

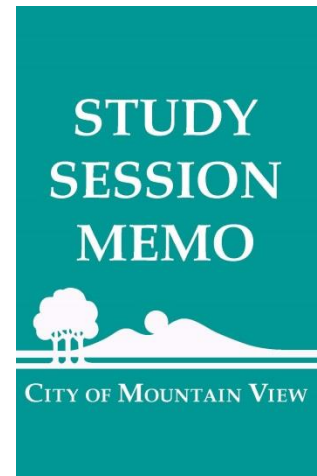
DATE: March 6, 2018

TO: Honorable Mayor and City Council

FROM: Gregg A. Hosfeldt, Assistant Public Works Director
Michael A. Fuller, Public Works Director

VIA: Daniel H. Rich, City Manager

TITLE: **Recycled Water Advanced Treatment/Long-Term Planning**



PURPOSE

The purpose of this Study Session is to provide an overview of the City's water portfolio and information regarding the City's strategies for improving the quality of its recycled water.

BACKGROUND

City Potable Water Consumption

The City provides its residents and businesses potable water from the San Francisco Public Utilities Commission's (SFPUC) Hetch Hetchy system, the Santa Clara Valley Water District (SCVWD), and City groundwater wells. In 2017, the City used an average of 8.3 million gallons per day (mgd); 7.3 mgd (88 percent) of the supply was purchased from the SFPUC, 0.8 mgd (10 percent) was purchased from the SCVWD, and 0.1 mgd (2 percent) was obtained from wells. Approximately 4% of water customers in the City are served by California Water Service.

SFPUC Contract

The water supply agreement with the City and County of San Francisco includes an individual supply guarantee (ISG) that allows the City to purchase up to 12.46 mgd (daily average). The agreement, initially approved in 2009, provided an ISG of 13.46. The City reduced the ISG in 2017 as part of the agreement to sell 1.0 mgd of supply to the City of East Palo Alto. The water supply agreement expires in 2034.

The agreement also requires the City to purchase a minimum of 8.93 mgd. Of the 26 wholesale customers who purchase water from the SFPUC, only Mountain View, Sunnyvale, Milpitas, and the Alameda County Water District have contract minimum

purchase requirements. These agencies have the ability to purchase water from other wholesalers (e.g., the SCVWD) and the minimum purchase requirement was included to protect the SFPUC from revenue loss due to agencies shifting demand to less-costly alternative sources.

Water Purchase History

As shown below, the City's purchases of SFPUC water have decreased since Fiscal Year 2000-01.

