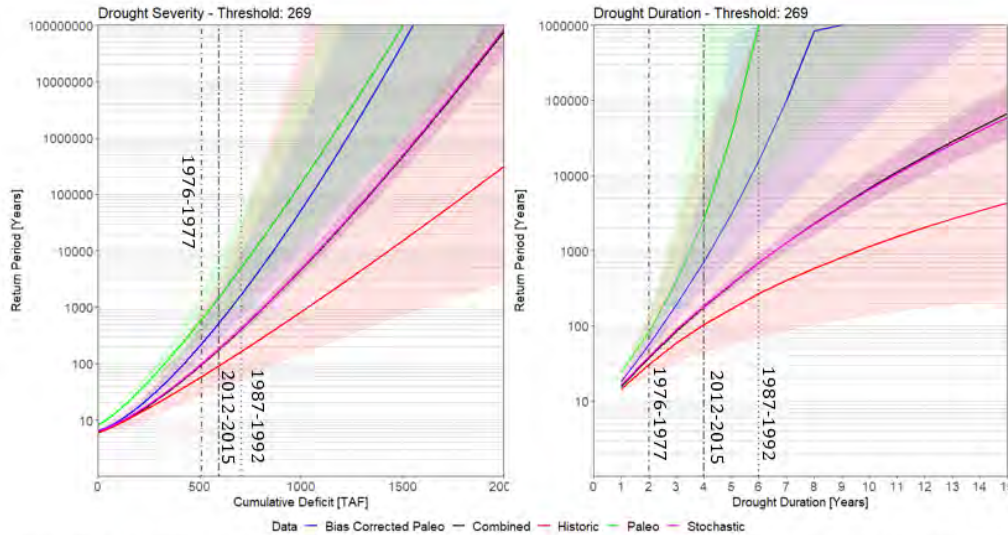
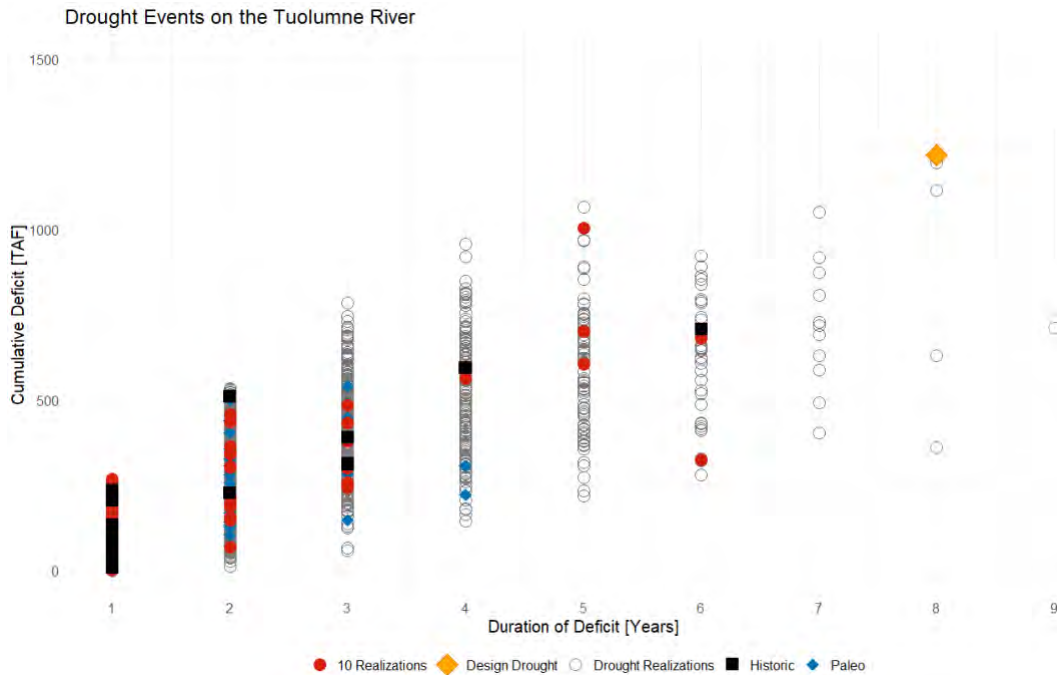
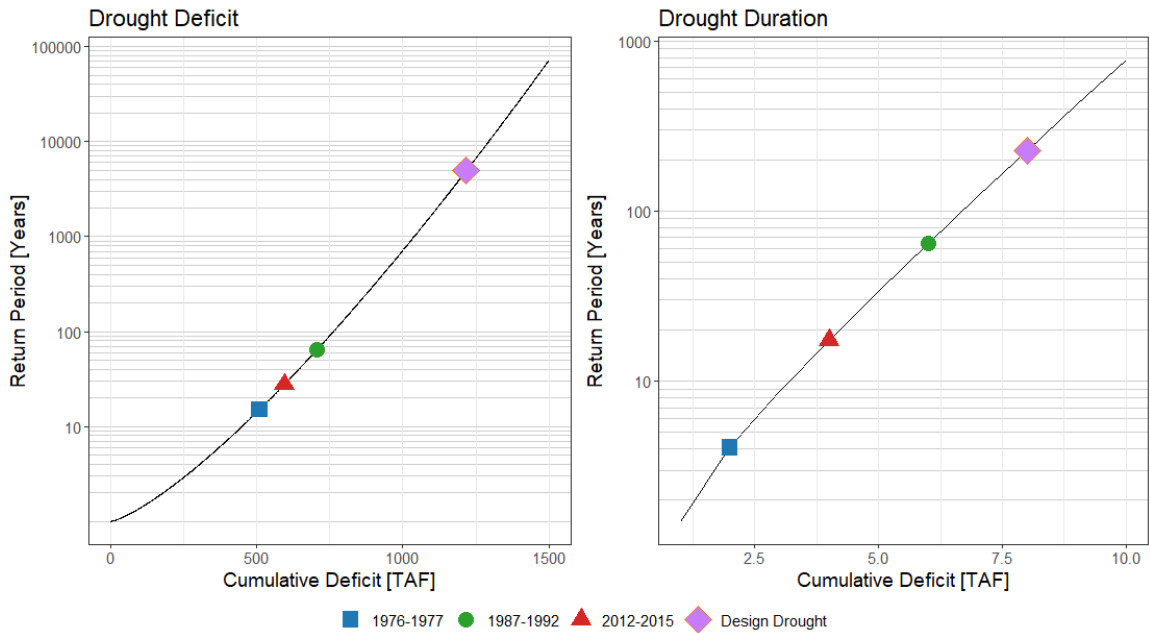


Figure 3-3-31. Drought frequency curves for severity (left) and duration (right). Results are obtained for the 269 TAF threshold. The color lines show the frequency curves obtained for the considered datasets: bias corrected paleo (blue), paleo (green), historic (red), 510 stochastic realizations (purple) and the combined dataset (black). The shaded areas show the 95% confidence intervals obtained using the bootstrap method for each model. Severity and duration for the historic drought events are shown and labeled as vertical lines.

As hypothesized, when reducing the overprediction of flow in dry years using PRMS, the number of drought events increased. More long and very severe drought events were extracted from the stochastic realizations. This is represented in the figure below with more events with duration greater or equal to 6 years and higher severity (cumulative deficit). However, as shown in the previous figure, the large uncertainty bounds around the frequency curve remains, which means a poor confidence in the frequency estimate (i.e. the return period).



We updated the return period estimates for severity and duration of historical droughts (figure below) and attempted to extrapolate to the Design Drought. However, we decided to abandon the idea due to the extremely large uncertainty bounds on the estimate (as aforementioned). Even after improving the PRMS hydrologic model outputs with post-processing, we did not carry forward to the final report the return periods for Design Drought, because the extrapolation was extreme for the level of confidence on the frequency curve. If the error bound is too large on the estimate, what good is the estimate itself. However, the error bound is much smaller for the historical droughts and therefore we published these estimates in the report.



Updated resolution: The drought frequency analysis can be updated after the hydrologic modeling errors are corrected.

- G-15** The detailed hydrologic analysis conducted in the LTVA does not find that a warmer climate “would likely benefit the SFPUC’s water entitlements” (from commentor) due to earlier runoff. The LTVA finds that the annual average water available to the city (WAC) decreases with warming (Section 5.1.1.2 and Figure 5-4(a) of the LTVA). Importantly, the LTVA finds that the *variability* in WAC does increase with warming, and estimated reductions in WAC can be much larger than the increases in WAC (Figure 5-6 of the LTVA). Understanding the changing variability in water available to the city with warming is crucial in water supply planning to safeguard the SFPUC’s water supply. The LTVA also finds that annual average water available to the SFPUC changes linearly with annual precipitation. Because climate models are not as equivocal on precipitation changes in the region as compared to changes in temperature, understanding more about these changes is also important. The SFPUC is committed to continued efforts of investigating climate change effects on water supply as new climatic information and data are available.

- G-16** The SFPUC will consider new water demand scenario(s) prior to making large future investment decisions on projects identified in the AWS Plan as part of Recommendation 5. See Global Response 1 for more information on demand forecasting.
- G-17** Consistent with the WSIP Program, planning staff continue to use 12% of total system yield over the design drought as the basis for water supply planning. See Global Response 3 for more information on how rationing is used in AWS planning.
- G-18** See Global Response 3 for more information on how rationing is used in AWS planning.
- G-19** See Global Response 3 for more information on how rationing is used in AWS planning, including how the Bay-Delta Plan factors into its use.
- G-20** The AWS Plan defines the water supply gap as the difference between water available in dry years and cumulative 2045 customer demands. Based on this definition, the resulting water supply gap is 92 mgd. As the comment notes, Figure 3-3 shows that of the 92 mgd gap, up to 11 mgd can be filled by rationing, if 81 mgd of new supplies are developed. For clarity, a footnote has been added to Figure 3-4 repeating this breakdown. This figure is also shown in the Executive Summary of the AWS Plan.
- G-21** At this time, the SFPUC will not modify its design drought as part of the AWS planning process. More information on the design drought is included in Global Response 2. Information on demand projections is included in Global Response 1.
- G-22** At this time, the SFPUC will not modify its design drought as part of the AWS planning process. More information on the design drought is included in Global Response 2. A new Recommendation 5 is being added to the AWS Plan to evaluate potential modifications to its retail demand forecasting model, including the consideration of a range of possible future demand scenarios to support future AWS planning and recommendations.
- G-23** The SFPUC's Wastewater Enterprise, as well as wastewater agencies around the Bay Area, are working with State regulators to address water quality issues including nutrient loading. Purified and recycled water projects described in the AWS Plan would reduce total wastewater discharges. While not an explicit goal of the Plan, project-specific impacts to nutrient flows can be included in the considerations for each project as they are evaluated in the future.
- G-24** The stated goal of the AWS Plan (pg. 7) is to "identify water supply projects that increase the dry-year reliability of RWS supplies and address the long-term water supply gap in alignment with the LOS Goals and Objectives." Of the six AWS Projects highlighted in the AWS Plan, three purified water projects and one recycled water project include partnerships with wastewater agencies around the San Francisco Bay. While not an explicit goal of the Plan, project-specific impacts to nutrient flows can be included in the considerations for each project as they are evaluated in the future.
- G-25** The selection of technologies for purified water treatment will be based on a number of factors including effectiveness, regulatory and permitting requirements, cost, and other factors. Performance criteria for purified water projects will be developed prior to completing alternatives' analyses.

- G-26** The SFPUC serves as both a retail and wholesale water supplier. As discussed in Section 1.3.1, the SFPUC is undertaking the development of the AWS Program with a regional focus and in its role as the operator and steward of the RWS. The presentation referenced by the commentor was given in the context of SFPUC as a retail supplier. Section 4.2 describes the role that retail and local projects can play in reducing demands on the AWS. It is in this context that the purified water project is described. While additional details for this project are outside the scope of the AWS Plan, the project is continuing to move forward in planning through San Francisco's local water program.
- G-27** The SFPUC is open to exploring a conjunctive use partnership with Stanislaus County. See Global Response 4 for more information on the SFPUC's coordination with agencies in the Central Valley.
- G-28** The SFPUC is open to exploring other alternatives with irrigation districts to increase supply reliability and fishery protection in the Tuolumne River. See Global Response 4 for more information on the SFPUC's coordination with agencies in the Central Valley.
- G-29** The SFPUC is committed to revisiting its retail demand forecasting and to coordinating with BAWSCA in the review of wholesale demand projections. As new demand scenario(s) are developed, the projected water supply gap would likely be affected. New information, once available, will be used to provide future recommendations in updates to the AWS Plan, beginning in FY 2026-2027.

Regarding inclusion of ambitious potable reuse in AWS planning, three of the six proposed AWS Projects are potable reuse projects. The SFPUC remains committed to developing sustainable water supply options that would provide water supply in dry years.

