ENGINEERING REPORT ADDENDUM

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To: San Lucas County Water District

From: Brian McCauley, PE | MKN & Associates, LLP
Mihika Ram, PE | MKN & Associates, LLP

Date: June 19, 2026

Re: San Lucas CWD Non-Nitrate – ER Addendum 1, New Wells and Selected Alternative

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1.0 Introduction

1.1 Background

San Lucas is an unincorporated community and census designated place in southern Monterey County, California. It is located roughly 7.5 miles southeast of the 1^{st} Street Highway 101 exit in King City. This community is served by the San Lucas County Water District (SLCWD) and is situated between Highway 101 to the west and Highway 196 to the east. The water system is regulated by the State Water Resources Control Board (SWRCB) Division of Drinking Water (DDW). The system is currently comprised of one active well, a manganese dioxide filtration system, a 300,000-gallon water storage tank, and a chemical dosing system. The District currently faces issues with water quality and the aging conditions of their existing water system infrastructure. Nitrate concentrations in groundwater began rising in 2007, followed by consistent color and odor complaints from residents. These continuous issues resulted in a “do-not-drink" notice from the County of Monterey Health Department in 2011, and the community has since relied on bottled water

In February 2025, MKN & Associates, LLP (MKN), an Ardurra Group, Inc. company, submitted an engineering report (Final ER) evaluating alternatives to mitigate the non-nitrate (salinity, iron, manganese, and sulfate) and nitrate-related potable water quality violations and concerns within the community. SLCWD decided to pursue a combination of two alternatives, Nos. 4 and 5: Wellhead Treatment with Manganese Dioxide Filtration, and Reverse Osmosis (RO) with Phased Construction and New Well Drilling to address the water quality challenges. Sub-alternative B was also selected, which designates California Water Service (Cal Water, CWS) as the owner and operator of the existing SLCWD system, including any improvements constructed as a result of this project, following construction. Additional detail regarding the historical water quality issues, infrastructure, and selected alternatives and sub-alternative is included in the Final ER.

This ER Addendum serves to update the District’s background information, water quality demands, existing water system conditions, and scope of work for water system improvements based on the selected alternative. Additionally, this ER Addendum will propose water system infrastructure design based on land availability, hydrogeological conditions, environmental permitting constraints, updated water quality data, and existing facility conditions.

Proposed project details, such as site location and constraints, will incorporate the findings of the following investigations:

- Hamner & Jewell Associates (HJA) – This subconsultant is responsible for the assessment of land availability and acquisition by determining prospective sites for the new wells and water treatment facility. Their findings were presented in a report which included the identification of property ownership, possible constraints or challenges to acquisition, budgetary estimates for the purchase prices of the properties, and potential damages or other costs associated with property purchase.
- Luhdorff & Scalmanini Consulting Engineers (LSCE) – This subconsultant has collected, reviewed, and utilized available data and information to develop a conceptual hydrogeologic model of the proposed project area and to preliminarily characterize site specific conditions (well depth, water quality, yield) in the study area.

Further, this ER Addendum includes water quality testing conducted since the completion of the ER in 2025 and will serve as an abridged Preliminary Design Report (PDR) for the design of two new production wells and other associated improvements.

1.2 Existing Water System

The District operates one active well, Well #03, and one storage tank that serves the water distribution system, supporting approximately 315 people, including a school, with a total of 97 service connections. However, the well does not meet the drinking water needs of the community due to water quality concerns, therefore bottled water deliveries are used to supply drinking water. Instead, Well #03 serves other indoor/outdoor uses and as a site for water quality monitoring. Well #03 is owned by the Naraghi family and is currently operated by SLCWD under a use agreement (License Agreement, 2014), which allows the use of the well until such time that a long-term water supply solution is realized (Attachment D of the Final ER).

From Well #03, water is conveyed about 1.2 miles through a 6-inch pipeline to the distribution system and a 300,000-gallon bolted steel storage tank located roughly 1,000 feet northwest of the Community. The distribution network consists primarily of 6-inch and 8-inch pipelines, and each residence is supplied by a 1-inch service lateral. System pressure is provided jointly by Well #03 and the hydraulic grade of the water in the storage tank. Based on the well’s estimated 100 psi discharge, an elevation gain of about 70 feet, and anticipated pipeline losses, the average system pressure is estimated at approximately 60 psi, though field confirmation is recommended before design, which is an item to be completed during the next phase of work.

1.3 Existing Water Quality Update

A summary of key water quality data for Well #03 has been updated to include more recent data and is presented below in **Table 1-1**. Primary constituents are contaminants that pose health risks and are regulated through enforceable Maximum Contaminant Levels (MCLs). Secondary constituents, by contrast, primarily affect aesthetic water quality characteristics such as taste, odor, and appearance and are not associated with health risks at typical concentrations. Contaminants that exceed primary drinking water Maximum Contaminant Levels (MCLs) are highlighted in orange, while contaminants exceeding secondary drinking water MCLs are highlighted in yellow. If a contaminant does not exceed primary or secondary drinking water MCLs, it is left unhighlighted.

Table 1-1: Historical Water Quality for Well #03 (2014–2025)

Parameter	Average	Minimum	Maximum	Units	MCL[1]
Aggressive Index	12.0	11.7	12.3	AGGR	--
Arsenic – Dissolved	3.1	1.1	7.0	ug/L	10
Barium – Dissolved	59.1	44.1	104.0	ug/L	1000
Calcium – Dissolved	154.7	111.0	180.0	mg/L	--
Carbon Tetrachloride	0.7	0.7	0.7	ug/L	0.5
Chloride	114.5	82.1	142.0	mg/L	250
Conductivity @ 25C	1,440	1,129	1,600	umhos/cm	--
Gross Alpha Particle Activity	13.8	3.9	63.4	pCi/L	15
Hardness as CaCO3, Dissolved	621	441	730	mg/L	--
Iron – Dissolved	286.9	44.0	1,040.0	ug/L	--
Manganese – Dissolved	432.6	39.0	860.0	ug/L	--
Nitrate as N	3.4	0.1	19.9	mg/L	10
Nitrite as N	0.2	0.2	0.2	mg/L	1
pH	7.2	7.1	7.3	pH Units	--
Selenium – Dissolved	3.8	1.3	5.6	ug/L	50
Sodium – Dissolved	76.5	63.0	84.0	mg/L	--
Sulfate	453.2	327.0	550.0	mg/L	--
Total Dissolved Solids (TDS)	1,247	260.0	2,200	mg/L	--
Uranium, Radiological	7.8	2.0	39.9	pCi/L	20

Note:

1. *"–" indicates no primary or secondary MCL for a given constituent.*

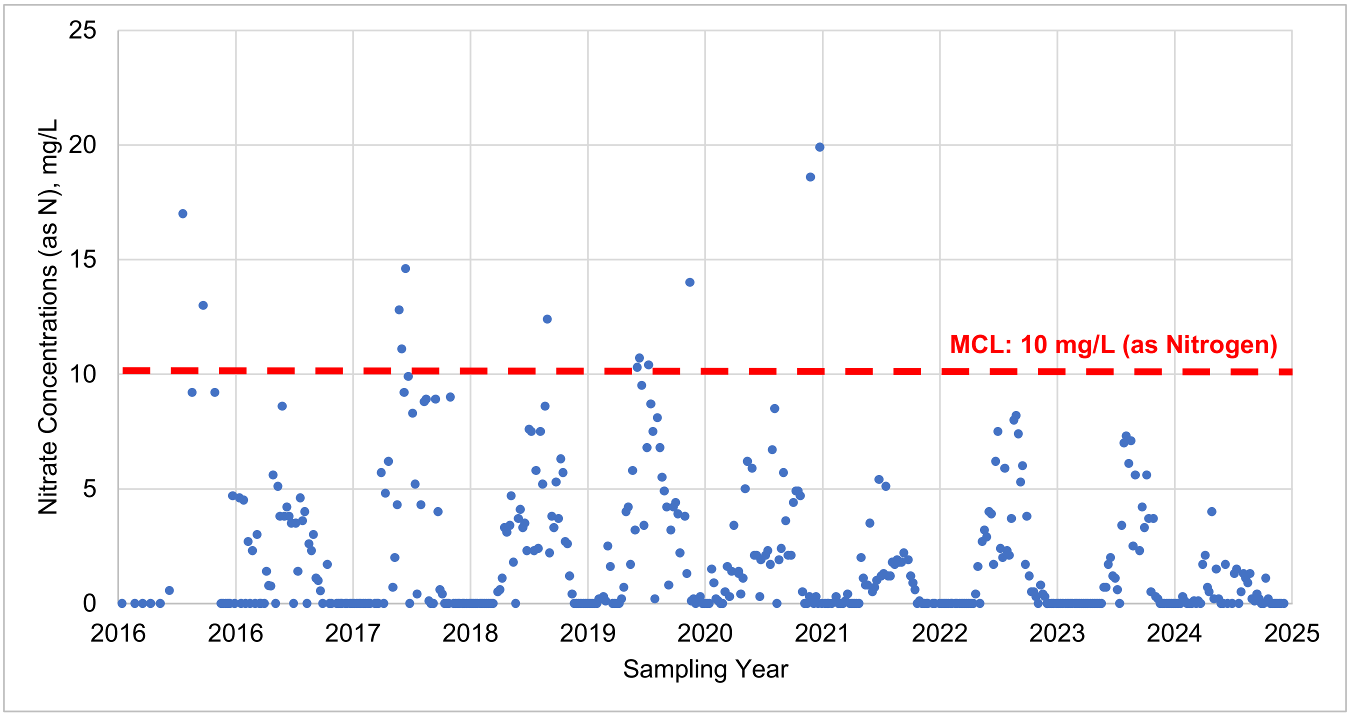
No major changes in water quality have occurred since the last analysis was conducted using 2023 data. Generally, the concentration of several minerals, including barium, calcium, and selenium, have increased, while hardness, TDS, and radiological constituents have decreased. No additional sampling has been conducted for the potable water storage tank, so the water quality is assumed to have remained the same for the basis of this report.

2.0 Problem Description Update

2.1 Water Quality Issues Update

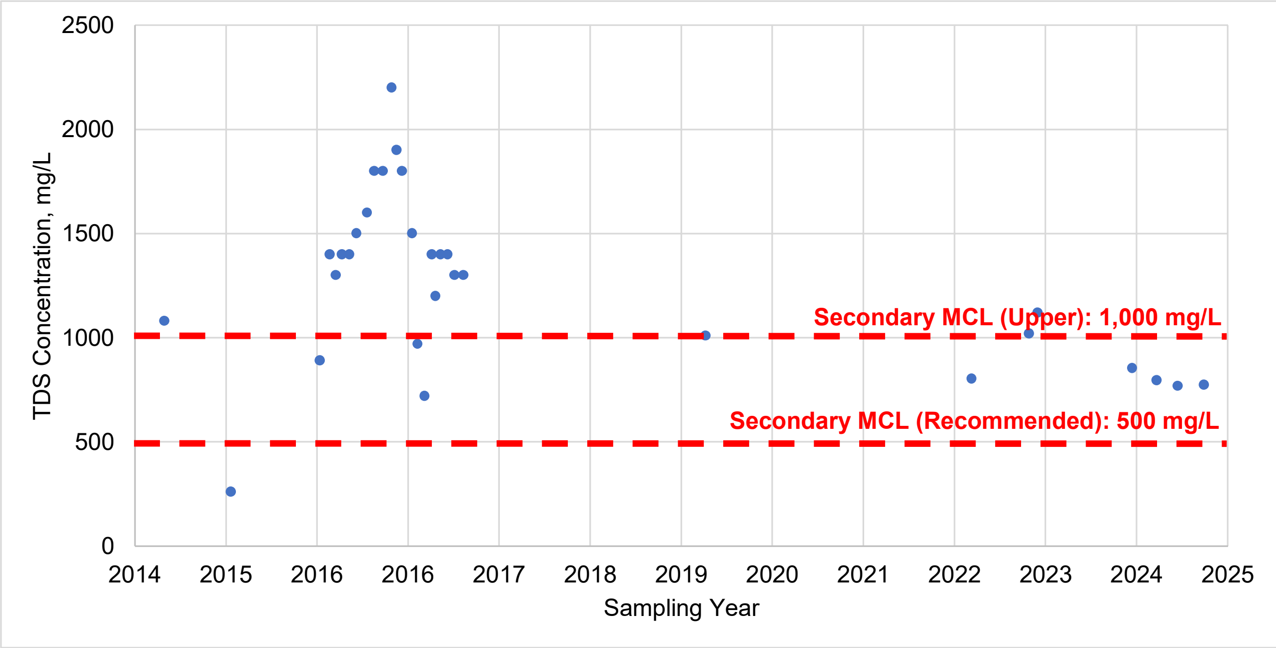
Historical nitrate concentrations in raw water from 2016 to 2025 are depicted on **Figure 2-1**. It is generally observed that between the spring and late fall/early winter months of each year, nitrate concentrations spiked to around 7-20 mg/L, often lasting several months before decreasing to non-detect levels during winter months. The most variation occurred between 2016 and 2021 when concentrations ranged from non-detect to 20 milligrams per liter (mg/L) as Nitrogen, with higher concentrations exceeding the MCL of 10 mg/L (as Nitrogen) mandated by the SWRCB DDW. Since 2020, concentrations have remained below this MCL and have shown reduced variability. However, due to historical MCL exceedances and seasonal fluctuations in nitrate levels, the selected treatment technology will be implemented to prevent future exceedances and to provide protection should concentrations return to pre-2020 levels.

Figure 2-1: Historical Nitrate Concentrations - Well #03 (2016–2025)



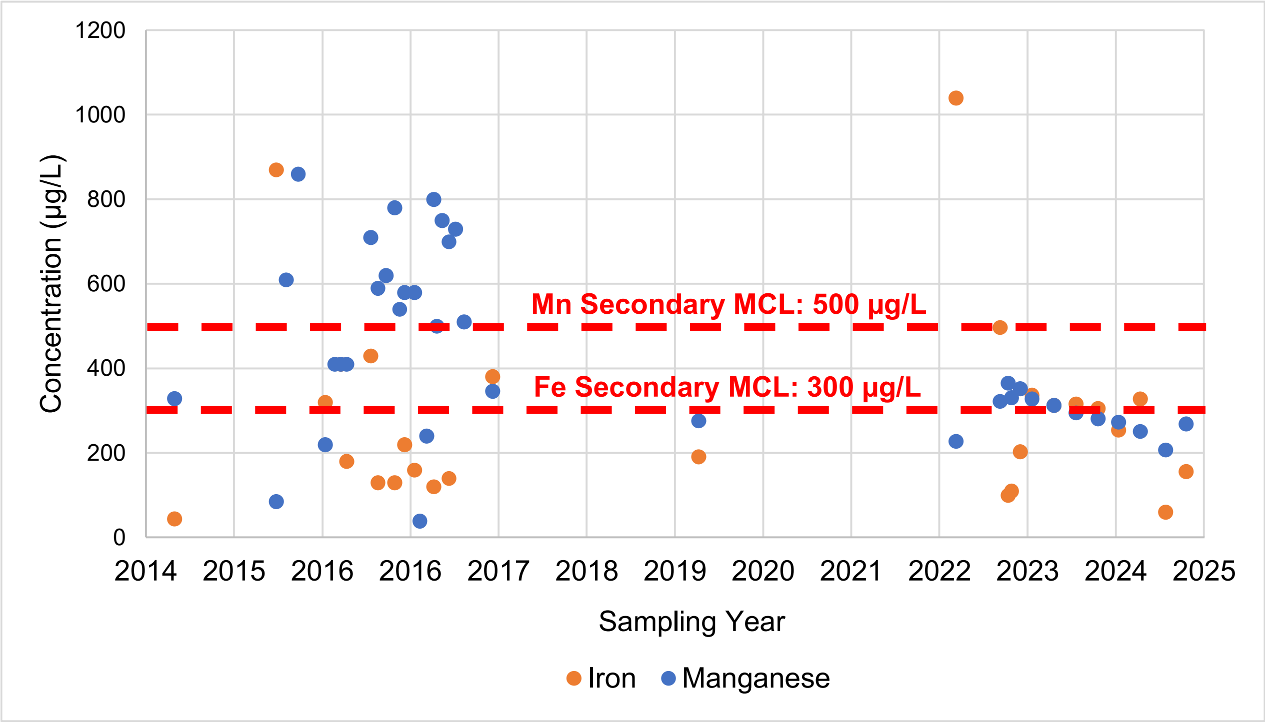
Historical salinity (TDS) concentrations from 2014 to 2025 are depicted on **Figure 2-2**. The quantity of TDS sampling data from Well #03 remains much more limited than the nitrate sampling data. TDS concentrations spiked between the spring and winter months of 2016, and it is suspected that this may be loosely correlated with the cause(s) of the nitrate spikes in the same period. Since this spike, concentrations have gradually decreased but remain above either the recommended or upper secondary MCL concentrations of 500 and 1,000 mg/L, respectively. Given the deviations in the raw water TDS concentrations, it is anticipated that TDS concentrations will continue to fluctuate in the future.

Figure 2-2: Historical TDS Concentrations - Well #03 (2014–2025)



Iron and manganese concentration ranges remain unchanged, varying from 44 to 1,040 micrograms per liter (µg/L) and 39 to 860 µg/L, respectively (**Figure 2-3**). The average of iron and manganese concentrations from 2014 to 2025 remain quite high, calculated to be approximately 287 and 433 µg/L, respectively. Though a large portion of the sampling values for both constituents are above the secondary MCLs of 300 µg/L (iron) and 50 µg/L (manganese), the mean value of each has decreased since 2023.

Figure 2-3: Historical Iron and Manganese Concentrations - Well #03 (2014-2025)



Uranium concentrations have remained within the historical range of 2 to 39 picocuries per liter (pCi/L). Only one exceedance of the uranium MCL occurred in the second quarter of 2017, and the calculated average of uranium concentrations has remained steady at approximately 8 pCi/L. Besides a spike in the third quarter of 2024, sampling results have remained below 10 pCi/L since the first quarter of 2022, indicating that uranium concentrations will likely remain below the MCL in the future. Gross Alpha Activity concentrations range from 3.9 to 63.4 pCi/L. Nine exceedances of the 15 pCi/L MCL have occurred since 2017, and it is suspected that these can be primarily attributed to the presence of uranium in the raw water. Concentrations have been gradually decreasing over time, with only one exceedance occurring since 2020.

Carbon tetrachloride and color have not been remeasured since 2023. Odor measurements have remained within the historical range of 1 to 3 threshold odor numbers (TON). The average of odor measurements from 2014 to 2025 has remained unchanged at approximately 2 TON. While the range of historically sampled odor measurements remains at or below the secondary MCL of 3 TON, the presence of odor measured at 1 TON can easily be smelled in water obtained from household appliances. It is suspected that the presence of odor can potentially be attributed to the reduction of sulfurous elements in the aquifer (i.e., sulfates, sulfides) into hydrogen sulfide gas, typically resulting in a “rotten egg” smell.

2.2 Existing SLCWD System Deficiencies & Distribution System Analysis Update

A review of the existing water system by the DDW Monterey District Engineer (2024 Sanitary Survey, October 2024, **Attachment A**) revealed several deficiencies at the current well, treatment, and storage facilities that further justify the need for the proposed project. Most critically, the current treatment plant continues to experience operational failures, including intermittent filter breakthroughs that result in treated water exceeding secondary MCLs for iron and manganese. In the interim, a separate SWRCB-funded project is currently underway to rehabilitate the existing treatment facilities until such time that this long-term project is constructed.

During a recent site visit, the Rural Community Assistance Corporation (RCAC) identified several deficiencies within the distribution system. It was observed that valve operating nuts had not been exercised or maintained, and other assets, such as hydrants, also showed no evidence of routine maintenance. While the lack of upkeep on these components can shorten their service life and increase long-term operating costs, overall hydraulic performance remains adequate.

In addition, the existing finished water storage tank requires multiple repairs and maintenance actions. At the existing tank site, the bolted steel tank was observed to be leaking, and several issues were noted with both the structural and sanitary integrity of the tank. The 300,000-gallon bolted steel tank, while providing adequate volume for current system demands, exhibited holes in the soil adjacent to its foundation, necessitating further investigation to assess potential undermining and required improvements to protect the tank’s structural stability. The tank lacks a functioning water-level gauge or monitoring system, and several components show signs of deterioration, including a corroded anchor bolt and bracket that must be repaired. Additional deficiencies include a minor leak at the tank bottom, a hatch door that does not provide a watertight seal—as evidenced by spiderwebs beneath the hatch—and advanced corrosion at the roof vent where metal loss is occurring. All of these issues require corrective maintenance but collectively demonstrate that the tank is aging and in need of significant rehabilitation. A thorough condition assessment is recommended to evaluate the scope of repairs and/or the need for replacement of the tank.

The existing facilities currently lack an emergency power supply, which represents a critical vulnerability during power outages or natural hazard events. To facilitate operational resilience, the new wells and treatment facilities should be equipped with either a permanent standby generator or provisions for immediate connection to a portable backup power supply.

3.0 Project Alternatives Update

A combination of Alternatives 4 and 5 was chosen as the basis for design. A summary of all five original alternatives, along with the rationale for their selection or exclusion, is presented below. During preliminary alternatives development, non-regenerable ion exchange was determined to be infeasible and was therefore not advanced for further evaluation. Based on the available source water quality data, the media would likely exhaust rapidly, requiring frequent replacement and disposal. The resulting operational costs and maintenance requirements make this alternative economically impractical compared to the other evaluated treatment technologies.

3.1 Alternative No. 1: Intertie with King City

Alternative No. 1 features the construction of an 8-inch pipeline connecting the San Lucas and the Cal Water King City (CWKC) water systems. The pipeline would span 8.2 miles along Highway 101 or the Union Pacific Railroad (UPRR), and would cross railroad track in King City. This alternative poses significant construction and permitting concerns, as coordination for either of these alignments would be difficult and costly. For example, the acquisition of multiple encroachment and crossing permits would be required – this administrative process alone could require several years to complete, which is inconsistent with the community's timeline given the urgency of the matter.

3.2 Alternative No. 2: Wellhead Treatment – Manganese Dioxide Filtration and Ion Exchange

Alternative No. 2 replaces the existing manganese dioxide filtration system and adds ion exchange as a second source of primary treatment. This project requires civil site work and construction of multiple buildings that support treatment infrastructure, as well as a tank. Although ion exchange systems are less difficult to operate than reverse osmosis systems, SLCWD does not maintain any water rights from Well #03, therefore negotiations for a new easement would have needed to commence immediately. Additionally, when accounting for the monetary and non-monetary costs, including staffing needs and the infrastructure and procedures required for disposal, this treatment process would offer only minimal water-quality benefits compared to the overall cost. This alternative will require the construction of the following:

- New manganese dioxide filtration system
    - Four (4) vessels
- 7,000-gallon backwash storage/ waste equalization tank
- Ion Exchange (IX) treatment skid
    - Three (3) vessels
- Brine Maker
- Three (3) static mixers
    - Two (2) Hypochlorite injectors

- One (1) Sodium Bisulfite injector

- Connection to the existing sewer system for waste disposal

3.3 Alternative No. 3: Wellhead Treatment – Manganese Dioxide Filtration and Reverse Osmosis

Similar to Alternative No. 2, Alternative No. 3 replaces the existing manganese dioxide filtration system and adds reverse osmosis treatment. This project also requires civil site work, and the construction of new buildings, auxiliary systems, and tanks that support treatment and disposal infrastructure. Negotiations with the current owners of Well #03 would be required for this Alternative as well, unless a new well site is located. Though the same challenges are posed from Alternative No. 2, not only do the proposed treatment infrastructure components match the capacity and requirements of the existing water system infrastructure, but Reverse Osmosis will provide a significant improvement to overall water quality provided to customers, as compared to Ion Exchange. This alternative will require the construction of the following:

- New manganese dioxide filtration system
    - Four (4) vessels
- 10,000-gallon backwash storage/waste equalization tank
- One (1) Static-ring mixer
    - One (1) Sodium Bisulfite injector
    - One (1) Antiscalant injector
    - One (1) Sulfuric Acid injector
- One (1) Static-ring mixer
    - One (1) Sodium Hypochlorite injector
    - One (1) Sodium Hydroxide injector
- 750-gallon break tank
- Reverse Osmosis system
    - Two (2) cartridge filters
    - Two (2) feed pumps
    - Clean-in-Place (CIP) system
    - Membranes
- ROC Tank and ROC disposal pumps
- Forced Draft Degasifier
- Product Water Pump Station

- Connection to the existing sewer system for waste disposal

3.4 Alternative No. 4: Wellhead Treatment – New Drilling

Alternative No. 4 consists of acquiring land with improved water quality, as confirmed by professional hydrogeologists, and subsequently constructing a new well and treatment system at the selected site. Multiple documents, permits, and approvals are anticipated, including a potentially extensive CEQA process. However, the initial challenges will prevent future issues with use, access, or maintenance of the constructed facilities. This alternative also offers the potential of higher quality influent, dependent on site specific investigations, therefore reducing the necessary treatment equipment.

3.5 Alternative No. 5: Wellhead Treatment – Manganese Dioxide Filtration and Reverse Osmosis with Phased Construction

Alternative No. 5 is a phased delivery approach of Alternative No. 3. By separating the treatment processes, construction of lower-cost treatment facilities will be expedited, consequently providing quick improvements to high priority water quality constituents while concurrently working on the funding and construction of the greater project. By expediting the construction of manganese dioxide filtration, levels of turbidity, odor, iron, and manganese will decrease drastically before the treatment system of the additional contaminants is under construction. Under this Alternative, SLCWD will have the flexibility to evaluate water quality parameters, such as nitrate, following Phase 1 improvements and further refine the necessary treatment processes. The drawbacks are identical to those described under Alternative 3, as this alternative employs the same treatment process. This alternative will require the construction of the following:

Phase 1

- New Manganese Dioxide Filtration System
    - Four (4) Vessels
- 3,000-Gallon Backwash Storage/Waste Equalization Tank
- One (1) Static-Ring Mixer
    - One (1) Sodium Hypochlorite Injector

Phase 2

- Sodium Bisulfite Feed System (storage tank, feed pumps on a skid, injection quills)
- One (1) Antiscalant Feed System (storage tank, feed pumps on a skid, injection quills)
- Sulfuric Acid Feed System (storage tank, feed pumps on a skid, injection quills)
- 750-Gallon Break Tank
- Reverse Osmosis System
    - Two (2) Cartridge Filters
    - Two (2) Feed Pumps
    - Clean-in-Place (CIP) System

- Membranes
- Reverse Osmosis Concentrate (ROC) Tank and ROC Disposal Pumps
- Forced Draft Degasifier
- Product Water Pump Station

4.0 Existing Basis of Design and Updated Project Approach

4.1 Updated Project Concept

The project concept that was selected as the desired alternative includes the elements listed below. A detailed list of components and improvements is included in **Section 6.1**.

- Water system to be owned and operated by Cal Water
- Implementation of pre-design exploratory efforts
  - Monitoring well drilling to confirm water quality and design criteria for the proposed new wells
  - Pilot testing of manganese dioxide filtration and reverse osmosis to confirm the selected treatment approach remains appropriate for the new wells and further refine treatment parameters
  - Condition assessment of the existing bolted steel water storage tank to refine the necessary corrective actions
  - Determination of pressures within existing distribution system
- Construction of two new wells at one new site
- Implementation of a phased approach to treatment improvements to meet established finished water goals as defined in **Section 6.1**
  - Phase 1 improvements will include construction of the new wells, a manganese dioxide filtration system and associated support systems (sodium hypochlorite feed system and backwash disposal system), and the associated yard piping and electrical & controls system infrastructure
  - Phase 2 improvements will include construction of an RO system (including a clean-in-place system, break tank, and feed pump), an ROC handling system (storage tank and ROC disposal pumps), chemical systems (sulfuric acid, membrane antiscalant, sodium bisulfite, sodium hypochlorite, and sodium hydroxide), a degasification system, and product water pump station. Phase 2 will also include construction of a CMU building to house the new RO system, chemical systems, electrical infrastructure, and an operator room
- Rehabilitation of the water storage tank, discussed in further detail in **Section 6.1**.
- Cleaning/rehabilitation of the distribution system to remove iron and manganese buildup, discussed in further detail in **Section 6.1**.