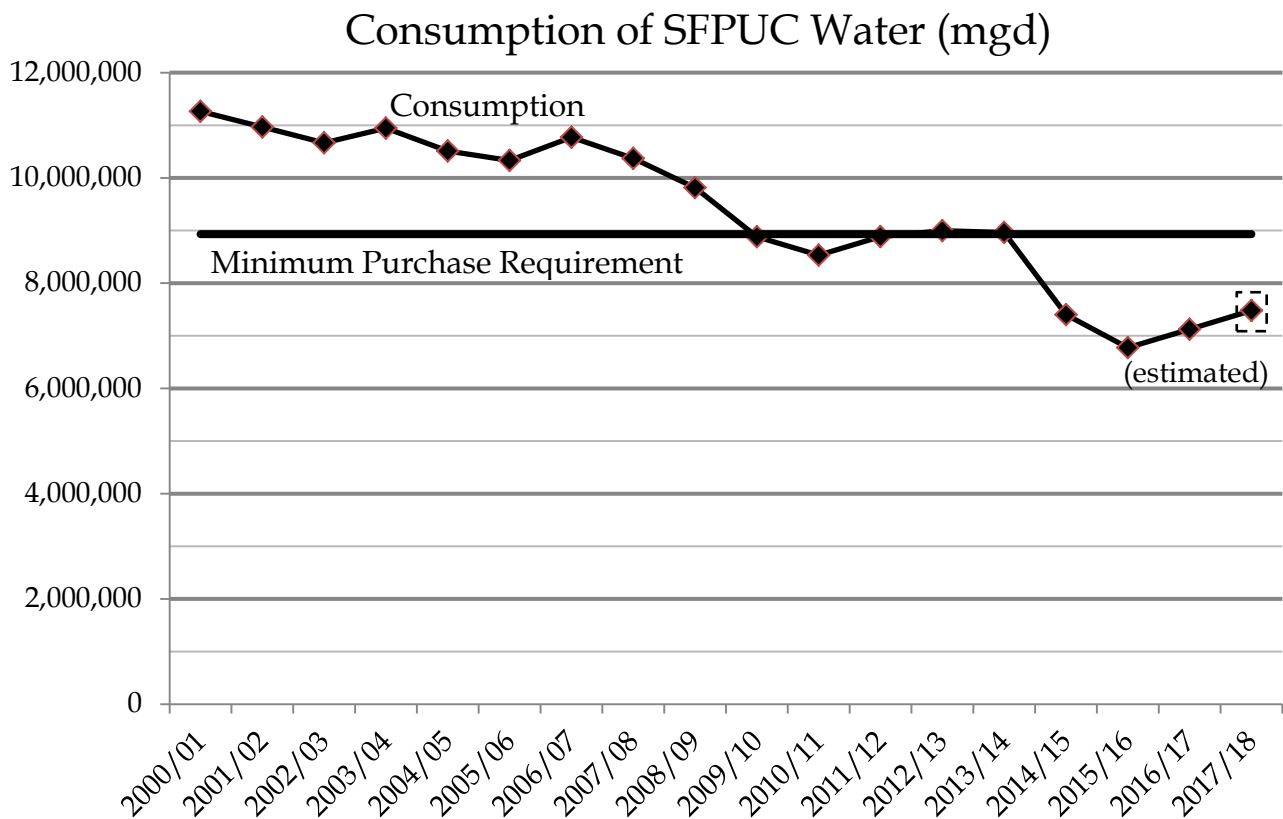


Figure 1 - SFPUC Water Consumption

The City did not meet the minimum purchase requirements in Fiscal Years 2009-10, 2010-11, and 2011-12 and was charged \$77K for unused water in 2010-11 and \$367K in 2011-12. The SFPUC chose not to charge the City in Fiscal Year 2009-10, presumably because of the relatively small percentage of underuse, but levied a charge the following year as water use continued to decline.

Between 2012 and 2017, California experienced the worst drought on record. In

response to severe water shortages, the State and many water agencies declared drought emergency conditions in 2014 and began requiring mandatory water use reductions. The City's water reduction targets from the State and wholesale water suppliers ranged from 10 percent to 30 percent at various points throughout the drought, and the City responded by declaring its own drought conditions (Stage 1 in April 2014 and Stage 2 in September 2014). The City also implemented numerous water use reduction programs and expanded outreach and education programs. These actions, combined with actions taken by the State and the City's water suppliers (the SFPUC and SCVWD), resulted in Mountain View reducing potable water use by 13 percent in 2014, 28 percent in 2015, and 29 percent in 2016 (compared to 2013 water use). In recognition of the need to conserve water, beginning in 2014, the SFPUC waived the minimum purchase requirement as long as the City did not shift demand to other suppliers. The SFPUC did not levy charges for unused water for Fiscal Years 2013-14 through 2016-17.

Governor Brown lifted the drought emergency status in April 2017 and the City Council rescinded the drought emergency declaration in May 2017. Following a return to normal water supply conditions last year, the SFPUC notified the City of its intention to require water suppliers to meet the minimum purchase requirement. The City's consumption of SFPUC water increased by approximately 5.0 percent in the first seven months of the fiscal year versus the prior fiscal year. Despite this increase, average daily consumption for the last 12 months is 7.34 mgd, well below the minimum purchase requirement.

