



COUNCIL REPORT

DATE: June 27, 2023

CATEGORY: Consent

DEPT.: Public Works

TITLE: **Negotiation of Advanced Water Purification (Recycled Water) Project Cost-Sharing Agreement with Palo Alto**

RECOMMENDATION

Authorize the City Manager or designee to negotiate a cost-sharing agreement with the City of Palo Alto for the design, construction, and operations of Phase 1 of the Advanced Water Purification (Recycled Water) System at the Regional Water Quality Control Plant.

BACKGROUND

The City of Mountain View (City or Mountain View) is a partner agency of the Regional Water Quality Control Plant (RWQCP), which treats wastewater from the cities of Palo Alto, Mountain View, Los Altos, and East Palo Alto, the Town of Los Altos Hills, and Stanford University. The RWQCP is owned and operated by the City of Palo Alto (Palo Alto). Mountain View and Palo Alto have been beneficially reusing recycled water from the RWQCP since the early 1980s for nonpotable uses, such as irrigation, toilet flushing, and environmental flows.

Recycled water provides several benefits, including reducing fresh-water discharges to the San Francisco Bay and diversifying the cities' supply portfolios with a local, droughtproof water source. However, one key concern with recycled water is the high salt content when compared to potable water, represented primarily as total dissolved solids ("TDS"), which can be damaging to certain landscapes and equipment.

In December 2009 and May 2010, respectively, the cities of Palo Alto and Mountain View adopted a Salinity Reduction Policy with the stated goal of reducing recycled water TDS to 600 parts per million (ppm). In the years following adoption of this Policy, the partner agencies implemented several projects to improve the recycled water quality, primarily by reducing saline groundwater infiltration to sanitary sewer mains. While these projects were successful in reducing recycled water TDS from approximately 1,200 ppm to 800 ppm, ultimately, it was decided that an Advanced Water Purification System (AWPS) would be needed to meet the Salinity Reduction Policy goal. The AWPS project is managed by Palo Alto, and the design is nearing completion. At this time, a decision must be made whether to proceed with construction.

Recycled Water Distribution System

Mountain View owns and operates a recycled water distribution system that currently serves customers in North Bayshore with an average of 0.46 million gallons per day (MGD). The City's Recycled Water Feasibility Study Update, approved by Council on [March 22, 2022](#), recommended infrastructure improvements to expand service to all customers in North Bayshore and to the NASA-Ames campus. Once these near-term recommended projects are complete and all existing identified customers are converted from potable to recycled water, the updated study estimated that Mountain View's recycled water demand will increase to 1.44 MGD. Longer-term plans could allow for expansion into the East Whisman Area, potentially increasing the City's recycled water demand to 2.39 MGD. The City's existing and future total recycled water demand is summarized in Table 1.

Table 1: City Existing and Future Recycled Water Demand

	Incremental Demand (MGD)	Total Cumulative Demand (MGD)
Existing	0.46	0.46
North Bayshore/NASA Expansion	0.98	1.44
East Whisman Expansion	0.95	2.39

Figure 1 shows the City's existing and potential future recycled water facilities and customers (from the feasibility study update). Presently, a portion of Mountain View's recycled water demand has been delayed due to the high recycled water salt content, including at least 10 private sites as well as Shoreline at Mountain View and Shoreline Golf Links, which accumulates salt buildup faster than the rest of North Bayshore because they overlay on an impermeable landfill cap. The recycled water used by Shoreline at Mountain View and Shoreline Golf Links must be blended with potable water to make it suitable for use on turf grass.