It is anticipated that the existing Well #03 will be reclaimed by the Naraghi family per the use agreement following the completion of the Project. Therefore, it is anticipated that the well and transmission line will be disconnected from the SLCWD water system as part of the Project. The Project does not include decommissioning and removal of the existing transmission pipeline or water treatment facility from Well #03.

It is noted that currently, the best available assumption is that new well water quality will be similar to that of Well #03. Should water quality in the new wells vary, the treatment strategy will be tailored to the new well water quality. Based on this assumption, manganese dioxide filtration was initially assumed to include four (4) vessels in the Final ER. However, **Section 6.5.1** presents a final design recommendation that incorporates five (5) vessels to provide operational benefits, including reduced frequency of media changeouts and improved treatment reliability during backwashing operations.

5.0 New Water Supply Development

To strengthen the community's water reliability, two new groundwater wells are proposed, which will provide redundancy for continuous service. In addition, a new treatment plant will be built to improve the quality of delivered water from these sources.

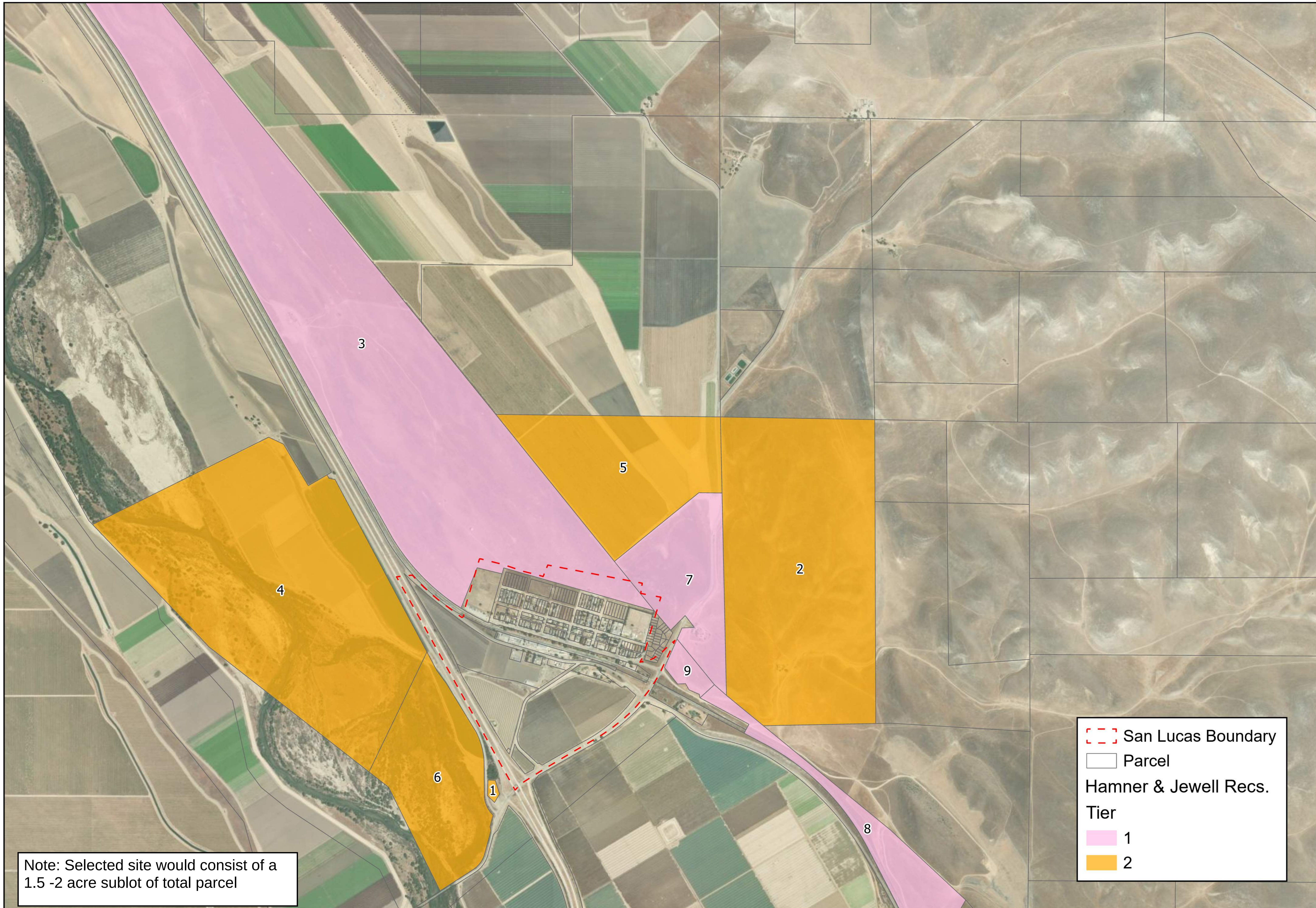
5.1 Land Availability & Acquisition

This section summarizes the findings from the research of Hamner, Jewell & Associates (HJA). Phase 1 of the research included identifying property ownership and providing advisory about possible constraints or challenges to acquisition. This also included budgetary estimates for the purchase price of each property, including potential damages or other costs associated with the property purchase. HJA returned nine potential parcels and categorized them by tier based on their proximity to the town center, availability of existing infrastructure, and current perceived land uses, as shown in **Figure 5-1**. Parcels located west of U.S. Highway 101 were classified as Tier 2 due to the additional coordination and permitting required from Caltrans for any facilities that would need to cross the freeway.

A summary of the identified parcels is summarized in **Table 5-1** and shown in **Figure 5-1**.

Prior to full acquisition of any parcel, it is anticipated that access for exploratory test well drilling and associated water quality evaluation would be obtained through temporary easements or similar agreements with property owners. These agreements may include an option to purchase contingent upon the results of test well yield and quality. This phased approach would reduce the risk of acquiring parcels that may not meet production or water quality objectives.

HJA conducted early property owner outreach and a cost of acquisition analysis on the three most preferable parcels (preferences discussed further in **Section 5.3**). Results of the cost analysis are included in **Table 5-1**. Parcel 1 is anticipated to have the highest cost due to zoning. Parcel 1 is zoned as commercial with agricultural use, while Parcels 2 and 3 are zoned as agricultural. HJA was able to speak with the property owner of APNs 231-012-009 and 231-012-014. The property owner did not express a resistance to selling, but did express concerns that Mission Ranches had performed soil testing on the property previously and had elected not to move forward with acquisition. Additional discussion of testing and expectations should be discussed with this property owner to facilitate acquisition discussions. HJA also attempted to contact the property owner of APN 231-011-001 but could not get in contact. It is assumed this property owner would be amenable to acquisition due to the fact that the water storage tank is on the same parcel.



Note: Selected site would consist of a 1.5 -2 acre sublot of total parcel

San Lucas County Water District

Figure 5-1

Potentially Available Identified Parcels

1 inch = 2,000 feet

0 1,000 2,000

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Table 5-1: Potential Available Parcels						
Label	**APN**	**Acres**	**Land Use**	**Flood Risk**	**$/Acre / Est. Total Cost**	**Notes**
Tier 1						
8	233-011-007-000	51.0	Grazing/Pasture	Low; small portion within 100-year floodplain	$5,000 / $10,000	Located in highly sensitive archaeological area
9	231-011-005-000	10.7	Open Field	Medium; portion within 100-year floodplain		Located in highly sensitive archaeological area
3	231-011-001-000	701.3	Open Field	None		Selected site would be a 1.5-2-acre sublot in the southernmost portion of the total parcel
7	421-131-002-000	78.0	Open Field	Low; small portion within 100-year floodplain		-
Tier 2						
1	231-012-014	1.6	Dirt Lot	High; within 100-year floodplain, adjacent to Salinas River	$70,000 - $100,000	East of Highway 101
6	231-012-009	11.6	Agricultural	High; within 100-year floodplain, adjacent to Salinas River	$15,000 / $32,000[1]	East of Highway 101
5	421-131-001-000	132.7	Agricultural	Low; small portion within 100-year floodplain		-
2	421-131-003-000	361.1	Open Field/ Pasture	Low; small portion within 100-year floodplain		-
4	231-012-006	377.0	Agricultural	High; large portion within 100-year floodplain, adjacent to Salinas River		East of Highway 101

Note:

1. *Includes an estimated cost to cure and damages of $2,000.*

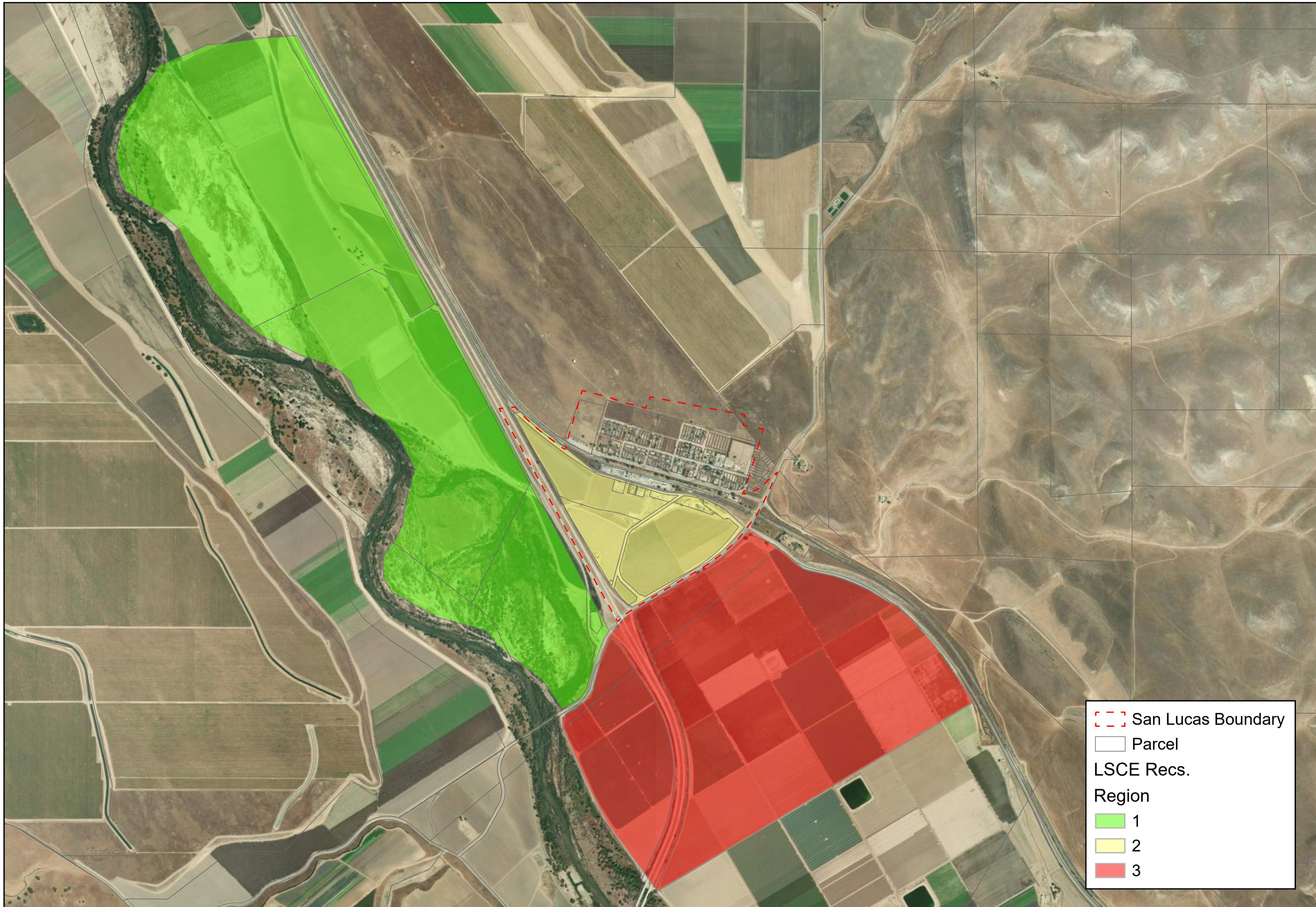
5.2 Local Hydrogeology

Luhdorff and Scalmanini, Consulting Engineers (LSCE) developed a limited conceptual hydrogeologic model of the study area in order to identify potential areas deemed favorable for yield and water quality, as well as viability for well construction by assessing seasonal ground conditions, location relative to distribution and collection system, minimum setbacks, and location relative to existing wells. LSCE collected and reviewed information from the sources listed below in support of the conceptual hydrogeologic model. This section summarizes the findings of LSCE.

- State of California Water Well Drillers Completion Reports
- Monterey County Water Resources Agency
- Reports prepared by others
- Hydrogeologic reports prepared by California Department of Water Resources, United States Geological Survey (USGS), and others
- California State Water Resources Control Board, Division of Drinking Water (DDW)
- Previous work completed by LSCE in the Salinas Valley
- Local drilling and pump contractors

The local hydrogeologic setting of the San Lucas area is characterized by the alluvial deposits of the central Salinas Valley, which generally provide the most reliable groundwater production due to their greater thickness and lateral continuity. Recharge to the groundwater system occurs primarily through infiltration of precipitation and streamflow losses along the Salinas River and its tributaries, as well as through deep percolation of applied irrigation water. Groundwater levels and flow directions are influenced by seasonal recharge patterns, agricultural pumping, and long-term basin-wide water management practices. In deeper aquifer zones, groundwater conditions may reflect longer residence times and reduced direct connection to surface water features.

For the purposes of evaluating potential locations for a new municipal supply well, LSCE focused on areas situated near the central axis of the valley and east of the Salinas River, where alluvial aquifers tend to be more productive. Areas along the margins of the valley, and especially those outside the alluvial basin, were excluded because the sediments become thinner, more heterogeneous, and less capable of supporting the sustained yields required for a potable water supply. These areas along the margins of the valley include the areas of San Lucas east of the railroad tracks. Hard-rock settings outside the valley were also eliminated due to their poor groundwater availability. Additionally, locations west of the Salinas River were not considered due to the logistical challenges of conveying water across the river into the community. A summary of each recommended region is included below, and their respective locations are depicted in **Figure 5-2.**



San Lucas County Water District

Figure 5-2

Identified Regions Suitable for Drilling

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Region 1: West of Highway 1 East of the Salinas River

Region 1 is located northwest of San Lucas between Highway 101 and the Salinas River. This area occupies a favorable hydrogeologic position within the thicker and more laterally continuous alluvial deposits of the central valley. These deposits are generally capable of supporting higher and more reliable groundwater yields compared to areas along the eastern margin. Available well completion data from an irrigation well in this region indicate the potential for high-capacity production, supported by a large-diameter screened interval within upper alluvial sediments. Although pumping test and water quality data are lacking, the well design suggests strong aquifer conditions, making Region 1 the most promising zone for additional exploratory drilling, aquifer characterization, and groundwater quality evaluation.

Region 2: East of Highway 101, North of Highway 198, and South of Cattlemen Road

Region 2 lies southeast of San Lucas and similarly benefits from its proximity to the Salinas River and distance from the valley margins. The alluvial materials in this area are expected to have greater thickness and continuity than those farther east, improving the likelihood of achieving sufficient municipal well yields. Site access and constructability are also favorable. While hydrogeologic conditions appear suitable for exploration, Region 2 would require detailed site-specific investigations to confirm aquifer productivity and water quality.

Region 3: South of Highway 198/Lockwood–San Lucas Road

Region 3 extends south of Highway 198 toward the Salinas River but remains positioned away from the thin alluvial deposits along the eastern valley margin. Although hydrogeologic conditions may support groundwater development, Region 3 is less favorable due to its greater distance from San Lucas and associated conveyance requirements. In addition, existing groundwater quality concerns, such as elevated nitrate, iron, manganese, and TDS concentrations observed in Well #03, suggest that new wells in this area may encounter similar water quality limitations.

5.3 Selected Site

HJA, the land consultant, initially identified a substantial amount of property east of the railroad tracks as potentially available for well development. However, LSCE's hydrogeologic evaluation determined that this area exhibits poor subsurface conditions and is not well suited for municipal production wells. LSCE subsequently identified Regions 2 and 3 as possible secondary options, but both regions contain limited clearly developable land. Region 1 ultimately emerged as the area with the best overlap of favorable geologic conditions and potentially available parcels, though siting within this region remains highly dependent on landowner willingness to sell.

Within Region 1, MKN has identified two viable well siting options, as shown in **Figure 5-3**. Site Options 1 and 2 are located in close proximity to one another and both meet the physical and operational criteria for new well construction. Of the two, Site Option 1 is considered the more favorable location. The site consists of a flat, previously cleared dirt lot, which would simplify site preparation activities and reduce construction complexity. Additionally, Site Option 1 is located closer to existing water and sewer pipelines, reducing the length of new piping required and thereby lowering overall construction costs and minimizing potential disturbances. Further, Site Option 2 appears to have an existing agricultural well based on street-view imagery, which may be a limiting factor in site development.

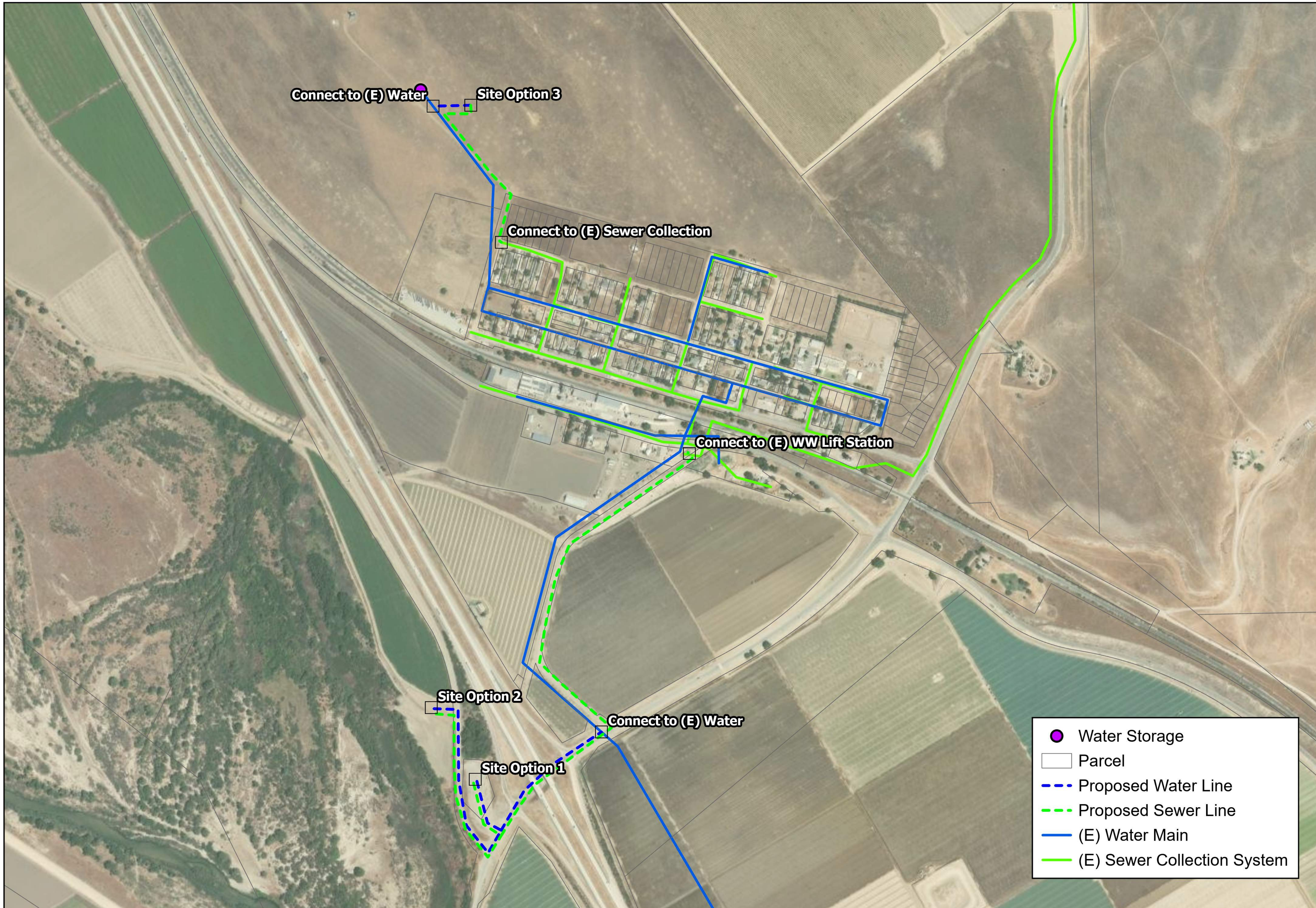

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Figure 5-3

Potential Project Sites

1 inch = 750 feet

0 375 750

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In contrast, Site Option 3 within Parcel 3—located east of the railroad tracks near the existing water storage tank—is considered a fallback alternative. Although the site offers substantial open space and proximity to existing utility infrastructure, LSCE's hydrogeologic assessment found that areas east of the railroad lie along the eastern margin of the Salinas Valley, where alluvial deposits are thinner, less laterally continuous, and more variable. These marginal conditions are associated with lower and less reliable groundwater production compared to the thicker, more uniform alluvial aquifers nearer the valley center. As a result, areas east of the railroad tracks were deemed less suitable for new municipal production wells, and Site Option 3 would only be considered if the preferred Region 1 sites prove infeasible.

5.4 Exploratory Efforts

As noted in previous sections, the available hydrogeological data is limited. Therefore, exploratory efforts are critical to water supply and treatment planning.

The deepest well log that could be located in the area extends to 530-feet below ground surface (BGS). Cemented materials were experienced between 300-feet and 530-feet BGS, but crystalline rock was not encountered. Therefore, it is recommended that a pilot borehole, and subsequent monitoring well, be drilled to 1,000-feet BGS or until crystalline rock is encountered, whichever comes first. A monitoring well is recommended over other completion styles because a multi-completion monitoring well will allow continued sampling of multiple zones. The downside is that pumping capacity testing would not be possible, but production capacity is not expected to be a constraint in this application due to the relatively low flow rates required to serve the SLCWD water system.

The exploratory effort would include the following steps:

- Drill a pilot borehole to 1,000-feet BGS or until crystalline rock is encountered, whichever comes first
- Collect lithologic samples at 10-foot intervals and perform a grain size distribution analysis on select samples
- Perform an electric geophysical log (e-log)
- Install a triple-completion monitoring well within the borehole (assuming the borehole geology appears favorable)
    - Ream borehole to accommodate three well casings: Stepped reaming to approximately 12-5/8-inch, 10-3/4-inch, and 8-3/4-inch diameters
    - Install up to three 2-inch diameter Schedule 40 PVC well casings at varying depths
- Conduct discrete water quality sampling from each of the three completion depths
- (Optional) Continued water quality monitoring for the duration of the planning and construction of the project to analyze seasonal variations and provide additional characterization of groundwater conditions until the new production wells are operational and routine monitoring is established
- Following testing, abandon the monitoring well by sealing the borehole with sand cement slurry in accordance with applicable standards to prevent hydraulic communication between water-bearing zones and avoid creating future water quality issues

6.0 Preliminary Design & Criteria

This section establishes the basis of preliminary design for the proposed groundwater production and distribution improvements. It presents the recommended improvements in a two-phase implementation framework to facilitate constructability, cost management, and service continuity. The section further documents verification of existing utilities and site constraints and sets forth preliminary distribution system design criteria. Well siting and separation requirements are summarized in accordance with regulatory and industry guidance, followed by preliminary well construction parameters—target depth and screen interval, casing/diameter selection, materials and corrosion protection, and sanitary seal—developed to align with the hydrogeologic setting and anticipated production rates. Key operational considerations and water quality expectations are outlined to inform equipment selection and treatment process configuration. The section also describes the preliminary approach to well equipping (pump selection and sizing, column and discharge piping, appurtenances, and metering), treatment system unit processes and layout, residuals and waste disposal provisions, site civil improvements, and electrical and instrumentation/SCADA requirements. All proposed improvements will be designed and constructed per Cal Water's standards.

6.1 List of Improvements

A summary of the anticipated improvements for the construction of two new production wells and associated treatment and distribution infrastructure include:

Pre-Construction

The planning and construction work to be completed before the construction of Phase 1 commences is summarized below:

- Water Storage Tank Rehabilitation
    - Detailed condition assessment through visual inspection to confirm and refine the findings and list of improvements below. An interior inspection of the tank was previously performed in 2023.
    - Structural/Civil
        - Stabilize soil and repair erosion around tank foundation
        - Repair localized tank leaks and deteriorated structural components
    - Mechanical/Appurtenances
        - Repair or replace water level monitoring equipment, hatch, and roof vent
    - Coating
        - Repair corroded anchor hardware and metal components
        - Perform localized coating repairs to prevent further corrosion

- SLCWD Distribution System Rehabilitation
  - Ice pigging throughout the entire system to remove iron and manganese buildup and biofilm, thereby improving hydraulic capacity and water quality
  - Hydraulic modeling to evaluate existing and post-rehabilitation system performance, assess pressure and flow conditions, and inform design decisions for distribution system improvements (if any) during the pre-construction phase. Distribution system pressure monitoring and flow testing will be required to support model calibration and for comparing existing and post-rehabilitation system hydraulics.
  - Water audit validation will be conducted to quantify real and apparent water losses and verify system input and consumption data
- Planning
  - Land Acquisition
    - Refer to **Section 5.1**
  - Test Well Planning
    - To be completed in order to establish drilling methods, borehole design, and testing protocols for test well construction, including lithologic logging during drilling, well installation and development, discrete depth (zone) testing and groundwater sampling, and aquifer pump testing to evaluate hydraulic properties
  - Environmental & Permitting
    - Refer to **Section 6.14**
- Site preparation
  - Surveying, staking, grading, establishment of construction access, and implementation of erosion and sediment control measures
  - 1,300 LF of chain-link fencing to be installed to secure the work area, control access, and protect equipment and materials
- Triple-completion monitoring well
  - Refer to **Section 5.4**
  - Water quality will be evaluated using the discrete samples collected at each of the three completion depths in the exploratory monitoring well. Should these results differ significantly from the water quality observed at Well #03, the treatment approach and design criteria for the new production wells will be updated accordingly to address site-specific groundwater conditions and contaminants.