Staff has been working to identify options for an ongoing waiver or a phasing of the minimum purchase cost to allow for recovery from drought-related consumption decreases. These efforts have included ongoing discussions with SFPUC staff and a request to the SFPUC members (2017) to consider granting relief for the minimum purchase. Because the minimum purchase requirement is part of the WSA, amending the agreement to reduce or eliminate the City's minimum purchase costs would require approval from all 26 Bay Area Water Supply and Conservation Agency (BAWSCA) members. Staff recently worked with the other three agencies with minimum purchase requirements to develop a proposal for allowing a phase-in period of the requirement. This option would reduce anticipated revenue to the SFPUC, a burden that would be shared with all BAWSCA members. Staff representatives of the agencies rejected the concept of a phase-in period and staff anticipates minimum purchase costs of approximately \$2.9 million will be charged in the current fiscal year. To provide a scale of these potential costs, in Fiscal Year 2016-17, the City's total cost for SFPUC water and related charges was \$13.4 million. Based on water use projections, staff anticipates reaching the minimum purchase requirement in Fiscal Year 2021-22.

The SFPUC has no current requests for conservation and the SFPUC's water storage is above historical averages. However, as of February 2018, rainfall is below average in the current water year (October 1, 2017 through September 30, 2018) and staff will monitor potential State conservation requirements that could result in a continuing minimum purchase requirement waiver.

Water Costs – Santa Clara Valley Water District

The water supply agreement with the SCVWD allows the City to purchase up to 1.2 mgd (daily average). This agreement also includes a minimum purchase requirement which is based on estimated future purchases. On average, the City has purchased 0.87 mgd over the past 5 years. The contract with the SCVWD expires in 2030.

Recycled Water System

The Regional Water Quality Control Plant (RWQCP) in Palo Alto provides wastewater treatment services for the cities of Palo Alto, Mountain View, and Los Altos; the Town of Los Altos Hills; Stanford University; and the East Palo Alto Sanitary District. The treated wastewater is used as recycled water or discharged to the Bay. Per the Basic Agreement (also known as the Partners Agreement) which details the rights and responsibilities of RWQCP customers, the City owns the rights to its wastewater flow entering the plant (approximately 7.1 mgd) and leaving the plant as recycled water or treated effluent.