Similarly, the SFPUC will continue to work with its partners in the San Joaquin basin to reach the shared goals of supply reliability and fishery protection through the creation of additional water resources. See Global Response 4 for additional detail on partnerships in the Central Valley.

- G-30** At this time, the SFPUC will not modify its design drought as part of the AWS planning process. A new Recommendation 5 is being added to the AWS Plan to evaluate potential modifications to its retail demand forecasting model, including the consideration of a range of possible future demand scenarios to support future AWS planning and recommendations. Once the SFPUC has completed its review of demand forecasting, additional scenario(s) may be developed that can be analyzed in future AWS Plan updates, beginning in FY 2026-2027. More information on demand projections and the design drought is included in Global Responses 1 and 2, respectively. See response to Comment G-23 for a response to the denitrification component of the comment and Global Response 4 for a response to the groundwater banking and irrigation district collaboration components of the comment.

From: [David Happs](#)
To: [Commission](#)
Cc: [Alternative Water Supply](#); bos-supervisors@sfgov.org; kayaks.unlimited@gmail.com; info@baykeeper.org; info@sf.surfrider.org; miller.amy@epa.gov; White, Eileen@Waterboards; [Solutions Not Sandbags](#); staff@tuolumne.org; information@sierraclub.org
Subject: SFPUC Alternative Water Supply Comments
Date: Thursday, August 31, 2023 12:22:11 PM

CAUTION: This email originated from **outside** of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

SF Public Utilities Commissioners:

Thank you for the chance to comment on SFPUC's current plans to expand the water usage from the Tuolumne River and Delta instead of cooperating with the Bay-Delta Water Quality Control Plan. We find the approach SFPUC has had in many different legal areas confusing and harmful, not only to the environment, which SFPUC provides lip service to, but also to the pocket books of its ratepayers and wholesale customers as SFPUC's strategy of constantly fighting meaningful environmental regulations has backfired many times, leading to more legal requirements placed on the ratepayers by courts than might have been achieved with reasonable negotiation, and collaboration. We also feel there have been many opportunities to provide more meaningful water recycling and groundwater improvements with SFPUC has not only ignored, but shown outright hostility to which should be a concern to the regulators, other bay area agencies, the citizens of California and most importantly, to the ratepayers who end up ultimately footing the bill for excessive and in some cases unwarranted infrastructure.

H-1

H-2

This overly litigious approach is problematic not only on the water supply side, but also on the sewer side. SFPUC has been given many opportunities to incrementally improve its combined sewer system but instead fights for the right to discharge untreated sewage into SF Bay. Please note that although the SFPUC claims the combined sewer overflows are "treatment" this is clearly not the case at some of the larger sewage outfalls around SF where discharges contain large floatable sanitary sewage debris as well as sediment which was supposed to be trapped in its system. But instead of finding ways to incrementally improve, it has spent \$10 millions of dollars on attorneys to fight the US EPA and Regional Board attempting to avoid even marginal improvements. SFPUC has similarly been spending \$10 millions on attorneys to fight statewide collaboration on the Delta, which is likely to cause judges to eventually decide SFPUC should be penalized for its intransigence.

H-3

H-4

When looking at SFPUC's demands to expand its water supply and attempts to provide for "Alternatives", Californians should be shocked to learn that SFPUC refuses to provide anything other than token "green" projects to redirect stormwater away from its combined sewer system and back into the ground to recharge the water table. SF has also avoided using its existing infrastructure to distribute recycled water and instead continues to use Hetch Hetchy where even simply replumbing can greatly reduce its reliance on water imports. Here is a quick list of low hanging fruit throughout SF that SFPUC has refused to deal with or outright ignored:

H-5

H-6

1. Downspout disconnect: Currently, San Francisco buildings are required by SF's plumbing code to channel their roof downspouts directly into the combined sewer, from which it is sent to the sewage treatment plant and in many storms a year get discharged into the Bay and ocean without any treatment other than token sedimentation. This is especially infuriating on the

H-7

City's westside where any water that returns to the ground can help recharge the Westside Basin and help both SF and its neighbors use local groundwater. Removing the requirement from the building code, at least throughout the westside, should be a first step in improving not only the ocean's water quality but also improving our groundwater supplies. Simply channelizing the storm water from roofs and pavement areas such as the large concrete patios throughout the sunset into the roadway gutters and then providing simple infiltration chambers ahead of the sewer catch basins could be a simple starting point. Even if the water does end up back into the combined sewer system from the gutter, just the change in the timing of the flow due to the decreased speed would help improve both flooding and combined sewage discharges. SF's plumbing code requirement to directly connect roof drains is something that is very rare in the United States, in fact in the world. One of the "Only in San Francisco" things that SF officials have taken for granted instead of working out strategies to overcome.

2. Disconnect large areas specifically to recharge groundwater and replace SFPUC's use of Hetch Hetchy Water:

A. Lake Merced Area: Throughout the westside of SF, there are many opportunities to directly disconnect large facilities and paved areas from the combined sewer system and have the storm water return to the water table. For example, the area from Brotherhood Way to Eucalyptus Drive between 19th Ave and Lake Merced is approx. 960 acres covered mostly by parking lots and large institutional buildings (churches, shopping mall, schools, apt. complexes). Currently most of the water from these areas all drain directly into the combined sewer system. Although there was some effort by the developer of Park Merced to remove that area from combined sewage and SFSU has also attempted to improve, mostly these are only token "green infrastructure" and do not incorporate the potential for large scale disconnect from the combined sewage system. Roadway drains surrounding Lake Merced could be retrofitted to allow decanted water to flow towards the lake during storms as Daly City's Vista Grande canal is (partially) doing today. This is an incredible opportunity first brought up in the 2008 Sewer System Master Plan but has since been ignored by SFPUC.

H-8

B. West Portal, down Trocadero Creek to Pine Lake: This area was identified to have a substantial green infrastructure project to address flooding but SFPUC chose to replumb the combined sewers there instead. Currently the Wawona and 15th area is prone to flooding due to the lack of adequate roadway conveyance to handle the flows that exceed the combined sewer system capacity. The project could have done a substantial roadway and rooftop disconnect upstream and allowed the rain to flow into the low areas of Trocadero Creek, with smaller storms infiltrating in the creek bed and larger overflow events eventually leading to Pine Lake. Currently, when local groundwater tables are lower, Hetch Hetchy water is used to supplement Pine Lake. Pine Lake suffers because the primary source of water has historically been springs immediately east of 19th Ave. When 19th Ave was built in the early 1900s, the roadway embankment blocked the flows from that spring. Instead of putting a culvert to maintain the historical source of Pine Lake, the spring flows were routed to a sewer catchbasin at the bottom of the sump created east of 19th Ave. This means that for the last 120 years, SF has been dumping the source of Pine Lake out the sewers and instead filling Pine Lake with Hetch Hetchy water.

H-9

H-10

C. Laguna Honda/Twin Peaks: the Mid Town Terrace, Forest Knolls and Laguna Honda Hospital areas are all upstream of the Laguna Honda reservoir. These areas could have the downspouts easily disconnected (most are external), and along with flows from the roadways, sent into the low sump area south of Clarendon and then infiltrating and overflowing into the old Laguna Honda Reservoir which would be used as a buffer for larger storms, allowing the water to slowly infiltrate back into the ground. It is likely this area is actually upstream of the Lobos Creek ground water basin in which case it would benefit the Presidio water supply as

H-11

well as reduce SFPUC reliance on Hetch Hetchy.

D. Various other local opportunities: Probably the easiest opportunity which has been ignored by SFPUC is to disconnect most of the street drains along the sides of Golden Gate Park and redirect the surface water into the Park.

H-12

3. Recycled Water:

Recycling waste water not only reduces reliance on supplies from Hetch Hetchy, but also reduces the impacts of sewage discharges into the bay, which are currently the major contributor to the harmful algal blooms killing fish and wildlife in the Bay. Opportunities include:

H-13

A. Provide recycled water to Mission Bay properties: SF required the Mission Bay developers to install "purple pipe" to use recycled water for flushing and irrigation but has never actually provided them with water. This has led to frustration by the excessive costs and lawsuits by the builders. One of the interesting points about this is there already is an existing, unused 10" force main that goes from the Southeast Sewer Treatment Plant(SEP) along 7th St, right next to Mission Bay. This pipe used to carry sewage sludge from the North Point Plant near Pier 39, down to the digesters at the SEP in Bayview. Along with Mission Bay users, there are numerous other potential recycled water uses nearby the force main alignment including the SF Downtown Steam loop, parks, etc. Instead of repurposing that pipe, SF has chosen to fight the developers even though SF itself was the one requiring "purple pipes".

H-14

B. AWSS System: SF is one of the few cities in the world that have are "double plumbed" with a separate water distribution network for high pressure fire fighting. This system runs throughout much of the northern and eastern parts of SF and there are plans to expand more into the southwest neighborhoods. with modest changes and institutional controls such as advising firemen to not drink from their hoses (which they probably shouldn't do anyway) this system could be using "title 22" reclaimed water instead of Hetch Hetchy. With simple pressure regulators at the various users, water from this system could be provided for irrigation and other reclaimed waste water uses.

H-15

<https://sfpuc.org/programs/future-water-supply-planning/alternative-water-supplies>
https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Bulletin-118/Files/2003-Basin-Descriptions/2_035_Westside.pdf

Response to Comment Letter H

David Happs, Member of the Public

August 31, 2023

- H-1** This comment is noted. Legal actions related to the Bay Delta Plan Amendment are outside the scope of the AWS Plan.
- H-2** The SFPUC has made significant investments in local groundwater and recycling projects, including the San Francisco Groundwater Supply Project and numerous projects under its Recycled Water Program. While these local projects are beyond the scope of the AWS Plan, the SFPUC is also committed to regional collaboration. See project details presented in Chapter 5 and Global Response 4.
- H-3** This comment is noted. Sewer system improvements in San Francisco are outside the scope of the AWS Plan.
- H-4** See response to Comment H-1. While outside the scope of the AWS Program, the SFPUC is working collaboratively with partners and the State on the Voluntary Agreement.
- H-5** Local water supply projects provide many benefits, including reducing demands on the RWS. As a result of a requirement in the WSIP Phased Variant, both San Francisco and the Wholesale Customers have each developed 10 mgd of local supplies to offset demands on the RWS. The AWS Plan continues to encourage additional local water supply development, as discussed in Section 6.3.1.
- H-6** Note that the AWS Plan is prepared from the perspective of the SFPUC as a regional water provider to both wholesale and retail customers of the RWS. Therefore, the discussion of local retail projects is limited to how these projects can play a role in reducing reliance on the RWS and increase local reliability. Note that regulation prohibits the use of potable water pipelines for non-potable recycled water. Purified water would be able to use the existing potable distribution system and there are several purified water projects in planning phase as described in the AWS Plan.
- H-7** Local groundwater projects are part of how San Francisco, as a customer of the Regional Water System, can lower its demands on the Regional Water System. Those projects and strategies are a focus of SFPUC's Water Resource Division but are outside of the scope of the AWS Plan.
- H-8** This comment is outside the scope of the AWS Plan. SFPUC is working with Daly City on the Vista Grande Project.
- H-9** Flooding is a challenge in several areas of San Francisco. Solutions are location-specific and may range from installing green infrastructure to addressing capacity issues. While the SFPUC continues to look at ways to address high-risk flooding areas in the City, this comment pertains to areas outside the scope of the AWS Plan.

- H-10** Pine Lake is fed by the same underground spring that feeds Lake Merced; water from the Regional Water System is not stored in Pine Lake. The SFPUC does not currently anticipate storing water from the Regional Water System in Pine Lake.
- H-11** Local groundwater projects are part of how San Francisco, as a customer of the Regional Water System, can lower its demands on the Regional Water System. The SFPUC continues to encourage these projects and strategies as a way to reduce in-city demand as discussed in Section 6.1.3; their development and implementation are a focus of the SFPUC's Water Resource Division but are outside of the scope of the AWS Plan.
- H-12** In 2005, San Francisco's plumbing code was amended via Ordinance 137-05, making it possible for residents to disconnect downspouts from the combined sewer system and direct rainwater to alternative locations such as rain gardens, rain barrels, and cisterns. The SFPUC currently offers grants for such activities through its Green Infrastructure Grant Program. Downspout disconnection remains a viable option for San Francisco residents to use alternative water supplies for non-potable uses, thereby reducing their potable demand. The SFPUC continues to encourage these types of projects as a way to reduce in-city demand, as discussed in Section 6.1.3; their development and implementation are a focus of the SFPUC's Water Resource Division but are outside of the scope of the AWS Plan.
- H-13** The SFPUC agrees that purified water has great potential to address the water supply gap. Three of the six projects included in the AWS Plan involve purified water. While outside the scope of the AWS Program, the SFPUC is also looking at opportunities for purified water in San Francisco, in its capacity as San Francisco's water supplier.
- H-14** The SFPUC is planning a purified water project in San Francisco that could serve dual-plumbed buildings on the east side of San Francisco.
- H-15** Local recycled water projects are part of how San Francisco, as a customer of the Regional Water System, can lower its demands on the Regional Water System. The SFPUC continues to encourage these projects and strategies as a way to reduce in-city demand as discussed in Section 6.1.3; their development and implementation are a focus of the SFPUC's Water Resource Division but are outside of the scope of the AWS Plan.