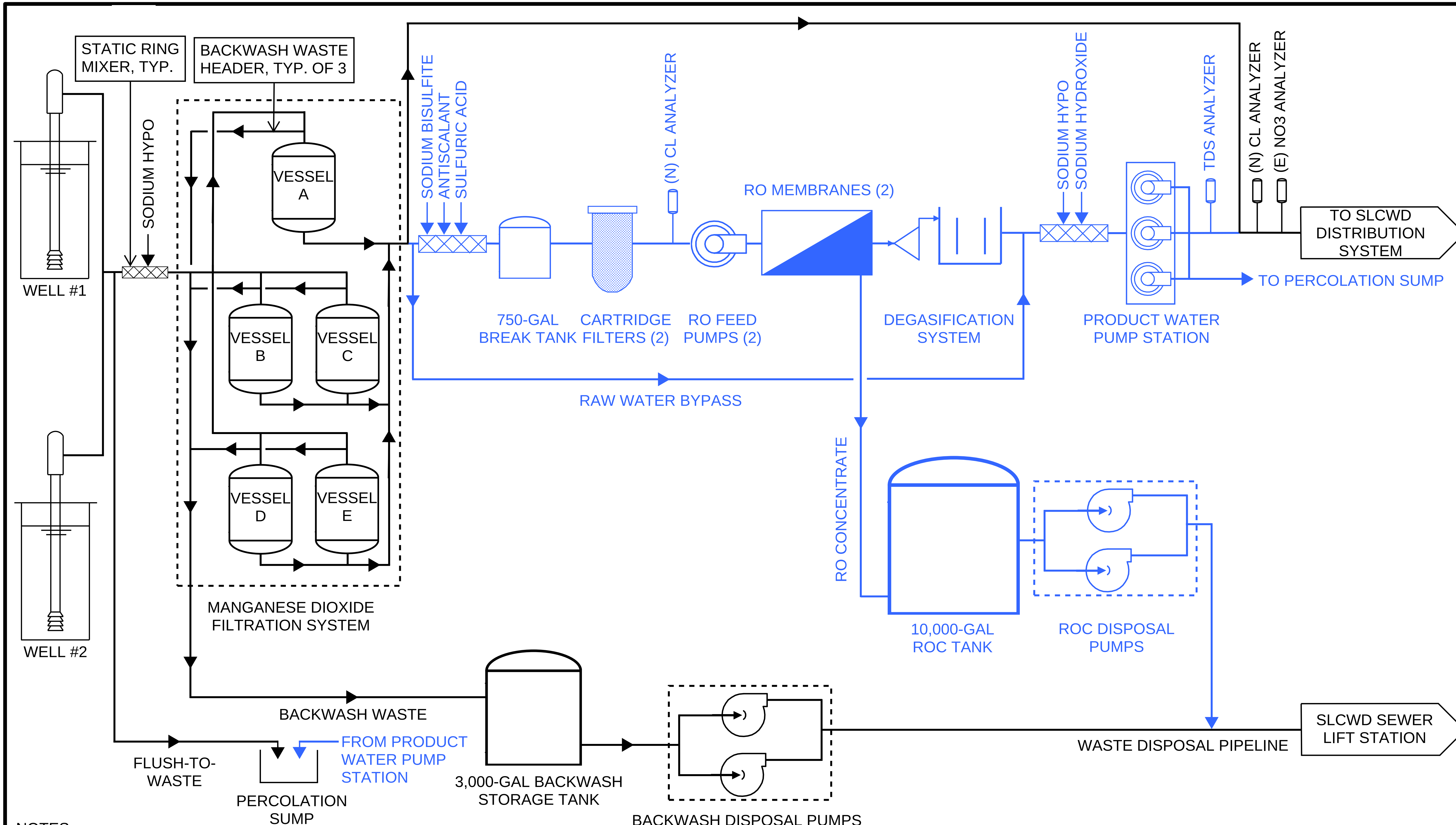
Phase 1

- Drilling, testing, and equipping of wells, including construction of two new production wells and one monitoring well, installation of well pumps, motors, and appurtenances, including pump shelters
    - Two points of access will be required during well drilling
- Piloting of manganese dioxide filtration system and RO membranes
- Installation of electrical and controls infrastructure
- Installation of manganese dioxide filtration system (including sodium hypochlorite chemical storage and injection system)
- Installation of 3,000-gallon high density polyethylene (HDPE) backwash waste storage tank, pumps, and associated backwash disposal infrastructure
- Performing civil site work (i.e. site grading, trenching and backfill, security fencing, installing yard process and service piping) necessary to construct filtration and chemical system on a new concrete pad with shade canopy
- Installation and connection of transmission pipeline to SLCWD distribution system and appurtenant features
- Installation and connection of waste disposal pipeline to existing SLCWD sewer lift station
- Installation of backup generator

Phase 2

- Installation of reverse osmosis and degasifier treatment systems, with associated chemical storage and injection systems
- Installation of a 10,000-gallon FRP ROC tank, pumps, and associated concentrate disposal infrastructure
- Replacement of well pumps to account for revised hydraulic conditions associated with RO treatment
- Performing civil site work (i.e. site grading, trenching and backfill, constructing new access roads, new security fencing, installing new yard process and service piping) to construct CMU building on new concrete pad with associated process and service piping within

A process flow diagram (PFD) of the proposed improvements is included as **Figure 6-1**.



NOTES:

1. WELL PUMPS WILL BE REPLACED OR MODIFIED DURING PHASE 2 TO ACCOUNT FOR REVISED HYDRAULIC CONDITIONS.

2. ONE CARTRIDGE FILTER, RO FEED PUMP, AND RO MEMBRANE SHOWN FOR CLARITY; TWO REQUIRED.

LEGEND

PHASE 1: (black)

PHASE 2: (blue)

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SAN LUCAS CWD NON-NITRATE ENGINEERING REPORT ADDENDUM

PHASE 1 & 2 IMPROVEMENTS
PROCESS FLOW DIAGRAM

FIGURE 6-1

6.2 Verification of Existing Utilities

The locations of existing utilities and critical site features have been updated for this ER Addendum. Caution will be taken during the planning and design of the new well, tank, and pipeline alignment to avoid conflicts with existing utilities. Potholing of critical utility crossings and connection points will be conducted as part of the design process.

A utility survey and mapping service, 4M Analytics, was utilized to identify which utility providers are present within the project area. The mapping results indicated the presence of the following utility providers:

- PG&E
- Zayo Fiber Solutions, LLC
- Verizon
- TPx Communications Co.
- Sprint LLC
- Pacific Bell Telephone
- MCI Communications Corporation
- Cogent Communications, Inc.
- CenturyLink
- AT&T

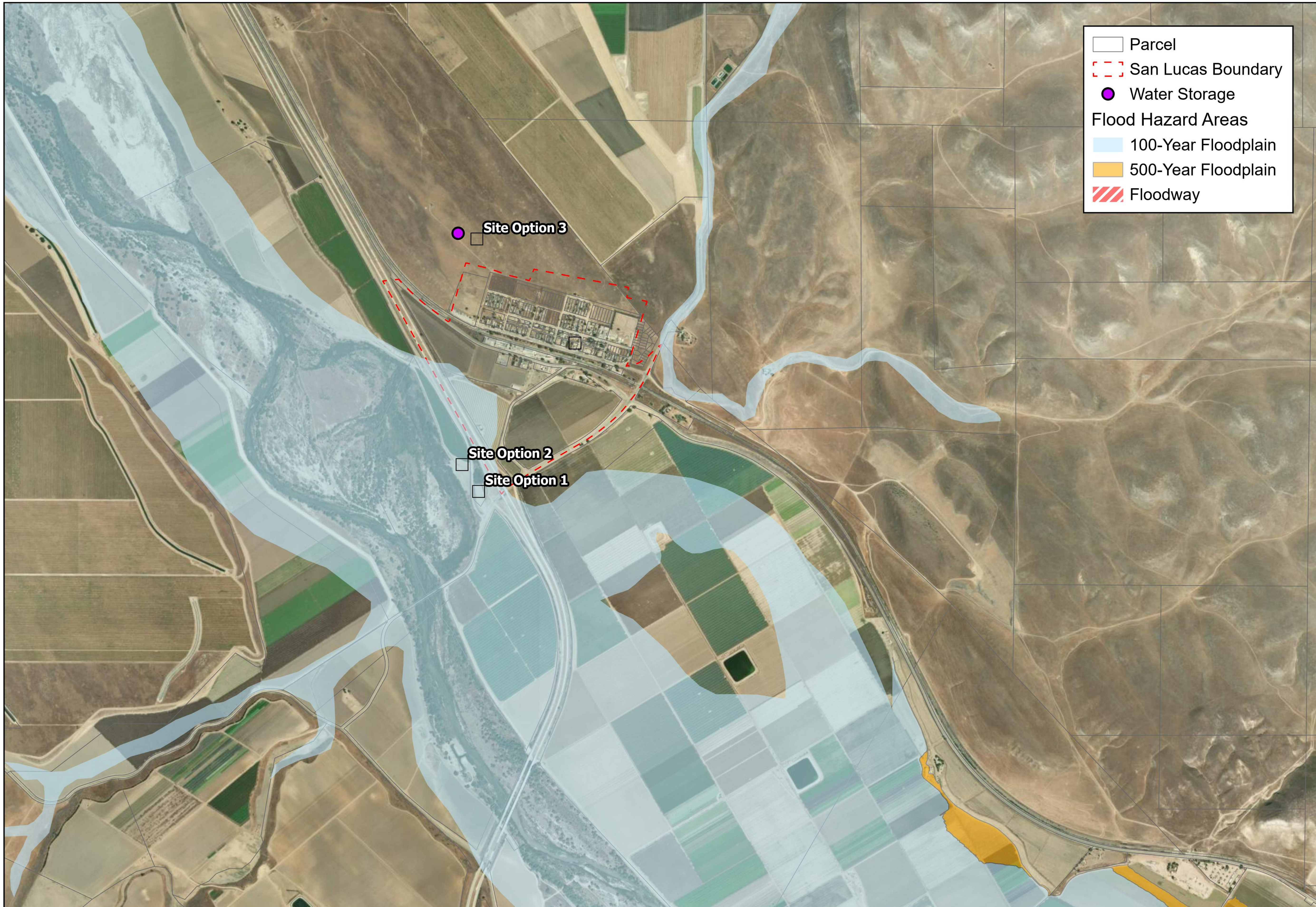
6.3 Well Design

The preliminary design of the two proposed wells will follow the California Department of Water Resources (DWR) Well Standards, Bulletin 74-81, which specify statewide minimum requirements for siting, sanitary protection, casing, annular sealing, and surface construction features, as well as Monterey County (County) Code Chapter 15.08 Water Wells, Section 110: Technical Standards.

6.3.1 Siting & Separation

DWR well standards require wells to be located at safe distances from potential contamination sources such as septic systems, sewers, seepage pits, and animal enclosures. Monterey County additionally adopts and enforces these statewide requirements. However, historical and ongoing land use activities throughout the groundwater basin have contributed to regional groundwater quality impacts. As a result, no location within the basin can be considered fully separated from potential contamination sources. Therefore, the annular space shall be sealed from the ground surface to the first impervious stratum and extend to a minimum depth of 50 feet.

The well site is outside of the 500- year floodplain, but within the 100- year floodplain due to its vicinity to the Salinas River (**Figure 6-2**).



San Lucas County Water District

Figure 6-2

Flood Hazard Areas

1 inch = 2,000 feet

0 1,000 2,000

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Each well will conform to the following setbacks:

- 50’ from property line (best practices)
- 100’ (flexible setback) from other onsite wells (best practices)
- 100’ from septic and leach lines (per County Code 15.08.110)
- 150’ from seepage pits (per County Code 15.08.110)
- 100’ from any animal enclosure (per DWR Bulletin 74-81)

6.3.2 Depth, Diameter, and Materials

Due to limited hydrogeologic information as discussed in **Section 5.2**, the proposed well depth, screening intervals, and construction materials are unknown at this time. Following drilling of the monitoring well, logging of geology, and analysis of water quality, these parameters will be determined and presented in a forthcoming Design Confirmation Technical Memorandum (TM).

For budgetary purposes, a 1,000-foot deep and 20-inch diameter stainless steel-cased well is assumed at this time. The preliminary casing diameter selection is based on anticipated depth and design production capacity. Although data is limited, the 1,000-foot depth represents a conservative yet reasonable, worst-case depth assumption based on available data and the goal of maximizing subsurface information collection during exploration.

Each well will be enclosed within a permanent lockable pump shelter constructed in accordance with CWS Standard Installation Detail 2.1-1. The shelter will provide protection from environmental conditions, unauthorized access, and operational noise, and will function as an acoustic barrier for the well equipment.

6.3.3 Operation

It is anticipated that the wells will operate in a duty and standby configuration, with one well will be in operation while the other is offline. It is not anticipated that both wells would run simultaneously, as influence and competition between the wells could be introduced.

6.3.4 Anticipated Water Quality & Yield

Due to limited hydrogeologic information as discussed in **Section 5.2**, the well yield and water quality is unknown at this time. However, due to the relatively small demand of Well #03, it is anticipated that new wells would be able to accommodate and match this required yield. Following monitoring well drilling, zone sampling, and analysis of water quality, productive zones of the most preferable water quality may be identified and targeted in the new production wells. Additionally, monitoring well water quality will be used to confirm or update the design criteria for the recommended treatment systems.

Once the wells are placed into service, a startup sampling program will be conducted. Water quality samples will be collected during sustained pumping at full production rates as well as following periods of well inactivity, with time-phased sampling performed during startup to evaluate changes in water quality as the wells are brought online. The purpose of this monitoring is to confirm that nitrate and other constituent concentrations do not experience significant short-term increases during startup.

6.4 Well Equipping

The new production wells (Well A and Well B) will each be equipped with a new vertical turbine well pump sized to match both current and future system demands, as well as to maintain consistent flowrate through the new treatment vessels as head loss through the vessels will increase over the filter run periods. The wells will be equipped with both a sounding port and submersible pressure transducers to measure drawdown.

Both wells will require new discharge and flush-to-waste piping and appurtenances. Well discharge piping will consist of 4-inch pipe that will be welded carbon steel and mechanically joined ductile iron pipe for above-grade and below-grade piping, respectively. The raw water discharge piping will consist of a single swing style check valve to prevent backflow to the well and a 2-inch flush-to-waste assembly. An inline magnetic flow meter will be installed upstream of the flush-to-waste connection to record both total and instantaneous flowrates from the well. A single butterfly valve located downstream of the flow meter will provide isolation of the discharge manifold for maintenance activities.

The well flush-to-waste assembly will consist of a single butterfly valve with a locking feature to control the flow for the waste cycle and provide isolation during maintenance activities, and a pump control valve that will close slowly through the course of a waste cycle to mitigate water hammer and maintain a discharge pressure setpoint. Flushing cycles will discharge approximately 200 to 300 gallons per cycle and will discharge to the on-site storm drain via a 4-inch air gap.

Sufficient instrumentation will be provided such that the well pump will be shut down upon receiving high/low-pressure signals from the new pressure switch on the above-grade well discharge piping.

Preliminary sizing of the well pump assumes a pumping water level of 85 feet BGS, which will be verified during subsequent phases of design. Under Phase 1, the well pumps (with VFDs included) will be used to convey groundwater through the new manganese dioxide filtration system and into the existing SLCWD system and storage tank. Pressure control strategies, such as a hydropneumatic surge tank, will be evaluated during the design stage.

During Phase 2 improvements, the well pumps will be replaced due to the revised hydraulics associated with implementation of an RO system (see **Section 6.9.1**). A product water pump station will be installed during Phase 2 to convey treated water into the SLCWD distribution system. During subsequent phases of design, alternatives to avoid replacement of pumps will be evaluated. This may include removal of pump bowls to accommodate the lower head conditions associated with Phase 2.

Design criteria related to the well equipping improvements are presented in **Table 6-1**.

Table 6-1: Well Equipping Improvements Design Criteria		
Parameter	**Description/Value**	**Units**
Well Pump		
Type	Vertical Turbine	--
Design Capacity	150	gpm
Design Total Dynamic Head	370	feet
Minimum Motor Efficiency	70	%
Nominal Motor Rating	25	horsepower
Motor Drive	Variable Frequency Drive	--
Voltage	460	VAC
Well Equipping		
Above Grade Pipe Material	Welded Carbon Steel	--
Above Grade Pipe Coating	Fusion Bonded Epoxy	--
Below Grade Pipe Material	Ductile Iron Pipe	--
Below Grade Joint Fittings	Mechanically Restrained	--
Isolation Valves	Butterfly	Lug Style
Discharge Pipe Diameter	4	inch
Flush-to-Waste Pipe Diameter	2	inch
Pressure Relief Pipe Diameter	4	inch
Design Discharge Velocity	3.8	fps
Design Discharge Pressure	80–90	psi

6.5 Treatment System

As shown in **Table 1-1**, historical sampling results indicate exceedances of the secondary MCLs for iron (0.3 mg/L) and manganese (0.05 mg/L). Phase 1 improvements are primarily designed to reduce concentrations of these constituents to a continuous maximum of 80% of their respective secondary MCLs. Because iron and manganese are the primary contributors to the drinking water discoloration currently experienced by residents, Phase 1 improvements will significantly enhance the aesthetic quality of the water delivered to the community.

Removal of iron and manganese upstream of the future RO system (to be constructed under Phase 2 improvements) is also necessary to protect RO membranes and ensure the efficacy and longevity of the RO system. The sodium hypochlorite system included under Phase 1 improvements will serve two primary functions: oxidation of iron and manganese upstream of the manganese dioxide filtration system, and providing a disinfection residual in finished water.

The manganese dioxide filtration system to be installed as Part of Phase 1 improvements will generally consist of the following key components:

- Five (5), 30-inch diameter manganese dioxide vessels operated in parallel configuration
- UV-resistant polyethylene hypochlorite storage tank and chemical metering pumps for pre-treatment
- Sodium hypochlorite injection and static ring mixer
- Backwash storage tank and backwash disposal pumps
- Yard process and service/drainage piping
- Associated electrical and control systems infrastructure

The treatment system PFD is shown in **Figure 6-1.**

6.5.1 Manganese Dioxide Filtration System

Design criteria for the manganese dioxide filtration system are presented in **Table 6-2** below. The system will operate in a parallel configuration, which will allow for one vessel to be taken out of service for backwash while the other filter vessels remain online. Backwash water will be supplied as filter effluent from the four vessels that remain in operation. Each filtration vessel will be backwashed once per day, to avoid the accumulation of iron and manganese solids within the filter media. These backwashes can be timed to occur during a low demand period of each day.

It is noted that while the manganese dioxide filtration system design has been revised to include five vessels. Inclusion of five vessels will allow for a more conservative hydraulic loading rate, lengthen the anticipated frequency of media changeouts, and allow for reliable treatment during backwash and implementation of Phase 2 improvements.

Table 6-2: Manganese Dioxide Filtration System Design Criteria		
Parameter	**Description/Value**	**Units**
Filtration System		
Number of Vessels	5	--
Flow per Vessel	30	gpm
Minimum Pressure Drop	2 to 3	psi
Maximum Pressure Drop	7 to 10	psi
Vessel Working Pressure	125	psi
Vessel Design Pressure	150	psi
Internal Vessel Diameter	30	inches
Surface Area (Per Vessel)	4.9	ft^2
Approx. Media Bed Depth (Per Vessel)	3′–6″	feet
Configuration	Parallel	--
Approx. Media Volume per Vessel	17.2	ft^3
Approx. Media Volume per Treatment Train	86	ft^3
Filtering Hydraulic Loading Rate, Normal Operation	6.1	gpm/ft^2
Filtering Hydraulic Loading Rate, during Backwash	7.6	gpm/ft^2
Backwash		
Backwash Loading Rate	20	gpm/ft^2
Backwash Time per Vessel	5	minutes
Backwash Frequency	24	hour of run time
Total Backwash Time per Train	25	minutes
Approx. Backwash Flowrate per Vessel	98	gpm

6.5.2 Sodium Hypochlorite System

The sodium hypochlorite system has been conservatively designed based on the future maximum day demand (MDD) of 118,870 gpd, or 82.5 gpm. Based on existing worst-case water quality data (maximum observed concentrations) an estimated hypochlorite dose of 3.8 mg/L is sufficient to satisfy oxidation demands upstream of the treatment vessels. To provide a maximum disinfection residual of 2 mg/L in addition to the worst-case (i.e., maximum concentrations of iron, manganese, and total organic carbon) oxidation-based demand, the total target injection concentration is 5.8 mg/L. During startup and routine operation, operators may adjust the dose as needed based on measurements from the chlorine analyzer to ensure effective oxidation and compliance with disinfection residual requirements.

The Phase 1 system includes one sodium hypochlorite skid and associated injection point, located upstream of the manganese dioxide filtration system. During Phase 2, a second skid will be installed to provide an injection point upstream of the product water pumps. Both skids will draw from a single 250-gallon, double-walled cross-linked polyethylene (XLPE) storage tank with integrated secondary containment to isolate sodium hypochlorite in the event of a spill. The integrated secondary containment on the double wall tanks is sized to hold at least 110-percent of the nominal tank volume in the event of catastrophic failure or leak of the tank walls. Chemical deliveries are anticipated every one to three months to minimize hypochlorite degradation and maintain solution strength near the design concentration of 12.5%.

The storage tank capacity has been selected to reduce the potential for hypochlorite degradation, particularly during the high summer temperatures in San Lucas. It is recommended that operators check chlorine residual levels one to two times per week and flow-pace the hypochlorite dosing pumps based on the chlorine analyzer results to consistently maintain the residual setpoint. To further limit degradation, the hypochlorite storage tank will be opaque and UV-stabilized, and will be located in a lockable enclosure under an awning.

Design criteria for the sodium hypochlorite oxidation demand and chlorination residual are presented in **Table 6-3**.

Table 6-3: Sodium Hypochlorite Oxidation/Chlorination Design Criteria

Parameter	Description/Value	Units
Injection		
Design Flow	82.5	gpm
Hypochlorite Strength	12.5	%
Specific Gravity	1.07	--
Maximum Oxidation Demand	3.8	mg/L
Estimated Chlorine Residual	2.0	mg/L
Online Free Chlorine Analyzer?	Yes	--
Storage		
Nominal Volume	250	gallons
Tank Diameter	4	feet
Number of Tanks	1	--
Tank Material	XLPE	--
Anticipated Delivery Frequency	1- to 3	months

Hypochlorite will be injected into a static ring mixer upstream of the manganese dioxide treatment vessels. The duplex packaged feed skid will include two diaphragm metering pumps (one duty and one standby), associated piping, pressure relief components, calibration, and instrumentation necessary to deliver the required 5.8 mg/L dose for oxidation and residual maintenance. A free chlorine analyzer installed downstream of the filters (and ahead of the future, Phase 2 Improvements) will continuously measure residual levels and can be used to pace the active hypochlorite pump to ensure the target residual is achieved prior to entry in the distribution system. The analyzer will alert operations staff if free chlorine concentrations fall below preset thresholds adjust the speed of the active pump accordingly.

Design criteria for sodium hypochlorite dosing skid is presented in **Table 6-4**.

Table 6-4: Sodium Hypochlorite Skid Design Criteria		
Parameter	**Description/Value**	**Units**
Pump Type	Diaphragm	--
Number of Pumps	2 (1 duty, 1 standby)	--
Estimated Usage	0.21	gph
Pump Flow Capacity	0.001 to 0.44	gph
Discharge Line Size (Inner Diameter)	1/4	inch
Discharge Line Material	Natural PVDF (Kynar)	--

Following implementation of Phase 1 improvements finished water quality will largely remain the same, though iron and manganese concentrations will be well below the treatment goal of 80% of the secondary MCLs (0.3 mg/L and 0.05 mg/L, respectively).

Upon installation of the Phase 2 improvements, finished water quality will further improve due to the implementation of RO. Key water quality parameters (arsenic, nitrates, selenium, uranium, carbon tetrachloride, gross alpha particle activity, and chlorides) will be reduced to a continuous maximum concentration of less than 80% of their respective MCLs, and total dissolved solids will be reduced to below 500 mg/L.

6.6 Water Quality Monitoring

The water system currently performs routine monitoring at Well #03, at the existing iron and manganese treatment plant effluent, and throughout the distribution system. With the planned abandonment of the existing treatment facility and the construction of two new production wells and a new treatment plant, these monitoring responsibilities will continue and must be transferred to the new well sites and treatment processes to ensure regulatory compliance.

Source Water

Under existing operations, Well #03 is monitored quarterly for bacteriological contaminants, including total coliform and *E. coli*. Because these samples are taken prior to treatment, identical bacteriological monitoring will be required at one of the two proposed new wells once they become active sources.

Source water is additionally subject to an extensive chemical monitoring program. This includes routine monitoring for General, Mineral, and General Physical Constituents, and quarterly monitoring for odor, TDS, iron, and manganese, the latter two of which exceeded their secondary MCLs in 2024. Monitoring for inorganic chemicals occurs every three years, while nitrate as nitrogen is sampled weekly and reported monthly to the DDW. Nitrite, synthetic organic chemicals, VOCs, and radionuclides (Gross Alpha, Uranium, and Radium 226/228) are monitored at frequencies ranging from quarterly to every nine years. In 2024, Gross Alpha exceeded its MCL, whereas the system remained in compliance for Radium, VOCs, and SOCs. These monitoring requirements will all be carried forward to the new well sources per DDW regulations.

Distribution System

The distribution system is monitored in accordance with the State-approved Bacteriological Sample Siting Plan (BSSP), dated June 6, 2023. The system is required to collect one routine distribution sample per month. Because the distribution system will remain in service during and after the transition to the new treatment facilities, all existing Total Coliform Rule (TCR) monitoring practices will continue unchanged at the new project site.

Treatment Facility

The certified treatment operator currently visits the iron and manganese treatment facility weekly to perform field testing for chlorine residual, iron, and manganese, both before and after treatment. Additionally, monthly laboratory testing is conducted for iron and manganese. Although the system is meeting its treatment monitoring requirements, laboratory results indicate that the existing plant does not consistently achieve treatment targets below secondary MCLs. For the new treatment plant, similar monitoring frequency and parameters will apply, with the expectation that the new treatment process will reliably correct the past deficiencies associated with iron, manganese, and secondary water quality standards.

6.7 Water Transmission Main

A new 6-inch transmission pipeline will be constructed from the proposed site, span approximately 2,700 feet along San Lucas Road, and connect to the existing water main at the intersection of State Highway 101 and San Lucas Road. The proposed alignment is anticipated to remain within the San Lucas Road corridor, however crossing of the State Highway 101 right of way will be accomplished via trenchless methods. Final alignment and crossing requirements will be confirmed during design and permitting.

The following design criteria and elements in **Table 6-5** will be incorporated in the pipeline design:

Table 6-5: Pipeline Design Criteria		
Parameter	**Description/Value**	**Units**
Pipe Material	AWWA C900 PVC (DR18) or AWWA C151 Ductile Iron	--
Mechanical Joint Fittings	AWWA Standard C153	--
Flanged Fittings	AWWA Standard C110	--
Maximum Water Velocity	7	fps
Maximum System Operating Pressure	125	psi
Thrust Restraint	Concrete Thrust Blocks at All Pipe Bends > 5°	--
Combination Air and Vacuum Release Valves	Ductile Iron Body Float Actuated Air Vents with Lockable, Vented Cover	--
Combination Air and Vacuum Release Valve and Spacing	¼ (or Local High Points)	--
Blow-Off Station Locations	All Local Low Points	--
Water Main Cover Over Top of The Pipe	4	ft
Water Main Installation	Open Trench	--
New Mains Disinfection	AWWA C651	--
Materials in Contact with Drinking Water	NSF 61	--
Chemicals in New Main	NSF 60	--
Transmission & Distribution Piping	Schedule 80 PVC	--
Concrete Thrust Blocks & Cement	f'c = 3000	psi
Cement (basic)	ASTM C150, ASTM 595, Type II or II/IV	--

The new 6-inch well discharge piping, tank inlet and outlet piping, and appurtenances are sized for a flow rate of 150 gpm and a maximum velocity of 7 feet per second (fps).