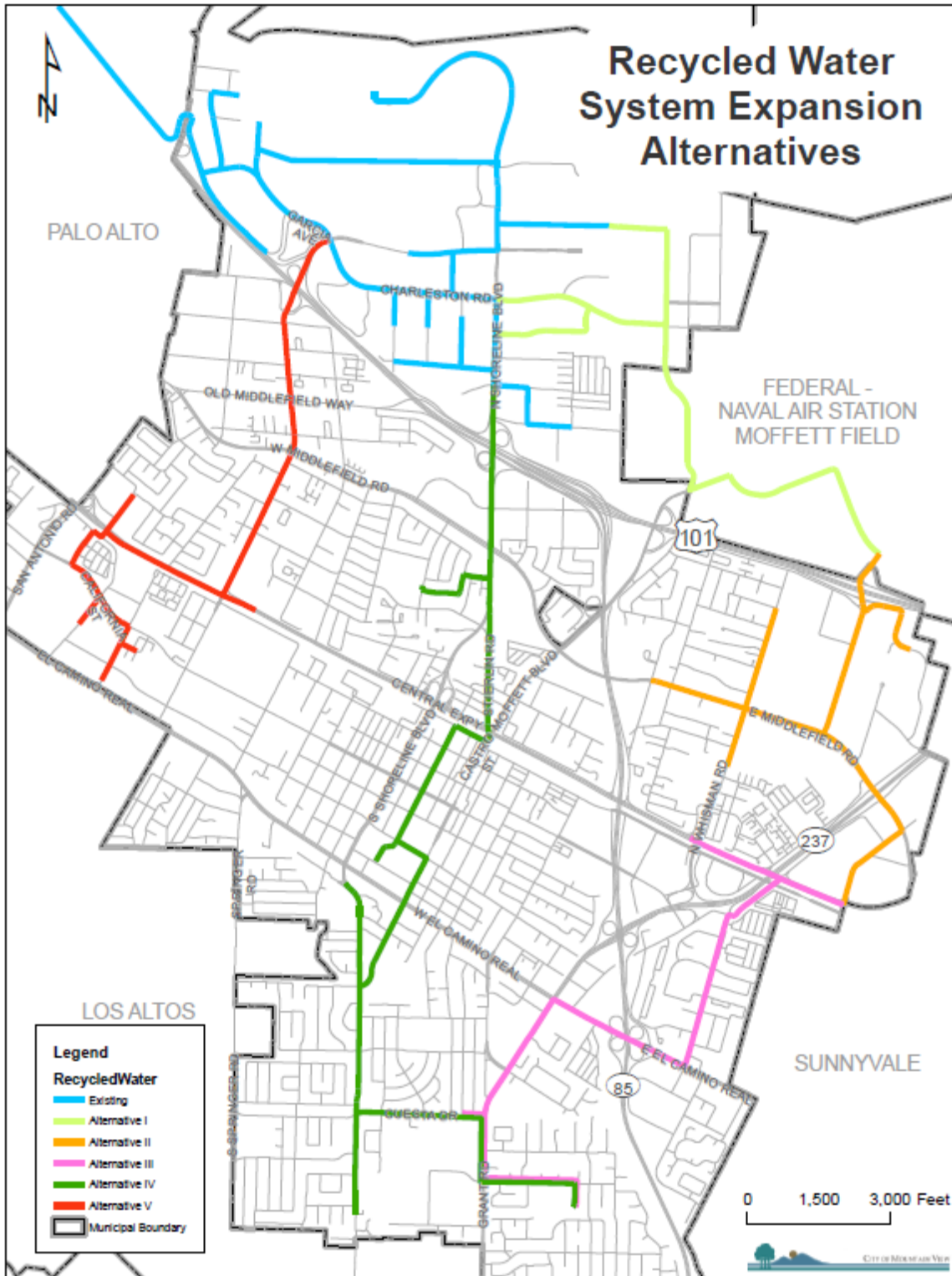
In 2009, the cities of Mountain View and Palo Alto completed construction of a recycled water distribution system from the RWQCP to the North Bayshore Area of Mountain View (north of U.S. 101). The system is located within the area served with SFPUC water and provides recycled water to 50 customers with average consumption of 0.4 mgd; Attachment 1 illustrates the location of the existing system. The current consumption is significantly below the estimates developed prior to system construction. Although water use has been affected by installation of drought-tolerant landscaping, the primary obstacle to using recycled water is the high level of salinity. Recycled water salinity is typically expressed in parts per million (ppm) of total dissolved solids (TDS). Based on detailed analysis and long-term studies, TDS levels of approximately 600 ppm are tolerated by salt sensitive landscaping, including redwood trees. Between 2009 and 2017, TDS levels ranged from 775 to 1,100 ppm.

In 2010, Palo Alto and Mountain View established a TDS goal of 600 ppm for recycled water and agreed to identify and incorporate infrastructure improvements to reduce salinity. Subsequently, Mountain View, Palo Alto, and East Palo Alto completed numerous sewer system repairs to rehabilitate and improve the reliability of their

wastewater collection systems. In 2012, the City rehabilitated 4,000' of sewer lines in Shoreline at Mountain View to extend the life of the lines and reduce the infiltration of saline groundwater, and in 2014, the City received approval to discharge saline groundwater extracted from within the boundaries of the Shoreline Landfill to Stevens Creek, further reducing salt discharges to the wastewater stream sent to the RWQCP. Palo Alto and the East Palo Alto Sanitary District also completed smaller repairs to reduce infiltration. These efforts reduced recycled water salinity to approximately 700 PPM in late 2013, but TDS levels increased during the drought as decreased potable water consumption reduced wastewater flows to the RWQCP, resulting in a higher concentration of TDS (due to reduced dilution). Additionally, the TDS of potable water sources increased, resulting in additional salinity in the wastewater stream. TDS levels during averaged 840 PPM during 2017.