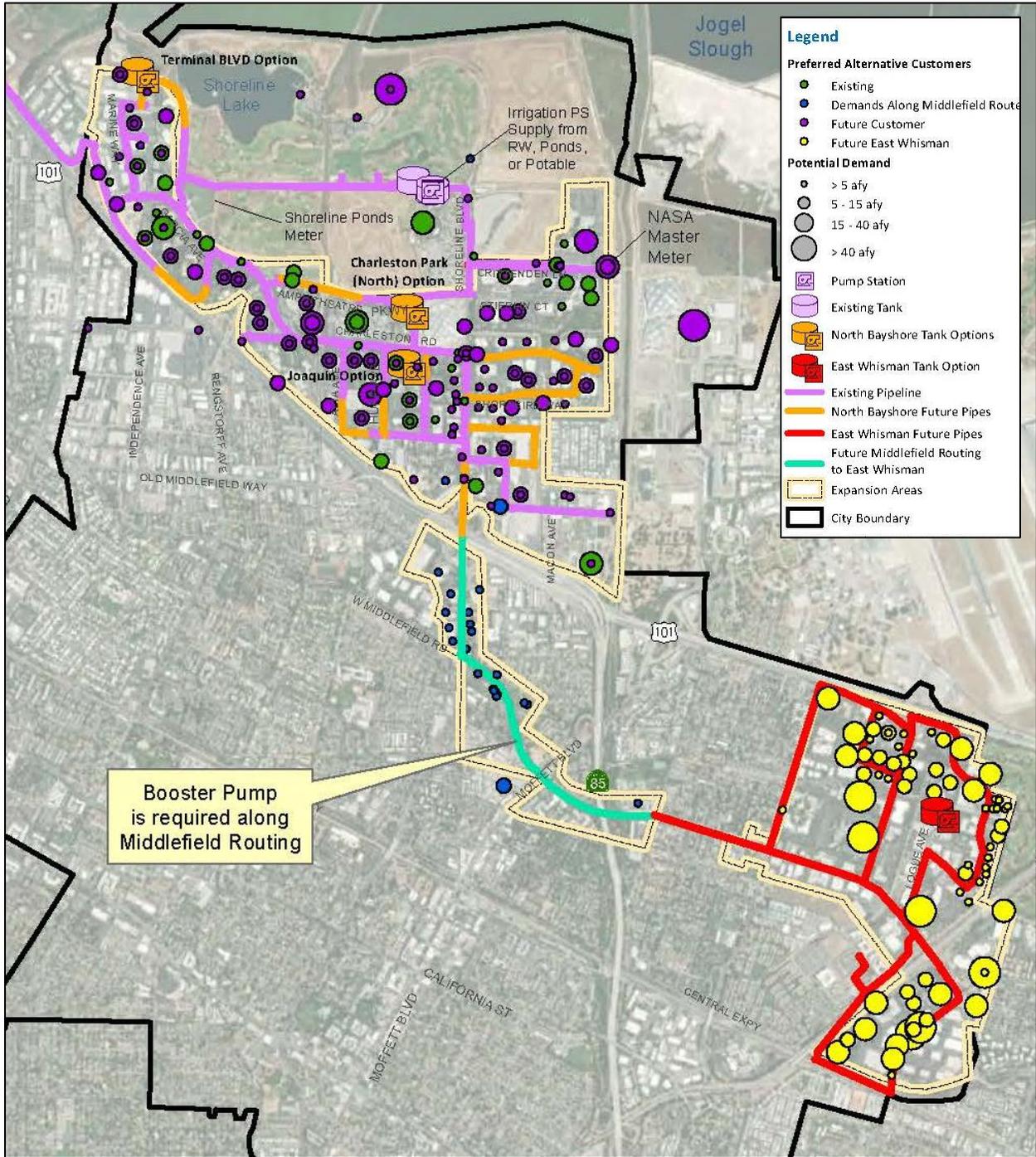


Figure 1: Existing and Potential Future Recycled Water Facilities and Customers

Proposed Advanced Water Purification System Project

Construction of the AWPS will significantly improve the RWQCP’s recycled water quality. The AWPS will be located at the RWQCP in Palo Alto and will remove salts from a small side stream of the existing recycled water, blending it back in with recycled water to create a new “enhanced” recycled water for delivery to customers in Mountain View and Palo Alto. Figure 2 provides a flow schematic of treated wastewater at the RWQCP. Once wastewater has undergone primary and secondary treatment, it passes through dual-media filters and is sent either to be recycled or discharged to the San Francisco Bay. The AWPS starts where Phase 1 is indicated in the figure, taking a side stream of recycled water and treating it through microfiltration and reverse osmosis, followed by a decarbonator to raise pH and reduce corrosivity. Any flows in excess of recycled water demand are treated through ultraviolet disinfection and discharged into the Bay via an outfall.

