

Local Advanced Water Purification System

ARB Major Submittal

Prepared by
City of Palo Alto

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MEMORANDUM

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TO: Architectural Review Board/ City of Palo Alto

PROJECT: Local Advanced Water Purification System (AWPS)

DATE: September 2022

SUBJECT: Project Written Description

This project description summary is prepared for the City of Palo Alto (City) Architectural Review Board (ARB) site and design review of the Local Advanced Water Purification System (AWPS, proposed project) at the Regional Water Quality Control Plant (RWQCP), Palo Alto, California. The proposed project will include the construction and operation of a membrane filtration recycled water facility and a permeate storage tank at the City's RWQCP.

Introduction and Background of the Project

The City of Palo Alto owns and operates the RWQCP, which is an advanced treatment facility that provides wastewater treatment for the cities of Palo Alto, Mountain View, Los Altos, Los Altos Hills, Stanford and East Palo Alto Sanitary District. Currently, the RWQCP treats an average of 17 million gallons per day (MGD), much of the treated effluent is discharged into the Lower South Bay. The RWQCP produces and distributes approximately 230 million gallons per year of tertiary-treated recycled water to the City of Mountain View, several City-owned facilities and a commercial truck fill standpipe at the RWQCP.

Following public concerns regarding the irrigation of redwood trees and other salt-sensitive species with recycled water, the City prepared an Environmental Impact Report (EIR) focused on water quality issues and salinity impacts. On January 25, 2010, Council approved the Recycled Water Salinity Reduction Policy including a goal of reducing the recycled water total dissolved solids level to 600 parts per million. In 2017, Valley Water, Palo Alto, and Mountain View finalized a feasibility study and the preliminary design report for a local Advanced Water Purification System (Project). Currently, the Project is in design and construction is expected to begin in 2023.

The Project will improve the recycled water quality by reducing its average concentration of total dissolved solids (TDS) from 800 milligrams per liter (mg/L) to 450 +/- 50 mg/L through the blending of reverse osmosis permeate with tertiary-treated recycled water. Highly treated water produced by the Project would benefit landscapes currently irrigated with recycled water in Palo Alto, enable Palo Alto to expand its non-potable distribution system, and provide a first step toward small-scale potable water production for direct or indirect potable reuse in Palo Alto.

Scope of Work

The Project will consist of the following elements: membrane filtration (microfiltration or ultrafiltration), reverse osmosis, chemical storage/feed systems, a permeate storage tank and ancillary components. The Project will be located outside the current fence on the northwest side of the RWQCP.

The new facility will be a one-story concrete deck approximately 116 ft by 134 ft in area and will house membrane filtration, the reverse osmosis system, a majority of the chemical feed system, and other ancillary components. The facility would have a building footprint of approximately 15,544 square feet. The concrete deck foundation will consist of 258 piles for the main deck with a pile tip elevation of -30 ft. The Project includes an electrical building located on the western side of the main structure. For this building, an additional concrete deck 80 ft by 20 ft will be installed. The foundation of this smaller deck will consist of 48 piles with a pile tip elevation of -30 ft. The main structure will be partially covered by a roof. The roof dimensions are 112 ft by 66 ft with a height of 32 ft.

The Project also includes a reverse osmosis permeate tank that will be located northeast of the main structure and west of the former chlorine contact tank. The storage tank will be a 50 ft diameter circular tank with a nominal sidewall height of 30 ft. The storage tank capacity will be 350,000 gals. The tank will be erected on a reinforced concrete mat type foundation supported by deep pile foundation as designed by the tank supplier and installed by the Contractor.

The Project will also include a blending station located in the basement of the RWQCP Administration Building and installation of yard piping inside the RWQCP.

Existing and Proposed Uses

The local AWPS will be located on currently undeveloped land in the western portion of the RWQCP area. The site includes a soil bed filter that removes odors from the Influent Pumping Station. The soil bed filter will be removed, and an odor control system will be installed next to the Influent Pumping Station. Several water and wastewater mains are in the site. The main structure was designed to consider an East Palo Alto Sanitary District easement. The Project includes the relocation of one 8-inch sewer line located onsite.