All construction materials shall conform to the most recent CWS standards, including the requirements of CW 863: Specifications for Installation of Ductile Iron and Polyvinyl Chloride (PVC) Pressure Pipe and Appurtenances, with particular attention to the following material specifications referenced therein. A list of relevant CWS standard installation details includes, but is not limited to, the following:

- CWF-380-KC: 6" Fire Hydrant
- CW-14-R6: Valve Cover, Frame, and Frame Risers
- CW-122-R5: Blow-Off Assembly
- CW-435-R4: Thrust Block Installation
- CW-436-R11: 2" Service Connection Polyethylene Install (PE)

- CW-439-R6: Valve Cover, Casing, & Frame Installation
- CW-555-R17: 1” Service Connection Polyethylene Install (PE)
- CW-801-R2: Butterfly Valve (Mechanical Joint)
- CW-837-R4: Two Long Side Services in Common Trench
- CW-850-R4: Tracer Wire Installation
- CW-950-R3: 2” Combination Air Relief Valve Assembly
- CW-1020-R2: 2” Service Connection Copper Install (CTS)
- CW-1029-RevA: 1” Service Connection Copper Install (CTS)
- Pipe fittings: Manufactured by US Pipe, Union/Tyler, Sigma Corp., Star Pipe, or SIP Industries per latest revision of CW-863

6.8 Backwash Waste Disposal

As described in **Section 6.5.1**, the manganese dioxide filtration system will require daily backwashing to prevent the accumulation of iron and manganese solids within the vessels. The backwash waste disposal system will include a backwash storage tank, backwash disposal pumps, and a waste disposal pipeline to the SLCWD sewer system.

The backwash waste disposal system will remain in operation during both Phase 1 and Phase 2. Separation of backwash waste (laden with iron and manganese solids) from ROC is recommended during Phase 2 (including separate disposal pump stations) to avoid re-oxidation and/or precipitation of iron and manganese within the tank or process equipment, which would result in sludge accumulation at the bottom of the tank or re-precipitation of iron and manganese.

Acceptance and treatment of the backwash waste streams by the San Lucas Wastewater Plant is a critical project requirement. Development of the necessary agreements and coordination with the receiving agency will be addressed through subsequent UC Davis and Water Systems Consulting (WSC) work efforts.

6.8.1 Backwash Waste System

Backwash waste from the filters will discharge to a new 3,000-gallon Fiber Reinforced Plastic (FRP) tank. Immediately following the completion of a backwash cycle, backwash waste pumps will be used to convey backwash waste from the storage tank to the SLCWD sewer lift station, located at the intersection of Cattlemen Road and Lockwood-San Lucas Rd. The backwash waste storage tank will have a 2% slope to the tank outlet to minimize the risk of solids buildup at the bottom of the tank.

The backwash waste conveyance pumps will be located on a concrete pad adjacent to the backwash storage tank. The backwash waste pumps will be of horizontal, end-suction centrifugal style with self-priming and abrasion-resistant upgrades to account for potentially abrasive fines within the backwash waste.

The backwash storage tank will include level instrumentation with low- and high-level alarms. The backwash waste pumps will be single-speed and programmed to run based on level setpoints in the backwash waste storage tank.

Design criteria for the backwash waste system are presented in **Table 6-6** below.

Table 6-6: Backwash Waste System Design Criteria		
Parameter	**Description/Value**	**Units**
Tank		
Nominal Storage Capacity	3,000	gallons
Nominal Tank Diameter	9	ft
Nominal Tank Sideshell Height	7.5	ft
Minimum Freeboard	1	ft
Overflow Elevation	6.5	ft
Material	FRP	--
Inlet/Outlet Size	4	inches
Backwash Waste Conveyance Pumps		
Style	Centrifugal, End-Suction	--
Configuration	1 active, 1 standby	--
Design Flowrate	150	gpm
Design Total Dynamic Head	86	feet
Minimum Motor Efficiency	85	%
Nominal Motor Rating	5	horsepower
Voltage	460	VAC

6.8.2 Waste Disposal Pipeline

A new waste disposal pipeline will be required to convey waste flows from the new treatment system to SLCWD's sewer system. The waste disposal pipeline will be constructed as part of Phase 1 improvements for disposal of filtration backwash waste. When Phase 2 is commissioned, ROC will also be disposed of through the waste disposal pipeline constructed as part of Phase 1 improvements. It is noted that upon completion of Phase 2 improvements, the backwash waste pumps and ROC disposal pumps will be programmed such that they do not discharge waste at the same time, to minimize the risk of mixing backwash waste with ROC.

Discharge of manganese dioxide filtration system waste and ROC through a pipeline requires consideration of the chemical attributes of each waste stream. A nominal pipe diameter of 4 inches and a design velocity of 3.5 fps was selected to avoid potential settling of iron and manganese precipitate within the pipeline or excess mineral scaling due to the high TDS and calcium carbonate precipitation potential of ROC.

Design criteria for the waste disposal pipeline are listed in **Table 6-7.**

Table 6-7: Waste Disposal Pipeline Design Criteria		
Parameter	**Description/Value**	**Units**
Design Velocity	3.5	fps
Design Flowrate	150	gpm
Piping Material	Socket Welded Schedule 80 PVC	--
Maximum System Operating Pressure	125	psi
Thrust Restraint	Concrete Thrust Blocks at All Pipe Bends > 5°	--
Combination Air and Vacuum Release Valves	Cast Iron Body Float Actuated Air Vents	--
Combination Air and Vacuum Release Valve and Spacing	¼ (or Local High Points)	--
Cleanouts	Placed at locations to allow for maintenance access; Sized to match pipe	--
Disposal Pipeline Cover Over Top of The Pipe	4	ft
Disposal Pipeline Installation	Open Trench	--
Concrete Thrust Blocks & Cement	f’c = 3000	psi
Cement (basic)	ASTM C150, ASTM 595, Type II or II/IV	--

6.9 Phase 2 Improvements

The following components will be included under Phase 2 improvements:

- Well pump replacement
- RO Bypass and Blend Manifold
- Cartridge Filtration
- Break Tank and RO Feed Pump
- 2-stage RO (with Clean-in-Place system and Permeate Flush system)
- Permeate Degasification System
- Product Water Pump Station
- ROC Storage Tank and Disposal Pumps

System sizing and projections of RO system performance presented below assume that water quality in the new wells will match water quality in the existing well (Well #03). Treatment design criteria and recommendations will be updated as needed if water quality in the exploratory triple-completion monitoring well differs significantly from Well #03. Preliminary RO projections have indicated that a 2-stage RO system can achieve approximately 84 percent recovery while still maintaining finished water quality goals. In order to maintain a finished water flowrate of 150 gpm, the raw water (well pump) flowrate will be increased to 166 gpm. Following completion of monitoring well drilling and piloting, the preliminary design of the RO system presented herein may require adjustment to ensure that finished water quality objectives can be met with Phase 2 improvements.

6.9.1 Well Pump Improvements and Hydraulic Considerations

Per the PFD presented in **Figure 6-1**, Phase 2 improvements will include significant changes to the hydraulic conditions associated with Phase 1. Downstream of the manganese dioxide filters, an atmospheric break will occur as flow discharges to the RO feed tank. A separate RO feed pump will be used for improved flow control through the cartridge filters and into the RO system and flexibility in partially bypassing RO. Downstream of RO, the degasification process will introduce an additional atmospheric break in the treatment process, resulting in the loss of hydraulic head available from the upstream treatment processes. Because the degasification system operates at or near atmospheric pressure, the pressure developed by the upstream RO feed pumps cannot be maintained through this process. As a result, a product water pump station will be required downstream of the degasification system to re-pressurize the blended water and convey finished water to the SLCWD distribution system.

To operate more efficiently while meeting the reduced hydraulic head conditions and increased raw water flowrate associated with Phase 2 improvements, the 25-HP well pumps installed during Phase 1 will be replaced 7.5-HP well pumps at Phase 2. The new pumps will integrate into the VFDs installed as part of Phase 1.

The design criteria for the Phase 2 well pumps are presented in **Table 6-8** below.

Table 6-8: Phase 2 Well Pumps Design Criteria

Parameter	Description/Value	Units
Type	Vertical Turbine	--
Design Capacity	166	gpm
Design Total Dynamic Head	110	feet
Minimum Motor Efficiency	70	%
Nominal Motor Rating	7.5	horsepower
Voltage	460	VAC

6.9.2 RO Bypass System

A bypass and blend system will be provided downstream of the manganese dioxide filtration system to allow a portion of filtered water to be blended with RO permeate to achieve the desired finished water quality while maximizing treatment efficiency and minimizing long term operational and maintenance costs. Based on preliminary water quality projections, it is estimated that approximately 35 percent of filter effluent can bypass the RO system. The blending system will consist of a dedicated bypass pipeline equipped with a V-port ball valve. The bypass valve will allow operators to adjust the proportion of filtered water that bypasses RO and is blended with RO permeate immediately upstream of the degasification system.

The bypass flow will be manually adjustable to allow operators to optimize the blend ratio based on finished water quality conditions. Finished water quality will be monitored using online TDS, nitrate, pH, and free chlorine analyzers installed immediately upstream of the product water pump station. Operators may periodically adjust the bypass control valve to maintain compliance with finished water quality goals while minimizing RO loading and concentrate production.

6.9.3 Reverse Osmosis

A 750-gallon break tank will be installed downstream of the manganese dioxide filters and upstream of the cartridge filters to provide hydraulic separation between the processes and provide additional contact time for sodium bisulfite to remove any remaining chlorine upstream of the RO membranes. The break tank will function as a buffer that stabilizes flow conditions, dampens potential short-term fluctuations in upstream treatment processes, and provides a consistent suction source for the RO feed pumps. The break tank will be constructed of HDPE and will include level instrumentation, low- and high-level alarms, overflow protection, and drain connections. Tank level controls will be integrated with the RO feed pump to prevent cavitation or loss of suction.

Cartridge filtration will be provided upstream of RO to remove any remaining suspended solids in the manganese dioxide filter effluent and to protect RO membranes and downstream pumps. The cartridge filter system will consist of a dual-cartridge pressure housing equipped with replaceable filter cartridges rated at 5 microns to provide effective removal of fine particulate matter that could contribute to membrane fouling. The housing will include isolation valves, differential pressure gauges & transmitters, and drain connections to allow monitoring of filter performance and facilitate routine cartridge replacement. Cartridges will be replaced based on differential pressure, operating time, or manufacturer recommendations to ensure adequate protection of the RO membranes.

Chemical antiscalant, sodium bisulfite, and sulfuric acid (see **Section 6.9.5**) will be injected into a static mixer upstream of the break tank to minimize mineral scaling and bacteriological fouling on the membranes and to maintain adequate flux. An RO feed pump will be required to convey pretreated water from the RO feed tank to the membranes. The RO feed pump will be a horizontal, inline multistage pump with 316 Stainless Steel wetted parts.

It is estimated that at average system flux value of 11.1 gallons per square foot of membrane area per day (GFD), two stages of treatment would result in a RO train recovery of approximately 84 percent. 8-inch brackish water membrane elements with 400 ft^2 of active area per element were selected in a 2:1 pressure vessel array (10 elements in the first stage, 5 elements in the second stage, 5 elements per pressure vessel).

The RO system will utilize standard membrane elements installed in pressure vessels and arranged in a two-stage configuration to optimize membrane utilization and recovery while maintaining acceptable flux rates and scaling potential. In the two-stage arrangement, feedwater will pass through the first stage of membrane vessels where a portion of the water will permeate through the membranes. The remaining concentrate from the first stage will be directed to the second stage to recover additional permeate before final concentrate disposal. This configuration improves overall system recovery and reduces concentrate volume while maintaining stable hydraulic loading on the membranes. The RO system will include instrumentation and control equipment necessary to monitor key operating parameters including feed pressure, differential pressure across membrane stages, permeate flow, concentrate flow, and system recovery.

The RO system will produce concentrate waste streams from normal operation, as well as during a clean-in-place cycle and the permeate flush cycle. Concentrate waste produced by the RO system will be sent to the ROC storage tank (**Section 6.9.7**) and pumped to the SLCWD sewer system through the Waste Disposal Pipeline described in **Section 6.8.2**.

The key RO feed water quality constituents used to generate system sizing, projected permeate quality, concentrate quality, and finished (blended) water quality are presented in **Table 6-9** below. RO water quality and performance projections are included in **Attachment B**.

Table 6-9: Phase 2 Water Quality Projections

Parameter	Units	Raw (RO Feed)	Concentrate	Permeate	Finished (Blended)
Temperature	°C	15	15	15	15
TDS	mg/L	1,291.0	7,808.0	6.1	500.4
Bicarbonate (as HCO_3)	mg/L	218.0	496.0	2.3	32.5
Calcium	mg/L	185.8	1151.0	0.3	73.4
Chloride	mg/L	130.0	803.2	0.7	51.6
Fluoride	mg/L	0.0	0.0	0.0	0.0
Iron	ug/L	0.0	0.0	0.0	0.0
Manganese	ug/L	0.0	0.0	0.0	0.0
Nitrate (as NO_3)	mg/L	15.0	91.3	0.3	6.1
pH	--	7.7	6.6	4.6	7.0[1]
Sodium	mg/L	86.7	533.4	0.9	34.7
Sulfate	mg/L	550.0	4089.0	1.3	260.8
Silica	mg/L	30.0	184.8	0.3	12.0
Boron	mg/L	0.0	0.0	0.0	0.0
Carbon Dioxide	mg/L	5.7	109.0	103.9	5.2[1]

Notes:

1. *Carbon dioxide of total RO system permeate reduced in downstream degasification system and blended between the product water pumps and degasification system outlet, assuming minimum 95% removal of carbon dioxide to adjust final pH.*

Design criteria for the reverse osmosis system are presented in **Table 6-10** below.

Table 6-10: Reverse Osmosis System Criteria		
Parameter	**Description/Value**	**Units**
General		
Well Flow	160	gpm
Fraction of Treated Water	35	%
Design Raw Water Bypass Flow	60	gpm
Design RO Influent Flow (Split Between Two (2) RO Trains)	100	gpm
Design Permeate Flow	84	gpm
Design Concentrate Flow	16	gpm
Feed Pump		
Number of Pump(s) (One for Each RO Train)	2	--
Pump Type	Multi-stage Vertical Turbine	--
Pump Material	316 SST	--
Capacity	55	gpm
Nominal Motor Rating	10	HP
Minimum Pump Efficiency	80	%
Motor Drive	Variable Frequency Drive	--
RO System Sizing		
Cartridge Filter Element Rating	5	micron
Design System Recovery Range[1]	84	%
Number of Train(s)	2	--
Stages Per Train	2	--
No. Pressure Vessels in Stage 1[2]	2	--
No. Pressure Vessels in Stage 2[2]	1	--
No. of Elements per Pressure Vessel	5	--
No. of Elements per Train	12	--
Type of Vessels	Fiberglass Reinforced Plastic	--
Vessel Configuration	Side-Port	--
Manufacturers	DuPont, Hydronautics, Toray	--
Average Flux	11.3	GFD

Notes:

1. *Based on RO performance projections using water quality information from existing Well #03, to be refined during subsequent phases of design.*
2. *Assumes 4 elements per vessel, 8-inch nominal diameter, 40-inch length, 400 ft^2 active area per element.*

A clean-in-place (CIP) system is a process that cleans the membrane elements housed in the RO vessels without having to disassemble the vessels. The process consists of rinsing the membranes in a series of stages to remove foulants that can accumulate on the membrane surfaces. Regular cleaning of the membranes optimizes the lifespan of the RO system, as well as minimizes downtime since the CIP can be automated through monitoring and controls. Based on the available Well #03 water quality data, CIP cycles will likely be required 1 to 2 times per year. This estimate will be refined based on upcoming pilot testing results and water quality data from the new well. The standard CIP system consists of the following stages:

- Pre-rinse
- Low/high pH cleaning
- Final rinse

The pre-rinse stage uses treated permeate as an initial flush of the membranes to remove feedwater from the vessels which could impact chemical efficiency during the cleaning phase. Based on water quality, an acid or caustic chemical can be used during the cleaning phases to remove fouling that has accumulated on the membrane surfaces. Since the project well has high TDS as well as higher concentrations of calcium and a high pH, a low pH cleaning solution will be used to remove inorganic foulants and inhibit scaling of the membranes, and a high pH cleaner will be used to remove organic foulants such as biofilms and organic matter. The low and high pH cleaning solutions are pumped through the RO system's components, such as membranes, pressure vessels, and pipes in a closed-loop recirculation process, allowing for adequate contact time to remove contaminants. The final rinse uses treated permeate to ensure all chemicals are removed from the cleaning phase, and the quality rinse acts as a calibration stage to ensure that the membrane quality is restored to operating conditions.

The CIP system will contain a 500-gallon high-density polyethylene (HDPE) tank to supply treated permeate to the RO vessels during a cleaning process. Treated permeate (pre-rinse) is supplied to the vessels through a 5 HP flush pump designed to supply permeate to operate at a maximum of 10 gpm per element at 60 psi for 10-15 minutes, with a flow meter upstream of the RO vessels set in a flow-paced compound control loop to allow for flow monitoring that can be adjusted as needed by operations staff. Operators will add chemical to the CIP tank during the low/high pH cleaning phases and initiate a CIP cycling by closing the discharge valve to the RO system and opening the re-cycling line valve to appropriately mix the chemical. Operators will monitor the pH analyzer until readings reach a desired pH setpoint, at which the CIP cycling line valve will be closed, and the CIP discharge line will be opened, allowing the cleaning solution to enter the RO system downstream of the RO system cartridge filter where it will be cycled through for a minimum of thirty (30) minutes at a flowrate of 8 gpm per membrane element. The final rinse will supply permeate at a flowrate of 10 gpm per membrane element for approximately 10-15 minutes. CIP piping will be socket-welded Schedule 80 PVC, and CIP effluent from each of the three stages will be discharged to the ROC storage tank.

Prior to shutdown of the RO treatment system, a portion of permeate is diverted back to the head of the RO membranes, effectively flushing out foulants that have accumulated on the membrane surface. By flushing the RO system after every service, the lifetime of the membranes is extended and the period between operating the CIP system is extended, minimizing system downtime. Due to the size of the RO treatment system, the permeate flush system is configured to be operated using the CIP piping and valving, however will not include chemical dosing as part of its process. During a permeate flush cycle, treated permeate from the 500-gallon HDPE tank is supplied to the vessels using the 5 HP flush pump designed to operate at a maximum 10 gpm per element at 50 psi, with a flow meter upstream of the RO vessels set in a flow-paced compound control loop to allow for flow monitoring that can be adjusted as needed. To ensure adequate flushing, the permeate will be recirculated through the RO system for a minimum of 10 minutes. System controls will include instrumentation to monitor pH, turbidity, and conductivity during a permeate flush cycle. If the permeate quality deteriorates over the permeate flush cycle, this could indicate significant fouling of the membranes.

Conceptual CIP and permeate flush design criteria are provided in **Table 6-11** below.

Table 6-11: Reverse Osmosis CIP/Permeate Flush Design Criteria

Parameter	Description/Value	Units
CIP		
Pre-Rinse Flowrate per Element	10	gpm
Pre-Rinse Duration	10–15	minutes
Low pH Cleaner	Citric Acid	--
Low Target pH	4	--
High pH Cleaner	Sodium Hydroxide	--
High Target pH	11	--
Low/High pH Cleaning Flowrate per Element	8	gpm
Low/High pH Cleaning Duration	30 - 60	minutes
Final Rinse Flowrate per Element	10	gpm
Final Rinse Duration	10–15	minutes
Permeate Flush		
Flowrate per Element	6-10	gpm
Duration	10–15	minutes
CIP/Permeate Flush Tank		
Storage Tank Type	HDPE	--
Quantity	1	--
Design Storage Tank Size	500	gallons
Nominal Tank Diameter	4	feet
Nominal Tank Sideshell Height	5	feet

Table 6-11: Reverse Osmosis CIP/Permeate Flush Design Criteria		
Parameter	**Description/Value**	**Units**
CIP/Permeate Flush Pump		
Number of Pump(s)	1	--
Pump Type	Multi-stage Vertical Turbine	--
Pump Material	316 SST	--
Maximum Capacity	20	gpm
Operating Pressure	50 - 60	psi
Nominal Motor Rating	5	HP
Minimum Pump Efficiency	80	%
Motor Drive	Variable Frequency Drive	--

6.9.4 Degasification

Downstream of RO, a degasification system will be required to remove entrained carbon dioxide. RO permeate commonly contains elevated levels of dissolved carbon dioxide because the membrane process removes alkalinity while allowing carbon dioxide to pass through the membrane. Elevated CO_2 levels can result in low permeate pH and increased corrosivity of the finished water if not removed. RO permeate and RO bypass flows will be blended downstream of the degasification system, upstream of the sodium hypochlorite and sodium hydroxide injections.

Degasification will be accomplished using a deep bubble aeration system equipped with fine bubble diffusers installed within a 3-stage baffled basin (HDPE vessel with aluminum framing). Air will be introduced through the diffusers at the bottom of the basin, producing small bubbles that promote efficient mass transfer of dissolved carbon dioxide from the water to the air phase. As the bubbles rise through the water column, carbon dioxide will transfer from the water into the air bubbles and be released to the atmosphere. Furthermore, to reduce overall project capital costs and simply operation, a deep bubble aeration system was selected because of the upstream, above-grade storage capacity it provides, in lieu of constructing a more costly, below-grade storage tank and separate, packed tower degasifier system that would de-couple upstream storage capacity from aeration treatment, potentially increasing capital costs and operating complexity. An above-grade deep bubble aeration system provides both equalization of product water storage and degasification of the blended RO permeate ahead of the product water pump station.

The aeration system will be designed to provide an air-to-water ratio of 10:1 with a target carbon dioxide removal efficiency of 95%. The degasification system will include a baffled basin, air distribution piping, diffuser assemblies, and a blower. Two blowers will be provided in a 1-duty, 1-standby configuration, with each blower sized to provide 100 percent of the required air flow. The system will be designed for continuous operation and will include provisions for blower control, maintenance access, and periodic diffuser inspection or replacement. Removal of dissolved carbon dioxide will increase the pH of the permeate and improve the stability of the finished water prior to downstream treatment or distribution.

Design criteria for the degasification system are presented in **Table 6-12** below.

Table 6-12: Degasification Design Criteria		
Parameter	**Description/Value**	**Units**
Basin Dimensions	4′9″ x 2′9″ x 6′1″	ft
Number of Diffusers per Stage	7	--
Number of Stages	3	--
Target Air-to-Water Ratio	10:1	--
Required Air Flow Rate	200	scfm
Blower Size	7.5	HP
No. Installed Blowers (Duty + Standby)	1 + 1	--

6.9.5 Chemical Systems

The following section describes the additional chemicals required for implementation of Phase 2. Refer to the PFD presented in **Figure 6-1** for chemical dosing points within the overall treatment process.

For the purposes of this preliminary design, it is assumed that the following chemicals will be delivered in 275 chemical storage totes. Each chemical storage tote will be placed on a pallet with integral chemical containment and a weight scale. The scale will be integrated with the plant controls system to alert operators when the volume in the tote is low and replacement of the nearly empty tote is required.

Chemical dosing pumps will be duplex packaged feed skids, including two diaphragm metering pumps (one duty and one standby), associated piping, pressure relief components, calibration, and instrumentation necessary to deliver the required dose for the stated purposes of each chemical listed below.

Sulfuric Acid

Sulfuric acid will be dosed upstream of the cartridge filters and RO system. Sulfuric acid serves the following key purposes:

- Lowers RO feedwater pH
- Limits calcium carbonate scaling in membranes by converting carbonate species into dissolved carbon dioxide
- Prevents potential for re-oxidation of any remaining iron or manganese
- Reduces risk of silica scaling
- Enhances effectiveness of membrane antiscalant

Sodium Bisulfite

Sodium bisulfite (SBS) will be dosed upstream of the cartridge filters and RO system. SBS serves the critical function of removing any residual chlorine from manganese dioxide filter effluent to protect the RO membranes from chemical degradation. The selected RO membranes will be polyamide composite membranes, which are highly sensitive to oxidation. Exposure to oxidation can result in permanent loss of salt rejection and reduced membrane life.

Membrane Antiscalant

Preliminary RO projections have indicated that the Vitec 4000 antiscalant will be the most appropriate antiscalant for use upstream of RO. Antiscalants inhibit scale formation and deposition of mineral scale on the membrane surface, which maintains stable performance and enhances overall recovery.

Sodium Hydroxide

Sodium hydroxide will be dosed downstream of the degasification system and upstream of the product water pump station to stabilize and raise the pH of finished water before it enters the distribution system. The addition of sodium hydroxide will limit the corrosion potential of finished water by adding bicarbonate alkalinity. The chemical feed system will be designed to allow for flow-pacing of sodium hydroxide to meeting a specified finished water pH target based on measurement from the online pH analyzer upstream of the product water pump station.

Sodium Hypochlorite

A second hypochlorite injection point will be located upstream of the product water pump station, also equipped with a static ring mixer. This new skid (Skid 2) will provide operational flexibility to boost chlorine residual as needed to address variations in water quality, particularly elevated concentrations of iron, manganese, and other constituents.

A free chlorine analyzer installed downstream of the product water injection point will continuously measure residual levels and can be used to pace the hypochlorite pumps to ensure the target residual is achieved prior to distribution. The analyzer will alert operations staff if free chlorine concentrations fall below preset thresholds and will automatically start the Skid 2 pumps upstream of the product water pump station to inject sodium hypochlorite, ensuring the chlorine residual meets the setpoint. As an additional safeguard, the product water pumps will automatically shut down if chlorine levels exceed operator-defined high-high or low-low setpoints, preventing the distribution of inadequately disinfected water or water with excessive chlorine that could cause taste and odor concerns. Analyzer discharge, consisting of reagent-free sample water, will be routed to the backwash storage tank.

6.9.6 Product Water Pump Station

The product water pump station will be required to boost the pressure of finished water into the distribution system. The pump station will consist of three inline multistage vertical turbine pumps arranged in two active, one standby configuration. This configuration was selected to maintain continuity of finished water flow when one RO train is offline for cleaning or maintenance. A 2-inch flush-to-waste connection consisting of a threaded plug and 4-inch threaded companion flange (6-hole pattern) will be installed on the discharge piping and connected to the on-site storm drain via a 4-inch air gap connection.

The pumps will be constructed with corrosion-resistant wetted materials suitable for potable water service. Each pump will be equipped with isolation valves, check valves, and pressure instrumentation to allow safe operation, monitoring, and maintenance. A flowmeter will be installed on the combined discharge manifold downstream of all the product water pumps. The pumps will operate at constant speed and will be controlled by the facility control system based on downstream system pressure or storage tank level conditions. The pumps will be equipped with soft starters. Under normal operating conditions, one pump will serve as the lead unit while the second pump will remain in standby and automatically start in response to failure of the lead pump. The control system will also provide pump alternation to balance operating hours between the two pumps and extend equipment life.

Based on the current design and anticipated pumping requirements, the vertical turbine pump wet well is estimated to provide approximately 750 gallons of storage volume. This preliminary volume is intended to provide adequate submergence for the pump intake, minimize vortex formation and air entrainment, and accommodate normal operational fluctuations. During subsequent design phases, the wet well geometry and storage volume will be refined and verified based on the selected pump manufacturer's requirements, anticipated operating range, pump cycling considerations, and hydraulic design criteria.