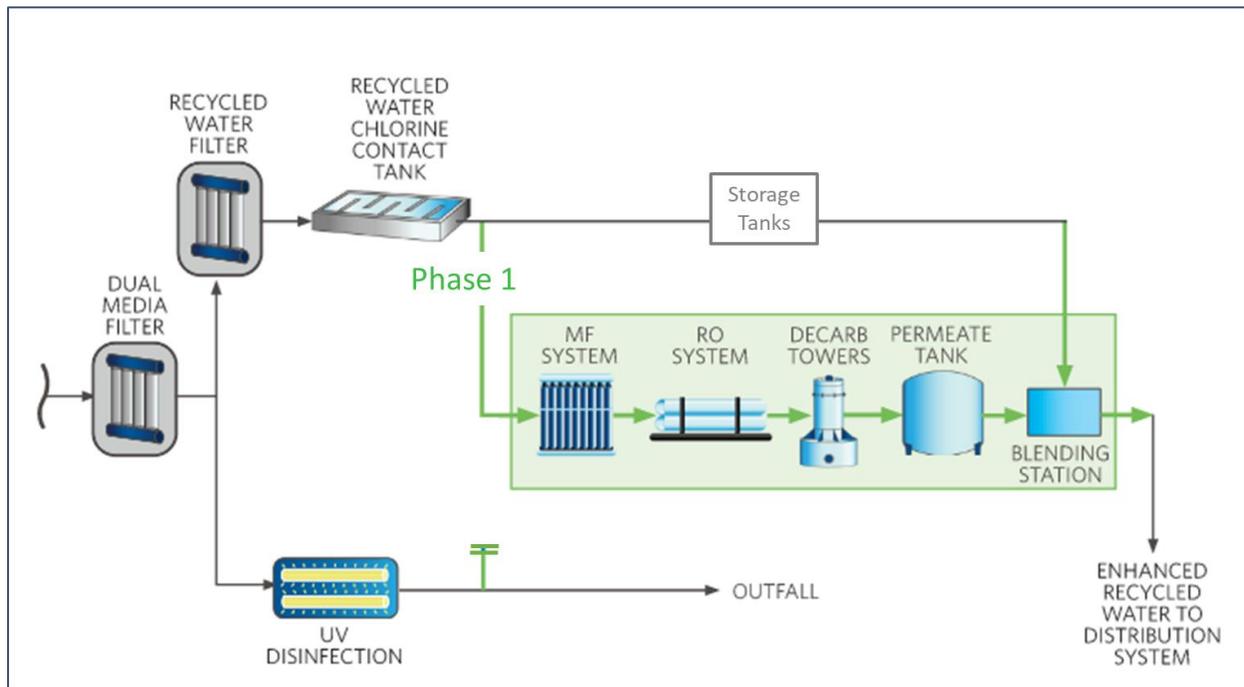


Figure 2: Enhanced Recycled Water Process Flow Diagram

The AWPS is designed to be constructed in two phases, the first of which is under consideration at this time. Phase 1 will produce 1.125 MGD of AWPS product water, which will be blended with recycled water at an approximate 1:2 ratio to produce 2.0 to 2.25 MGD of enhanced recycled water with a target TDS of less than 500 ppm. The exact volume of enhanced recycled water produced depends on the final operating parameters of the AWPS and the demand profile of recycled water users. Construction of Phase 2, which is not being considered at this time, would

double the volume of AWPS product water. If Mountain View and Palo Alto decide to proceed with Phase 1 construction, completion of the AWPS is expected by late 2026.

Capital Costs and Funding Sources

The current estimated capital cost for Phase 1 of the AWPS is \$56.3 million based on the project’s 90% design deliverables. A summary of these costs is provided in Table 2. The current cost estimate is considerably higher than the previous estimate, which was approximately \$20 million. This significant change is driven primarily by construction cost increases over the past three years, design modifications, and the need to elevate the treatment systems to meet sea level rise projections.

Table 2: Total Estimated AWPS Capital Costs

	Amount
Construction	\$43,000,000
Odor Control	620,000
Design and Engineering	3,180,000
Contingency	4,300,000
Project Management	470,000
Construction Management	4,730,000
Total Project Capital Cost	<u>\$56,300,000</u>

To support construction of the AWPS, Palo Alto and Mountain View have secured funding from the Santa Clara Valley Water District (Valley Water) through the Partnership to Advance Resilient Water Reuse Programs in Santa Clara County (2019 Valley Water Agreement) and from the U.S. Bureau of Reclamation (USBR) WaterSMART Title XVI WIIN Act grant program (awarded in 2022). The remaining APWS capital costs would be shared by the cities of Mountain View and Palo Alto. Palo Alto (through its role as RWQCP owner/operator) has applied for a Clean Water State Revolving Fund (SRF) loan to cover this remaining share (Table 3).