The proposed local AWPS will be part of the RWQCP Recycled Water production system. Tertiary-treated recycled water will be conveyed from the current Chlorine Contact Tank into the membrane filtration. Reverse osmosis permeate will be pumped to a permeate storage tank. Permeate will be mixed with tertiary-treated recycled water and then sent to the recycled water system.

The facility will not be permanently occupied and will have space for one operator to access as needed for routine operations and maintenance.

Purpose of the Proposed Changes

The purpose of the changes to the site is to construct an AWPS to improve the recycled water quality by reducing its average concentration of total dissolved solids (TDS) from 800 milligrams per liter (mg/L) to 450 +/- 50 mg/L through the blending of reverse osmosis permeate with tertiary-treated recycled water.

Design Intent

The basis of design for the Project is to meet a maximum, instantaneous permeate production capacity of 1.125 MGD during the current first phase, expandable to 2.25 MGD in a future second phase. The Project is being designed to accommodate the future expansion with minimal civil/mechanical/electrical work by adding equipment to housekeeping pads.

To account for future sea level rise in accordance with the City of Palo Alto Sea Level Rise Policy, the finished grade elevation will be raised at the location of the Project. The top of concrete of the main Project structure will be set at 11.5 ft. To make up for the remainder of the required elevation to keep rotating mechanical, electrical and instrumentation out of the flood plain and future sea level elevation, equipment will be placed on equipment pads as required to an elevation of 13.5 ft. The top of the new chemical containment wall will be at 13.5 ft.

The main structure will sit approximately 3 to 4 feet higher than the surrounding terrain. The on-site grading is being designed to maintain a 2% or less slope in building access areas and 4% or less slope in operational maneuvering areas.

Electrical, potable water and fire services supply will be independent from the existing RWQCP services and new connections will be needed from City of Palo Alto Utilities.

The proposed architectural design addresses the City's desire for a facility that blends into the surrounding environment but at the same time provides treatment for recycled water in an efficient way. The Project emphasizes functional and operation requirements needed for a facility such as the RWQCP, but also takes into consideration the existing pedestrian walkway and landscaping outside the RWQCP. The Project is being designed to address public views from outside the RWQCP perimeter by maintaining screening as much as possible given the severe space limitations on-site. Buildings, screen fencing/walls and canopies at the Project site will use materials, colors and design standards consistent with existing facilities.

The following strategies have been implemented to define the inward facing and outward facing architectural solutions:

- a) Optimize the comfort and safety of the working environment beyond the minimum space requirements to achieve practical and functional solutions
- b) Use practical architectural forms, features, materials, finishes and colors to blend into the environment and be consistent with the existing RWQCP structures and in scale with surrounding area
- c) Utilize building materials that promote durability, longevity and ease of maintenance
- d) Consider material availability and sourcing to keep project costs and schedules in check

Materials, Colors and Construction Methods

The Project building, canopy, fencing/walls and materials are selected to meet the RWQCP operational and safety requirements outlined in the project, governing CEQA documents, design criteria, and compliance with building codes and standards. Building forms, materials and colors are selected to meet Palo Alto Baylands Master Plan and the RWQCP CEQA document requirements for screening in Embarcadero Road, the adjacent business park and the pedestrian path.

Canopy – The canopy will be over the microfiltration and reverse osmosis equipment, compressors, cartridge filters and blowers. The canopy will be approximately 66 ft wide, 116 ft long with a clearance of 25 ft and a maximum height of 32 ft. The canopy will be a pre-engineered metal building with purlin supports and a standing seam roof. The roof color will be colonial red, and the purlins will be painted cool zinc gray.



BUILDING ROOF COLOR
COOL COLONIAL RED



PURLIN COLOR
COOL ZINC GRAY

Electrical building – The electrical building will be a pre-fabricated building that houses motor control centers (MCCs) and variable frequency drives (VFDs) as well as a small control room for SCADA equipment. The building is located west of the main structure and is 80 ft long by 20 ft wide with a height of 12.5 ft. The building is a prefabricated unit painted ANSI 70 Gray #5049.