Future Recycled Water System Expansion and Consumption

In 2014, the City completed a feasibility study to review options for increasing long-term recycled water consumption. The study identified five potential options for expanding the existing system (all costs are 2014 dollars). The five options are shown in Figure 2 and described below.



Date: 2/28/2018

Figure 2 - Recycled Water System Expansion Options

Alternative 1: This expansion would add pipelines to serve 31 new customers in the North Bayshore Area and east of Stevens Creek, including businesses on Stierlin Court, Shorebird Way, and Charleston Road (east of Shoreline Boulevard), Google sites in the Bay View development, and the Army Reserve and NASA/Ames campus. Alternative 1 would add demand of 0.52 mgd with 23,000' of new pipeline, a 1.8 MG reservoir (to ensure the City can meet peak-hour flows), and a booster pump station to ensure adequate system pressure. The estimated cost of this alternative ranges from \$13.4 million to \$16.8 million.

Alternative 2: Adds infrastructure to the pipelines constructed in Alternative 1 to serve 40 additional customers along Middlefield Road, Ellis Street, Clyde Avenue, and North Whisman Road. Alternative 2 would add demand of 0.17 mgd with 39,000' of new pipeline, a 1.9 MG reservoir, and a booster pump station. The estimated cost of this alternative ranges from \$18.2 million to \$22.7 million.

Alternative 3: Adds infrastructure to the pipelines constructed in Alternatives 1 and 2 to serve 53 customers south of Central Expressway, including El Camino Hospital, Sylvan Park, Cuesta Park, and Cooper Park. Alternative 3 would add demand of 0.24 mgd with 61,000' of pipeline, a 2.3 MG reservoir, and two booster pump stations. The estimated cost of this alternative ranges from \$25.2 million to \$31.5 million.

Alternative 4: Adds infrastructure to the existing system to serve 51 new customers, including businesses on Shoreline Boulevard south of Highway 101, Franklin Street, Castro Street, Miramonte Avenue, Cuesta Drive, and Grant Road. Numerous City facilities, including Stevenson Park, Eagle Park, McKelvey Park, and Cuesta Park, would be served. Alternative 4 would be constructed independently of Alternatives 1, 2, and 3, and add demand of 0.24 mgd with 38,000' of new pipeline, a 2.1 MG reservoir, and three booster pump stations. The estimated cost of this alternative is \$18.2 million to \$28.2 million.

Alternative 5: Adds infrastructure to the existing system to serve 42 new customers south of Highway 101. New customers would include primarily multi-family properties along Rengstorff Avenue, Central Expressway, California Street, and Ortega Avenue. Alternative 5 would be constructed independently of Alternatives 1, 2, 3, and 4. Alternative 5 would add demand of 0.09 mgd with 41,000' of new pipeline, a 1.9 MG reservoir, and two booster pump stations. The estimated cost of this alternative ranges from \$23.2 million to \$28.2 million.

At the conclusion of the feasibility study, staff recommended and Council supported pursuing Alternative 1. Portions of Alternative 1 are in construction, including service

to the Bay View development and NASA/Ames site; staff anticipates recycled water service to these areas will begin in approximately 2021. Additionally, design of the system extension to Shorebird Way and Charleston Road (east of Shoreline Boulevard) will be completed in 2018, with construction planned for Fiscal Year 2019-20. Finally, service to the Charleston East development is anticipated to begin in approximately 2021.

Staff has developed an estimate of potential recycled water use, assuming water quality improves to a level suitable for all uses. The estimates include increased consumption resulting from the City’s Building Code requirement (as of January 1, 2017) that all commercial buildings greater than 25,000 square feet incorporate dual plumbing in the design of the building to allow the use of recycled water, when it becomes available, for flushing toilets and urinals and priming floor traps.