BOARD MEMBERS

43885 SOUTH GRIMMER BOULEVARD • FREMONT, CALIFORNIA 94538
(510) 668-4200 • www.acwd.org

MANAGEMENT

- AZIZ AKBARI
- JAMES G. GUNTHER
- JUDY C. HUANG
- PAUL SETHY
- JOHN H. WEED

- ED STEVENSON
General Manager
- KURT ARENDS
Operations and Maintenance
- GIRUM AWOKE
Engineering and Technology
- LAURA J. HIDAS
Water Resources
- JONATHAN WUNDERLICH
Finance and Administration

August 31, 2023

VIA ELECTRONIC MAIL

Steven Ritchie (aws@sfwater.org)
 Assistant General Manager, Water Enterprise
 San Francisco Public Utilities Commission
 525 Golden Gate Avenue
 San Francisco, CA 94102

Dear Mr. Ritchie:

Subject: Draft Alternative Water Supply Plan

The Alameda County Water District (ACWD) wishes to thank you for the opportunity to comment on the San Francisco Public Utilities Commission (SFPUC) Draft Alternative Water Supply Plan (Draft Plan). ACWD has reviewed the Draft Plan and offers the following comments:

1. ACWD Service Area, Page 13 and Appendix A

Figure 2-1 is taken from a source that does not show ACWD’s service area boundary correctly, whereas the map showing ACWD’s service area boundary in Appendix A appears to be correct. ACWD recommends the following footnote should be added to Figure 2-1: “Figure 2-1 may not provide accurate and complete boundaries for the agencies identified.” Additionally, regarding the service area map for ACWD in Appendix A, ACWD notes what appears to be incidental linework in the southeastern portion of ACWD’s customer service area that should be verified and removed.

I-1

I-2

2. ACWD-USD Purified Water Project, Pages 85-88

- a. ACWD is aware that SFPUC used its own economics analyses to provide cost estimates reported in the Draft Plan and notes that the draft Purified Water Feasibility Evaluation (PWFE) of the ACWD-USD Purified Water Project has slightly different estimates than the Draft Plan for the Phase 1 estimated capital cost per acre-foot and capital cost.
- b. In the Draft Plan’s “Staffing & Workforce Development,” the paragraph on page 87 describes a potential staffing plan for the Purified Water Project. However, staffing plans and details are not included in the draft PWFE. ACWD requests the Draft Plan clarify that the staffing plan is from SFPUC’s analyses and not from the draft PWFE.

I-3

I-4

August 31, 2023

- c. Under “Operational Considerations” in the second paragraph on page 87, Phase 1 of the Purified Water Project is described as requiring groundwater injection, but the current draft PWFE does not include that as a project component. The current draft PWFE describes Phase 1 as sending the purified water to Quarry Lakes for recharge into the groundwater basin. ACWD recommends editing this paragraph to reflect what is in the current draft PWFE. I-5
- d. ACWD notes that the draft PWFE of the ACWD-USD Purified Water Project is still being finalized, and that ACWD continues to assess the Project’s need and timing (currently anticipated beyond 2040). Additionally, in 2023 ACWD is beginning a thorough integrated resources planning update that will consider this project among many other supply options to meet long-term needs. I-6

Thank you again for the opportunity to comment on the Draft Plan. For further discussions about these comments or about ACWD's water resources, please contact Laura Hidas, Director of Water Resources, at (510) 668-4441 or at laura.hidas@acwd.com. We look forward to coordinating further with you on this Draft Plan.

Sincerely,



Ed Stevenson
General Manager

la/tn

cc: Laura Hidas, ACWD
Thomas Niesar, ACWD
Michelle Walden, ACWD
Tom Francis, BAWSCA

Response to Comment Letter I

Alameda County Water District (ACWD)

Ed Stevenson, General Manager

August 31, 2023

- I-1** A footnote has been added to Figure 2-1 to reflect this comment.
- I-2** This linework on the map was a result of waterbodies on the GIS basemap file and has been removed from the figure.
- I-3** The SFPUC acknowledges that the cost estimates reported in the AWS Plan are based on the SFPUC's own economic analysis and may differ from the estimates reported in the draft Purified Water Feasibility Evaluation (PWFE).
- I-4** The "Staffing & Workforce Development" Section of the ACWD-USD Purified Water Project Description in Chapter 5 has been revised to reflect this comment.
- I-5** The "Operations Considerations" Section of the ACWD-USD Purified Water Project Description in Chapter 5 has been revised to reflect this comment.
- I-6** The SFPUC recognizes that ACWD continues to assess the ACWD-USD Purified Water Project's needs and timing and is conducting an integrated resources planning update.



CALIFORNIA WATER SERVICE

Water Resource Sustainability Department 1720 North First Street
San Jose, CA 95112

August 31, 2023

Mr. Steven Ritchie
Assistant General Manager, Water Enterprise
San Francisco Public Utilities Commission
525 Golden Gate Avenue, 13th Floor
San Francisco, CA 94102

RE: SFPUC's Draft Alternative Water Supply (AWS) Plan – Cal Water Comments

Dear Mr. Ritchie:

Cal Water has reviewed the SFPUC's Draft Alternative Water Supply Plan (AWS Plan) made available for public review on June 28, 2023. We appreciate the efforts and details of the AWS Plan and support additional alternative water supply. The Bay-Delta Plan changes represent significant potential changes to water supply to the region, and alternative supplies are needed. This letter provides our comments on the AWS Plan.

Executive Summary page x, Chapter 1: Introduction page 1, and Section 2.2 Regional Water System Overview page 15

All three sections reference that the RWS draws an average of 85% of its water from the Tuolumne River, and the remaining 15% from local surface water. In all three cases wells are not mentioned, even though the Regional Groundwater Storage and Recovery project is mentioned in the document. Perhaps these wells are not included for a specific reason, but it seems that they are or will be part of the water supply mix and should be referenced more clearly.

J-1

Section 2.3.1 page 22

Section 2.3.1 outlines the total system yield of 257 mgd for dry year supply. There is no discussion or detail of normal year supply, and adding this as a baseline would better show the magnitude of potential water supply shortages.

J-2

Additionally the continuation of this section on page 23 describes the simulated design drought sequence. This model output could be used to develop probability of exceedance curves to add a discussion of Level of Service that will be achieved through the implementation of the AWS Plan projects.

J-3

Figure 2-6: Historical Retail and Wholesale Water Purchased from the RWS (2000-2022) page 28

The Wholesale Historical values bar chart upper limit values shown in blue, do not seem to match the corresponding purchase number shown in white. As an example, the blue bar chart

J-4





CALIFORNIA WATER SERVICE

upper value shown in 2017-2018 with a value of 128.1 mgd, seems to be larger than the blue bar chart upper values shown in 2019-20 and 2020-21 where the values are 132.2 and 134.5 mgd respectively. There seems to be an error in how the blue bar chart values are shown in this graphic.

3.2.3 Climate Uncertainty page 39

The third paragraph of this section starts with the statement that “impacts related to climate change are not currently quantified in the AWS planning efforts.” It is concerning that not even an initial value of climate change impacts is included in this AWS Plan, as many climate change models are now showing a need for additional water supplies which would only add to the deficits shown in this plan.

J-5

Section 3.3.4 Customer Reliance on RS Supplies page 41, Section 4.2 Reducing Demands on the RWS through Local Water Projects page 47, and Recommendation 14 on page 127

There is discussion in these areas on the changes in dependence on SFPUC supplies and the consideration of a regional fund for local supplies. It would be valuable to clarify in one or all of these sections if there is a want just to reduce demands on SFPUC supplies, or to also reduce percent dependence on SFPUC supplies.

J-6

Section 4.2 Reducing Demands on the RWS through Local Water, San Francisco Groundwater Supply Project page 47

The last sentence states that “pumping can be gradually increased in order to blend up to 4 mgd of treated groundwater...” It would be valuable to clarify this statement and why that pumping is unable to be implemented immediately, or in the near-term, to help with regional water supplies.

J-7

Table 4-1 on page 58

The Planning Principle to Diversify supplies mentions desalinated water. Though Alternative 5A has the potential of desalination, desalination projects as alternative water supplies are largely missing from this Plan. It is understood that there is a high cost to desalination, but it is recommended that additional detail be added explaining why additional desalination projects are not being pursued.

J-8

The projects referenced in this section largely include local projects, and do not include projects that connect with State Water Project Contractors, or other Irrigation Districts for water banking or transfer opportunities that could help with dry year supply needs.

J-9

If the Bay-Delta Plan is implemented as adopted, there were discussions related to a project to recapture the by-pass flows in the Tuolumne River once the instream flow requirements have been met. Though costly, including a discussion on this project and potential costs would help





CALIFORNIA WATER SERVICE

show the true cost of the adoption of the Bay-Delta Plan, and the added value of the six proposed projects.

1. Daly City Recycled Water Expansion after page 76

The Project Location map seems to indicate that the Colma Cemeteries are outside of Cal Water's service territory, and that the new storage tank is to the northwest of this green cemetery area. It is recommend that the map be revised to better indicate that the Colma cemeteries are within Cal Water's service territory, and that the most likely new storage tank location is to the southeast corner of the green cemetery area.

J-10

The third page of the project description shows that the O&M costs are estimated to be \$12million. Though stated elsewhere, it would be valuable to state in this section that the O&M costs are not included in the \$4,203 cost per acre-foot. Including these costs will have a direct increase to the cost per foot. Additionally it could also be mentioned that the full 0.7 mgd capacity is included in the \$4,203 cost per acre-foot cost.

J-11

J-12

2. San Francisco-Peninsula Regional PureWater

The Project location map shows the Cal Water Bear Gulch service territory shaded, but this project will likely go through San Carlos within the Cal Water Mid-Peninsula service territory. It is recommended to make this correction and to the Agencies where the likely alignment would go through.

J-13

The second page of this section shows an Estimated Capital Cost per Acre-Foot value of \$1,868 value. This cost per acre-foot still appears low compared to the high cost of the project even with the relatively high supply it would include. There is risk of additional costs depending on which alignment is selected to complete the project.

J-14

Page A-6 (160 of 197) California Water Service

The City of San Carlos is shown with the Redwood City label over it. Redwood City is denoted on most of the maps, but it is requested that the Redwood City label be removed and the City of San Carlos label be added to properly show the Cal Water service territory.

J-15

Finally, the assumptions in this AWS Plan are directly connected to the final decision on the Bay Delta Plan. It is not clear in this document if it will be revised once that decision is made, or when a revision to this AWS Plan will be made.

J-16

Thank you again for considering these comments regarding the Alternative Water Supply Plan. We look forward to working with you to further increase supply reliability.





CALIFORNIA WATER SERVICE

Sincerely,

A handwritten signature in black ink that reads "Scott Wagner". The signature is fluid and cursive.