ELECTRICAL BUILDING COLOR
ANSI 70 GRAY #5049

RO Permeate Tank – A 50 ft diameter tank, 30 ft tall tank made of glass-lined bolted steel painted forest green. The color was selected based on the manufacturer's catalogue and provides continuity with the existing and new tree canopy around the RWQCP



RO PERMEATE TANK COLOR
FOREST GREEN

Chainlink security fence – An 8 feet high galvanized steel chain-link to meet RWQCP security specifications. Additionally, perimeter fencing solutions are developed to meet the project criteria of aesthetically screening the local AWPS from exterior public view.

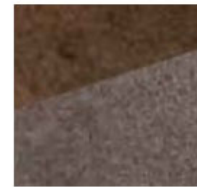
Concrete soundwall – To reduce sound coming from the pumping equipment inside the facility, a 10 feet high, precast concrete wall with precast concrete pilasters will be installed in certain sections of the perimeter. The wall's exterior surface will have a wood plank texture with a horizontal board staggered pattern. The wall will be stained and will be coated with an anti-graffiti sealer. Colors and materials were selected to blend into the adjacent landscape plant screening material.



CONCRETE FORMLINER



CONCRETE STAIN



Asphalt pedestrian path – A 5 feet wide asphalt pedestrian path with wood headerboard

Construction Methods

The Project will be constructed over a period of 18 months beginning in 2023 and continuing through 2024. Project construction will consist of soil bed filter removal, tree removal, sewer line relocation, excavation, pile installation, building construction, equipment installation, startup and testing. In parallel, pile excavation and site preparation for the permeate storage tank will take place. On the exterior, the perimeter wall foundation will be excavated and constructed. The Project will include new landscaping and tree replacement onsite. Inside the RWQCP, yard piping excavation, installation and fill will occur as well as work in the chemical storage tanks and basement of the Administration Building. Construction access will be from Embarcadero Way. The Project will be designed to be constructed without interruption to the current treatment operations, except during special circumstances such as piping and utility tie-ins.

Landscaping Plan

The landscape design follows the requirements of the Palo Alto Baylands Master Plan and the requirements for the RWQCP to install and maintain landscaping around the facility to provide visual screening for visitors to the surrounding Baylands. The landscape solution is designed to:

- Blend into the existing site and the existing Baylands planting layout and palette,

creating an aesthetically pleasing facility.

- Take advantage of existing healthy mature screening, transition to denser shrubs along the fenceline and move to smaller shrubs and native grasses towards the road.
- Combine perimeter fencing solutions and layered plant materials to screen the Project and ancillary structures
- Maintain safety and site security. The planting design considers the right balance of plant material and path alignment to provide vehicles, cyclists and pedestrian traffic adequate visibility to each other and safe sight distance.
- Provide a plant palette that will be low-maintenance, low water use, visually interesting in foliage color, texture and blooms, and locally adapted to the climate.

Lighting Design Criteria

Lighting levels will be provided following the recommended levels suggested by the Illumination Engineering Society (IES) handbook. Lighting fixtures types are to be suitable for the environments where installed and will be installed in a serviceable and accessible location for routine maintenance. Light sources for the entire project will be LED.

Indoor location will be provided with lighting fixtures than ensure all passages and exits remain illuminated in the event of power failure. Under the canopy ceiling mounted and pendant mounted fixtures will be installed. For outdoor locations but inside the RWQCP, pole mounted fixtures will be installed with heights as required to maintain lightning illumination levels in the area similar to other structures at the RWQCP. Pole heights and locations are considered to address maintenance issues for the City to replace or repair fixtures. The project does not include any modification to the lightning located outside the perimeter wall along Embarcadero Road.

Egress and emergency lighting systems are provided in conformance with NFPA 101 (Life Safety Code). LED type exit signs will be placed inside the facilities as well.