A summary of anticipated consumption is provided below (mgd):

	<u>FY</u> <u>2022-23</u>	<u>FY</u> <u>2029-30</u>
Consumption from existing customers:	0.40	0.40
Pending Connections (30 to 35):	0.19	0.19
Additional Use from Current Customers:	0.16	0.16
Dual Plumbing Use (existing service area):	0.15	0.20
Expansion (Bay View, NASA Ames):	0.07	0.40
Expansion (Middlefield/Ellis/Whisman):	—	0.17
Charleston East:	<u>0.04</u>	<u>0.04</u>
Total (mgd)	<u>1.01</u>	<u>1.44</u>
(AF/ year)	1,322	1,613

As noted, several portions of Alternative 1 are being constructed or tentatively scheduled for construction, and development plans have changed since the 2014 feasibility study. There have been a number of land use and other changes in the City since the completion of the feasibility study (such as the dual plumbing ordinance), and staff believes it is appropriate to update the study to reflect these changes. Staff is finalizing a scope of work for updating the study, which will include construction cost estimates for system expansion, consumption estimates for new developments, an analysis of the need for new pump stations and recycled water storage, and options for expanding the recycled water infrastructure to other areas of the City. Pending Council approval to proceed, the estimated completion for the update is early Fiscal Year 2018-19.

Advanced Treatment Feasibility Study

The high salt content of the recycled water has been the primary obstacle to increased consumption. In 2015, staff from Mountain View, Palo Alto, and the SCVWD agreed it was unlikely the goal of 600 PPM would be met without treating the recycled water and the agencies funded a feasibility study for implementation of an advanced treatment system. The goals of the study include reviewing the costs to construct a treatment facility designed to produce 1.125 mgd of treated water and the cost to expand the capacity to 2.25 mgd. Because the ultimate goal of treatment was to produce recycled water with TDS of approximately 450 ppm, the treated water would be blended with untreated recycled water, yielding a volume of approximately 2.25 mgd (with capacity to expand to 4.5 mgd). Staff anticipates recycled water with TDS of 450 ppm will be suitable for use on all types of landscaping and for all indoor nonpotable uses in dual-plumbed buildings but will continue to work to identify appropriate salinity levels.

Study Findings

The study was completed in 2017 and confirmed the technical feasibility of an advanced treatment system and identified options for placing the facility at the RWQCP. Additionally, the system would be capable of producing water of the quality needed for all nonpotable uses. The preliminary cost estimates for the design and construction of an advanced treatment system are shown below:

	<u>Total Cost</u>	<u>CMV Share</u>	<u>Annual O&M</u>
1.125 mgd (2.25 mgd total supply):	\$16,000,000	\$12,000,000	\$485,000
2.25 mgd (4.5 mgd total supply):	\$19,995,000	\$15,000,000	\$970,000

(CMV cost share based on allocation of original system construction costs)

A 2.25 mgd system will provide to the City an estimated supply of 1.69 mgd of low TDS water (based on a 75% project cost share). The supply should be adequate to meet long-term projected recycled water needs.

Schedule

If Palo Alto and Mountain View agree to fund and construct an advanced treatment facility, staff anticipates Palo Alto will act as project manager, including developing contracts for design and construction, obtaining construction bids, and managing the construction process. Based on tentative schedules included in the feasibility study, the time required to develop funding strategies and complete design and construction is approximately three to four years.

Water Cost Comparison

Using recycled water preserves potable water for domestic uses and is typically produced at a lower cost than potable water supplies because the source water is readily available from wastewater treatment plants. Attachment 2 compares the wholesale cost of SFPUC water versus recycled water based on projected use in Fiscal Year 2022-23 (when potable consumption is forecast to exceed the minimum purchase requirement). This preliminary analysis shows that the commodity cost of recycled water will be significantly lower than the cost of potable water and becomes increasingly more cost-effective as the City's contribution to construction funding decreases. Staff will provide an update regarding potential capital costs following the completion of the feasibility study update.