Table 3: Estimated AWPS Capital Cost Share

	Amount
Total Project Capital Cost	\$56,300,000
Outside Funding Sources	
• Valley Water	\$16,000,000*
• USBR Grant	12,900,000
Total Outside Funding	\$28,900,000
Remaining Mountain View/Palo Alto Cost Share	\$27,400,000

* In 2019 dollars, escalated annually.

Operating Costs and Funding Sources

In addition to the capital costs described above, costs will be incurred for operation of the AWPS. Operating costs will depend on the actual volume of enhanced recycled water produced to meet customer demands. Initial AWPS production is projected to be slightly over half of the total capacity—ramping up to full production within five years. The associated operating costs are projected to range from \$840,000 to \$1.43 million per year, but ultimately will depend on recycled water demand volumes and the final AWPS operating parameters.

Some external funding is available to support AWPS operations, negotiated as part of the 2019 Valley Water agreement. Currently, Valley Water pays RWQCP partners \$200,000 per year for the option to purchase 9.0 MGD of wastewater effluent for use in a regional water purification project. If Valley Water exercises its option to purchase wastewater over the long term, annual payments will eventually increase to \$1 million (in 2019 dollars, adjusted annually). Mountain View and/or Palo Alto could choose, at that time, to utilize their share of these funds to support AWPS operating costs.

ANALYSIS

Key considerations for deciding whether to construct the AWPS include expected benefits to tree canopy and plumbing equipment balanced against the anticipated capital and operational costs. The sections below present the anticipated benefits of the AWPS (compared to the existing recycled water quality) followed by a detailed explanation of anticipated costs to Mountain View and its rate payers.

Project Benefits to Landscaping

Considerable work has been done to evaluate the impacts of recycled water to landscapes over the past decade, particularly the Coast redwood. A seven-year study completed between 2009 and 2016 showed that salt build-up from recycled water irrigation was detrimental to Coast redwood trees in the North Bayshore Area and that adaptive management practices were unsuccessful in preventing salt damage. Since this study evaluated impacts only to the Coast redwood, Mountain View recently contracted with HortScience Bartlett Consulting (HortScience) to evaluate the effects of recycled water irrigation on the larger body of tree canopy in North Bayshore (current and future), to better understand the benefits of AWPS compared to the existing recycled water. A summary of this recent study is provided below.

The 2023 horticultural study aimed to determine expected outcomes for existing and future tree canopy in North Bayshore under two scenarios: (1) when irrigated with the existing recycled water; and (2) when irrigated with the enhanced recycled water produced by the AWPS. The study utilized an existing database of 9,600 previously identified trees to represent the City's existing canopy, and the approved North Bayshore Precise Plan plant palette and North Bayshore street tree list to represent future canopy.

Scenario 1: Irrigation with Existing Recycled Water Quality

- Existing Trees: The study results indicate 38% of existing trees in North Bayshore are expected to maintain a normal appearance if irrigated with the existing recycled water (representative of 31 species). Approximately 26% (representative of 8 species) will experience some salt-damage, but at levels that are considered acceptable to horticulturists and the general public. The remaining 36% of existing trees in North Bayshore are expected to develop unacceptable salt injury over the next 10 to 20 years if irrigated with the existing recycled water. Trees expected to incur unacceptable salt damage include 3,460 individual trees of 11 different species, including Coast redwood, sweetgum, birch, and cherry.
- Future Trees: The study results indicate a normal appearance for 22 future tree species, acceptable appearance for four tree species, and unacceptable appearance for four tree species (including alder, cherry, and willow). The percentage of overall canopy impacted could not be estimated because it will depend on the prevalence that each species is planted in future years.

Scenario 2: Irrigation with AWPS Enhanced Recycled Water Quality

- Existing and Future Trees: If the AWPS is constructed, the study expects all current trees and all future tree species will maintain a normal appearance when irrigated with the enhanced recycled water.

A visual representation of normal, acceptable, and unacceptable tree appearance is provided in Figure 3 below, excerpted from the horticultural study.