Scott Wagner
Director of Water Resources

Cc: Alison Kastama, SFPUC, BAWSCA Liaison
Manisha Kothari, SFPUC, Manager, Alternative Water Supply (AWS) Program
Nicole Sandkulla, BAWSCA, CEO / General Manager



Response to Comment Letter J

California Water Service (Cal Water)

Scott Wagner, Director of Water Resources

August 31, 2023

- J-1** The description in the introduction of the RWS is intended to provide an overview of normal year deliveries from the RWS. Groundwater is a source of supply for the RWS in dry years and therefore not included in the overview description.
- J-2** The second paragraph of Section 2.3.1 discusses normal year supply, stating that "in normal or wet years, the SFPUC watersheds produce enough supply to meet current and projected future demands, and existing obligations." Because there is no shortage of supply in normal years, the focus of the AWS Plan is on identifying and addressing potential water supply shortfalls in dry years. Therefore, the baseline is described as the dry year water available with WSIP projects completed (Chapter 2) and it is compared to the potential water supply shortages with the Bay-Delta Plan Amendment implemented (Chapter 3). Table 3-1 provides a side-by-side comparison.
- J-3** A new Recommendation 5 is being added to the AWS Plan to review the SFPUC's demand forecasting model and coordinate with BAWSCA to update demands and possibly create additional demand scenario(s). This will likely affect future analysis of the projected water supply gap. The SFPUC acknowledges this comment and can review it in the context of future planning updates. See Global Responses 1 and 2 for more information on demand projections and the design drought, respectively.
- J-4** Figure 2-6 has been revised to reflect this comment.
- J-5** The SFPUC understands that climate change and other changes to external conditions may jeopardize the future ability of the RWS to meet the desired levels of service. To better understand the potential vulnerability of the RWS to uncertain future conditions, the SFPUC recently partnered with the Water Research Foundation to produce the Long-Term Vulnerability Assessment (LTVA). The LTVA final report, published in December 2021, found that climate change exacerbates impacts from other drivers of potential change such as increased instream flow requirements and increased demands on the system. The SFPUC is aware that climate change studies need to be updated periodically as part of a continuous process when new information and data are available. The last sentences of paragraph 1 and 3 in Section 3.2.3 of the AWS Plan reflect this commitment.
- J-6** The stated goal of the AWS Program is "to identify water supply projects that increase dry-year reliability of AWS supplies and address the long-term water supply gap." The extent to which individual customers reduce their reliance on the RWS is part of their individual planning processes. Recommendation 15 is aimed at reducing the gap by incentivizing the development of local supplies and thereby reducing the demand on the RWS.

- J-7** The SF Groundwater Supply Project has completed construction of six new wells on the westside of San Francisco. However, three wells (two on the westside and one in the central portion of Golden Gate Park) cannot be used until the Westside Recycled Water project is operational so that Golden Gate Park can stop pumping from these wells for irrigation and the SFPUC can start operating the new wells for potable use. Additional treatment is also potentially required at three project wells, which is currently being evaluated. Finally, the SFGW EIR mitigation measures requires that the SFGW Project ramp up production in increments of about 1 mgd to ensure the project does not lead to adverse impacts and undesirable environmental conditions such as subsidence, impacts to Lake Merced, or seawater intrusion.
- J-8** The SFPUC remains open to exploring opportunities for additional desalination projects through partnership with other agencies. However, given the demands associated with land and energy requirements as well as potential entrainment and impingement impacts for desalination projects compared to purified water projects, the SFPUC has focused resources on pursuing purified water projects for local, in-city development.
- J-9** The SFPUC is exploring water supply projects that would leverage State Water Project facilities to convey water to the SFPUC in the context of the Los Vaqueros Reservoir Expansion Project. This is described in Project 5C in Chapter 5. For a discussion of potential opportunities with Irrigation Districts, see Global Response 4.
- J-10** The Daly City Recycled Water Expansion Project map has been revised to reflect the edits suggested in this comment.
- J-11** The SFPUC acknowledges this comment requesting additional clarification. As mentioned in the comment, other parts of the document (see section 5.2.3) note that the O&M costs are not included, and the header of the metric is explicitly labeled "Capital cost per acre-foot." In an effort to maintain consistency in how the costs of each project are described, additional language is not explicitly provided for the Daly City Project.
- J-12** The SFPUC acknowledges this comment. The capacity used as a basis for the calculation of the cost per acre-foot is consistent for all projects. No additional changes were made.
- J-13** The San Francisco-Peninsula Regional PureWater Project map has been revised to reflect the edits suggested in this comment.
- J-14** The project is in the early planning phases and the cost estimate provided represents planning to feasibility-level information with an estimated accuracy range between -30 percent and +50 percent.
- J-15** This change has been made to Cal Water wholesale service area map in Appendix A. This change was also made to the San Francisco-Peninsula Regional PureWater project map in Chapter 5.
- J-16** Recommendations 3 and 4 in Chapter 6 provide for periodic updates to the AWS Plan as negotiations progress and more information becomes available, beginning in FY 2026-2027.



August 31, 2023

Steven Ritchie
Assistant General Manager, Water Enterprise
San Francisco Public Utilities Commission
525 Golden Gate Avenue, 13th Floor
San Francisco, CA 94102

RE: BAWSCA's Review of the SFPUC's Draft Alternative Water Supply (AWS) Plan

Dear Mr. Ritchie,

The City of Santa Clara joins BAWSCA in its strong support of both the Draft Alternative Water Supply (AWS) Plan and the overall AWS Program. The SFPUC must be prepared to face potential future reductions to its existing water supply that could require the development of new supplemental sources to improve long-term water supply reliability in order to meet its legal and contractual obligations to the BAWSCA Member Agencies as well as the water needs of its Retail Customers in San Francisco. Climate change and future regulatory uncertainties could exacerbate the need for new diversified and distributed water supply sources. Santa Clara joins BAWSCA in the assertion that the AWS Plan meets these critical planning needs.

Components of the AWS Plan provide the roadmap for the development of projects needed to address the water supply shortfall (gap) that is calculated to be present through the planning horizon (2045). That gap is acutely related to shortage of supply during times of drought.

K-1

The AWS Plan presents detailed information regarding estimated project costs and development times and estimated rate impacts to both SFPUC Retail and Wholesale Customers for the AWS planning work estimated to take place within the SFPUC's 10-year Capital Improvement Plan (CIP). While Santa Clara joins BAWSCA in agreement that the presented rate impacts are correct for the purposes of the SFPUC's 10-year CIP, it further agrees that the full rate impact of the implementation of the suite of AWS Plan projects has not been estimated at this time as more details are needed that can only be provided following further planning work.

K-2

This complete cost and rate impact information will be necessary for the City of Santa Clara to support future decision making.

The AWS Plan includes recommendations for the Commission to consider that, if embraced, will work to 1) Avoid widening the water supply gap; 2) Fill the water supply gap; and 3) Reduce the water supply gap.

K-3

There remains uncertainty related to how regulatory and other pressures can widen the supply shortfall. The AWS Plan is clear that, although implementing the projects listed can contribute substantially to lessening that gap, additional projects beyond those documented in the Plan will be necessary to fill the water supply gap.

K-4

Santa Clara is among the BAWSCA Member Agencies that has committed to a level of conservation that will continue to result in lowered water demands. Santa Clara believes that demand hardening should be taken into consideration as part of long-term water supply planning. Santa Clara continues to be committed to water use efficiency, recycled water expansion and reducing per capita water use while underscoring the realities of population growth and housing requirements, thus highlighting the need for the AWS Plan.

K-5

Santa Clara joins BAWSCA in the sincere hope that the AWS Plan better positions San Francisco to fulfill its contractual obligation under the 2021 Amended and Restated Water Supply Agreement between San Francisco and the Wholesale Customers (WSA) to decide, by December 31, 2028, whether to make the cities of San Jose and Santa Clara permanent Wholesale Customers of the SFPUC. It is appropriate for the AWS Plan to acknowledge and be informed by the requirement that the SFPUC make this decision. It is important to note that the AWS Plan must incorporate the SFPUC's existing contractual obligations to Santa Clara under the WSA as identified by BAWSCA's August 21, 2023 comment letter (under specific comments, Item #3), however, the City supports the goals of the AWS and joins BAWCA in support of it.

K-6

K-7

Sincerely,



Gary Welling
Director, Water and Sewer Utilities
City of Santa Clara

cc: Nicole Sandkulla, CEO/General Manager, BAWSCA
Tom Francis, Water Resources Manager, BAWSCA

Response to Comment Letter K

City of Santa Clara

Gary Welling, Director, Water and Sewer Utilities

August 31, 2023

- K-1** As stated in Section 2.3.1, the SFPUC watersheds produce enough supply in normal or wet years to meet current and projected future demands, and existing obligations. Drought and climate uncertainty are drivers affecting the future water supply gap, as discussed in Section 3.2.3.
- K-2** The AWS Plan incorporates preliminary capital costs, as they are known as of the drafting of this document (May 2023). Based on proposed budgeting recommendations at the time, the SFPUC analyzed potential rate impacts over the next 10-year period. Recommendations in Chapter 6 include the most recent changes based on evolving budget developments. As additional cost information is developed, associated rate impacts will continue to be evaluated. Results will be included in future updates to the AWS Plan.
- K-3** This comment provides a summary of objectives that the AWS Plan aims to achieve through the recommendations presented in Chapter 6. The SFPUC recognizes this comment.
- K-4** The SFPUC recognizes the uncertainty around regulatory and other drivers that may impact the water supply gap. Changes to either water availability or demand will affect the water supply gap and future planning goals.
- K-5** The SFPUC agrees that demand hardening must be taken into consideration as part of its long-term water supply planning.
- K-6** Comment noted. The decision of whether to make the cities of San Jose and Santa Clara permanent customers is one of the drivers of the AWS Program.
- K-7** The SFPUC is committed to delivering up to 9 mgd to San Jose and Santa Clara through 2028 and acknowledges that a 10-year notice is required to terminate supplies, if such a decision is made by the SFPUC. See response to Comment F-10.

August 31, 2023

Steven Ritchie
Assistant General Manager, Water Enterprise
San Francisco Public Utilities Commission
525 Golden Gate Avenue, 13th Floor
San Francisco, CA 94102
aws@sflower.org

Re: Comment Letter – SFPUC’s Draft Alternative Water Supply Plan

Dear Mr. Ritchie:

San José Municipal Water System (SJMWS) has reviewed the SFPUC’s Draft Alternative Water Supply (AWS) Plan and appreciates the opportunity to provide comment.

SJMWS would like to express overall support for SFPUC’s efforts to plan for and address potential water supply shortfalls through the 2045 planning horizon, thereby improving water supply reliability for the 2.7 million residents and businesses within the Bay Area that rely on SFPUC’s Regional Water System.

L-1

As discussed in the Draft AWS, staff from SFPUC, San José, and Santa Clara have been coordinating to assess feasibility of one of the Draft AWS’ identified projects, the South Bay Purified Water Project. SJMWS is appreciative of SFPUC staff’s collaborative efforts throughout the initial assessment of this project.

L-2

We look forward to continued collaboration now and in the future to evaluate the viability of the South Bay Purified Water Project, and any other water supply projects or transfers that may be an option to inform the SFPUC Commission’s 2028 policy decision to formally recognize San José and Santa Clara as permanent wholesale customers.

L-3

Sincerely,



Jeff Provenzano
Deputy Director
Environmental Services Department

Response to Comment Letter L

San José Municipal Water System (SJMWS)

Jeff Provenzano, Deputy Director, Environmental Services Department

August 31, 2023

- L-1** This comment expresses support for SFPUC's efforts to plan for and address potential water supply shortfalls through the 2045 planning horizon. The SFPUC recognizes this comment.
- L-2** This comment expresses support for the SFPUC staff's collaborative efforts in coordinating to assess the feasibility and complete an initial assessment of the South Bay Purified Water Project. The SFPUC also appreciates the collaborative work with San Jose and Santa Clara, and recognizes this comment.
- L-3** This comment expresses support for continued collaboration regarding the evaluation of the South Bay Purified Water Project and any other projects that may inform the SFPUC's decision to make the cities of San Jose and Santa Clara permanent wholesale customers. The SFPUC recognizes this comment.

**San Francisco Public Utilities Commission
Citizens' Advisory Committee
Water Subcommittee**

MEETING MINUTES

**Tuesday, August 22, 2023
5:30 p.m. – 7:00 p.m.
525 Golden Gate Ave., 3rd Floor Tuolumne Conference Room**

**MEMBERS OF THE PUBLIC MAY OBSERVE AND PARTICIPATE VIA ZOOM
VIRTUAL CONFERENCE SOFTWARE**

Meeting URL

<https://sfwater.zoom.us/j/84852774253?pwd=YWJicDlFZjZBNjYyakRad2l1TytRdz09>

Phone Dial-in

669 219 2599

Find your local number: <https://sfwater.zoom.us/u/kbzVJuPz8b>

Meeting ID / Passcode

848 5277 4253 / 189833

Mission: The Water Subcommittee reviews water supply system reliability, water conservation, recycling, regional cooperation efforts and other relevant plans and policies. ([Admin Code 5.140-142](#))

Members:

Jennifer Clary (Chair) (D11)	Suki Kott (D2)	Amy Nagengast (D8)
Nicole Sandkulla (M-Reg'l Water Customers)	Eliahu Perszyk (M-Large Water User)	Douglas Jacuzzi (D4)

D = District Supervisor appointed, M = Mayor Appointed, B = Board President appointed

Staff Liaisons: Mayara Ruski Augusto Sa, Lexus Moncrease, and Jotti Aulakh
Staff Email for Public Comment: cac@sfwater.org

London N. Breed
Mayor

Newsha Ajami
President

Sophie Maxwell
Vice President

Tim Paulson
Commissioner

Tony Rivera
Commissioner

Kate Stacy
Commissioner

Dennis J. Herrera
General Manager

ORDER OF BUSINESS

1. Call to Order and Roll Call at 5:35 pm

Members present at roll call: (4) Perszyk, Kott, Jacuzzi, and Nagengast

Members Absent: (2) Sandkulla and Clary

Staff: Manisha Kothari

Members of the Public: Dave Warner and Peter Drekmeier

OUR MISSION: To provide our customers with high-quality, efficient, and reliable water, power and sewer services in a manner that values environmental and community interests and sustains the resources entrusted to our care.