Potential Sources of Funding

As noted above, the City's capital project costs to construct a 1.125 mgd advanced treatment system are tentatively estimated to be approximately \$12.0 million. Although there are no immediately available funding sources, staff is reviewing several options for securing funding:

- State Grants /Loans: Staff is working with the City of Palo Alto to identify grant programs available for funding recycled water supply and development projects. Staff is also reviewing the potential to secure State Revolving Fund (SRF) construction loans, which are low-interest and typically available for a 30-year term. The original system construction was partially funded with an SRF loan.
- SCVWD: Staff from the City, the SCVWD, and the City of Palo Alto are discussing the potential of providing effluent to the SCVWD in exchange for advanced treatment facility funding. While these discussions are in the preliminary stage, the SCVWD could fund a large portion of the system construction costs and significantly lower the City's production cost of high-quality recycled water. Pending Council approval to proceed, staff will continue these discussions and provide updates regarding potential contract terms as the process moves forward. This strategy would be a component of the SCVWD's regional recycled water expansion strategy discussed below.
- Federal Grants: The City is a member of the Western Recycled Water Coalition, a collaborative effort of cities, water and wastewater districts, and investor-owned water utilities, which pursues Federal funding for recycled water projects. Through the efforts of the Coalition, the City received a grant of \$3.67 million for

the construction of the original recycled water system. The City has a pending request for a 25 percent grant of a recycled water project (nonproject-specific) to a maximum of \$5 million. The request is part of House Resolution (H.R.) 2799: The Western Water Recycling and Drought Relief Act. There is no timeline for potential approval of HR 2799.

- Rate Increases to Establish Reserve: The current recycled water commodity rate of \$3.07 per unit (748 gallons) is less than half the cost of the commercial potable water rate of \$6.80. It would be possible to implement increases to the recycled water rate to begin building a reserve for capital projects.

Regional Recycled Water Efforts

To preserve its potable water supply and prepare for future droughts, the SCVWD has established a goal of annual recycled water production that meets at least 10 percent of the County's water demands by 2025. The Expedited Purified Water Program (EPWP) could provide up to 45,000 acre-feet per year of purified water for indirect potable reuse to supplement groundwater recharge from other sources such as imported and stored local water supplies. The EPWP includes potential water supply development projects throughout the County, including expansion of the Silicon Valley Advanced Water Purification Center in San Jose and projects at the Palo Alto Regional Water Quality Control Plant (RWQCP) and Sunnyvale Water Pollution Control Plant.

To support these efforts, in 2017, the City signed an agreement with the SCVWD to analyze the feasibility of large-scale reuse projects. The agreement, which expires on December 31, 2020, will allow the SCVWD to review options for treating, distributing, and reusing treated water, and begin developing preliminary project costs. One project being studied is purifying the effluent from the RWQCP for reuse as a droughtproof supply. The wastewater could be purified locally or conveyed to the City of Sunnyvale's Water Pollution Control Plant or the SVAWPC for purification and distribution. The water could then be used locally or transported to other areas of the County for groundwater infiltration, injection, and/or future facility connections needed for implementation of potable reuse.

Other Considerations

The SFPUC and the SCVWD supply the City's potable water, and the water supply outlook is currently adequate. However, supplies are dynamic, and staff is continually monitoring issues that could impact short and long-term water supplies.

Drought

As noted, rainfall in the current water year is far below average, and staff is monitoring potential local and State responses and conservation requests. Staff will provide recommendations as necessary to comply with future conservation mandates.

SFPUC WaterMAP

The SFPUC is responsible for delivering up to 184 mgd to wholesale customers in nondrought years. The SFPUC's Water Management Action Program (WaterMAP) is a plan designed to ensure the SFPUC continues to meet its contractual supply commitments from 2019 to 2040 as well as numerous other water supply objectives:

- Continue to meet retail customer (San Francisco) demands of up to 81 mgd in nondrought years.
- Develop supplies to make up for losses in yield from currently established instream flow requirements in drought and nondrought years.
- Make the City of San Jose a permanent customer with a fixed Individual Supply Guarantee of up to 9.5 mgd in nondrought years.
- Make the City of Santa Clara a permanent customer with a fixed Individual Supply Guarantee of up to 5.0 mgd in nondrought years.
- Consider options to provide an additional supply of up to 1.5 mgd to meet East Palo Alto's projected increase in demands over their ISG (*this objective was largely met through the City's 2017 water transfer to East Palo Alto*).
- Work with Wholesale Customers to enable transfers of Individual Supply Guarantees.