Figure 3: Demonstration of Plant Appearance at Different Levels of Salt Injury

The study explains that expected salt injury typically correlates with high irrigation needs. This occurs because when a larger volume of recycled water is applied to a landscape, it carries with

it a larger loading of salt. As such, low-water-use and drought-tolerant plants are generally less likely to incur salt damage from recycled water.

Although not discussed in the horticultural study, staff understands that many trees have experienced increased stress over the past decade from continued periods of drought, which reduce both natural rainfall volumes and irrigation volumes (through drought restrictions). Consequently, completion of the AWPS does not necessarily guarantee the survival of existing trees since many species with high irrigation demand are also particularly susceptible to drought stress. However, based on the results of this recent horticultural study, **it appears that construction of the AWPS would address tree salinity concerns in North Bayshore associated with recycled water.**

The study also evaluated impacts to trees and grass at Shoreline at Mountain View and Shoreline Golf Links and determined that the AWPS enhanced recycled water could be used to irrigate all trees and grass without any expected salt damage. Thus, **construction of the AWPS would allow Shoreline irrigation managers to reduce the current potable water blending, which is required to support turf growth in soils overlaying the landfill cap.**

Other Project Benefits

Staff recognizes that enhanced recycled water may offer design, operational, and maintenance benefits for some internal nonpotable uses. The City has served one customer with recycled water for toilet flushing since mid-2016, and several other sites have connected recently or are currently in construction. Over this short period of time, staff has not received any complaints about the recycled water affecting plumbing materials or other concerns. However, staff understands there may be potential concerns related to long-term plumbing maintenance. It is also expected that some future customers will use recycled water for cooling towers, and there may be design considerations affecting both material selection and operating parameters. **Improved water quality (including reduced TDS and chloride) could allow more flexibility in material selection and improved operations for dual plumbing in buildings.**

Preliminary Finance Plan and Cost Allocation Analysis

To evaluate financing options for funding Phase 1 of the AWPS, Palo Alto contracted with engineering consultants Woodard & Curran (with subconsulting financial advisors Bartle Wells Associates) to prepare a preliminary finance plan. A summary of this plan is provided below along with options for potentially allocating costs.

Capital Cost Allocation and Funding Options

Subtracting the funding contributions from Valley Water and USBR, the remaining Phase 1 of the AWPS capital cost of \$27.4 million will need to be funded by the cities of Palo Alto and Mountain View. The preliminary finance plan proposes this cost be allocated to each city based on the ratio of recycled water treatment flow allocation, which is 75% Mountain View and 25% Palo Alto currently with the proposed project. Table 4 shows the proposed capital cost share for Mountain View and Palo Alto.

Table 4: Proposed Mountain View/Palo Alto Capital Cost Share

	Share	Amount
Palo Alto	25%	\$ 6,860,000
Mountain View	75%	20,580,000
Combined Capital Cost Share	—	<u>\$27,400,000</u>

City staff supports the preliminary finance plan’s proposed capital cost allocation. However, Palo Alto staff recently expressed concerns with the project cost in comparison to the perceived benefits to their city. Palo Alto’s existing recycled water users include a park, a duck pond, a bike bridge, animal services, and the Palo Alto Golf Course—all of which currently receive recycled water at no cost. Significant infrastructure expansion would be required to benefit additional users in Palo Alto, and it is unclear at this time whether that expansion will occur. If not, Palo Alto appears content with the existing water quality and, consequently, has inquired whether Mountain View would consider funding a greater share of the project as the primary beneficiary.

Given the water-quality benefits outlined in the preceding section, staff recommends Council support additional capital funding from Mountain View, potentially up to the full Mountain View/Palo Alto cost-share amount of \$27.4 million. If Council provides direction to proceed, staff plans to recommend that the Shoreline Regional Park Community Fund provide up to \$22 million to cover the majority of the AWPS capital cost share when the cost-share agreement returns to Council. The current and upcoming expansion of the recycled water system is in the North Bayshore area, supporting the use of recycled water as a sustainable and drought-proof resource for meeting nonpotable water demand in North Bayshore, including for Shoreline at Mountain View and Shoreline Golf Links. The remaining portion would be funded through an SRF loan, to be repaid as rate-funded debt service. If approved by Council, the City’s Utility Rate and Fee Study will evaluate scenarios to ensure the City’s recycled water rates remain affordable.