*Chair Clary joined at 5:45 pm. Quorum maintained.

2. Approval of the [June 27, 2023 Minutes](#)

Motion was made (Jacuzzi) and seconded (Perszyk) to approve the June 27, 2023, Minutes as amended.

AYES: (4) Perszyk, Kott, Jacuzzi, and Nagengast

NOES: (0)

ABSENT: (2) Sandkulla and Clary

Public Comment: None

3. Report from the Chair

- Chair welcomes committee members, staff, and the public

Public Comment: None

4. Public Comment: Members of the public may address the Committee on matters that are within the committee's jurisdiction and are not on today's agenda

- **Dave Warner** commented that the water and sewer rate projections are based on a certain level of demand. He noted that if demand comes in below the assumed level, water rates must increase to cover all the fixed costs, including the \$8.8 billion in the 10-year Capital Plan. Warner added that water and sewer rates would have to increase even more than projected as water demand declines. He commented that as a chief financial officer by trade, he is concerned about the lack of financial expertise within the SFPUC's leadership, especially considering the \$10 billion debt the SFPUC will be in once the 10-year Capital Plan is put in place.
- **Peter Drekmeier** commented that the SFPUC was entitled to 2.77-million-acre feet and demand has been under 200 million gallons per day (mgd), which is 225,000-acre feet per year, for the past nine years. He noted that the SFPUC was entitled to enough water to last 12 years, but because there was no place to store it, the unimpaired flow between February and June in the lower Tuolumne River was 81%, while the Bay Delta Plan calls for 40%. Drekmeier added that demand was down and was 221 mgd in the middle of summer, which is the peak of demand.

5. Discussion: [SFPUC Draft Alternative Water Supply Plan](#), Water CAC Subcommittee

Discussion

- **Member Jacuzzi** commented that he did not see any mention of the Westside Basin Aquifer in the Alternative Water Supply Plan (AWSP).

M-1

Staff Kothari responded that the AWSP is focused on additional alternative water supply projects that the SFPUC is considering beyond what is already in planning, so the only reference to WSIP (Water System Improvement Program) is that the SFPUC has ongoing WSIP projects. She commented that the Future Planning List touches on the Westside Basin with its' Daly City Recycled Water Expansion Project, which proposes recycled water delivery to the cemeteries in Colma that then alleviate some of the pumping in the Westside Groundwater Basin and provide additional assurance for the dry year supply. Staff Kothari noted that the pie charts and graphs are baseline with implemented WSIP projects, and the focus is on the additional needs that the SFPUC can fill.

Chair Clary commented that the AWSP was about the regional water system, so the Westside Basin would not be mentioned. She noted that there was a difference between in-city supply and the supply that was a part of the regional water system.

- **Member Nagengast** asked for key takeaways on the Urban Water Management Plan to better understand how the AWSP built on it. M-2

Staff Kothari responded that the AWSP takes in-city retail demand from the Urban Water Management Plan, and the adjustment made in the AWSP relative to the Urban Water Management Plan is the expansion of the non-potable ordinance because the SFPUC lowered the threshold for what would trigger the onsite water reuse development. She noted that there was 0.2 mgd less demand in 2040 from retail. Staff Kothari added that for all the other customers except for San Francisco and suburban retail, the SFPUC relies on BAWSCA's (Bay Area Water Supply and Conservation Agency) annual survey

- **Chair Clary** commented that she would like to see a ranking of potential projects to see what their sensitivity is to potential drivers. She noted that the SFPUC has a storage heavy system, so extra storage does not have as much weight because it will likely be impacted in a similar way during a drought. A decision by the regional board to require denitrification of the City's effluent into SF Bay could make east side recycling more feasible. Chair Clary added that she would also like to understand how the SFPUC responds to various stressors. M-3

- **Member Perszyk** asked if the AWSP explicitly discussed the relationship between the ability to increase a supply of alternative water sources and the ability to increase in-stream flows. M-4

Staff Kothari responded that each project would be looked at differently, and the location of the project would matter.

- **Member Perszyk** asked if a dry year would be more of an issue. M-5

Staff Kothari responded affirmatively and commented that the projects in a dry year are intended to provide water that was not available upstream from the Tuolumne.

- **Chair Clary** commented that it would be helpful to add a table that identified how much water was left in the river for various wet and dry years.
 - Resource: [Tuolumne River Flows and Diversions](#)

M-6

Staff Kothari responded that the yield of the projects is how much the SFPUC can receive without taking water from the Tuolumne in dry years.

- **Member Perszyk** asked if that could be visually demonstrated.

Member Kott responded that it would help weigh how much impact a project has.

M-7

Chair Clary responded that it would help show which projects are more helpful in a drought.

- **Member Jacuzzi** asked about knocking off one year from the design drought.

M-8

Chair Clary responded that the discussion of whether a design drought should be seven or eight years is unprofessional, and instead, they should look at what the triggers are for a five-year plan. She noted that, despite the 20-year drought we've been having, the SFPUC was never in danger of having a water supply issue, which is progress that the SFPUC has made. They should be thinking of how they can share their good fortune with the species that are overstressed in the Tuolumne River. Chair Clary then asked about the 244 mgd demand in 2045 and whether all the different systems are expecting a 30% increase in water use even though there has been a 30% decrease in water use over the last two decades. She also asked if the SFPUC could think about differential pricing where people who were giving big demand increases to the SFPUC are required to pay for the projects identified in the AWSP that are needed to meet that increased demand. Lastly, Chair Clary asked if Brisbane was going to increase their water use by 50%.

Staff Kothari responded affirmatively but noted that the Baylands Development was not included in their demand number.

- **Member Perszyk** asked what BAWSCA's position would be on that idea.

Chair Clary responded that they would be opposed to it because they would be the ones paying for it.

- **Staff Kothari** commented that for the AWSP, the SFPUC wants to incentivize all customers to develop local supplies and reduce demand on the regional water system, which would benefit everybody. She noted that part of the proposal in the AWSP is for the SFPUC to work with BAWSCA to help develop that approach.

- **Member Jacuzzi** asked what local supplies would look like.

M-9

Staff Kothari responded that there is potential for potable water because people are relying on potable supply from the regional water system.

- **Chair Clary** asked if potable water production was being limited to 10% of the supply. M-10

Staff Kothari responded that the 10% rule has to do with mixing and only applies over a 24-hour period.

- **Member Jacuzzi** asked if there were other sources besides purified water. M-11

Staff Kothari responded that the geography would dictate what potential there is in different places and noted that the SFPUC is looking for a new water supply that has not been tapped enough.

- **Chair Clary** asked what the yield of the Westside Basin was.

Member Jacuzzi responded that the Westside Basin is overburdened.

- **Chair Clary** commented that the Basin is too small for indirect potable reuse but that should not apply to direct potable reuse. She noted that recycled water that cannot be put in the system can be put in the ground. M-12

Staff Kothari responded that the SFPUC did a study for the Daly City Recycled Water Project to look at indirect potable reuse potential from that project. She commented that an issue was that Daly City did not have space for the additional treatment that was required, and they did not have sufficient well sites to put that water in. Staff Kothari added that if these issues can be resolved then there would be potential for purified water injection in indirect potable reuse for the Westside Basin.

- **Member Perszyk** commented that there should be language added to include the modularity of being able to add capacity in the future. M-13

- **Chair Clary** asked what the maximum potential to produce direct potable reuse at the Westside Basin was. M-14

Staff Kothari responded that it is 38 mgd on the east side and between 4 and 5 mgd on the west side with more room to expand on the east side.

- **Member Nagengast** asked what the ratio was between what the SFPUC purchased and what the demand was for any given year. M-15

Staff Kothari responded that she does not have those numbers, but it is a fact that their use has been lower than the projections. She noted that the SFPUC is trying to do a better job of calibrating that, but a large portion of their overall demand does rely on their wholesale customers to provide them with their demand.

- **Member Nagengast** commented that she appreciated the graphic that depicted the six projects, but she would like to see them in the context M-16

of the year they could get implemented to better understand where things have been uncertain historically. She noted that she would like to see demand projections versus purchases from a customer perspective, and to visually understand things better, she would like to see things on a time-based scale.

Staff Kothari clarified if that meant seeing the demand projections and potential supply together and how that gap is changing with the implementation of the projects in five-year increments.

- **Member Perszyk** commented that alternative water supply projects are expensive and asked if there will be a return on investment for water supply from the grant programs.

M-17

Staff Kothari responded that the first three years of working on the AWSP was focused on procuring and the feasibility of the projects but now they are looking into hiring somebody who prioritizes financial analysis because affordability is a key issue.

Public Comment:

- **Dave Warner** commented that the SFPUC should consider the general public as the audience for the AWSP. He noted that the executive summary makes it sound like future demand is fixed but that is far from the case. Warner added that Commissioner Ajami had pointed out how the SFPUC has an old school centralized approach to water and how she hoped for a decentralized approach in the future where households would use SFPUC water just for drinking, cooking, showering, and the rest of the water would be recycled in-house. He commented that the executive summary needs to show that demand is more uncertain than what is shown in the AWSP because demand uncertainty is the biggest challenge to making alternative water supply decisions, particularly when the cost structure is so high.

M-18

- **Peter Drekmeier** commented that a big issue is that the SFPUC does not want to run out of water, but they also do not want to over-invest in expensive alternative water supplies. He noted that if the SFPUC did build out the 92 mgd of perceived demand, that would cost about \$300 million per year, which would be spread out amongst the rate payers. Drekmeier added that the Urban Water Management Plan used Plan Bay Area while BAWSCA included a sensitivity analysis with their demand study at the end of 2022, which looked at population growth by using the California Department of Finance projections. He commented that the projections showed that BAWSCA's demand would remain flat for the next 25 years while Plan Bay Area projected that San Francisco will grow twice as fast in the next 15 years after 2020 than it did in the 15 years before 2020. Drekmeier noted that San Francisco was investing in infrastructure storage at a time when demand projections were suggesting that they would be using 400 mgd, which is twice the amount being used today. He added that alternative water supplies are like water conservation because the idea is that they will benefit the environment, but that water does not end up in the environment if the reservoirs have storage capacity.

M-19

6. **Discussion: Water CAC FY 2023-2024 Priorities**, Jennifer Clary, Water CAC Chair

- Resource: [Citizens Advisory Committee Annual Report FY 21-22](#)

Discussion

- **Member Perszyk** asked whether the tribal land management issue should be a part of the Water Subcommittee or if it should go to the Full CAC.

Chair Clary responded that she would check with the Full CAC Chair.

- **Chair Clary** commented that the CAC does not focus on water rates because that is a topic for the Rate Fairness Board.
- **Member Perszyk** commented that for the SF Groundwater Project, the Water Subcommittee should investigate the San Francisco Groundwater Feasibility Study.
- **Chair Clary** commented that the Water Subcommittee, excluding herself and Sandkulla, should watch the Bay Delta Plan hearings to come up questions/comments.

Member Kott responded that it was a great idea and noted that it would be a public meeting to make sure the rules of quorum are met.

- **Chair Clary** commented that the Alternative Water Supply should not be included in the list of priorities for the upcoming year because they just covered that. She noted that the Emergency Firefighting Water System topic should stay on the list because there was an ordinance passed to discuss that every year. Chair Clary added that Commissioner Ajami did not seem interested in the diversity and inclusion topic when it was brought up to her attention at the recent Full CAC meeting.

Member Perszyk responded that she seemed interested but perhaps SFPUC staff was not making her aware of all the problems.

- **Member Kott** commented that the SFPUC now has a DEI (Diversity, Equity, and Inclusion) Director who oversees everything.

Chair Clary responded that it was hard to know where Diversity, Equity, and Inclusion fit in the budget, so she would check with the Full CAC Chair about that topic.

- **Member Nagengast** asked when should demand projections be discussed.

Chair Clary responded that the Urban Water Management is done every five years, so the next iteration of it would be in 2025. She then noted the priorities for the 2023-2024 fiscal year. Chair Clary commented that Jacuzzi will oversee the SF Groundwater Project, Perszyk will oversee Infrastructure and the Water Capital Plan, Kott will oversee Hiring Practices/Labor Force Turnover, Nagengast will oversee Demand Projections, and all the Water Subcommittee members except for Chair Clary and Sandkulla will focus on the Bay Delta Plan and Voluntary Settlement. Lastly, Chair Clary noted that it should be a priority to have Assistant General Manager Steve Ritchie

present to the Water Subcommittee on budget and the Water Enterprise's priorities.