The WaterMAP is a long-term effort and there are no known impacts to the City at this time. However, staff will monitor development of the plan and identify potential water supply development projects that could impact the City.

Bay-Delta Plan

The State Water Resource Control Board (SWRCB) is responsible for managing California's water resources and drinking water for the protection of the environment, public health and all beneficial uses, and ensuring proper water resource allocation.

The SWRCB is also responsible for managing water flows to the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay-Delta), which includes the Sacramento-San Joaquin Delta, Suisun Marsh, and San Francisco Bay. California's two major rivers, the Sacramento and the San Joaquin, converge in the Delta and meet incoming seawater from the Pacific Ocean in San Francisco Bay. The SWRCB manages Bay-Delta water quality through the Bay-Delta Plan.

The Bay-Delta Plan (originally adopted in 1995) included objectives intended to protect fish and wildlife, but the population of native fish (e.g., Chinook salmon and Central Valley steelhead) has declined. Due in large part to recent droughts, the Bay-Delta is at the center of an ongoing Statewide debate about how to reasonably protect fish and wildlife without causing unreasonable negative effects on water supply for agriculture, drinking water, hydropower, and other competing beneficial uses. There are several proposed changes to the Bay-Delta Plan, the most significant being expanded habitat protection that would be accomplished by increasing required flows in the Tuolumne River (which is 85 percent of the SFPUC's water supply), as well as the Stanislaus and Merced Rivers. This proposal could require that 40 percent of the water flowing into the Tuolumne River reach the Delta, significantly reducing supplies available to these water wholesalers and their municipal, industrial, and agricultural customers.

Because of the complexity of the proposal, staff is relying on BAWSCA and the SFPUC to provide background information and analysis. The timeframe for finalizing changes to the plan is unknown, but the next update is expected in mid-2018. Both BAWSCA and SFPUC anticipate the plan changes will have an impact on long-term water supplies. After the next update, staff will work with BAWSCA, the SFPUC, and the SCVWD to identify potential water supply impacts and a recommended response.

SUMMARY

There are several key considerations for the City's water supply:

- The City has adequate potable water supply to meet current and projected needs.
- Staff is continuing to evaluate options for reducing or eliminating costs related to the minimum purchase requirement.
- Although the City will likely be assessed minimum purchase costs in Fiscal Year 2017-18, staff anticipates consumption will be above the minimum requirement in Fiscal Year 2021-22.

- It is possible to construct an advanced treatment facility at the RWQCP to produce water of a quality viable for nonpotable uses. Staff is reviewing numerous options for design and construction funding, including State and Federal grants and loans, and a possible agreement with the Santa Clara Valley Water District to provide water for reuse projects.
- There are additional opportunities for expanding the recycled water distribution system throughout the City. Staff is planning to update the analysis of these options in Fiscal Year 2018-19.
- Staff will continue to monitor potential impacts to the region's potable water supply, including droughts, development of new supplies, and pending changes to the Bay-Delta plan.

RECOMMENDATION

Staff seeks Council approval to proceed with the following next steps:

- Continue to pursue funding for the advanced treatment system through grants, loans, and partnerships.
- Update the recycled water feasibility study to reflect land use and other changes since completion of the original study.
- After the study update, provide an update to Council regarding the costs to expand recycled water service to other areas of the City.

PUBLIC NOTICING – Agenda posting.

GAH/TS/2/CAM
761-03-06-18SS-E

- Attachments:
1. Map of Existing Recycled Water Distribution System
 2. Projected Cost of Recycled Water Versus Potable Water