The design criteria for the product water pump station are presented in **Table 6-13.**

Table 6-13: Product Water Pump Station Design Criteria		
Parameter	**Description/Value**	**Units**
Style	Inline Multistage	--
Configuration	2 active, 1 standby	--
Design Point	262	TDH
Total Design Flowrate	150	gpm
Minimum Motor Efficiency	70	%
Nominal Motor Rating	7.5	horsepower
Voltage	460	VAC

6.9.7 Concentrate Disposal

Concentrate from the RO system will be directed through individually dedicated 4-inch discharge piping into a 10,000-gallon fiberglass reinforced plastic (FRP) tank with a minimum air gap of two pipe diameters, or 8-inches, between the discharge flange and the top of the storage tank. CIP and permeate flush discharge will be directed to the top of the tank through a dedicated 4-inch line. The FRP storage tank will be equipped with an ultrasonic level transducer to monitor the concentrate water level in the tank. Controls for the ultrasonic level transducer will provide interface between the storage tank, process area PLC, and operations staff through alarm high and low setpoints. Additionally, the tank will contain access features for operations staff to inspect and maintain the tank. Access features consist of an exterior access ladder, and a 30-inch diameter manway for access.

Tank inlet and outlet piping will be PVC and will be equipped with flexible expansion joints to allow for movement during seismic events and thermal expansion/contraction of joints. The tank will also be equipped with a 6-inch overflow and 3-inch drainage piping directed into the facility drainage sump where it can be cycled back to the tank when the sump reaches an operator defined high-level setpoint. Blending and stabilization of the concentrate with the CIP, permeate flush, and well flush-to-waste prior to discharging into the sewer system is pertinent for the local wastewater treatment facility as water quality projections of the concentrate show high concentrations of chlorides, silica, boron, and TDS. Additionally, the ROC pumps will have the capability to cycle the concentrate to mitigate scaling within the tank and appurtenances.

The ROC pumps will be located on a concrete pad adjacent to the ROC storage tank. The ROC pumps will be of horizontal, end-suction centrifugal style with self-priming and corrosion-resistant upgrades to account for the potentially corrosive nature of ROC waste. The ROC pumps will be single-speed and programmed to run based on level setpoints in the ROC storage tank.

Design criteria for the ROC Disposal System are presented in **Table 6-14** below.

Table 6-14: Backwash Waste System Design Criteria		
Parameter	**Description/Value**	**Units**
Tank		
Nominal Storage Capacity	10,000	gallons
Nominal Tank Diameter	12	ft
Nominal Tank Sideshell Height	13	ft
Minimum Freeboard	1	ft
Overflow Elevation	12	ft
Material	FRP	--
Inlet/Outlet Size	4	In
ROC Waste Pumps		
Style	Centrifugal, End-Suction	--
Configuration	1 active, 1 standby	--
Design Flowrate	150	gpm
Design Total Dynamic Head	81	feet
Minimum Motor Efficiency	70	%
Nominal Motor Rating	5	horsepower
Voltage	460	VAC

6.10 Site Improvements

Development of the proposed treatment facility will require several site improvements. The site will be constructed in anticipation of Phase 2 improvements, therefore minimal earthwork and grading are anticipated during Phase 2.

The site will be enclosed within a chain-link fence with a locked access gate for site security. The chain-link fencing will consist of galvanized steel posts and rails supporting galvanized chain-link mesh, with UV-resistant privacy screening fabric. The site will include motion-activated lighting within the enclosure. The entire site will be surfaced with 3/4-inch crushed rock aggregate to provide a durable, permeable surface suitable for vehicle access, operations, and maintenance activities.

Under Phase 1, concrete slabs for the new filtration skid, chemical enclosure (sodium hypochlorite storage tank and feed pumps), electrical equipment, and backwash disposal system will be required. The chemical enclosure pad and associated below-grade chemical piping trench will be sized to accommodate the chemical systems included under Phase 2.

The filtration system, chemical enclosure, and electrical infrastructure will be enclosed by prefabricated aluminum shade structures with aluminum quarter side panels for additional UV protection. The roofs of the shade structures will be sloped to prevent accumulation of precipitation on the canopy.

The chemical enclosure will include all chemical storage tanks and feed skids required for both Phase 1 and Phase 2 improvements. The enclosure will be constructed during Phase 1, with sufficient footprint to allow installation of the additional chemical feed systems required for Phase 2. The enclosure will include a concrete ramp, double-door gates, and will be designed to allow access for ongoing chemical deliveries (both bulk and tote-style deliveries). Chemical feed piping routed between the chemical enclosure and injection points shall be installed in a below-grade, traffic-rated utility trench to protect the piping system and maintain vehicle access across the site. The trench will be designed to accommodate five chemical feed lines, each provided with secondary containment via pipe encasement, and will include removable traffic-rated covers or a structural top slab capable of supporting routine plant vehicle loading.

Treatment facility drainage, well equipping flush-to-waste, and infrequent product water flushing (required for potential occurrences of off-spec finished water) will discharge to a concrete percolation sump. Based on the silty-loamy soils of the site areas identified in **Section 5.3** and using information in the Natural Resources Conservation Service (NRCS) Web Soil Survey, the percolation rate was conservatively assumed to be 1 inch per hour. Therefore, a precast 6’ x 6’ x 6’ (L x W x D) concrete percolation sump with a traffic-rated access hatch will be constructed to hold facility drainage and flushing discharges while providing at least 18 inches of freeboard at all times. Based on preliminary sump sizing and percolation rate assumptions, the sump will have the capacity to percolate approximately 538 gallons per day. Percolation sump sizing will be refined during detailed design.

6.11 Electrical

Electrical power for the new facility will be provided through a new service connection from Pacific Gas and Electric Company (PG&E). The initial electrical demand for Phase 1 of the project is estimated at approximately 89 kVA (76 kW), with an estimated service current of approximately 112 amperes (amp). The electrical demand for Phase 2 will be approximately 140 kVA (119 kW), with an estimated service current of approximately 142 amperes.

To accommodate Phase 2 expansion and minimize the need for significant electrical upgrades at Phase 2, the electrical infrastructure to be installed during Phase 1 will be designed and sized to support Phase 2 electrical loads. Major electrical components including the utility service connection, transformer, main switchgear, motor control centers (MCCs), and associated distribution equipment will be sized to support the Phase 2 load requirements. During Phase 1, only the electrical feeders (i.e., wires or cables) and equipment necessary for the Phase 1 components will be installed and energized, however the backbone electrical infrastructure will be configured to allow for straightforward connection of additional loads during the construction of Phase 2 improvements.

Electrical redundancy reliability will be accomplished through the implementation of two MCCs (MCC-A and MCC-B). MCC-A will serve one well pump, one RO Train, and the "first train" of all other process equipment, and MCC-B will similarly serve the second train of all unit processes. The MCCs will be served by a single switchgear and automatic transfer switch, unless otherwise requested by Cal Water and/or other project stakeholders. This configuration provides process-level redundancy such that the failure or maintenance outage of a single process train, well, or MCC will not interrupt water production or result in a service outage. Electrical equipment will be installed beneath a prefabricated metal shade structure with side panels to provide protection from direct sunlight, precipitation, and other weather-related conditions while maintaining adequate ventilation for equipment operation.

The electrical demands associated with Phase 1 and Phase 2 improvements are presented in **Table 6-15** and **Table 6-16** below.

A new 200-amp service connection to the overhead utility lines (located approximately 200 feet from the proposed site, on the opposite side of Bunte Road) will be required. It is assumed that the treatment facility will require a new utility transformer, given that the required service extension must cross an intervening roadway and the site currently has no electrical infrastructure. The electrical service extension will require trenching, conduit, and roadway crossing improvements as required by the local PG&E jurisdiction. PG&E will also require a new service application, engineering review, and payment of applicable fees for engineering, administration, tie-ins, and any other additional facilities necessary to complete the extension. The extent of improvements required for the service connection will be explored through conversations with PG&E during subsequent phases of design.

Table 6-15: Phase 1 Electrical Demands

Load	Quantity	kW	HP	Full Load Amperage @ 240V, 1 Phase	Full Load Amperage @ 460V, 3 Phase
Well Pumps	2	18.7	25	--	58.5
Backwash Waste Pumps	2	3.7	5	--	11.7
MCC Control Circuit	1	1.5	2	6.25	3.13
Main Control Panel	1	1.5	2	6.25	3.13
Sodium Hypochlorite Pumps	2	0.12	0.16	0.5	0.25
				Total Amperage	**77**
				Adjusted Total Amperage[1]	**112**
				Total kVA	**89**
				Total kW	**76**

Note:
1. *Conservatively includes a 120% demand factor in addition to 25% of the largest connected load.*

Table 6-16: Phase 2 Electrical Demands					
Load	**Quantity**	**kW**	**HP**	**Full Load Amperage @ 240V, 1 Phase**	**Full Load Amperage @ 460V, 3 Phase**
Well Pumps	2	5.6	7.5	--	17.6
RO Feed Pumps	2	7.5	10	--	5.9
Degasification Blower	1	5.6	8	--	8.8
Product Water Pumps	3	5.6	7.5	--	26.3
Backwash Waste Pumps	2	3.7	5	--	11.7
ROC Disposal Pumps	2	3.7	5	--	11.7
CIP/Permeate Flush Pump	1	0.75	1	--	1.8
CIP Electric Heater	1	3.7	5	--	5.9
HVAC System	1	15	20	--	23.4
MCC Control Circuit	1	1.5	2	6.25	3.13
Main Control Panel	1	1.5	2	6.25	3.13
RO Systems Remote I/O Panels	2	3.0	4	12.5	6.26
Chemical Dosing Remote I/O Panel	1	1.5	2	6.25	3.13
Waste Disposal Remote I/O Panel	1	1.5	2	6.25	3.13
Sodium Hypochlorite Pumps	4	0.12	0.16	0.5	1.0
Sodium Bisulfite Pumps	2	0.12	0.16	0.5	0.25
Antiscalant Pumps	2	0.12	0.16	0.5	0.25
Sulfuric Acid Pumps	2	0.12	0.16	0.5	0.25
				Total Amperage	**142**
				Adjusted Total Amperage[1]	**175**
				Total kVA	**140**
				Total kW	**119**

Note:

1. *Conservatively includes a 120% demand factor in addition to 25% of the largest connected load.*

6.12 Instrumentation and Controls

A plant-wide controls and monitoring system will be provided to allow automated operation, data acquisition, and remote monitoring of the treatment facility. The system will be based on a programmable logic controller (PLC) architecture with a local human-machine interface (HMI) and supervisory control and data acquisition (SCADA) functionality. The SCADA system will connect to Cal Water's network via King City and be accessed exclusively through that network. An alarm notification system will be designed in accordance with Cal Water standards and integrated with the SCADA/HMI platform to provide timely alerts and support rapid response to operational upsets. The system will include a secure cellular communication system to allow operators to view system status, alarms, and key operating parameters from remote locations.

The Phase 1 controls system will integrate monitoring and control of the well pumps, manganese dioxide filtration system, sodium hypochlorite system, backwash waste tank, and backwash disposal pumps. The controls system will be designed to accommodate the ultimate Phase 2 facility configuration, which will include monitoring and control of the cartridge filters, RO feed pump, RO membrane trains, degasification system, additional chemical systems, product water pumps, ROC storage tank, and ROC disposal pumps. The main PLC, control panels, network architecture, and communications infrastructure installed during Phase 1 will therefore be sized to support the anticipated Phase 2 input/output (I/O) requirements and processing capacity. This approach will allow for implementation of Phase 2 improvements without the need for replacement of major controls system components. During Phase 1 construction, only the field instrumentation, control wiring, and I/O modules necessary to operate the initial treatment processes will be installed and commissioned. The remaining I/O capacity, panel space, and communication ports required for Phase 2 equipment will be reserved within the control panels to allow integration of additional equipment during construction of Phase 2.

The plant control system will include approximately 90 total I/O points in Phase 1 and an additional 115 I/O points in Phase 2, for an ultimate buildout of approximately 205 total I/O points. The Phase 1 main PLC control panel is therefore sized for the ultimate Phase 2 control system with approximately 20 to 30 percent spare I/O capacity, resulting in a recommended total panel capacity of approximately 250 to 275 I/O points. A floor-mounted enclosure (84" by 60" by 24") is expected to provide adequate space for the PLC, power supplies, communications equipment, terminal blocks, interposing relays, and future expansion.

6.13 Funding Requirements

Given that the project is anticipated to be funded by multiple state and federal sources, design and procurement-related requirements of each of the funding programs should be adhered to. Anticipated requirements or programs to be considered include:

- Davis-Bacon
- Disadvantaged Business Enterprise
- American Iron and Steel
- Build America, Buy America

Requirements should be discussed and coordinated with the various funding agencies prior to design.

6.14 Environmental and Permitting

An environmental and permitting constraints memorandum is anticipated to be developed following this ER Addendum. The results of the environmental and permitting constraints memorandum will be integrated into a subsequent ER Addendum or the Design Confirmation TM.

Denise Duffy & Associates (DD&A) will provide an analysis of environmental constraints including a project description, preliminary biological and cultural resource studies, and the identification of required regulatory permits.

As a cursory review of the project requirements, the following environmental documents, permits, and approvals are anticipated:

- CEQA Documentation
- Caltrans Encroachment Permit
- Monterey County Encroachment Permit
- Monterey County Well Permits
- Monterey County Combination Building Permit
- Waste Discharge Requirements (WDR) revisions for well development water and liquid waste byproduct disposal[(1)]
- Service Agreement between CWKC and SLCWD
- LAFCo service area amendment
- Authority to Construct/Permit to Operate from the Monterey Bay Air Resources District
- California Public Utilities Commission (CPUC) Approval
- SWRCB DDW Amendment to Domestic Water Supply Permit
    - SLCWD Permit (Phase 1) – Treatment plant improvements
    - CWKC Permit (Phase 2) – Additional sources, treatment, and transfer of ownership
- Monterey County Planning Approval
- Monterey County Regional Fire District Approval

(1) The revisions to the WDRs will be addressed under a separate Work Plan prepared by WSC.

7.0 Cost Estimate

An opinion of probable capital costs for Phase 1 improvements to the SLCWD distribution system under the selected alternative with appropriate contingencies is included in **Table 7-1**.

Table 7-1: Phase 1 Opinion of Probable Capital Cost				
Item	**Qty.**	**Units**	**Unit Price**	**Cost**
General				
Mobilization, Demobilization, and Cleanup[1]	1	LS	$ 637,000	$ 637,000
Site Preparation	1	LS	$ 30,000	$ 30,000
Earthwork, Grading, and Site Improvements[2]	1	LS	$ 252,000	$ 252,000
Tank Repairs (Budgetary)	1	LS	$ 210,000	$ 210,000
SLCWD System Rehabilitation[3]	1	LS	$ 80,000	$ 80,000
Traffic Control	1	LS	$ 120,000	$ 120,000
			Subtotal	**$ 1,329,000**
Equipment				
Online Analyzers and Instrumentation[4]	1	EA	$ 55,000	$ 55,000
Sodium Hypochlorite Injection System[5]	1	LS	$ 75,000	$ 75,000
Manganese Dioxide Filtration System[6]	1	LS	$ 150,000	$ 150,000
Backwash Waste Tank and Pumps[7]	1	LS	$ 75,000	$ 75,000
			Subtotal	**$ 355,000**
Structures and Foundations				
Steel Shade Structure and Anchorage[8]	1	LS	$ 58,000	$ 58,000
Chemical Piping Trench[9]	40	LF	$ 1,575	$ 63,000
Concrete Slab Foundations[10]	14	CY	$ 1,285	$ 18,000
Chain-Link Fencing[11]	1,300	LF	$ 37	$ 47,500
			Subtotal	**$ 186,500**
Piping and Appurtenances				
Triple-Completion Monitoring Well and Associated Testing[12]	1	EA	$ 315,000	$ 315,000
Production Well	2	EA	$ 2,415,000	$ 4,830,000
Vertical Turbine Pump, Discharge Piping, and Appurtenances[13]	2	EA	$ 425,000	$ 850,000
Process and Service Piping, Fittings, and Appurtenances[14]	1	LS	$ 150,000	$ 150,000

Table 7-1: Phase 1 Opinion of Probable Capital Cost				
Misc. Fittings and Appurtenances	2	LS	$ 10,000	$ 20,000
			Subtotal	**$ 6,165,000**
Water Transmission Main				
Trenching and Backfilling[15,16]	4,600	LF	$ 210	$ 966,000
Connection at SLCWD[17]	1	LS	$ 10,000	$ 10,000
Boring Under Caltrans ROW	1,000	LF	$ 1,000	$ 1,000,000
			Subtotal	**$ 1,976,000**
Waste Disposal Pipeline				
Trenching and Backfilling[15,16]	5,235	LF	$ 189	$ 990,000
Connection at SLCWD[17]	1	LS	$ 10,000	$ 10,000
Boring Under Caltrans ROW	1,000	LF	$ 1,000	$ 1,000,000
			Subtotal	**$ 2,000,000**
Electrical and Controls				
Backup Generator[18]	1	LS	$ 300,000	$ 300,000
PG&E Connection[19]	1	LS	$ 200,000	$ 200,000
Electrical Infrastructure[20]	1	LS	$ 650,000	$ 650,000
Controls System[21]	1	LS	$ 200,000	$ 200,000
			Subtotal	**$ 1,350,000**
Planning				
Land Acquisition	1	LS	$ 130,000	$ 130,000
Test Well Planning[22]	1	LS	$ 275,000	$ 275,000
Environmental & Permitting	1	LS	$ 100,000	$ 100,000
Piloting and Corrosion Control Study	1	LS	$ 278,000	$ 278,000
			Subtotal	**$ 783,000**
Construction Total				**$ 14,145,000**
Contingency (20%)				$ 2,829,000
Total with Contingency				**$ 16,974,000**
Administrative, Engineering, and Construction Management (20%)[23]				$ 3,395,000
Total				**$ 20,369,000**
Inflation Adjustment[24]				$ 1,291,000
Total at Time of Bid				**$ 21,660,000**
Notes:				

Table 7-1: Phase 1 Opinion of Probable Capital Cost

1. *Assumes mobilization, demobilization, and cleanup to be approximately 5% of the Construction Total.*
2. *Includes excavations, grading, and installation of 3/4" aggregate base within the fenced enclosure of the new facility (90,000 SF). Includes approximately 1,500 CY of aggregate.*
3. *Includes pipe cleaning via ice pigging, hydraulic modeling, and a water loss audit.*
4. *Consists of two (2) online Free/Chlorine/pH Analyzer and one (1) Nitrate Analyzer (Reagent-less), pump discharge pressure transmitters, and tank level instrumentation.*
5. *Includes 250-gallon, double-walled Sodium Hypochlorite storage tank, duplex pump feed skid with associated instrumentation, and feed piping to injection points.*
6. *30-inch Diameter, five (5) Vessel Packaged Filtration Skid (with Backwash Controller) supplied by treatment equipment vendor.*
7. *Includes 3,000-gallon FRP Backwash Storage Tank and two 5-HP end-suction, centrifugal backwash disposal pumps with abrasion resistant internal components.*
8. *Assumes prefabricated aluminum shade structures with aluminum quarter side panels for additional UV protection. Includes 8' by 10' structure for filtration system, 4' by 8' structure for electrical equipment, and 10' by 18' structure for chemical enclosure.*
9. *Includes precast concrete utility trench, vehicle-rated top slab covers for routine plant access, and chemical-resistant interior lining.*
10. *Includes an 8' by 18' slab for filtration system, 10' by 18' chemical enclosure, 4' by 8' electrical pad, and a 12' by 13' backwash disposal system pad. Includes 10% safety factor for waste and overages.*
11. *Includes galvanized steel chain-link mesh, posts, and rails with UV-resistant privacy screening fabric. Includes 100 LF of fencing for chemical enclosure.*
12. *Consists of constructing test well, development, zone testing and sampling, pump testing, and demolition.*
13. *Includes two 25-HP Vertical Turbine well pumps with VFDs.*
14. *Assumes welded carbon steel piping above grade and mechanically restrained, ductile iron pipe and fittings below grade. Includes well discharge piping connection to vendor-supplied filtration skid, discharge to transmission main, and backwash waste piping.*
15. *Assumes separate trenching for transmission main and waste disposal lines, to be refined during subsequent phases of design.*
16. *Includes piping material and installation costs.*
17. *Tie in at existing SLCWD water or sewer facilities.*
18. *Includes 200 kW Tier 4 Cummins final diesel generator capable of providing 24 - 48 hours of continuous power to new wells and the treatment facility.*
19. *Includes new 400-amp PG&E service connection, utility transformer, PG&E coordination and administration fees, and 200 LF of conduit connection to existing service line.*
20. *Includes new transformer, switchgear, motor control center, and conduit.*
21. *Includes main PLC panel, HMI/SCADA development, remote access hardware, controls integration of all Phase 1 equipment, and startup/commissioning.*
22. *Consists of hydrogeology desktop study, test well design, and test well reporting and analysis.*
23. *Consists of financing (5%), construction administration (5%), engineering during construction (5%), and legal/administrative costs (5%).*
24. *Adjustment accounting for inflation between project cost estimation and project bidding. Based on the project schedule presented in Section 6 and the average Construction Cost Index changes over the previous 2 years.*

An opinion of probable capital costs for Phase 2 improvements to the SLCWD distribution system under the selected alternative with appropriate contingencies is included in **Table 7-2**.

Table 7-2: Phase 2 Opinion of Probable Capital Cost				
Item	**Qty.**	**Units**	**Unit Price**	**Cost**
General				
Mobilization, Demobilization, and Cleanup[1]	1	LS	$ 228,000	$ 228,000
			Subtotal	**$ 228,000**
Equipment				
Online Analyzers and Instrumentation[2]	1	LS	$ 45,000	$ 45,000
Well Pump Replacements[3]	2	LS	$ 25,000	$ 50,000
Reverse Osmosis System[4]	1	LS	$ 1,500,000	$ 1,500,000
Degasification System[5]	1	LS	$ 125,000	$ 125,000
Product Water Pump Station[6]	1	LS	$ 150,000	$ 150,000
Chemical Feed Storage and Injection Systems[7]	3	LS	$ 60,000	$ 180,000
ROC Storage Tank and Disposal Pumps[8]	1	LS	$ 80,000	$ 80,000
HVAC System[9]	1	LS	$ 75,000	$ 75,000
			Subtotal	**$ 2,205,000**
Structures and Foundations				
Concrete Masonry Unit Building and Foundation[10]	1600	SF	$ 600	$ 960,000
Concrete Slab Foundations[11]	16	CY	$ 1,200	$ 19,200
Steel Shade Structures and Anchorage[12]	1	LS	$ 35,000	$ 35,000
			Subtotal	**$ 1,015,000**
Electrical and Controls				
Electrical Improvements[13]	1	LS	$ 200,000	$ 200,000
Controls Improvements[14]	1	LS	$ 120,000	$ 120,000
			Subtotal	**$ 320,000**
Mechanical				
Process and Service Piping, Fittings, and Appurtenances[15]	1	LS	$ 800,000	$ 800,000
			Subtotal	**$ 800,000**
			Construction Total	**$ 4,552,000**
			Contingency (20%)	$ 911,000

Table 7-2: Phase 2 Opinion of Probable Capital Cost	
Total with Contingency	**$ 5,463,000**
Administrative, Engineering, and Construction Management (20%)[16]	$ 1,093,000
Total	**$ 6,556,000**
Inflation Adjustment[17]	$ 633,000
Total at Time of Bid	**$ 7,189,000**

Notes:

1. *Assumes mobilization, demobilization, and cleanup to be approximately 5% of the Construction Total.*
2. *Consists of one Free Chlorine/pH analyzer, one TDS analyzer, pump discharge pressure transmitters, and tank level instrumentation.*
3. *Includes two 7.5-HP vertical turbine pumps and integration into existing VFDs.*
4. *Consists of a 100-gpm (assumes approx. 40% of the raw water bypassed), 2-stage reverse osmosis skid with 8-inch elements, cartridge filters, online turbidity, ORP, TDS, pressure, and flow analyzers, local control panel, booster pump, skid-mounted piping and appurtenances, clean-in-place pump and tank, and permeate flush pump.*
5. *Consists of HDPE degasification tank with baffles, control panel, and blowers with associated piping and appurtenances.*
6. *Consists of three vertical turbine pumps and pressure transducer with associated piping and appurtenances. Includes prefabricated concrete wet-well structure.*
7. *Consists of duplex diaphragm metering pump skids with associated piping and instrumentation (assumes delivery of 275-IBC Tote Chemicals) for 38% Sodium Bisulfite, 93% Sulfuric Acid, and 100% Antiscalant.*
8. *Consists of one (1) 10,000-gallon FRP concentrate equalization storage tank with two (2) end-suction centrifugal pumps (with corrosion resistant, stainless steel wetted parts) associated piping and appurtenances.*
9. *Includes new 13-ton cooling capacity blower and ductwork for new CMU building.*
10. *Includes 40' x 40' x 12' (Length x Width x Height) concrete masonry unit building (8-inch split-faced CMU walls with adequate insulation, two (2) doors, and a single coiling overhead roll-up door with associated structural foundations. CMU building shall include operations room and process room.*
11. *Includes 40' by 10' slab for product water pumps and degasification system and 14' by 16' slab for concentrate disposal system. Includes 10% safety factor for waste and overages.*
12. *Assumes prefabricated aluminum shade structures with aluminum quarter side panels for additional UV protection. Includes 40' by 10' structure for product water pumps and degasification system enclosure.*
13. *Includes conduit installation and integration of Phase 2 equipment to existing MCCs.*
14. *Includes HMI/SCADA development, integration of Phase 2 equipment, field wiring, additional I/O modules, and startup/commissioning.*
15. *Assumes welded carbon steel and ductile-iron yard pipe and fittings (buried and exposed, respectively). Assumes RO process piping will be 316L Stainless Steel. Includes process connections from filtration skid to cartridge filters, RO, degasification, product water pumps, and ROC storage and disposal pumps.*
16. *Consists of financing (5%), construction administration (5%), engineering and construction management during construction (5%), and legal/administrative costs (5%).*
17. *Adjustment accounting for inflation between project cost estimation and project bidding. Based on the project schedule presented in Section 6.0 and the average Engineering News Record Construction Cost Index change for 2020 – 2024 (5.84%).*

7.1 Short Term Expenditures

Approximately $6.05M in grants have been earmarked for Phase 1 project improvements. The Environmental Protection Agency (EPA) has approximately $2.05M in Community Grant Program funding that may be used toward planning or construction and may be awarded within 2-3 months of a complete application. The SWRCB has $4M via AB102 that may be used for construction activities only. Funds must be expended by June 2027, therefore necessitating portions of the project to be expedited. **Table 7-3** indicates the portions of the project that may be expedited to expend the $6.05M in grant funding.