Public Comment:

- **Dave Warner** commented that the sensitivity analysis with the BAWSCA Demand Study is fascinating, and it would be great to have the SFPUC do it as well. He noted that it is a big ask for Water Subcommittee members to watch the Bay Delta Plan hearings and recommended having the SFPUC and the NGOs (non-governmental organization) present to the Water Subcommittee instead.

7. Staff Report

- No report from Staff

Public Comment: None

8. Future Agenda Items and Resolutions

Standing Subjects

- Groundwater
- Water Quality

Specific Subjects

- Tribal Land Acknowledgment Resolution – *tentatively October*
- AGM Steve Ritchie Visit – *tentatively October*
- BAWSCA Demand Projections – *tentatively October*
- Emergency Firefighting Water System Update - *Sept. Full CAC Topic*
- Affordability – *Tentatively Full CAC topic*
- Green Infrastructure - *Tentatively WW Topic*
- Integrating Tribal Leaders into SFPUC Land Management Decisions
- State Board Water Rights
- Water Enterprise Environmental Stewardship Policy Implementation Report
- Debate about Bay Delta – Member Sandkulla suggested everyone watch the February 5, 2021, Commission workshop about the Voluntary Agreement
- COVID and Long-term Affordability Program
- Implementation of the Bay Delta Plan Flow Requirement
- Hetch Hetchy Water and Power Division Update
- State Policy and Programs on Affordability or Low-Income Rate Assistance (LIRA)
- Bay Delta Plan and voluntary settlement agreement
- Legislative Update
- State of the Regional Water System Report – Bi-annual report
- Drought resilience: 3-year water supply update
- Water Equity and Homelessness
- State of Local Water Report
- Retail Conservation Report
- Harry Tracy Water Treatment Plant tour

Adopted Resolutions for Follow Up

- Resolution in Support of a Resilient Water Supply [adopted August 17, 2021](#)
- Resolution in Support of the Southern Skyline Boulevard Ridge Trail Extension Project [adopted April 20, 2021](#)

- Resolution in Support of Interim Emergency Rate Assistance Program and Revised Community Assistance Program [adopted July 21, 2020](#)
- Resolution in Support of Improved Communications Related to the San Francisco Groundwater Supply Project [adopted August 21, 2018](#)
- Resolution in Supporting Stewardship and Public Access in the Redeveloped Lake Merced West Property [adopted in March 15, 2016](#)
- Resolution on Impacts of Drought on System Maintenance and Improvements [adopted January 19, 2016](#)

Public Comment: None

9. Announcements/Comments Please visit www.sfpuc.org/cac for final confirmation of the next scheduled meeting, agenda, and materials.

- **Member Jacuzzi** commented that the SFPUC website should list specific dates for when CAC meetings are held.
- **Chair Clary** commented that the CAC should consider a different location to hold their meetings.

Public Comment:

- **Peter Dreke** commented that at the recent Commission meeting, Commissioner Ajami recommended moving general public comment back to the beginning of the meeting.

10. Adjournment

Motion was made (Kott) and seconded (Jacuzzi) to adjourn the meeting.

Meeting was adjourned at 7:18 pm.

Response to Comment Letter M

SFPUC Citizens' Advisory Committee Water Subcommittee

August 29, 2023

M-1 The AWS Plan has a regional focus and assumes that WSIP projects are completed as part of the baseline scenario. Recommendations 1 and 6 in Chapter 6 are aimed at ensuring the completion of groundwater projects that were initiated under WSIP, to avoid widening the future supply gap. The focus of the AWS Plan is on how to address the resulting supply shortfall in future dry years if the Bay-Delta Plan Amendment is implemented. Of the six regional projects described in detail in Chapter 5 of the AWS Plan, the Daly City Recycled Water Expansion project provides dry year groundwater supply in the Westside Basin.

M-2 During the meeting, SFPUC staff responded that the AWS Plan primarily uses in-city retail demand from the SFPUC's 2020 UWMP.

M-3 Projects included in the AWS Plan are largely in the early planning stages. Rather than providing a subjective ranking without comparable level of detail, the AWS Plan aims to present the information as it is known in Chapter 5. While there isn't a ranking, several criteria are described for each project including: infrastructure needs, water supply availability and distribution, institutional complexity, operational considerations, staffing and workforce development, alternatives, and cost. Pros and cons are included for each project, along with a project schedule and recommendation.

There are two storage projects included in the list of AWS Projects. One provides water in an area where the SFPUC doesn't currently have supply or delivery infrastructure and the other is the expansion of one of our reservoirs to hold more drought supply. In both cases, more storage provides incremental dry year supply. However, the majority of projects are purified water projects. In parallel to the regional purified water projects, the SFPUC is also pursuing a purified water project in San Francisco. From a purified water standpoint, denitrification provides better feed water quality for advanced treatment in San Francisco and for regional projects.

Regarding the role of stressors in water supply planning, a new Recommendation 5 has been added to Chapter 6 that will enable the SFPUC to explore revisiting its retail demand modeling. In that process, the SFPUC will consider a sensitivity analysis. Results of this analysis would be included in an AWS Plan update in 2026.

M-4 The yield of each project shown in Table 5-1 is the dry year water supply that the SFPUC can expect from that project. The yield is intended to fill a gap that results from less water available to customers in dry years and is a 1:1 ratio.

M-5 During the meeting, the SFPUC responded that projects in the AWS Plan are intended to provide water that is not available from the Tuolumne watershed in dry years.

M-6 The yield of the projects or "SFPUC Supply Assumed" shown in Table 5-1 represents the estimated volume of water that the SFPUC can receive from AWS Projects to help fill the water

supply gap. The gap assumes an estimated volume of water that is released for fishery and environmental purposes.

- M-7** See response to Comment M-6.
- M-8** The SFPUC is not currently considering changes to the design drought. See Global Response 2 for additional information.
- M-9** Local water supplies would be projects that can replace RWS deliveries, particularly in dry years. Examples include local purified water, desalination, or groundwater banking projects.
- M-10** Staff responded that the 10% rule in the draft Direct Potable Reuse regulations has to do with mixing and only applies over a 24-hour period.
- M-11** Staff responded that location would dictate what potential there could be for local water supply development and noted that the SFPUC continues to explore new dry year water supply opportunities that are feasible.
- M-12** Staff responded that the SFPUC did a study for the Daly City Recycled Water Project to look at indirect potable reuse potential from that project. This work found that there was not sufficient space for the required additional treatment and that there were not sufficient well sites. If these items can be resolved, IPR potential from that project can be reconsidered.
- M-13** The future opportunity to reconsider purified water is included under "Project Alternatives" for the Daly City Recycled Water Expansion project in Chapter 5.
- M-14** The SFPUC's production capacity for purified water on the west side of San Francisco is limited by available source water and permit regulations from the Oceanside Treatment Plant and is approximately 5 mgd. Staff noted that the Southeast Treatment Plant, while not connected to the Westside Basin, has a larger purified water potential of up to 38 mgd according to the SF Purified Water Opportunities Study in San Francisco.
- M-15** Comparing past deliveries with previously projected demands is a task that will be undertaken as part of a new demand forecasting analysis that is included as Recommendation 5 in Chapter 6 of the AWS Plan. Tracking that data, potentially recalibrating the retail demand model, and coordinating with BAWSCA to analyze wholesale demand projections will help inform future AWS investment decisions and will be included in updates to the AWS Plan in 2026.
- M-16** See response to Comment M-15. A comparison of demand projections versus purchases will be considered in the recommended demand modeling update for the AWS Plan.
- M-17** Affordability and financial analysis of the AWS Projects will be a key planning issue as more project information becomes available. The AWS Plan identifies this as a priority area of focus in the next three years of program development.
- M-18** The SFPUC has included a new Recommendation 5 in Chapter 6 of the AWS Plan to review and explore ways to revise its retail demand forecasting. Further, the SFPUC is committed to working with BAWSCA to also review demand projections for Wholesale Customers. While some demand uncertainty is inevitable, developing likely scenario(s) can help account for a range of potential outcomes in planning. Under the heading "Project and Programmatic

Recommendations" in the Executive Summary, the AWS Plan notes the need to continue to update water availability and demand projections and take a stepwise approach to recommending investments in AWS Projects.

M-19 Comment noted.



RESTORE HETCH HETCHY

Yosemite National Park

San Francisco Public Utilities Commission

August 31, 2023

Re: Comments on the Draft Alternative Water Supply Plan

Restore Hetch Hetchy appreciates the opportunity to provide comments on the San Francisco Public Utilities Commission’s Draft Alternative Water Supply Plan. Moreover, Restore Hetch Hetchy respects and honors the work of both the Commission and staff in providing reliable water to customers in San Francisco and other cities in the Bay Area.

Fundamentally, the Draft Alternative Water Supply Plan, with the exception of Calaveras Reservoir, considers only modest additional supplies. Additional elements should be added to ensure the SFPUC will be able to meet customer needs in the years and decades to come.

The Alternative Water Supply Plan should consider both groundwater banking and recycling. These are alternatives that water agencies throughout California have been pursuing successfully in recent years, but are inexcusably missing in the Draft Alternative Water Supply Plan.

Groundwater banking is by far the most cost-effective large-scale alternative. SFPUC staff knows this. BAWSCA staff knows this. There are willing partners in Stanislaus County. What is missing is the prospective cooperation of the Turlock and Modesto Irrigation Districts. SFPUC Commissioners and staff should both reach out to the Districts and determine together how to work cooperatively on a groundwater banking program. Failure to do so will result in the inability to capture water in wet years, as well as contribute to California’s long-term groundwater over-draft problem.

Recycling, especially converting wastewater at the San Francisco Public Utilities Commission’s Southeast Treatment plant, also has the potential to produce significant “droughtproof” supplies far in excess of other alternatives. While recycling is an expensive alternative, it would improve water quality in San Francisco Bay, helping to avoid catastrophes like the 2022 “fish kill” caused by an algae bloom in the Bay.

N-1

N-2

N-3

BOARD OF DIRECTORS

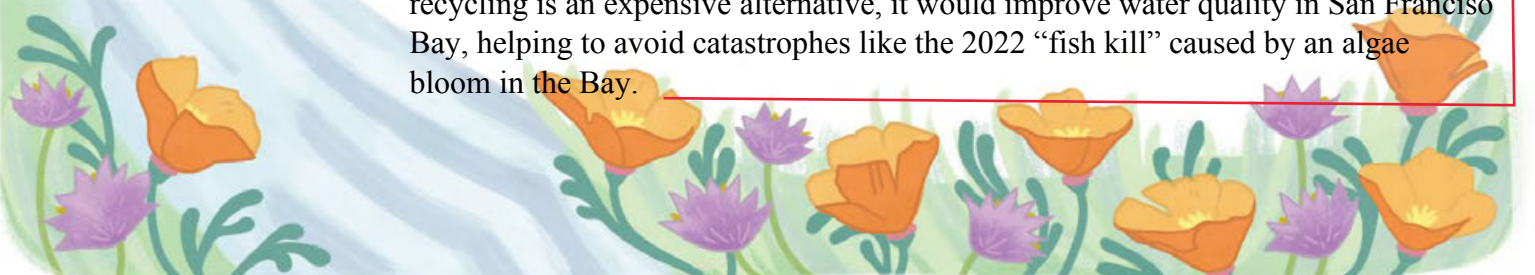
- Roger Williams, Chair
- Virginia Johannessen, Vice- Chair
- Peter Van Kuran, Treasurer
- Mark Palley, Secretary
- Kathy Bowler
- Mark Cederborg
- James Fousekis
- Ann Hayden
- Lance Olson
- Craig Reynolds
- Lucho Rivera
- Mecia Serafino
- Melanie Webber

STAFF

- Spreck Rosekrans
Executive Director
- Julene Freitas
Office Manager
- Marissa Leonard
Engagement and Development Director

3286 Adeline St. Suite 7
Berkeley, California 94703
510.893.3400

Tax ID # 77-0551533



San Francisco Public Utilities Commission
August 31, 2023
Re: Comments on the Draft Alternative Water Supply Plan



The San Francisco Public Utilities Commission’s own analysis shows that the projects presently included in the will not mitigate the projected shortfall if the Bay-Delta Plan is implemented as adopted by the State Water Board. The analysis appears to assume that the final form of the Bay-Delta Plan will impose lesser challenges to its system – an assumption that has obvious inherent risks.

N-4

Furthermore, the San Francisco Public Utilities Commission should consider that public support for restoring Hetch Hetchy Valley may well require the water supply function of Hetch Hetchy Reservoir to be replaced. While that outcome is by no means certain, prudent planning should consider the prospect and how the system would operate without storing water in Yosemite National Park.