Operating Cost Allocation and Proposed Funding

The preliminary financial plan proposed that AWPS operating costs be recovered by the RWQCP on a per-unit basis (one unit being equal to 100 cubic feet), thereby allocating costs to Palo Alto and Mountain View proportional to each cities’ recycled water use. Table 5 summarizes the projected range in operating cost shares for both cities based on projected trends in future recycled water use (e.g., 0.4 to 0.8 MGD for Palo Alto and 0.8 to 1.3 MGD for Mountain View).

Table 5: Estimated Operating Cost Share

	Amount (Year 1)	Amount (Year 10)
Palo Alto	\$264,600	\$ 556,700
Mountain View	575,600	876,700
Total Annual Operating Cost	\$840,200	\$1,433,400
Cost per unit of water*	\$1.36 per unit	\$1.43 per unit

**One unit = 100 cubic feet.*

Staff supports the operating cost allocation proposed in the preliminary finance plan. Staff also understands that Palo Alto may be evaluating alternative cost allocation options to address its cost/benefit concerns. It is staff’s opinion that the preliminary finance plan’s proposed cost allocation methodology is equitable, and staff does not support alternative cost allocation methods that increase the City’s contribution to the annual AWPS operating costs, which would increase the burden on the City’s ratepayers.

Project Limitations and Unknowns

As part of the preliminary finance plan, Woodard & Curran evaluated how well the AWPS will be able to meet future demands during peak conditions. Their analysis indicates the RWQCP will be able to meet the target TDS 95% of the time, but that there may be some occasions during the peak irrigation months of June, July, and August when TDS may exceed the target. Depending on future recycled water demand, this could occur within five to 10 years of AWPS operation; however, staff understands that at all times TDS is expected to remain below the Salinity Reduction Goal of 600 ppm.

Although exceeding the target TDS during peak irrigation months is of some concern, there are several options which could be considered as this time approaches:

1. Mountain View and Palo Alto could agree to expand the AWPS through Phase 2.
2. Mountain View could utilize a planned recycled water tank in North Bayshore to blend in potable water, thereby reducing recycled water salinity. Blending facilities are already being considered in the tank design to boost flow rates during times of peak demand when the RWQCP pumps are unable to maintain adequate system pressure.

Despite this uncertainty, construction of the AWPS will undoubtedly improve the City's recycled water quality and offer many benefits to our users. For perspective, Figure 4 compares TDS for the City's existing recycled water ("Palo Alto-Existing") with those from neighboring agencies (from 2020) and the enhanced recycled water.

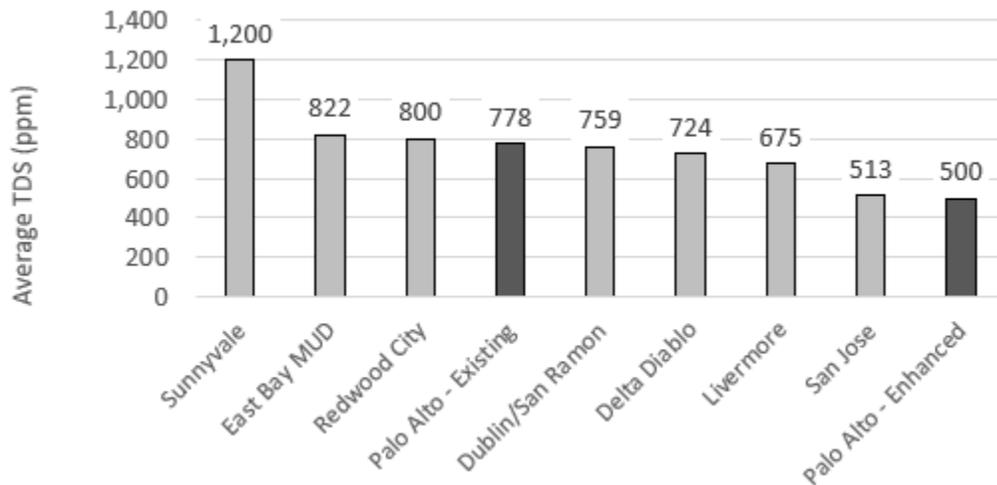


Figure 4: Comparison of Average Recycled Water TDS

Consequences of No Construction

If Mountain View and/or Palo Alto choose not to proceed with construction of the AWPS, the following will occur:

1. Palo Alto will reject the \$12.9 million USBR grant, which was awarded specifically for the AWPS project. This action may jeopardize the success of future grant applications.
2. Palo Alto will withdraw its SRF loan application, which may jeopardize the success of future loan applications, especially for other wastewater treatment upgrade projects.