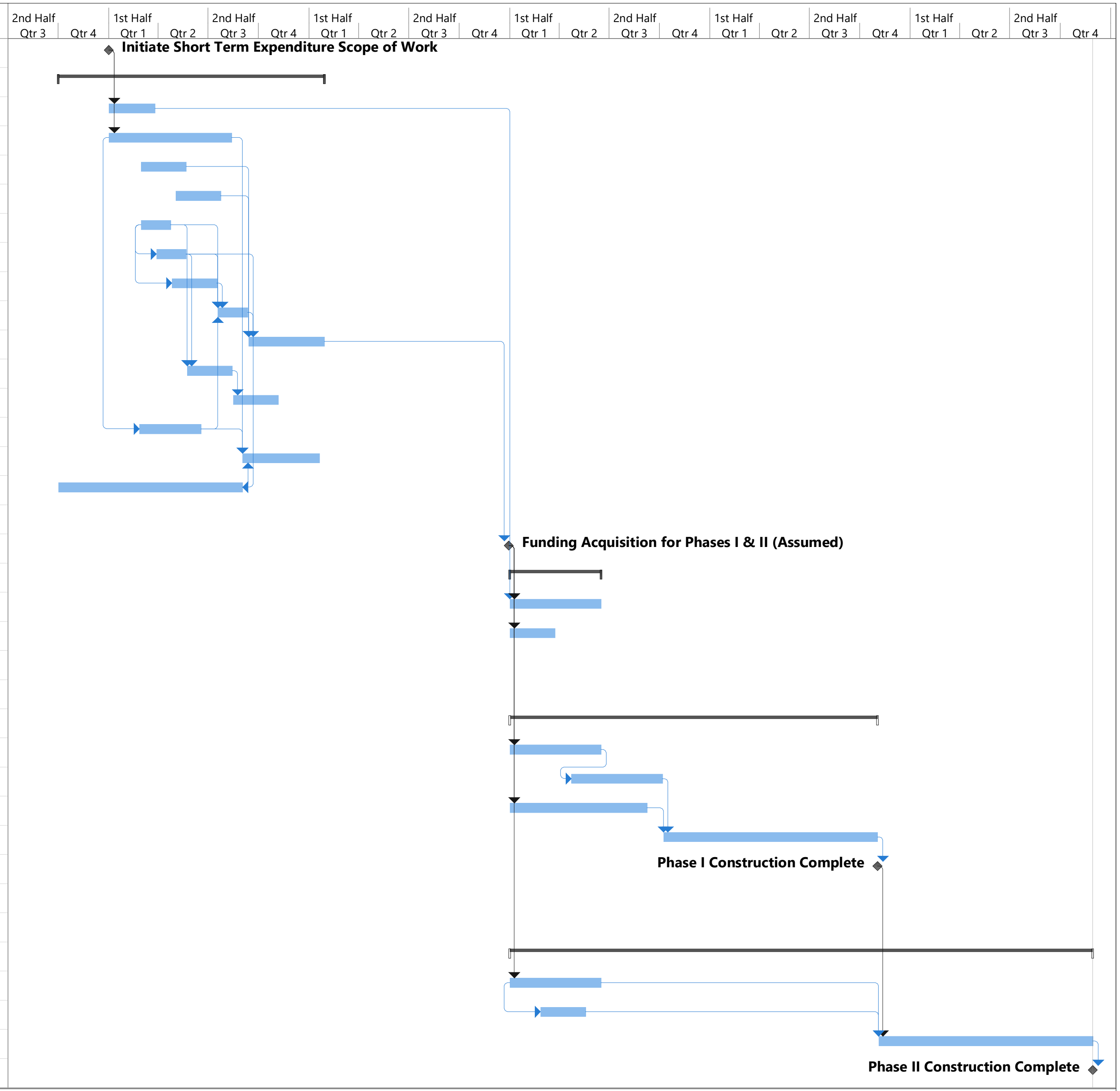
Table 7-3: Capital Cost Short Term Expenditures

Item	Description	Estimated Cost
EPA - Planning		
1	Project Management & Meetings	$ 89,600
2	Water Storage Tank Condition Assessment	$ 17,240
3	Monitoring & Production Well Planning	$ 275,000
4	Hydraulic Modeling	$ 14,520
5	Water Loss Audit	$ 7,744
6	Data Review & Utility Record Search	$ 14,996
7	Survey	$ 84,700
8	Geotechnical Study	$ 44,700
9	Design Confirmation TM	$ 16,950
10	Preliminary Engineering	$ 154,050
11	Expedited Design Packages	$ 10,000
	EPA Planning Subtotal	**$ 729,500**
EPA - Construction		
1	Production Wells (Partial)	$ 1,322,500
	EPA Construction Subtotal	**$ 1,322,500**
	EPA Planning and Construction Total	**$ 2,052,000**
SWRCB - Construction		
1	Chain-Link Fencing	$ 47,500
2	Exploratory Monitoring Well & Associated Testing	$ 315,000
3	Production Wells (Partial)	$ 3,507,500
4	Land Acquisition	$ 130,000
	SWRCB Construction Total	**$ 4,000,000**
	Total Short Term Planning & Construction Costs	**$ 6,052,000**

8.0 Schedule & Phasing

Schedule and phasing are highly dependent on funding availability. **Figure 8-1** presents a high-level anticipated project schedule and demonstrates how select tasks may be completed concurrently to improve schedule efficiency and shorten the overall project timeline. Due to uncertainty of this timing, the following durations are anticipated, but actual timing is unknown.

ID	Task Name	Duration
1	**Initiate Short Term Expenditure Scope of Work**	**0 days**
2	**Short-Term Expenditures**	**347 days**
3	Water Storage Tank Condition Assessment	3 mons
4	Monitoring & Production Well Planning	8 mons
5	Hydraulic Modeling	3 mons
6	Water Loss Audit	3 mons
7	Data Review & Utility Record Search	2 mons
8	Survey	2 mons
9	Geotechnical Study	3 mons
10	Design Confirmation TM	2 mons
11	Preliminary Engineering	5 mons
12	Expedited Design Packages	3 mons
13	Chain-Link Fencing	3 mons
14	Exploratory Monitoring Well & Associated Testing	4 mons
15	Production Wells	5 mons
16	Land Acquisition	12 mons
17		
18	**Funding Acquisition for Phases I & II (Assumed)**	**0 days**
19	**Pre-Construction**	**120 days**
20	Water Storage Tank Rehabilitation	6 mons
21	Distribution System Rehabilitation	3 mons
22		
23		
24	**Phase I**	**480 days**
25	Piloting & Exploratory Efforts	6 mons
26	Phase I Design	6 mons
27	Environmental & Permitting	9 mons
28	Phase I Bidding & Construction	14 mons
29	Phase I Construction Complete	0 days
30		
31		
32	**Phase II**	**760 days**
33	Phase II Design	6 mons
34	Permitting	3 mons
35	Phase II Bidding & Construction	14 mons
36	Phase II Construction Complete	0 days



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Task	Project Summary	Manual Task	Start-only	Deadline
Split	Inactive Task	Duration-only	Finish-only	Progress
Milestone	Inactive Milestone	Manual Summary Rollup	External Tasks	Manual Progress
Summary	Inactive Summary	Manual Summary	External Milestone	

Fig

9.0 List of Anticipated Sheets and Specifications

A preliminary list of anticipated plans for Phase 1 and Phase 2, respectively, are shown on **Tables 9-1** and **9-2**.

Table 9-1: Anticipated Drawing List – Phase I Groundwater Treatment Facility		
Sheet	**Sheet Number**	**Sheet Title**
GENERAL		
1	G-001	COVER SHEET/TITLE SHEET/SHEET INDEX
2	G-002	SYMBOLS, ABBREVIATIONS, AND LEGEND
3	G-003	NOTES
4	G-004	SITE SURVEY AND CONTROL NOTES
5	G-005	DESIGN CRITERIA
6	G-006	PROCESS FLOW DIAGRAM
7	G-007	HYDRAULIC PROFILE - TREATMENT
8	G-008	HYDRAULIC PROFILE - BACKWASH
CIVIL		
9	C-101	SITE PLAN
10	C-102	GRADING PLAN
11	C-103	YARD PROCESS PIPING PLAN AND PIPE SCHEDULES
12	C-104	TRANSMISSION MAIN PLAN AND PROFILE - I
13	C-105	TRANSMISSION MAIN PLAN AND PROFILE - II
14	C-106	TRANSMISSION MAIN PLAN AND PROFILE - III
15	C-107	TRANSMISSION MAIN PLAN AND PROFILE - IV
16	C-108	WASTE DISPOSAL PIPELINE PLAN AND PROFILE - I
17	C-109	WASTE DISPOSAL PIPELINE PLAN AND PROFILE - II
18	C-110	WASTE DISPOSAL PIPELINE PLAN AND PROFILE - III
19	C-111	WASTE DISPOSAL PIPELINE PLAN AND PROFILE - IV
20	C-112	WASTE DISPOSAL PIPELINE PLAN AND PROFILE - V
21	C-113	WASTE DISPOSAL PIPELINE PLAN AND PROFILE - VII
22	C-114	WASTE DISPOSAL PIPELINE PLAN AND PROFILE - VII
23	C-501	CIVIL DETAILS - I
24	C-502	CIVIL DETAILS - II
25	C-503	CIVIL DETAILS - III
26	C-504	CIVIL DETAILS - IV
PROCESS		
27	D-101	PROCESS 10A: WELL EQUIPPING - PLAN AND SECTIONS
28	D-102	PROCESS 10B: WELL EQUIPPING - PLAN AND SECTIONS
29	D-103	PROCESS 20: MANGANESE DIOXIDE FILTRATION SYSTEM - PLAN AND SECTIONS - PLAN

Table 9-1: Anticipated Drawing List – Phase I Groundwater Treatment Facility		
Sheet	**Sheet Number**	**Sheet Title**
30	D-104	PROCESS 20: MANGANESE DIOXIDE FILTRATION SYSTEM - SECTIONS AND DETAILS
31	D-105	PROCESS 20: MANGANESE DIOXIDE FILTRATION SYSTEM - ISOMETRICS
32	D-106	PROCESS 30: SODIUM HYPOCHLORITE SYSTEM - PLAN AND SECTIONS
33	D-107	PROCESS 30: SODIUM HYPOCHLORITE SYSTEM - ISOMETRICS
34	D-108	PROCESS 40: BACKWASH HANDLING SYSTEM - PLAN AND SECTIONS
35	D-109	PROCESS 40: BACKWASH HANDLING SYSTEM - ISOMETRICS
36	D-110	PROCESS DETAILS - I
37	D-111	PROCESS DETAILS - I
STRUCTURAL		
38	S-101	SLABS PLAN, NOTES, AND DETAILS
ELECTRICAL		
39	E-001	ELECTRICAL LEGEND AND NOTES
40	E-101	ELECTRICAL SITE PLAN & CONDUIT SCHEDULE
41	E-102	SINGLE LINE DIAGRAM AND PANEL SCHEDULES
42	E-103	CONTROL SCHEMATICS AND I/O LIST
43	E-104	CABLE AND CONDUIT SCHEDULES
44	E-105	FIXTURE SCHEDULE AND DETAILS
45	E-106	ELECTRICAL DETAILS
INSTRUMENTATION		
46	N-001	INSTRUMENTATION LEGEND AND SYMBOLS - I
47	N-002	INSTRUMENTATION LEGEND AND SYMBOLS - II
48	N-003	COMMUNICATIONS BLOCK DIAGRAM
49	N-101	PROCESS 10A: WELL EQUIPPING - P&ID
50	N-102	PROCESS 10B: WELL EQUIPPING - P&ID
51	N-103	PROCESS 20: MANGANESE DIOXIDE FILTRATION SYSTEM - P&ID
52	N-104	PROCESS 30: SODIUM HYPOCHLORITE SYSTEM - P&ID
53	N-105	PROCESS 40: BACKWASH HANDLING SYSTEM - P&ID

Table 9-2: Anticipated Drawing List – Phase II Groundwater Treatment Facility		
Sheet	**Sheet Number**	**Sheet Title**
GENERAL		
1	G-001	COVER SHEET/TITLE SHEET/SHEET INDEX
2	G-002	SYMBOLS, ABBREVIATIONS, AND LEGEND
3	G-003	NOTES
4	G-004	SITE SURVEY AND CONTROL NOTES
5	G-005	DESIGN CRITERIA
6	G-006	PROCESS FLOW DIAGRAM
CIVIL		
7	C-101	SITE PLAN
8	C-102	GRADING PLAN
9	C-103	YARD PROCESS PIPING PLAN AND PIPE SCHEDULES
10	C-104	DEMOLITION PLAN
11	C-501	CIVIL DETAILS - I
12	C-502	CIVIL DETAILS - II
PROCESS		
13	D-101	PROCESS 50: CARTRIDGE FILTRATION - PLAN AND SECTION
14	D-102	PROCESS 60: REVERSE OSMOSIS - PLAN AND SECTION -I
15	D-103	PROCESS 60: REVERSE OSMOSIS - PLAN AND SECTION -II
16	D-104	PROCESS 60: REVERSE OSMOSIS - PLAN AND SECTION -III
17	D-105	PROCESS 60: REVERSE OSMOSIS - PLAN AND SECTION -IV
18	D-106	PROCESS 60: REVERSE OSMOSIS - ISOMETRICS
19	D-107	PROCESS 70: DEGASIFICATION - PLAN AND SECTION
20	D-108	PROCESS 70: DEGASIFICATION - ISOMETRICS
21	D-109	PROCESS 80: PRODUCT WATER PUMP STATION - PLAN AND SECTION
22	D-110	PROCESS 80: PRODUCT WATER PUMP STATION - ISOMETRICS
23	D-111	PROCESS 90: REVERSE OSMOSIS CONCENTRATE HANDLING SYSTEM - PLAN AND SECTIONS
24	D-112	PROCESS 90: REVERSE OSMOSIS CONCENTRATE HANDLING SYSTEM - ISOMETRICS
25	D-113	PROCESS 100A: SULFURIC ACID STORAGE AND FEED SYSTEM - PLAN AND SECTIONS
26	D-114	PROCESS 100B: MEMBRANE ANTISCALANT STORAGE AND FEED SYSTEM - PLAN AND SECTIONS
27	D-115	PROCESS 100C: SODIUM BISULFITE STORAGE AND FEED SYSTEM - PLAN AND SECTIONS
28	D-116	PROCESS 100D: SODIUM HYDROXIDE STORAGE AND FEED SYSTEM - PLAN AND SECTIONS
29	D-501	PROCESS DETAILS - I
30	D-502	PROCESS DETAILS - II

Table 9-2: Anticipated Drawing List – Phase II Groundwater Treatment Facility		
Sheet	**Sheet Number**	**Sheet Title**
STRUCTURAL		
31	S-101	SLABS PLAN, NOTES, AND DETAILS
32	S-102	CMU BUILDING - PLAN AND SECTIONS
33	S-103	CMU BUILDING DETAILS
34	S-104	STRUCTURAL DETAILS
ELECTRICAL		
35	E-001	ELECTRICAL LEGEND AND NOTES
36	E-101	ELECTRICAL SITE PLAN & CONDUIT SCHEDULE
37	E-102	SINGLE LINE DIAGRAM AND PANEL SCHEDULES
38	E-103	CONTROL SCHEMATICS AND I/O LIST
39	E-104	CABLE AND CONDUIT SCHEDULES
40	E-105	FIXTURE SCHEDULE AND DETAILS
41	E-106	ELECTRICAL DETAILS
INSTRUMENTATION		
42	N-001	INSTRUMENTATION LEGEND AND SYMBOLS - I
43	N-002	INSTRUMENTATION LEGEND AND SYMBOLS - II
44	N-003	COMMUNICATIONS BLOCK DIAGRAM
45	N-101	PROCESS 50: CARTRIDGE FILTRATION - P&ID
46	N-102	PROCESS 60: REVERSE OSMOSIS - OVERALL SYSTEM P&ID
47	N-103	PROCESS 60: REVERSE OSMOSIS - FEED PUMPING P&ID
48	N-104	PROCESS 60: REVERSE OSMOSIS - FIRST STAGE P&ID
49	N-105	PROCESS 60: REVERSE OSMOSIS - SECOND STAGE P&ID
50	N-106	PROCESS 60: REVERSE OSMOSIS - CONCENTRATE P&ID
51	N-107	PROCESS 60: REVERSE OSMOSIS - PERMEATE P&ID
52	N-108	PROCESS 60: REVERSE OSMOSIS - CONCENTRATE/PERMEATE FLUSH P&ID
53	N-109	PROCESS 70: DEGASIFICATION - P&ID
54	N-110	PROCESS 80: PRODUCT WATER PUMP STATION - P&ID
55	N-111	PROCESS 90: REVERSE OSMOSIS CONCENTRATE HANDLING SYSTEM - P&ID
56	N-112	PROCESS 100A: SULFURIC ACID STORAGE AND FEED SYSTEM - P&ID
57	N-113	PROCESS 100B: MEMBRANE ANTISCALANT STORAGE AND FEED SYSTEM - P&ID
58	N-114	PROCESS 100C: SODIUM BISULFITE STORAGE AND FEED SYSTEM - P&ID
59	N-115	PROCESS 100D: SODIUM HYDROXIDE STORAGE AND FEED SYSTEM - P&ID

A preliminary list of anticipated technical specifications for Phase 1 and Phase 2, respectively, are shown on **Tables 9-3** and **9-4**.

Table 9-3: Anticipated Specification List – Phase I Groundwater Treatment Facility	
Section	**Description**
DIVISION 00 – BID ITEMS	
000010	EXPLANATION OF BID ITEMS
DIVISION 01 – GENERAL REQUIREMENTS	
11100	DESCRIPTON AND COORDINATION OF WORK
12000	MEASUREMENT AND PAYMENT
13300	SUBMITTALS
17825	PLANT TESTING STARTUP AND COMMISSIONING
17826	PERFORMANCE TESTING
19310	OPERATION AND MAINTENANCE MANUALS
DIVISION 02 – EXISTING CONDITIONS	
20120	PROTECTING EXISTING UNDERGROUND UTILITIES
20130	CONNECTIONS TO EXISTING BURIED PIPELINES
23219	SUBSURFACE UTILITY LOCATING (POTHOLING)
DIVISION 03 – CONCRETE	
33000	CAST-IN-PLACE CONCRETE
DIVISION 05 – METALS	
50520	BOLTS, WASHERS, ANCHORS, AND EYEBOLTS
DIVISION 09 – FINISHES	
99000	PAINTING AND COATING
99752	COLD-APPLIED WAX TAPE COATING
99754	POLYETHYLENE SHEET ENCASEMENT (AWWA C105)
DIVISION 26 – ELECTRICAL	
260101	BASIC ELECTRICAL REQUIREMENTS
260126	ELECTRIAL FIELD TESTING
260519	WIRES AND CABLES
260526	GROUNDING AND BONDING
260529	SUPPORTING DEVICES
260533	RACEWAYS
260534	ELECTRICAL BOXES
260535	UNDERGROUND STRUCTURES
260553	BASIC ELECTRICAL IDENTIFICATIONS
260573	ELECTRICAL SYSTEM STUDY
262213	TRANSFORMERS
262413	SWITCHBOARDS
262416	PANELBOARDS

Table 9-3: Anticipated Specification List – Phase I Groundwater Treatment Facility	
Section	**Description**
262726	WIRING DEVICES
262816	ENCLOSED SWITCHES AND CIRCUIT BREAKERS
264231	ELECTRIC MOTORS
264231	FLANGE INSULATION KIT
265600	EXTERIOR LIGHTING
DIVISION 27 – NETWORK COMMUNICATIONS	
271100	NETWORK EQUIPMENT SYSTEMS
DIVISION 31 – EARTHWORK	
311100	CLEARING, STRIPPING, AND GRUBBING
312300	EARTHWORK
312316	TRENCHING, BACKFILLING, AND COMPACTING
DIVISION 33 – UTILITIES	
330130	LEAKAGE AND INFILTRATION TESTING
331220	BACKFLOW PREVENTORS AND DETECTOR CHECKS
331300	DISINFECTION OF PIPING AND STRUCTURES
333112	PVC GRAVITY SEWER PIPE
DIVISION 40 – PROCESS INTEGRATION	
400500	GENERAL PIPING REQUIREMENTS
400515	PRESSURE TESTING OF PIPING
400520	MANUAL, CHECK, AND PROCESS VALVES
400560	AIR-RELEASE AND VACUUM-RELIEF VALVES
400570	GLOBE PATTERN CONTROL VALVES (AWWA C530)
400722	FLEXIBLE PIPE COUPLINGS AND EXPANSION JOINTS
400764	PIPE HANGERS AND SUPPORTS
400775	EQUIPMENT, PIPING, DUCT, AND VALVE IDENTIFICATION
402001	GENERAL REQUIREMENTS FOR STEEL PIPING
402035	RUBBER AND PLASTIC TUBING
402040	DUCTILE-IRON PIPE
402053	CARBON STEEL PIPE (16 INCHES AND SMALLER)
402090	PVC PIPE, 3 INCHES AND SMALLER
402094	CPVC PIPE, 3 INCHES AND SMALLER
405010	PCIS LOOP DESCRIPTIONS
405030	ANALYTICAL INSTRUMENTS
409000	INSTRUMENTATION
409117	MAGNETIC LEVEL INDICATOR
409210	ELECTRIC MOTOR ACTUATORS FOR VALVES
409500	PROGRAMMABLE LOGIC CONTROLLER EQUIPMENT

Table 9-3: Anticipated Specification List – Phase I Groundwater Treatment Facility	
Section	**Description**
409513	CONTROL ENCLOSURES
409543	CONTROL PANEL WIRE AND WIRE ACCESSORIES
409741	CONTROL PANEL POWER EQUIPMENT
409742	CONTROL PANEL TERMINALS
409743	CONTROL PANEL RELAYS AND TIMERS
409744	CONTROL PANEL HAND SWITCHES AND PILOT LIGHTS
DIVISION 43 – PROCESS GAS AND LIQUID HANDLING, PURIFICATION, AND STORAGE EQUIPMENT	
432102	MECHANICAL SEALS AND PACKING FOR PUMPS
432110	HORIZONTAL ENDSUCTION CENTRIFUGAL PUMPS
432160	DIAPHRAGM METERING PUMPS
432150	VERTICAL TURBINE PUMPS
433280	PACKAGED CHEMICAL FEED SYSTEM
434127	POLYETHYLENE STORAGE TANKS
DIVISION 44 – POLLUTION CONTROL EQUIPMENT	
444249	IN-LINE STATIC INJECTION RING MIXERS
444312	MANGANESE DIOXIDE FILTRATION SYSTEM

Table 9-4: Anticipated Specification List – Phase II Groundwater Treatment Facility	
Section	**Description**
DIVISION 00 – BID ITEMS	
000010	EXPLANATION OF BID ITEMS
DIVISION 01 – GENERAL REQUIREMENTS	
11100	DESCRIPTON AND COORDINATION OF WORK
12000	MEASUREMENT AND PAYMENT
13300	SUBMITTALS
17825	PLANT TESTING STARTUP AND COMMISSIONING
17826	PERFORMANCE TESTING
19310	OPERATION AND MAINTENANCE MANUALS
DIVISION 02 – EXISTING CONDITIONS	
20120	PROTECTING EXISTING UNDERGROUND UTILITIES
20130	CONNECTIONS TO EXISTING BURIED PIPELINES
23219	SUBSURFACE UTILITY LOCATING (POTHOLING)
DIVISION 03 – CONCRETE	
33000	CAST-IN-PLACE CONCRETE
DIVISION 05 – METALS	
50520	BOLTS, WASHERS, ANCHORS, AND EYEBOLTS
DIVISION 07 – THERMAL AND MOISTURE PROTECTION	
72100	THERMAL INSULATION
74113	FORMED METAL ROOF PANELS
74116	INSULATED METAL ROOF PANELS
74213	INSULATED METAL WALL PANELS
75419	PVC ROOFING
76200	SHEET METAL FLASHING AND TRIM
77100	ROOF SPECIALTIES
77200	ROOF ACCESSORIES
79200	JOINT SEALANTS
DIVISION 08 – OPENINGS	
81113	HOLLOW METAL DOORS AND FRAMES
81119	STAINLESS STEEL DOORS AND FRAMES
83323	OVERHEAD COILING DOORS
DIVISION 09 – FINISHES	
99000	PAINTING AND COATING
99752	COLD-APPLIED WAX TAPE COATING
99754	POLYETHYLENE SHEET ENCASEMENT (AWWA C105)
DIVISION 10 – SPECIALTIES	
101423	ROOM IDENTIFICATION PANEL SIGNAGE

Table 9-4: Anticipated Specification List – Phase II Groundwater Treatment Facility	
Section	**Description**
101470	ROOM DESIGNATOR AND HAZARDOUS AREA SIGNS
DIVISION 13 – SPECIAL CONSTRUCTION	
133419	PREFABRICATED BUILDINGS
DIVISION 22 – PLUMBING	
220000	PLUMBING
221118	RUBBER WATER HOSE, NOZZLES, AND QUICK CONNECTS
DIVISION 23 – HEATING, VENTILATING, AND AIR CONDITIONING	
230000	GENERAL MECHANICAL PROVISIONS
230001	HEATING, VENTILATING, AND AIR CONDITIONING
230529	HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT
230553	IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT
230593	TESTING, ADJUSTING, AND BALANCING FOR HVAC
230700	HVAC INSULATION
230913	INSTRUMENTATION AND CONTROL DEVICES FOR HVAC
232300	REFRIGERANT PIPING
233100	METAL DUCTS AND ACCESSORIES
233423	HVAC POWER VENTILATORS
233700	AIR OUTLETS AND INLETS
234100	PARTICULATE AIR FILTRATION
238126	SPLIT SYSTEM HEAT PUMPS
DIVISION 26 – ELECTRICAL	
260101	BASIC ELECTRICAL REQUIREMENTS
260126	ELECTRIAL FIELD TESTING
260519	WIRES AND CABLES
260526	GROUNDING AND BONDING
260529	SUPPORTING DEVICES
260533	RACEWAYS
260534	ELECTRICAL BOXES
260535	UNDERGROUND STRUCTURES
260553	BASIC ELECTRICAL IDENTIFICATIONS
260573	ELECTRICAL SYSTEM STUDY
262413	SWITCHBOARDS
262416	PANELBOARDS
262726	WIRING DEVICES
262816	ENCLOSED SWITCHES AND CIRCUIT BREAKERS
264231	ELECTRIC MOTORS
264231	FLANGE INSULATION KIT

Table 9-4: Anticipated Specification List – Phase II Groundwater Treatment Facility	
Section	**Description**
265600	EXTERIOR LIGHTING
DIVISION 27 – NETWORK COMMUNICATIONS	
271100	NETWORK EQUIPMENT SYSTEMS
DIVISION 31 – EARTHWORK	
311100	CLEARING, STRIPPING, AND GRUBBING
312300	EARTHWORK
312316	TRENCHING, BACKFILLING, AND COMPACTING
DIVISION 33 – UTILITIES	
330130	LEAKAGE AND INFILTRATION TESTING
331300	DISINFECTION OF PIPING AND STRUCTURES
333112	PVC GRAVITY SEWER PIPE
DIVISION 40 – PROCESS INTEGRATION	
400500	GENERAL PIPING REQUIREMENTS
400515	PRESSURE TESTING OF PIPING
400520	MANUAL, CHECK, AND PROCESS VALVES
400560	AIR-RELEASE AND VACUUM-RELIEF VALVES
400570	GLOBE PATTERN CONTROL VALVES (AWWA C530)
400722	FLEXIBLE PIPE COUPLINGS AND EXPANSION JOINTS
400764	PIPE HANGERS AND SUPPORTS
400775	EQUIPMENT, PIPING, DUCT, AND VALVE IDENTIFICATION
402001	GENERAL REQUIREMENTS FOR STEEL PIPING
402035	RUBBER AND PLASTIC TUBING
402040	DUCTILE-IRON PIPE
402053	CARBON STEEL PIPE (16 INCHES AND SMALLER)
402090	PVC PIPE, 3 INCHES AND SMALLER
402094	CPVC PIPE, 3 INCHES AND SMALLER
405010	PCIS LOOP DESCRIPTIONS
405030	ANALYTICAL INSTRUMENTS
409000	INSTRUMENTATION
409117	MAGNETIC LEVEL INDICATOR
409210	ELECTRIC MOTOR ACTUATORS FOR VALVES
409500	PROGRAMMABLE LOGIC CONTROLLER EQUIPMENT
409513	CONTROL ENCLOSURES
409543	CONTROL PANEL WIRE AND WIRE ACCESSORIES
409741	CONTROL PANEL POWER EQUIPMENT
409742	CONTROL PANEL TERMINALS
409743	CONTROL PANEL RELAYS AND TIMERS

Table 9-4: Anticipated Specification List – Phase II Groundwater Treatment Facility	
Section	**Description**
409744	CONTROL PANEL HAND SWITCHES AND PILOT LIGHTS
DIVISION 43 – PROCESS GAS AND LIQUID HANDLING, PURIFICATION, AND STORAGE EQUIPMENT	
432160	DIAPHRAGM METERING PUMPS
432102	MECHANICAL SEALS AND PACKING FOR PUMPS
432110	HORIZONTAL ENDSUCTION CENTRIFUGAL PUMPS
433280	PACKAGED CHEMICAL FEED SYSTEM
434127	POLYETHYLENE STORAGE TANKS
DIVISION 44 – POLLUTION CONTROL EQUIPMENT	
444249	IN-LINE STATIC INJECTION RING MIXERS
444210	MEMBRANE SYSTEMS
444212	REVERSE OSMOSIS MEMBRANES
444313	CARTRIDGE FILTERS
444331	DEGASIFICATION SYSTEM
444312	MANGANESE DIOXIDE FILTRATION SYSTEM

10.0 Next Steps and Outstanding Issues

The following items represent next steps and outstanding issues that need to be addressed prior to development of the project design. Results of these items are anticipated to be covered in the Design Confirmation TM.