N-5

Failure to consider potential substantial changes to system operations, whether initiated by environmental interests or other factors, carries inherent risks. The San Francisco Public Utilities Commission should expand the elements of the Draft Alternative Water Supply Plan, at a minimum, to include groundwater banking in Stanislaus County and recycling at the Southeast Treatment Plant.

N-6

For a short summary of recent and ongoing groundwater banking and recycling projects, see **Yosemite's Opportunity: Options For Replacing Hetch Hetchy Reservoir** – attached to this letter.

Restore Hetch Hetchy is prepared to assist the San Francisco Public Utilities Commission in these endeavors.

Sincerely,


Spreck Rosekrans
Executive Director

Yosemite's Opportunity

Options For Replacing Hetch Hetchy Reservoir

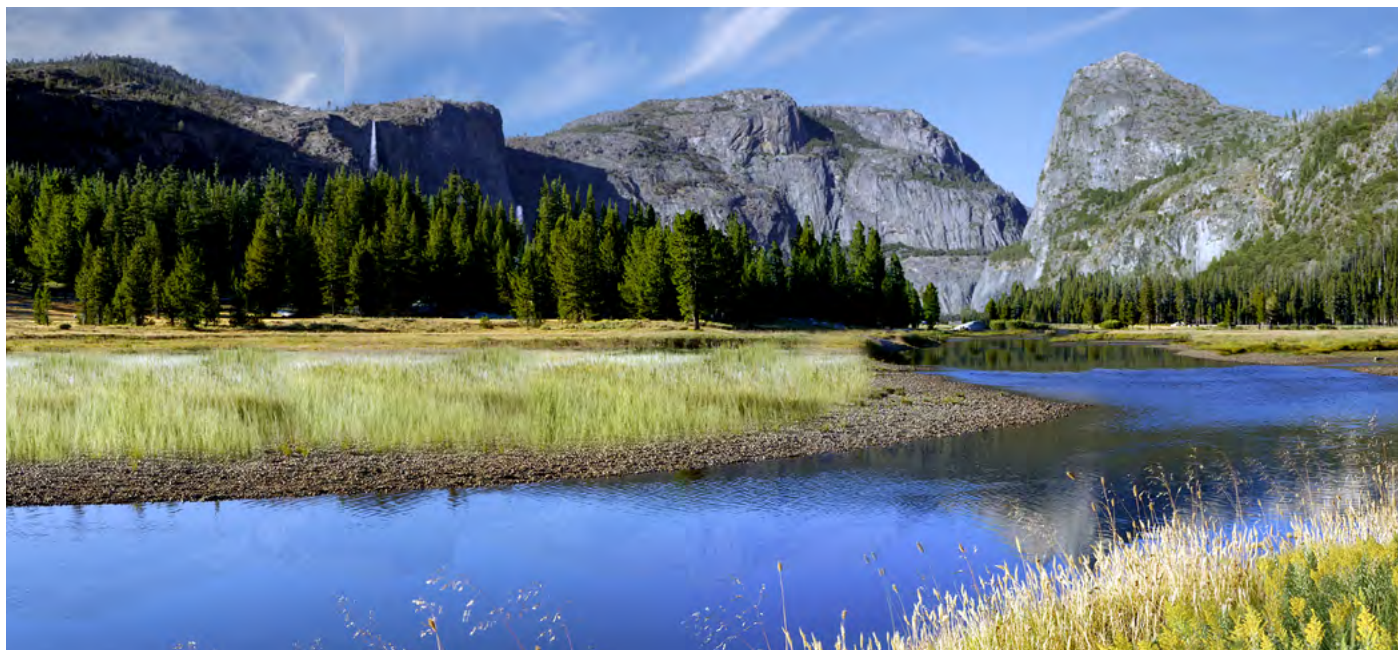


Photo: Loret Par

O'SHAUGHNESSY DAM AND HETCH HETCHY RESERVOIR

Hetch Hetchy Reservoir is a storage tank — one of four reservoirs on the Tuolumne River and one of nine in San Francisco's Regional Water System. Hetch Hetchy is not a source of water. The reservoir can be replaced and Hetch Hetchy Valley restored while continuing to meet 100% of the water and power needs of every community that depends on the Tuolumne River.

California water agencies have found many ways to reverse environmental damage, restoring ecosystems and wildlife populations on rivers and in wetlands — in the Central Valley, at Mono Lake, in the Bay-Delta and on the Trinity River. The same can be done for Yosemite's Hetch Hetchy Valley.

The recent investments that California's cities have made in groundwater, recycling and local surface storage would [replace Hetch Hetchy Reservoir more than 15 times over](#). The San Francisco Public Utilities Commission has the opportunity to pursue any or all of these technologies.

"The ultimate removal of the reservoir would make possible the restoration of the Valley a few miles from Yosemite Valley and, amazingly, a near twin of that extraordinary gift of nature.

In the case of Hetch Hetchy, it isn't that San Francisco's water supply now stored at the O'Shaughnessy Dam will be lost. Rather, it would be stored at existing dams downstream and perhaps off-stream or in groundwater basins."

— CARL BORONKAY
FORMER GENERAL MANAGER OF THE
METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

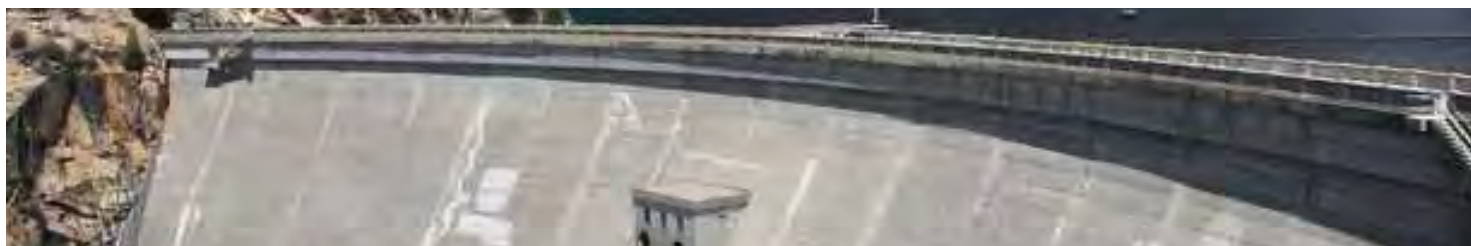
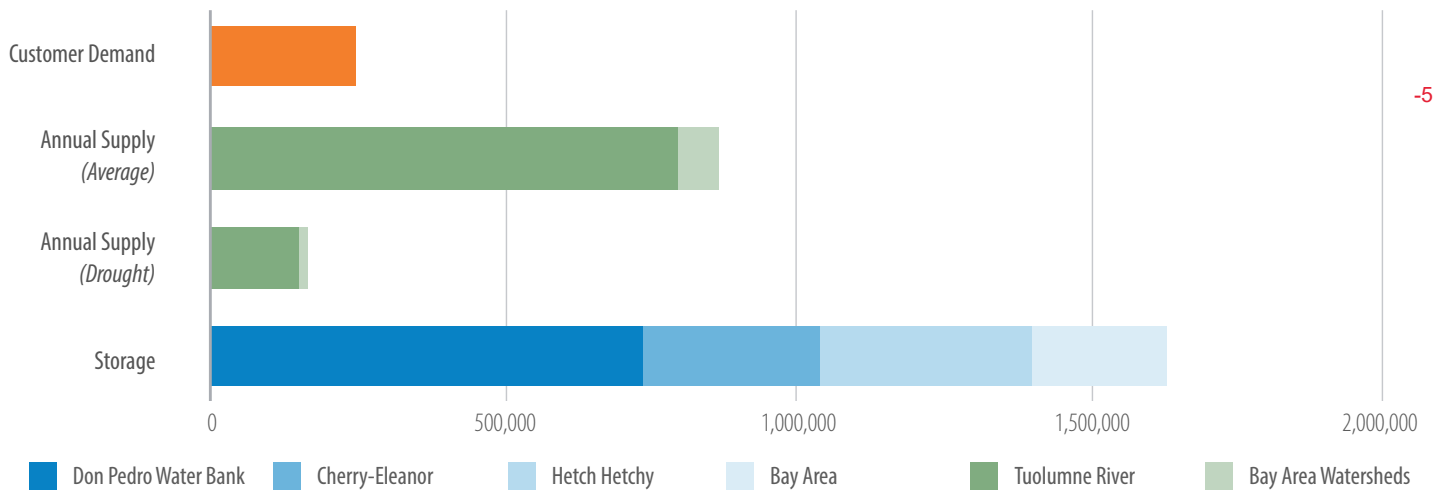


Photo: Tim Connor

FIGURE 1

San Francisco Regional Water System: Demand, Annual Supply & Storage (acre-feet)



The San Francisco Public Utilities Commission delivers about **250,000 acre-feet¹** of water annually. Flows in the Tuolumne River are more than adequate to meet that demand in most years.²

In dry years, water is withdrawn from storage. The driest period on record for San Francisco’s Regional Water System is the 6-year drought from 1987–1992, when the Tuolumne River provided only **151,000 acre-feet per year**.

To make up the shortage in a repeat of that drought lasting six years, or even a worse one, the SFPUC has invested in multiple storage projects to meet customer needs (see Figure 1).

Replacing Hetch Hetchy Reservoir requires additional investments.³ Other urban water agencies throughout California are actively continuing to invest in groundwater storage, local surface storage, and recycling. The SFPUC can and should do the same.

The San Francisco Public Utilities Commission (SFPUC) performs an essential public service by delivering water to homes and businesses in San Francisco as well as to other Bay Area communities. Hetch Hetchy Reservoir is an important component of San Francisco’s Regional Water System — but it can be fully replaced, and then some, with alternative investments.



¹ One acre-foot equals 325,851 gallons, roughly enough to supply two households for a year.

² References for this document can be found at hetchhetchy.org/yosemites-opportunity/

³ Like all water agencies, the SFPUC also increases reliability with demand-side programs — by encouraging conservation and efficient use through a variety of regulations and incentives.

RIVER AND WETLAND RESTORATION

Californians have supported ecosystem and wildlife renewal throughout the state, including restoration of rivers and wetlands in the Central Valley, at Mono Lake, in the Bay-Delta and on the Trinity River. Affected water agencies have found ways to invest in additional supplies and/or use water more efficiently.

Restoration of Hetch Hetchy Valley in Yosemite National Park would require system improvements to replace **360,000 acre-feet** of storage (or **60,000 acre-feet each year** over a 6-year drought). Water flowing through Hetch Hetchy Valley would be used or captured downstream – it would not go to waste.

The Trinity River Restoration program, jointly developed by the federal government and the Hoopa Valley Tribe, restores flow to the river, reducing diversions to cities and farms by **83,000 acre-feet per year**.

In 1994, the State Water Board ruled that the Public Trust Doctrine required additional inflow to Mono Lake, resulting in reduced diversions to Los Angeles by **46,000 acre-feet per year**.

The 1994 Bay-Delta Accord, an agreement to protect endangered estuarine fish including longfin smelt, reduces diversions to cities and farms by **316,000 acre-feet per year** below previous levels.

The Central Valley Project Improvement Act, enacted by Congress in 1992, added **250,000 acre-feet per year** to wildlife refuges in the Central Valley.

Court rulings in 2007 and 2008 to protect endangered salmon and other species have reduced diversions to cities and farms by **980,000 acre-feet per year**.

CALIFORNIA GROUNDWATER INVESTMENTS

Many California cities have agreements with agricultural water agencies to recharge and manage groundwater, allowing aquifers to be used as "banks" to exchange supplies using California's vast network of canals. California's "Sustainable Groundwater Management Act", passed in 2014, requires long-term sustainability throughout the state and provides incentives for additional agreements.

Banking San Francisco's excess water in aquifers in the eastern portions of the Turlock and Modesto Irrigation Districts and in the Eastside Water District would replace the storage function of Hetch Hetchy Reservoir.

ACWD
ALAMEDA COUNTY WATER DISTRICT

ZONE WATER AGENCY

SEMITROPIC
GROUNDWATER BANKING
WATER STORAGE DISTRICT

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

Examples of similar programs abound. Several Bay Area water districts bank groundwater in Semitropic, including Santa Clara Valley (350,000 acre-feet), Alameda County (150,000 acre-feet) and Zone 7 (65,000 acre-feet).

The Metropolitan Water District of Southern California, serving most of urban southern California, manages 212,000 acre-feet of groundwater storage within its service territory, and banks 350,000 acre-feet in Semitropic, 350,000 acre-feet in Arvin Edison, 250,000 acre-feet in Kern Delta, 330,000 acre-feet in Mojave and 30,000 acre-feet in Antelope Valley.