3. The \$16 million contribution from Valley Water will need to be reallocated to different recycled water or water supply projects as allowed under the 2019 Valley Water agreement.
4. Mountain View and Palo Alto will continue to face recycled water-quality challenges, particularly as conservation efforts increase salt concentrations in wastewater.

Alternatives for Mountain View if the AWPS Project is Not Constructed

If the AWPS project is not constructed, the City could consider other alternatives to reduce the recycled water salinity. The most likely alternative would be for the City to blend other sources of water with the current quality recycled water in a future recycled water reservoir. City Council approved a siting study contract with Wood Rodgers, Inc., on [April 3, 2023](#), to identify a location for a recycled water reservoir in the North Bayshore. Options for the other sources of water to use for blending include:

1. Future purified recycled water to be developed with Valley Water's regional advanced water purification project (subject to negotiations for purchase from Valley Water). Valley Water is currently considering a site for this project at the former Los Altos Wastewater Treatment Plant site on San Antonio Road by Terminal Boulevard.
2. Potable water.

Summary of Recommendations and Next Steps

Staff recommends that Council approve continuing to partner with Palo Alto by negotiating a cost-sharing agreement to construct the AWPS in accordance with the following key terms:

1. Mountain View will contribute up to 100% of the Mountain View/Palo Alto capital cost share, estimated at approximately \$27.4 million.
2. Mountain View will contribute operating costs proportional to the volume of enhanced recycled water received.

Following Mountain View's action tonight, the Palo Alto City Council will consider whether to support construction of the AWPS (currently scheduled for August 2023) and to proceed with negotiating the necessary agreements. Both cities must support construction for the project to proceed. If both the Mountain View and Palo Alto city councils support proceeding with the project, staff will return to Council for approval of a recommended cost-sharing agreement between the two cities.

FISCAL IMPACT

Mountain View's total estimated costs for Phase 1 of the AWPS for design, construction, and construction management include up to \$27.4 million capital costs, and annual operating costs estimated between \$580,000 and \$880,000.

Staff is not requesting an appropriation of funds for the capital costs at this time. Staff plans to recommend appropriating up to \$22 million from the Shoreline Regional Park Community Fund to support the AWPS capital costs when the Council is requested to approve the cost-sharing agreement with Palo Alto. Remaining costs would be added to the City's retail customer rates, to be evaluated as part of the Utility Rate and Fee Study.

CONCLUSION

Development of recycled water improves supply resiliency by diversifying the City's water portfolio with a droughtproof local supply. The cities of Mountain View and Palo Alto have worked to improve recycled water quality over the past decade with the goal of reducing salinity to below 600 ppm TDS. Previous projects have reduced the salinity from approximately 1,200 ppm to 800 ppm, and a decision must be made whether to proceed with construction of the AWPS to further reduce salinity to below 500 ppm, despite a significant project cost increase since the project was first initiated (from \$20 million to \$56 million). Expected benefits from the AWPS include improved landscape performance and increased flexibility for plumbing design, operation, and maintenance, which will benefit the City's current and future recycled water users.

To fund the AWPS, the cities have secured \$28.9 million in contributions from Valley Water and the USBR. The remaining \$27.4 million capital costs must be funded by Mountain View and Palo Alto. Annual operating costs between \$840,000 and \$1.43 million are also expected. Palo Alto's preliminary finance plan proposed that Mountain View fund 75% of the remaining capital cost (in accordance with recycled water capacity rights) and that operating costs be assessed annually proportional to the volume of water used. Staff supports this cost allocation but recommends Mountain View be prepared to fund up to 100% of the Mountain View/Palo Alto capital cost share. Staff recommends Council support construction of the AWPS and negotiating a cost-sharing agreement with Palo Alto under these key terms.

ALTERNATIVES

1. Do not approve proceeding with a cost-sharing project with Palo Alto to construct Phase 1 of the AWPS at the RWQCP; maintain the existing recycled water quality and explore future blending options.
2. Modify staff-recommended key terms for a cost-sharing agreement with Palo Alto.
3. Provide other direction.

PUBLIC NOTICING—Agenda posting with a copy to the City of Palo Alto.

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