- Field confirmation of distribution system pressures
- Condition assessment of the water storage tank to evaluate the scope of repairs and/or the need for replacement of the tank
- Additional discussion of exploration, testing, and expectations to be discussed with property owner to facilitate acquisition or temporary construction easement discussions
- Monitoring well construction and testing
- Environmental and Permitting Constraints Memorandum
- Confirmation of treatment approach and hydraulic calculations following exploratory efforts
- Confirmation of funding agency design and procurement requirements

Attachment A

2024 Sanitary Survey

State Water Resources Control Board
Division of Drinking Water

October 10, 2024

Antonio Ramirez, Secretary
San Lucas County Water District
PO Box 166
San Lucas, CA 93954
sanlucaswater@gmail.com

Dear Antonio Ramirez,

2024 SANITARY SURVEY – SAN LUCAS COUNTY WATER DISTRICT (CA2701676)

The State Water Resources Control Board Division of Drinking Water (Division) conducted a sanitary survey of the San Lucas County Water District (San Lucas) water system on February 29, 2024. This letter documents the findings of the sanitary survey.

The deficiencies that must be corrected are described in this letter and listed in the Deficiency List (**Attachment A**). A written response to this letter and the deficiency list is requested by ***November 10, 2024***, along with a plan to correct the deficiencies listed in the deficiency list. On the deficiency list table, please include the date of correction or planned date to correct the deficiencies listed and submit the table with the response to this letter.

The sanitary survey consisted of a physical inspection and an assessment of the following elements:

A. Source – Well 03,
B. Source and Storage Capacity
C. Treatment – Iron and Manganese Removal Plant,
D. Distribution system,
E. Finished water storage,
F. Pumps, pump facilities, and controls,
G. Monitoring, reporting, and data verification,
H. System management and operation, and
I. Operator compliance with State requirements

A. SOURCE – WELL 03

San Lucas CWD has one active groundwater source, Well 03. The water system does not have standby sources, backup supply, or emergency interconnections with another public water system. The Naraghi Family owns Well 03, but San Lucas CWD has an agreement to use the well as the water system's primary and sole water source.

Well 03 is located on an agricultural field. The well site is not housed, but it is secured by a high chain-link fence with a locked gate. Well 03 uses a submersible pump to deliver raw water to the iron and manganese removal treatment plant. The operator visits the well weekly.

The well facility is in good condition. The well site is located in the 100-year flood plain. To protect the well against flooding, the well head terminates more than 6 feet above the finished grade. A tall platform was constructed around the well casing with a ladder to access the well head. The well head is at least 1.5-feet above flood level.

Source Capacity				
Source Name	**PS Code**	**Status**	**Capacity (gpm)**	**Comments**
Well 03	CA2701676_006_006	Active	150	Wellhead structure is in good condition and protected from flooding.
TOTAL ACTIVE CAPACITY			150 gpm = 0.22 million gallons per day (MGD)	

Drinking Water Source Assessment Program (DWSAP)

DWSAP Summary		
Source	**Date**	**Potential Contaminating Activities**
Well 03	No source assessment completed for this well.	The well site is surrounded by agricultural fields. A ditch with runoff from agricultural irrigation runs a few feet from the well site. The Salinas River is approximately 300 feet from Well 03. The site is subject to flooding.

Deficiencies:

(1) The ground surrounding the well's concrete base was wet from runoff coming from the adjacent agricultural field. The runoff appears to be eroding the soil along the edge of the concrete base. The soil around the well must be graded such that it slopes away from the well. Surface runoff from agricultural irrigation must be diverted away from the well site.

(2) A DWSAP report has not been completed for Well 03.

(3) At the time of the inspection, the vent for the air release valve on the well discharge pipe needed a screen. The water system corrected this deficiency by installing a screen on the vent. Documentation was submitted to the Division on March 22, 2024. This deficiency has been corrected.

(4) The well is vulnerable to contamination from agricultural activities.

Recommendations:

(1) San Lucas CWD should request a larger easement around the well to provide the well with a 50-foot radius protection zone.

Please review the Sanitary Survey Deficiency List (**Attachment A**) for a description of the required corrective actions and due dates.

B. SOURCE AND STORAGE CAPACITY EVALUATION

The table below summarizes the past 10 years of production data as reported on San Lucas CWD's annual reports to the Division of Drinking Water:

Past 10 Years of Production Data (2014-2023) in Million Gallons (MG)			
Year	**Max Day***	**Max Month**	**Year Total**
2014	*0.06*	1.30 (July)	9.73
2015	*0.05*	1.01 (July)	8.44
2016	0.05	1.00 (July)	8.43
2017	0.05	1.05 (June)	7.44
2018	0.10	2.11 (March)	11.97
2019	0.09	1.87 (June)	12.40
2020	**0.11**	**2.37 (July)**	15.36
2021	0.10	1.92 (June)	15.41
2022	0.08	1.68 (July)	12.53
2023	0.08	1.61 (August)	11.68

*Estimated Max Day calculated by dividing max month by number of days in month and multiplying by a peaking factor of 1.5

Maximum production day from past 10 years: The maximum day demand (MDD) volume is 0.11 MGD

California Code of Regulations, title 22, section 64554 (a) requires maximum day demand (MDD) to be met with source capacity. MDD is calculated as the highest observed water demand in the past ten years. For systems with less than 1,000 service connections, the system must also have storage capacity equal to or greater than the MDD.

Using data provided in the past annual reports, the MDD was found to be **0.11 million gallons/day** (MGD). San Lucas CWD's source capacity is **0.22 MGD**. The water system is able to meet the 10-year MDD with source capacity alone.

A summary of source and storage capacity requirements is summarized in the following table:

Summary of Source & Storage Capacity Requirements			
Parameter	**Requirement (MGD)**	**Capacity (MGD)**	**Requirement Met?**
MDD - Sources	0.11	0.22	**Yes**
Storage Capacity	0.11	0.3	**Yes**

Recommendations:

(1) San Lucas CWD should consider adding a second water source for redundancy.

C. <u>TREATMENT</u>

San Lucas County Water District owns and operates a groundwater treatment plant to remove iron and manganese from Well 03. The plant is an *ATEC Iron and Manganese Removal System* with four pressure filters. The operations and maintenance plan for the filtration system is dated October 20, 2003. According to the operations and maintenance plan, the original media installed in the filters was *ATEC Systems 741M* filter media, a granular manganese dioxide (MnO_2) with a pyrolusite base.

Continuous chlorination is provided to the water from Well 03 at the iron and manganese treatment plant facility. Sodium hypochlorite is injected upstream of the iron and manganese removal filters to provide disinfection and oxidation prior to filtration. The chlorine injection equipment and chlorine solution crock are housed in a concrete building at the iron and manganese treatment plant site. An adequate amount of chlorine is stored at the treatment plant. San Lucas County Water District has more than a week of available onsite liquid chlorine.

Groundwater Treatment Plant		
PS Code	**Objectives**	**Comments**
CA2701676_004_004 Facility Name: Fe/Mn Water Treatment Plat	Iron and manganese removal and disinfection with sodium hypochlorite	The treatment plant is in need of repair or replacement.

<u>*Treatment Chemicals*</u>:

Chemical	Purpose	Manufacturer	NSF 60 Certified	Comments
Sodium Hypochlorite	Disinfection and oxidation	Hasa Multichlor	Yes	Injection point is upstream of the filters

Treatment Plant Performance:

The performance of the filtration system is not adequate. The filtration system is failing to consistently produce water that meets drinking water standards. San Lucas CWD is aware that the treatment facility is failing but has not completed corrective actions to solve this problem. In addition, the record maintenance for the plant is not adequate. The water system cannot confirm what type of media is being used in the filters and when the media was last inspected and/or changed. At the time of the inspection, the filter-backwash pond located in front of the treatment plant building was flooded due to malfunction of the backwash control system.

A review of the iron and manganese monitoring results submitted to the Division shows that the treated (i.e., filtered) water delivered to the distribution system has exceeded the manganese secondary maximum contaminant level (MCL) of 50 ug/L and the secondary MCL for iron of 300 ug/L. Treated water monitoring results are summarized below:

2023 – Treated Water Monitoring Results for Iron & Manganese (ug/L)

	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Manganese (MCL = 50 ug/L)	**108**	**274**	03/30 =18; 03/16 =21; Ave. =19.5[1]	4/27 =ND; 4/20 = ND; 4/13 =ND; 04/06 =18; Ave. =4.5[2]	ND	ND	ND	No sample	ND	ND	ND	**111**
Iron (MCL = 300 ug/L)	185	171	03/30 =82; 03/16=12; Ave. =104.5[1]	04/27 = ND; 04/20 =ND; 04/13 =42; 04/06 =56; Ave. =24.5[2]	83	32	38	No sample	**383**	32	66	**740**

ND = not detected; Results in bold font are above the secondary MCL.

2024 – Treated Water Monitoring Results for Iron & Manganese (ug/L)

	Jan	Feb	March	April	May	June	July	Aug
Manganese (MCL = 50 ug/L)	41	20	3/28 =31; 03/14 = **64** Ave. =47.5[1]	16	**210**	ND	**53**	ND
Iron (MCL = 300 ug/L)	162	63	03/28 =90; 03/14 =**1390**; Ave. =**740**[1]	192	231	61	**1580**	**399**

ND = not detected; Results in bold font are above the secondary MCL.

[1] Average of two sample results.
[2] Average of four sample results.

Compliance with the secondary MCLs for iron and manganese is not based on a single sample result; it is is based on a running annual average (RAA) of four quarters of monitoring (Cal. Code Regs., tit. 22, § 64449, subd. (c).). The current RAAs for iron and manganese in the water served to the public for the period of October 2023 through August 2024 (most recent 4-quartes) are:

	RAA (ug/L)	**Secondary MCL (ug/L)**	**In Compliance? (yes/no)**
Manganese	44.5	50	Yes
Iron	**464.1**	300	**No**

The San Lucas CWD exceeded the secondary MCL for iron during the third quarter of 2024.

Deficiencies:

(1) Combined vessel effluent pipe has a leak. The leak must be repaired.

(2) The filter backwash control system is not working properly. The control for the backwash process needs to be repaired or replaced.

(3) Backwash flow meter needs to be replaced.

(4) The treatment system is not equipped with filter head-loss gages

(5) The treatment system is not equipped with flow rate/equalization control for the filters

(6) Filtered water intermittently exceeds the iron and manganese secondary MCLs.

(7) Failure to comply with Directive 11 of Compliance Order No. 02_05_23R_003, issued June 8, 2023. Specifically, failure to submit an updated operations plan for the iron and manganese water treatment plant prepared by a licensed engineer, water treatment operator, or other individual qualified in the area of drinking water treatment by **July 30, 2023**.

(8) The treatment plant must be repaired or replace to ensure water served to the public consistently meets the secondary MCLs for iron and manganese. The San Lucas CWD must prepare a corrective action plan in accordance with Directive 12 of Compliance Order No. 02_05_23R_003 (issued June 8, 2023). The corrective action plan (CAP) must be submitted to the Division for review and approval and must include the following:

   a. An assessment of the treatment facility to determine the extent of needed repairs or replacement. The assessment must be performed by an engineer, licensed treatment operator, or other qualified individual with experience in iron and manganese treatment. Based on the findings, the San Lucas CWD must select the best solution that would ensure effective iron and manganese removal at the treatment plant.

b. A schedule for completion of the phases of the project and a date that shows when San Lucas CWD will have reliable compliance with the iron and manganese MCLs.

c. A cost estimate for the proposed project, including costs for planning, permitting and environmental review, design, construction, and testing.

d. A discussion on the source of funding for the project, i.e., system revenues, loans or grants.

e. Date to complete construction of the project.

D. DISTRIBUTION SYSTEM

San Lucas CWD reported one main break in the distribution system in 2023. The main was repaired in accordance with the Waterworks Standards. The water system operator, Cypress Water Services maintains records of distribution system maintenance and repairs. No deficiencies were identified in the distribution system.

E. FINISHED WATER STORAGE

San Lucas has one welded steel storage tank with a capacity of 300,000-gallons. The storage tank is in need of some repairs and maintenance work.

Deficiencies:

(1) There were holes in the soil next to the tank foundation. The water system must assess the condition of the soil at the edge of the tank and make necessary improvements to protect the foundation.

(2) The storage tank's water level gauge does not appear to be functioning. The tank is not equipped with a system to monitor the water level.

(3) One anchor bolt and bracket near the foundation was corroded. Corrosion damage on the anchor must be repaired.

(4) There was a minor leak at the bottom of the tank. Leak must be repaired.

(5) Spiderwebs were found under the hatch door. This is an indication that the hatch door does not provide a watertight seal. Make necessary improvements to the hatch door to ensure it provides a watertight seal and prevent insects from entering the tank through the hatch.

(6) The roof vent has advanced corrosion. The metal below the vent screen is falling apart. The water system must repair the vent structure.

Storage Capacity (see Source Capacity Evaluation Section above)

The San Lucas water system has adequate storage capacity.

F. PUMPS, PUMP FACILITIES, AND CONTROLS

The San Lucas CWD does not have any booster pump stations.

G. WATER QUALITY MONITORING, REPORTING, AND DATA VERIFICATION

The San Lucas CWD conducts water quality monitoring at Well 03, at the iron and manganese treatment plant effluent, and in the distribution system to determine the quality of the water served to the public.

Bacteriological Monitoring (Total Coliform and E. coli)

Source Water Bacteriological Monitoring Required Quarterly (Well 03-RAW): The San Lucas CWD monitors Well 03 for total coliform and *E. coli* bacteria at least quarterly. All analysis results for the period of October 2022 through August 2024 showed no detection for total coliform and *E. coli*. (note: well samples are collected prior to disinfection treatment)

Distribution System Bacteriological Monitoring - Total Coliform Rule (TCR): San Lucas CWD has a State-approved Bacteriological Sample Siting Plan (BSSP), dated June 6, 2023. The water system is required to collect one routine bacteriological sample from the distribution system every month. Distribution system samples for compliance with the TCR are performed in accordance with the approved BSSP. Analysis results for the period of November 2022 through August 2024 showed that total coliform and *E. coli* have not been detected in the water served to the public. (note: distribution system samples are collected after disinfection treatment is provided at the iron and manganese treatment plant)

Treatment Plant Effluent Monitoring – Iron and Manganese

The certified treatment operator visits the iron and manganese treatment plant weekly and conducts field sampling for chlorine residual, iron, and manganese before and after treatment. In addition, the treated water is sampled once a month for iron and manganese and results are analyzed at a certified laboratory.

The water system is in compliance with monitoring requirements at the plant.

Laboratory analysis results from samples collected at the plant effluent show the treatment system is not consistently removing iron and manganese to levels below their respective secondary MCLs. See the discussion on treatment plant performance, water quality results, and deficiencies noted under the **Treatment** section of this letter.

Source Chemical Monitoring

Chemical Monitoring Schedule - Source Monitoring (Well 03 – RAW):

Chemical Group	Monitoring Frequency	Last Sample	Next Sample Due	Results Above the MCL?	Comments/ Past Due monitoring
General Mineral, General Physical, and Contaminants with a Secondary MCL	Odor and TDS every 3 months All other chemicals Every 3 years	11/29/2023	Odor and TDS were due 2/2024. All other chemicals 11/2026	Yes, TDS exceeds the *secondary* MCL. *10/25/23 TDS =1,020 mg/L* *11/29/2023 TDS =1,120 mg/L*	The monitoring frequency for odor and TDS was increased to quarterly due to elevated results. San Lucas CWD has not complied with the quarterly monitoring for odor and TDS. **Monitoring for odor and TDS is past due.**
Iron and Manganese	Every 3 months	7/18/2024	10/2024	Yes, both iron and manganese exceed secondary MCLs. *07/18/24 Iron =316 ug/L* *07/18/2024 Manganese =295 ug/L*	In compliance with monitoring requirement. San Lucas has an iron and manganese removal treatment system. However, the treatment system does not consistently deliver water that meets the MCLs for iron and manganese.

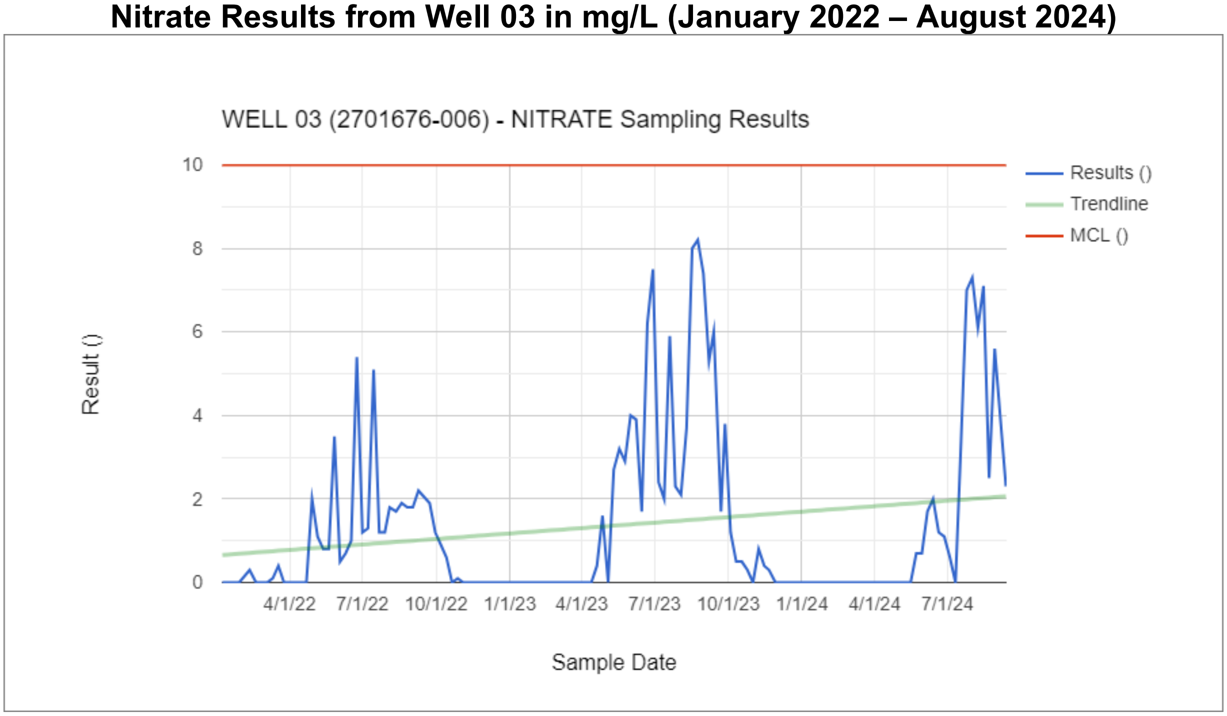
Chemical Group	Monitoring Frequency	Last Sample	Next Sample Due	Results Above the MCL?	Comments/ Past Due monitoring
Inorganic Chemicals	Every 3 years	11/29/2023	11/2026	No	In compliance with monitoring except asbestos. The system has not conducted monitoring for asbestos at Well 03. **Asbestos monitoring is past due.**
Nitrate (N)*	Monthly	9/12/2024	10/2024	No, most recent result was below the MCL. *9/19/2024 Nitrate =4.2 mg/L*	In compliance with monitoring requirement. Well 03 has a history of intermittently exceeding the nitrate MCL. Public notification for nitrate above the MCL is conducted monthly. See further discussion on nitrate below.
Nitrite	Every 3 years	11/29/2023	11/2026	No	In compliance
Gross Alpha (GA) and Uranium	Every 3 months	7/18/2024	10/2024	Yes, result for GA was above the MCL. *7/18/2024 GA =17.8 pCi/L*	In compliance with monitoring requirement. The system is currently in compliance with the GA MCL. The running annual average *(RAA)* for GA is below the MCL of 15 pCi/L. *GA RAA =9.6 pCi/L.*
Radium 226 and 228	Every 9 years	1/19/2023	01/2032	No	In compliance
Volatile Organic Chemicals	Every 6 years	11/29/2023	11/2029	No	In compliance

Chemical Group	Monitoring Frequency	Last Sample	Next Sample Due	Results Above the MCL?	Comments/ Past Due monitoring
Synthetic Organic Chemicals (SOC) – (not full panel**)	Every 3 years	1,2,3 TCP on 11/5/2021. All other chemicals 11/29/2023	1,2,3 TCP due 11/2024. All other chemicals due 11/2026.	No	In compliance. The San Lucas CWD must monitor Well 03 for all SOCs (*full panel)* because the well is vulnerable to contamination from agricultural activities. Please see discussion below.

*__*Nitrate (as N) – Well 03-RAW__*: San Lucas CWD monitors Well 03 for nitrate (as N) weekly. Samples are analyzed at a certified laboratory and results are reported to the Division by the 10th day of the following month. Weekly nitrate results reported for the period of January 2022 through August 2024 have all been below the MCL of 10 mg/L.

The highest nitrate result reported between January 2022 and August 2024 was for 8/24/2023 at 8.2 mg/L.

Nitrate Results from Well 03 in mg/L (January 2022 – August 2024)



Nitrate MCL = 10. mg/L

Nitrate Results above the MCL of 10. mg/L (Well 03-RAW): Well 03 has a history of intermittent nitrate spikes that exceeded the MCL of 10 mg/L. These incidents of high nitrate above the MCL are not fully understood and may occur in between sampling events. Therefore, the water system customers are at risk of drinking water that exceeds the MCL for nitrate. Nitrate is an acute contaminant which may cause a serious health problem to infants and pregnant women with a single exposure.

The Division issued Compliance Order No. 02_05_23R_003 (Order), dated June 8, 2023, to the San Lucas CWD for the nitrate MCL violation. Directive No. 3 of the Order requires the San Lucas CWD to issue public notification once a month to inform customers of the nitrate MCL violation and the health risks associated with drinking water with nitrate above the MCL. The San Lucas CWD is in compliance with the public notification requirement. San Lucas CWD also provides bottled water to customers at no cost. According to the San Lucas Board representative, each household receives five bottles per week provided by the Responsible Parties.

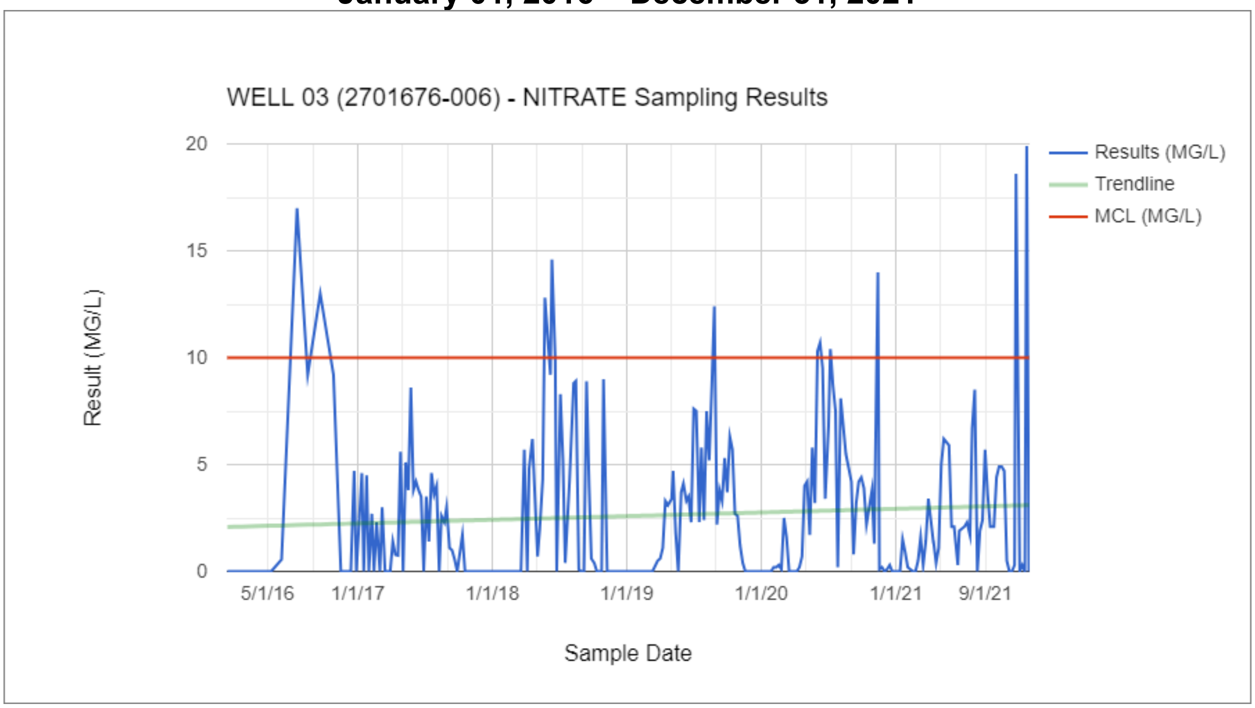
The Order includes 14 Directives with compliance deadlines. San Lucas CWD has not complied with all the Directives specified in the Order and has not returned to compliance with the nitrate MCL.

Between January 1, 2016 and December 31, 2021, the following nitrate results reported to the Division exceeded the nitrate MCL:

Well 03 – Nitrate Sampling Results Above the MCL (Nitrate MCL = 10 mg/L)		
Contaminant	**Sample Date**	**Result (mg/L)**
NITRATE	7/20/2016	17
NITRATE	9/21/2016	13
NITRATE	5/24/2018	12.8
NITRATE	5/31/2018	11.1
NITRATE	6/12/2018	14.6
NITRATE	8/27/2019	12.4
NITRATE	6/2/2020	10.3
NITRATE	6/9/2020	10.7

Well 03 – Nitrate Sampling Results Above the MCL (Nitrate MCL = 10 mg/L)		
Contaminant	**Sample Date**	**Result (mg/L)**
NITRATE	7/7/2020	10.4
NITRATE	11/13/2020	14
NITRATE	11/23/2021	18.6
NITRATE	12/22/2021	19.9

Well 03 - All Nitrate Sapling Results Reported
January 01, 2016 – December 31, 2021



*__**Synthetic Organic Chemicals (SOCs) Monitoring Requirement – Well 03-RAW__:* The most recent monitoring for SOCs at Well 03, conducted on 11/29/2023, included 20 of the 34 SOCs regulated by the State (Cal. Code Regs., tit. 22. § 64444, Table 64444-A (b).). There have been no detections for SOCs in the samples collected from Well 03; all results have been non-detected.