Geology and proximity to the California Aqueduct make Kern County an ideal site for groundwater recharge. Urban water agencies bank groundwater in Semitropic (970,500 acre-feet), Arvin Edison (350,000 acre-feet), Kern Delta (250,000 acre-feet) and other aquifers.

Operating a groundwater bank in Stanislaus County in conjunction with San Francisco's surface storage facilities would eliminate the need for Hetch Hetchy Reservoir and allow Hetch Hetchy Valley in Yosemite National Park to be restored. Groundwater plans in these areas show unsustainable pumping rates that limit farm production over time. Wet year recharge with San Francisco's water would provide benefits to all parties.

Option available to the San Francisco Public Utilities Commission

RECYCLING WATER IN CALIFORNIA

Increases in demand, limits on groundwater pumping and worries of drought have led to a boom in wastewater recycling projects — in California as well as other states and countries.

While Orange County has long been a recycling leader, others are catching up quickly. Most of California’s large urban agencies have initiated robust recycling plans, but so far San Francisco has not. Recycled water provides a reliable, drought-proof supply, and the enhanced treatment process reduces pollution to rivers, bays and beaches.

Replacing the water storage function of Hetch Hetchy Reservoir could be accomplished by recycling **60,000 acre-feet per year** (**360,000 acre-feet** over a 6-year drought).

The Orange County Water District recycling plant is the largest in the world. It presently recycles 100,000,000 gallons per day — soon to be increased to 130,000,000 gallons per day (**146,000 acre-feet per year** or **876,000 acre-feet** over a 6-year drought). After a multi-step treatment process which includes nanofiltration (shown above), the water is stored underground.

Governor Newsom praises the Los Angeles County Sanitation District's recycling plan, describing it as a model for others to follow. When completed, the plant will produce **168,000 acre-feet per year** of recycled water (**1,008,000 acre-feet** over a 6-year drought).

The San Francisco Public Utilities Commission reports a capacity to recycle **49,000 acre-feet per year** (**294,000 acre-feet** over a 6-year drought) at its water treatment plants but has no plans to move forward at this time. San Francisco's wholesale customers, who use 2/3 of the system's water, operate their own treatment plants and have similar opportunities.

Option available to the San Francisco Public Utilities Commission

San Diego's PureWater program is scheduled to provide a third of its total supply (**83,000 acre-feet per year**, or **498,000 acre-feet** over a 6-year drought), and will also reduce pollution along its famous beaches. San Diego will store its recycled water locally in Miramar and San Vicente Reservoirs.

The Santa Clara Valley Water District plans to recycle **40,000 acre-feet per year** (**240,000 acre-feet** over a 6-year drought) by 2035, about 10% of its supply.

DEVELOPING LOCAL STORAGE IN CALIFORNIA

Today, most of California's major rivers are either already dammed, protected by law, or too remote to be economically developed. Many water agencies have, however, found advantage in building "off stream" reservoirs close to their service areas to assure supply reliability during dry years. These reservoirs are built in canyons with little natural flow, avoiding the damage of damming a large river.

San Francisco has long-term plans to enlarge Calaveras Reservoir, allowing it to hold imported Tuolumne River supplies as well as local runoff. Enlarging Calaveras would replace 90% of the **360,000 acre-feet** of water storage that Hetch Hetchy Reservoir provides.

Diamond Valley Reservoir, first filled in 2003, holds up to **800,000 acre-feet** of water for customers of the Metropolitan Water District of Southern California. Above, Metropolitan General Manager Jeff Kightlinger dedicates a dam at Diamond Valley in honor of his visionary predecessor, Carl Boronkay. Boronkay called Hetch Hetchy Valley a "national treasure" and, after retirement, joined the Restore Hetch Hetchy Board of Advisors.

Los Vaqueros Reservoir, initially constructed by the Contra Costa Water District in 1998, was expanded in 2012 to hold **160,000 acre-feet** of water. It will be expanded further, and San Francisco should consider taking part in the project.

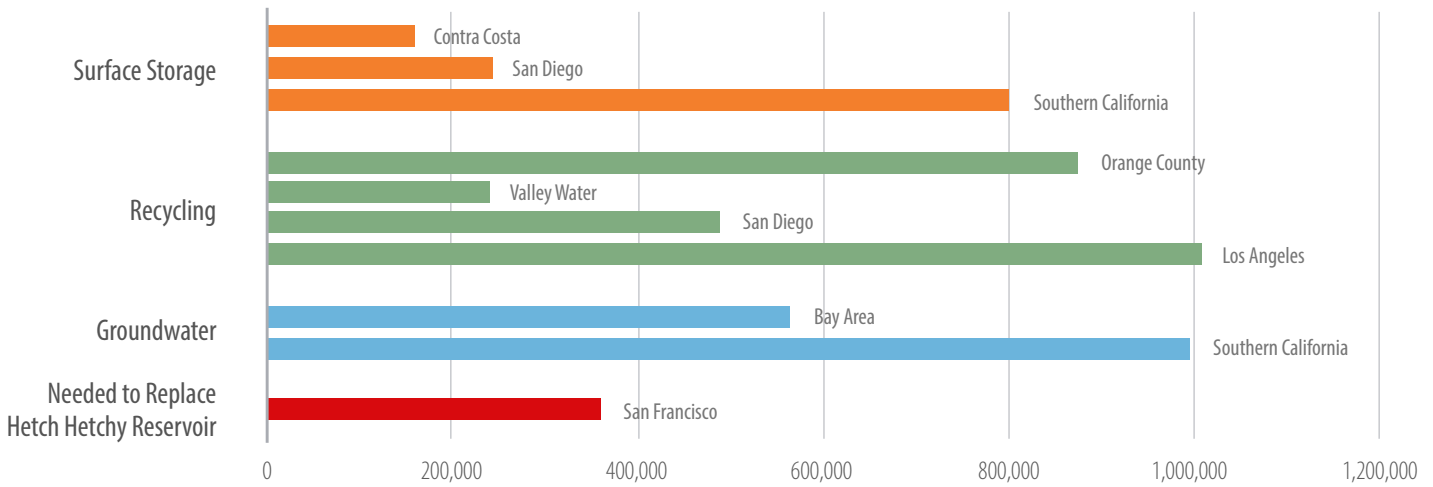
Calaveras Reservoir, the largest of the San Francisco Public Utilities Commission's Bay Area reservoirs, was rebuilt in 2019 and presently holds **97,000 acre-feet**. The SFPUC has plans to increase its capacity by **323,000 acre-feet** (almost the volume of Hetch Hetchy Reservoir). Some of the foundation work to support this larger project has already been accomplished.

Option available to the San Francisco Public Utilities Commission

In 2009, San Diego enlarged San Vicente Reservoir to **242,000 acre-feet**. It not only holds runoff from San Vicente Creek, but also water supplies diverted from the Colorado River.

FIGURE 2

Summary of Recent and Ongoing Water Storage and Supply Projects for Cities in California
AVAILABLE WATER SUPPLY OVER A SIX-YEAR DROUGHT (ACRE-FEET)



Recent investments by California's cities in groundwater, recycling and local surface storage would replace Hetch Hetchy Reservoir more than 15 times over. The San Francisco Public Utilities Commission has the opportunity to pursue any or all of these technologies.

ADDITIONAL NECESSARY IMPROVEMENTS

While water storage and/or supply are the most obvious system improvements necessary to restore Hetch Hetchy Valley in Yosemite National Park, other steps must be taken as well.

- Replace **350 gigawatt-hours** of electricity that will be lost when water from Hetch Hetchy Reservoir will no longer generate hydropower at the Kirkwood Powerhouse in summer and fall;
- Expand the Sunol Water Treatment Plant so the San Francisco Regional Water System has capacity to filter all system supplies; and
- Build new interties to connect Cherry and/or Don Pedro Reservoir to existing pipelines crossing the San Joaquin Valley.

Plans to remove the reservoir while maintaining water and power supplies have been proposed in a variety of reports by government agencies, environmental groups and academics. The estimated costs in the various reports of restoring Hetch Hetchy Valley without loss of water or power have been the subject of public disagreement but have never been independently reviewed.

Restore Hetch Hetchy's most recent cost estimate, published in a 2015 Superior Court filing, projects a cost of **2 billion dollars** over a fifty year period, including **199 million dollars** for additional interties, **372 million dollars** for water supply, **387 million dollars** for water treatment, **669 million dollars** for renewable electric power, and **374 million dollars** for modifying O'Shaughnessy Dam.

CRITICAL STAKEHOLDERS

The Turlock and Modesto Irrigation Districts are intertwined with the SFPUC on the Tuolumne River and at Don Pedro Reservoir. A restoration plan must guarantee, at a minimum, that the Districts suffer no loss of water supply or hydropower production.

Tribal communities were the original inhabitants of Hetch Hetchy. Indigenous peoples must be consulted in all stages of restoration and, if they desire, should be involved in the future management of the valley.



Photo: Sierra Mac River Trips

Rafters and kayakers flock to the Tuolumne River for its world-class whitewater. A restoration plan should assure recreational flows are protected.

The Bay-Delta Plan — Restore Hetch Hetchy supports the State's ongoing effort to improve flows and habitat for fish and wildlife on the Tuolumne River below Don Pedro Reservoir, as well as downstream into the Bay-Delta.

Yosemite's Opportunity

Options For Replacing Hetch Hetchy Reservoir



Painting: Tom Coyle

Hetch Hetchy, Yosemite Valley's lost twin, can be returned to its natural splendor; a majestic glacier-carved valley with towering cliffs and waterfalls where river and wildlife run free.

Hetch Hetchy can be a new kind of national park, with limited development, an improved visitor experience, shared stewardship with Native peoples, and permanent protection of its natural and cultural heritage for future generations.

Restore Hetch Hetchy *urges the San Francisco Public Utilities Commission to pursue system improvements so Hetch Hetchy Reservoir can be replaced without any loss of water supply or electric power production.*

Restore Hetch Hetchy *urges San Francisco, the State of California and the United States Congress to return Hetch Hetchy Valley to all people.*

“The Bay Area does not need Hetch Hetchy reservoir to continue delivery of high-quality water from the Tuolumne River.”

— JAY LUND

PROFESSOR OF CIVIL AND ENVIRONMENTAL ENGINEERING AND
CO-DIRECTOR OF THE CENTER FOR WATERSHED SCIENCES AT UC DAVIS

RESTORE HETCH HETCHY

BOARD OF DIRECTORS

Roger Williams, Chairman

Virginia Johannessen, Vice-Chairman

Peter Van Kuran, Treasurer

Mark Palley, Secretary

Kathy Bowler | Mark Cederborg | James Fousekis

Ann Hayden | Rex Hime | Lance Olson | Craig Reynolds

Lucho Rivera | Mecia Serafino | Melanie Webber

STAFF

Spreck Rosekrans, Executive Director

Julene Freitas, Office Manager

Mike Gaffney, Community Outreach Liaison



3286 Adeline St., Suite 7, Berkeley, CA 94703 | 510.893.3400 | Tax ID # 77-0551533

HetchHetchy.org

Response to Comment Letter N

Restore Hetch Hetchy

Spreck Rosekrans, Executive Director

August 31, 2023

- N-1** The SFPUC agrees that groundwater banking as well as recycled and purified water can be critical components of the AWS Program. The AWS Plan includes three purified water projects and one recycled water that provides an opportunity to increase groundwater storage for dry year supply. Additionally, Recommendation 3 has been updated to specifically refer to groundwater banking in the San Joaquin Valley.
- N-2** See Global Response 4 for information related to partnering efforts with irrigation districts in the Central Valley.
- N-3** The SFPUC agrees that purified water has great potential to address the water supply gap. Three of the six projects included in the AWS Plan involve purified water. While outside the scope of the AWS Plan, the SFPUC is also looking at opportunities for purified water in San Francisco, including at SFPUC's Southeast Treatment Plant, in its capacity as San Francisco's water supplier.
- N-4** The comment correctly notes that the AWS Projects presented in the AWS Plan do not fully resolve the projected supply gap in future dry years. In addition to tracking and reporting on developments of the Voluntary Agreement negotiations in Recommendation 3, Recommendation 15 aims to incentivize local supplies to reduce demands on the RWS. Additionally, the SFPUC remains open to other water supply projects and continues to pursue opportunities as they arise.
- N-5** Comment noted. The SFPUC is not considering the loss of water supply from Hetch Hetchy Reservoir at this time.
- N-6** See Global Response 4 for more information related to partnering efforts with irrigation districts in the Central Valley. Purified water with water from the Southeast Treatment Plant and Oceanside Treatment Plant is currently being planned through the SFPUC's local water program.