The remaining 14 SOCs have not been monitored (no samples collected from Well 03) since 4/29/2014. Well 03 has been designated as vulnerable to contamination from agricultural activities due to the location of the well and high nitrate levels that intermittently exceed the MCL for nitrate; therefore, San Lucas CWD must monitor Well 03 for all 34 regulated SOCs listed in Table 64444-A, subsection (b), of title 22, of the

California Code of Regulations every 3 years unless the system is granted a monitoring waiver by the Division.

San Lucas CWD must complete monitoring at Well 03 for the 14 chemicals listed below by **December 31st, 2024** and every 3 years thereafter:

a) Chlordane
b) 1,2-Dibromo-3-Chloropropane
c) Endothall
d) Endrin
e) Ethylene Dibromide
f) Glyphosate
g) Heptachlor
h) Heptachlor Epoxide
i) Hexachlorobenzene
j) Hexachlorocyclopentadiene
k) BHC-Gamma (Lindane)
l) Methoxychlor
m) Total Polychlorinated Biphenyls (pcb)
n) Toxaphene

Please note that the water system may request a monitoring waiver for cyanide, thiobencarb, and all regulated SOCs prior to completing the monitoring round. The waiver application requirements are specified in the California Code of Regulations, title 22, sections 64432 (n), and 64445 (d). The application for a monitoring waiver must be submitted to the Division in writing with all supporting documentation. If granted, the term of the waiver is three years.

Distribution System Monitoring

Disinfection Byproduct Rule (DBPR) Monitoring: The water system is required to monitor the distribution system for Total Trihalomethanes (TTHM) and Total Haloacetic Acids (HAA5) every 3 months in accordance with the approved DBPR Monitoring Plan. The approved DBPR Monitoring Plan, dated July 6, 2023, requires monitoring in August, November, February, and May on the Thursday of the 1st full week of the month.

Disinfection Byproducts Sampling Results in the Last 4 Monitoring Periods

	4th Quarter 2023	**1st Quarter 2024**	**2nd Quarter 2024**	**3rd Quarter 2024**	**Running Annual Average (ug/L)**	**MCL (ug/L)**
Sample Date	11/15/2023	02/08/2024	05/16/2024	Missed Sample		
TTHM Results (ug/L)	57	79	0	Past Due	45.3	80

	4th Quarter 2023	1st Quarter 2024	2nd Quarter 2024	3rd Quarter 2024	Running Annual Average (ug/L)	MCL (ug/L)
Sample Date	11/15/2023	02/08/2024	05/16/2024	Missed Sample		
HAA5 Results (ug/l)	26	27	0	Past Due	17.7	60

San Lucas CWD failed to collect samples for TTHM and HAA5 in August 2024. Sampling for DBPs is next due in **November 2024**. Compliance with the MCLs for TTHM and HAA5 is based on a running annual average (RAA) of the most recent 4 quarters of monitoring. The RAAs for TTHM and HAA5 are below the respective MCLs.

Chlorine Residual Monitoring: San Lucas CWD measures free chlorine residual weekly at the effluent of the storage tank and at the library sampling point. Results for weekly chlorine residual monitoring are submitted to the Division monthly. The free chlorine residual level is also measured in the distribution system at the same time and at the same location that coliform samples are collected. The chlorine residual results collected together with the coliform samples are reported to the Division by the laboratory by the 10th day of the following month.

Community water systems that provide disinfection using chlorine are required to submit to the Division a quarterly report for disinfectant residuals compliance (Cal. Code Regs., tit. 22, § 64537.4). During the first and second quarters of 2024, San Lucas CWD failed to submit the quarterly reports to the Division and did not report if the maximum residual disinfectant level (MRDL) for chlorine was exceeded. San Lucas must submit the quarterly reports for the first, second, and third quarters of 2024 by **October 10, 2024**.

The most recent quarterly report for disinfectant residual compliance submitted for the 4th quarter of 2023 showed that the water system complied with the MRDL for chlorine of 4.0 mg/L. The running annual average (RAA) for chlorine at the end of the 4th quarter of 2023 was 0.78 mg/L which is less than the MRDL of 4.0 mg/L.

Lead and Copper Rule Monitoring: San Lucas must conduct lead and copper tap sampling in the distribution system once a year between June 1 and September 30. The most recent sampling event was conducted in June 2024 at 10 tap sampling sites. The 90th percentile level for lead was 0.0016 mg/L (below the lead action level of 0.015 mg/L). The 90th percentile level for copper was 0.806 mg/L (below the copper action level of 1.3 mg/L). During the most recent sampling period, one sample exceed the action level for copper. The sample collected at 54692 Teresa Street on 6/17/2024 had a copper result of 2.23 mg/L.

On September 23, 2024, San Lucas CWD submitted to the Division the Lead and Copper Tap Sample Results Reporting Form, the Certification of Delivery of Lead and Copper Rule Results to Customers, and a sample of the letter that was provided to customers who participated in the most recent Lead and Copper Rule monitoring conducted in June 2024.

San Lucas is in compliance with the lead and copper tap sampling requirements. The next lead and copper tap sampling round is due in **2025** during June, July, August, or September at 10 tap sampling sites.

Water Quality Parameter (WQP) Monitoring (Lead and Copper Rule): San Lucas CWD exceeded the copper action level of 1.3 mg/L in October 2020. The 90th percentile for copper during the October 2020 sampling event was 2.180 mg/L. Since the action level for copper was exceeded, San Lucas CWD was required to conduct standard lead and copper tap sampling, and water quality parameter (WQP) monitoring at the entry point to the distribution system and in the distribution system in accordance with the Lead and Copper Rule (Cal Code Regs. tit. 22, § 64673.).

San Lucas CWD complied with the standard lead and copper tap sampling in 2023, but the system failed to complete the WQP monitoring requirements. In addition, the system failed to submit the written recommendation for corrosion control treatment to the Division by July 10, 2023 pursuant to California Code of Regulations, title 22, section 64673 (c)(3).

San Lucas CWS must comply with the WQP monitoring requirements as indicated in the tables below and submit a written recommendation for corrosion control treatment pursuant to California Code of Regulations, title 22, section 64673(c)(3). These requirements were due by December 31, 2023 and July 10, 2023, respectively, and are now past due.

California Code of Regulations, title 22, section 64673, subdivision (c)(1) requires that a small or medium-sized system with an action level exceedance must monitor for WQP pursuant to California Code of Regulations, title 22, section 64681 beginning with the first period after the exceedance. The San Lucas CWD must sample for the WQPs included in the table below. The first round (6-month period) of WQP monitoring, which consists of two samples for each WQP collected at least two weeks apart, was due between January 1, and June 30th, 2023.

Required Water Quality Parameters (WQP)
pH
Alkalinity
Calcium
Conductivity
Water temperature

Water Quality Parameter – Initial Monitoring Requirements:				
Number of Sampling Sites	**Location of Site**	**Name of Source Influencing the Site**	**Number of WQP samples per site**	**WQP due date**
Sample at the entry point to the distribution system	Sample Tap after Iron and Manganese Treatment Plant (treatment plant effluent)	Well 03	2 samples for each WQP (collected at least two weeks apart) during each 6-month period	Round 1: (6-month period) due between **January 1st and June 30th, 2023;** Round 2: (6-month period) due between **July 1st and December 31st, 2023**
One (1): Site representative of water in the distribution system	Select a sample location that is representative of distribution system. See CCR, title 22, § 64680(a)(1)	Iron and Manganese Treatment Plant Effluent	2 samples for each WQP collected at least two weeks apart during each 6-month period	Round 1: (6-month period) due between **January 1st and June 30th, 2023;** Round 2: (6-month period) due between **July 1st and December 31st, 2023**

San Lucas CWD must submit a report to the Division with the results of the WQP monitoring by the 10th day of the month following each 6-month period of monitoring (i.e., January 10th, and July 10th).

<u>Asbestos Monitoring in the Distribution System</u>: Not required. There are no asbestos-cement water mains in the San Lucas CWD distribution system.

Deficiencies:

(1) The San Lucas CWD has not completed the following water quality monitoring at Well 03:

a. Odor and TDS, every 3 months. Next Due by December 31, 2024.

b. Asbestos, every nine years. Next Due by December 31, 2024.

c. Fourteen of the regulated SOCs in Title 22 have not been monitored since 2014, sampling required every 3 years. Next Due by December 31, 2024.

(2) San Lucas CWD has not complied with all the Directives specified in Compliance Order No. 02_05_23R_003 and has not returned to compliance with the nitrate MCL.

(3) San Lucas CWD failed to sample for DBPs during the 3rd Quarter of 2024. Next due November 2024 on the Thursday of the 1st full week of the month.

(4) San Lucas CWD failed to submit the quarterly report for disinfectant residual compliance during the first and second quarters of 2024. Next due by October 10, 2024.

(5) San Lucas CWD failed to complete WQP monitoring in accordance with the Lead and Copper Rule in 2023 and 2024. The water system must complete WQP monitoring for two consecutive 6-month sampling periods.

(6) San Lucas CWD failed to submit the written recommendation for corrosion control treatment by July 10, 2023. The recommendation for corrosion control treatment is past due.

Reminders:

(1) Next lead and copper tap sampling round is due in 2025 during June, July, August, or September.

(2) Initial monitoring for hexavalent chromium is due by April 1, 2025. Collect one sample from Well 03 for hexavalent chromium to comply with the initial monitoring requirement.

(3) 1,2,3 TCP monitoring at Well 03 is due 11/2024.

H. <u>SYSTEM MANAGEMENT AND OPERATION</u>

The water system is owned and operated by the San Lucas County Water District, which is a special public district. The San Lucas CWD is governed by a 5-member board that meets monthly. The current Board President is Sheri Braden. Due to a lack of applicants in the public election, Board members are appointed by the Monterey County Board of Supervisors.

The system did not have an organizational chart available during the sanitary survey, but the system representative indicated that the board members make decisions to manage the water system, the secretary does clerical work, recordkeeping, and bookkeeping, and the contract operator, Cypress Water Services, is in charge of system operations and maintenance. The system also employs a meter reader. The operator meets with the board once a month and provides a report on the system’s operations and maintenance activities during the monthly board meetings.

According to the Board President, San Lucas County Water District is currently working on financial planning and catching up on financial auditing, paying down debts, and establishing a reserve. The Board is working on clearing a backlog of unpaid customer bills and working through arrearage programs. The Board is also working on applying for grants for both its water and wastewater systems.

According to the Board President, all customers have metered connections and water billing is based on usage.

Since the Division's 2022 sanitary survey, San Lucas County Water District is making progress on its accounting and building a reserve; however, the water district is still not financially sustainable and must continue to dedicate resources to having a financially sustainable water district and building a reserve for short- and long-term water system improvements.

San Lucas County Water District has been involved and is a key stakeholder with the current technical assistance work for both the water and wastewater systems.

Deficiencies:

(1) The water system does not have an Organizational Chart that includes all the names and people in each position working for the water system

(2) The system does not have Board guidelines

(3) The water system must be financially sustainable.

(4) The water system does not have a capital improvement program/plan

(5) Board members are not familiar with state and federal regulatory requirements for public water systems

(6) There is no formal planning process

(7) The system does not track unaccounted water losses

(8) San Lucas CWD reported not having an adequate source of capital for operations, maintenance, and capital projects

Records and Reports:

The San Lucas CWD submitted the 2023 Electronic Annual Report to the Drinking Water Program (2023 EAR) on March 29, 2024.

San Lucas CWD distributed the 2023 Consumer Confidence Report (CCR) on July 11, 2024 to customers. The system submitted the Certification Form and a copy of the 2023 CCR to the Division on July 11, 2024.

All records, including water quality results, public notifications and certifications are maintained at the San Lucas CWD office in file folders. In addition, the operator, Cypress Water Services, maintains digital records of all water quality monitoring results, maintenance and repairs, and treatment plant operations logs.

Other records maintained by the water system include storage tank level readings, well production, well flow rate, treatment plant production and flow rate, amount of chlorine used, chlorine residual levels at the storage tank and at the library sampling point, iron and manganese field samples at the treatment plant (pre and post treatment), and chlorine levels at the treatment plant (pre and post filtration). This data is recorded weekly by the certified operator. The logs with the weekly data are submitted monthly to the Division by the 10th day of every month.

Water Quality Emergency Notification Plan

San Lucas CWD has an emergency notification plan, dated 7/5/2023, on file with the Division. The notification plan appears adequate for the size of the system.

Deficiencies: (1) The water system does not maintain a copy of the water quality emergency notification plan at the office. A copy of the plan must be kept at the San Lucas CWD office.

Cross-Connection Control Program

San Lucas CWD does not have a Cross-Connection Control Program.

- Backflow Prevention Assembly Testing: Four backflow prevention assemblies were tested in 2023. Assemblies are scheduled to be tested annually.

- Cross-Connection Coordinator: Cypress Water Services is currently serving this role, but the operator indicated that San Lucas CWD will need someone responsible for implementing the Cross-Connection Control Program once it is developed.

- Cross-Connection Control Ordinance/Operating Rules: The system does not have one.

- Cross-Connection Control Hazards Survey: Cypress Water Services indicated during the Sanitary Survey that a hazards survey was completed in 2023. The water system did not submit a written summary of the hazards survey to the Division by July 20, 2023 as was requested in the 2022 Sanitary Survey Deficiency List.

- Backflow Prevention Assembly Inventory: The inventory was not submitted to the Division by June 30, 2023, deadline specified in the 2022 Sanitary Survey Deficiency List.

Deficiencies:

(1) Cross-Connection Control Program: San Lucas CWD must develop a program in accordance with the State Water Boards' Cross-Connection Control Policy Handbook. The Policy Handbook is available at: Cross-Connection Control Policy Handbook (ca.gov).

https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/docs/2023/cccph-adopt-2023-12-19.pdf

(2) San Lucas CWD must submit a written Cross-Connection Control Plan for Division review and approval by **July 1, 2025**.

(3) San Lucas CWD must designate someone as the cross-connection control program coordinator.

Customer Complaints

The water system has a customer complaint program to record and address complaints. All complaints are logged and submitted to the Division each month.

In May 2023, the water system reported two complaints of sulfur smell in the water and two complaints of black color and black little rocks or solids in the water. The two customers that complained of black water also added that the water plugged their washing machines and black chunks the size of pebbles appeared when using the washing machine. After a main repair in July 2023, the system received two complaints of the water turning black with black solids, clogging faucets, toilets, and sinks, and looking like mud. Flushing was performed to solve the problem.

Auxiliary Power Supply

San Lucas CWD does not have emergency power supply. The well and the disinfection facilities cannot be operated by backup power in the event of an emergency. However, San Lucas CWD has additional storage that could supply the distribution system during short term power outages.

Deficiencies: (1) The water system does not have standby power available. The San Lucas CWD must equip the well and treatment system with the ability to connect to an emergency power supply. The system must acquire permanent or portable standby power supply for the well and treatment facilities.

Valve Maintenance Program

During the Sanitary Survey, Cypress Water Services indicated that valves are exercised annually.

Dead End Flushing

The 2023 Electronic Annual Report to the Division of Drinking Water (2023 EAR) indicated that flushing is conducted as needed when there are water quality complaints.

Deficiencies: (1) The water system does not have a standard flushing program. San Lucas CWD must develop an annual flushing program by December 31, 2024.

Operation Controls

San Lucas CWD does not have a Supervisory Control and Data Acquisition (SCADA) system. Water system monitoring, control, and operation is done manually by the operator during weekly visits. The treatment system does not have controls with alarms to alert operators of treatment unit failures.

I. OPERATOR COMPLIANCE WITH STATE REQUIREMENTS

The distribution system classification for the San Lucas CWD water system is D1. The chief distribution system operator has the minimum required certification level.

Name of Chief Distribution System Operator: Miles Farmer
Certification Level of Chief Distribution System Operator: **D2**
Distribution Operator Number: 37268
Distribution Operator Certification Expiration Date: 02/01/2025

The treatment facility classification for the iron and manganese treatment plant is T1. The certified chief treatment plant operator has the minimum required certification level.

Name of Chief Treatment Operator: Miles Farmer
Certification Level of Chief Treatment Operator: **T3**
Treatment Operator Number: 30745
Treatment Operator Certification Expiration Date: 03/01/2025

WATER SYSTEM RESILIENCY & PREPAREDNESS

San Lucas CWD does not have a plan or implemented measures for climate change adaptation and resiliency. Well 03 is located adjacent to the Salinas River in a flood prone area, but the wellhead is raised.

OVERALL SYSTEM APPRAISAL

The San Lucas CWD’s well and storage tank are in good condition, but, per compliance order, the iron and manganese treatment plant must be repaired or replaced. The treatment plant is failing and has intermittent filter breakthroughs that result in the water supplied to the distribution system exceeding the secondary maximum contaminant levels for iron and manganese. The high iron and manganese levels in the water supply may be the source of discolored water complaints from customers.

The water system does not have adequate managerial and financial capacity, even though progress has been made since 2022. The water system's primary focus must be establishing a financially sustainable water system. Water quality monitoring and reporting is mostly up to date. The system is out of compliance with the nitrate maximum contaminant level and must install treatment to ensure it provides a safe, potable, and reliable water supply to customers.

If you have any questions regarding the sanitary survey, please contact Querube Moltrup, of my staff, at (831) 655-6936 or at Querube.moltrup@waterboards.ca.gov, or me at (831) 655-6939 or at dwpdist05@waterboards.ca.gov.

Sincerely,

Jonathan Weininger Digitally signed by Jonathan Weininger
Date: 2024.10.10 17:20:26 -07'00'
Water Boards

Jonathan Weininger, PE
District Engineer, Monterey District
Division of Drinking Water

Attachments: A. 2024 Sanitary Survey Deficiency List

Cc (email): Monterey County Environmental Health Department

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STATE WATER RESOURCES CONTROL BOARD
DRINKING WATER FIELD OPERATIONS BRANCH

ATTACHMENT A: 2024 SANITARY SURVEY DEFICIENCY LIST, RECOMMENDATIONS, AND REMINDERS

Purveyor: **San Lucas CWD (System No. CA2701676)**

Date of Inspection: **February 29, 2024**
Reviewing Engineer: **Querube Moltrup, PE**

Updated by: ____________________

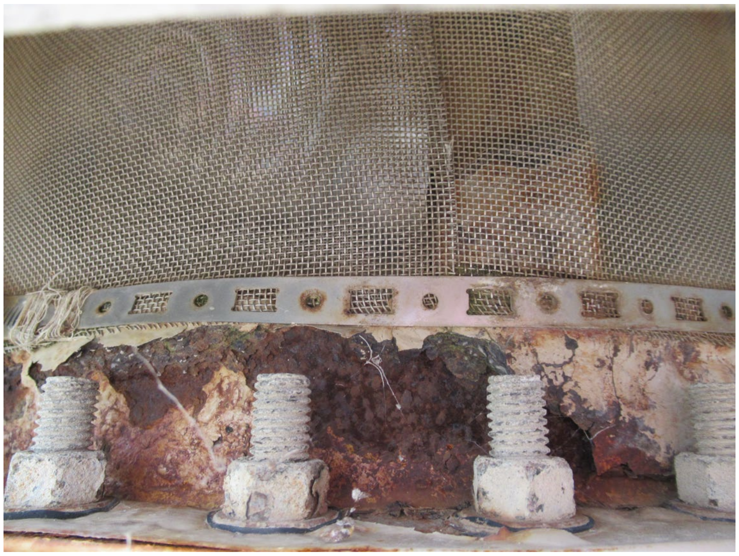
Date: _________________________

ORDER OF HAZARD:
A. CRITICAL HEALTH HAZARD - CORRECTIVE ACTION MUST BE TAKEN IMMEDIATELY
B. SERIOUS HEALTH HAZARD - ACTION MUST BE TAKEN AS SOON AS POSSIBLE
C. POTENTIAL HEALTH HAZARD - MUST BE CORRECTED AS WORKLOAD PERMITS
D. SYSTEM OR OPERATIONAL DEFECT RESULTING IN POOR WATERWORKS PRACTICE

2024 SANITARY SURVEY – DEFICIENCY LIST

Item No.	Description of Deficiency	Order of Hazard	Date to Address Deficiency	Date Corrected
	SOURCE – WELL 03			
1	Soil erosion from agricultural runoff along the edge of the well's concrete base. The ground around the well must be graded such that runoff from agricultural irrigation moves away from the well.	C	12/10/2024	
2	A Drinking Water Source Assessment and Protection (DWSAP) report has not been completed for Well 03. Complete a DWSAP for Well 03 and submit the completed report to the Division.	D	2/10/2025	
	TREATMENT – IRON AND MANGANESE TREATMENT PLANT			
3	The effluent pipe has a leak. Leak must be repaired.	B	**PAST DUE 8/10/2023 -** Submit a Corrective Action Plan and schedule to address the treatment plant's deficiencies and treatment failure	
4	Filter-backwash control system is not working properly. The control for the backwash process needs to be repaired or replaced.			
5	Backwash flow meter needs to be replaced.			
6	The treatment system is not equipped with filter head-loss gages			
7	The treatment system is not equipped with flow rate/equalization control for the filters			
8	Filtered water intermittently exceeds the iron and manganese secondary MCLs. San Lucas CWD exceeded the secondary MCL for iron during the 3rd quarter of 2024.			

Item No.	Description of Deficiency	Order of Hazard	Date to Address Deficiency	Date Corrected
9	Failure to comply with Directives 11, 12, and 13 of Compliance Order No. 02_05_23R_003 (Order)	B	**PAST DUE 7/30/2023 –** Submit Operations Plan for the Treatment Plant. **PAST DUE 8/10/2023 –** Submit Corrective Action Plan **PAST DUE 01/31/2024 -** Comply with the iron and manganese MCLs	
	STORAGE TANK – 300,000-GALLONS			
10	There were holes in the soil next to the tank foundation. Assess the condition of the soil at the edge of the tank and make necessary improvements to protect the foundation.	D	2/10/2025	
11	The storage tank's water level gauge does not appear to be functioning. The tank is not equipped with a system to monitor the water level. Install a system to monitor and control the water level in the tank.	B	1/10/2025	
12	One anchor bolt and bracket near the foundation was corroded. Corrosion damage on the anchor must be repaired.	C	1/10/2025	
13	There was a minor leak at the bottom of the tank. Leak must be repaired.	B	1/10/2025	
14	Spiderwebs were found under the hatch door. Make necessary improvements to the hatch door to ensure it provides a watertight seal and prevent insects from entering the tank through the hatch.	C	11/10/2024	

Item No.	Description of Deficiency	Order of Hazard	Date to Address Deficiency	Date Corrected
15	The tank's roof vent has advanced corrosion. The metal below the vent screen is falling apart. Repair vent structure. 	C	11/10/2024	
	WATER QUALITY MONITORING and REPORTING			
16	San Lucas CWD must complete the following water quality monitoring at Well 03: a. Odor and TDS, every 3 months. Next Due by December 31, 2024. b. Asbestos, every nine years. Next Due by December 31, 2024. c. Fourteen of the regulated SOCs in Title 22 have not been monitored since 2014, sampling required every 3 years. Next Due by December 31, 2024.	n/a	12/31/2024	

Item No.	Description of Deficiency	Order of Hazard	Date to Address Deficiency	Date Corrected
17	San Lucas CWD has not complied with all the Directives specified in Compliance Order No. 02_05_23R_003 (Order) issued for the nitrate MCL violation.	A	**PAST DUE 6/10/2024 –** Comply with nitrate MCL **PAST DUE 8/10/2023 –** Submit corrective action plan to comply with nitrate MCL. **PAST DUE 8/10/2024 –** Demonstrate that the San Lucas CWD complies with the nitrate MCL. **DUE NOW Every 3 months** – submit progress report showing actions taken during the previous quarter to comply with the nitrate and iron and manganese corrective action plans.	
18	San Lucas CWD failed to sample for DBPs during the 3rd Quarter of 2024. Next due November 2024 on the Thursday of the 1st full week of the month.	n/a	11/07/2024	
19	San Lucas CWD failed to submit the quarterly report for disinfectant residual compliance during the first and second quarters of 2024. Next due by October 10, 2024.	n/a	**DUE NOW** 10/10/2024	

Item No.	Description of Deficiency	Order of Hazard	Date to Address Deficiency	Date Corrected
20	San Lucas CWD failed to complete WQP monitoring in 2023 and 2024. The water system must complete WQP monitoring for two consecutive 6-month sampling periods. a. The first 6-month monitoring round was due between January 1st and June 30th, 2023. A report summarizing the results of the first round of monitoring must be submitted to the Division by the tenth day of the month following the monitoring period. b. The second round of WQP monitoring was due between July 1st and December 31st, 2023. A report summarizing the results of the second round of monitoring must be submitted to the Division by the tenth day of the month following the monitoring period.	A	**PAST DUE 6/30/2023 and 12/31/2023**	
21	San Lucas CWD failed to submit the written recommendation for corrosion control treatment by July 10, 2023. The recommendation for corrosion control treatment must be submitted to the Division.	A	**PAST DUE 7/10/2023**	
	SYSTEM MANAGEMENT AND OPERATION			
22	***Management:*** a. The water system does not have an organizational chart b. The system does not have Board guidelines c. The water system does not have an operating budget d. The water system does not have a capital improvement program/plan e. Board members are not familiar with state and federal regulatory requirements for public water systems f. There is no formal planning process g. The system does not track unaccounted water losses h. The system does not have an adequate source of capital for operations, maintenance, and capital projects	A	By 12/10/2024 submit plan and schedule to build technical, managerial and financial capacity. Resources are available here: TMF - Capacity Development | California State Water Resources Control Board	
23	***Dead End Flushing Program:*** The water system does not have a standard flushing program. San Lucas CWD must develop an annual flushing program by December 31, 2024.	D	Submit SOP[1] for flushing program by 12/31/2024	

[1] SOP = Standard Operating Procedure

Item No.	Description of Deficiency	Order of Hazard	Date to Address Deficiency	Date Corrected
24	***Water Quality Emergency Notification Plan (ENP):*** The water system does not maintain a copy of the water quality emergency notification plan at the office. A copy of the ENP must be kept at the San Lucas CWD office.	n/a	**DUE NOW**	
25	***Auxiliary Power Supply:*** The water system does not have standby power available. The San Lucas CWD must equip the well and treatment system with the ability to connect to an emergency power supply. The system must acquire permanent or portable emergency power supply for the well and treatment facilities.	C	By 12/10/2024 submit plan and schedule for emergency power supply	
26	***Cross-Connection Control:*** a. Cross-Connection Control Program: San Lucas CWD must develop a program in accordance with the State Water Boards' Cross-Connection Control Policy Handbook: https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/docs/2023/cccph-adopt-2023-12-19.pdf	C	**DUE NOW**	
	b. San Lucas CWD must submit a written Cross-Connection Control Plan for Division review and approval by July 1, 2025.	N/A	7/1/2025	
	c. San Lucas CWD must designate someone as the cross-connection control program coordinator.	A	**DUE NOW**	
	d. San Lucas CWD must submit the results of the 2023 cross-connection control hazards survey	A	**DUE NOW**	
	e. San Lucas CWD must submit an inventory of all the backflow prevention assemblies installed (active and inactive) in the system.	A	**DUE NOW**	

2024 SANITARY SURVEY – LIST OF RECOMMENDATIONS

Description of Recommendation	Recommended Date to Address Recommendation
Well 03 - San Lucas CWD should request a larger easement around Well 03 to provide the well with a 50-foot radius protection zone.	7/1/2025
Source Capacity and Reliability – San Lucas CWD should consider adding a second water source for redundancy.	As soon as feasible

2024 SANITARY SURVEY – WATER QUALITY DUE AND OTHER REMINDERS

Monitoring Due/Reminder	Due Date
Lead and Copper Rule: Next lead and copper tap sampling round is due in 2025 during June, July, August, or September.	9/30/2025

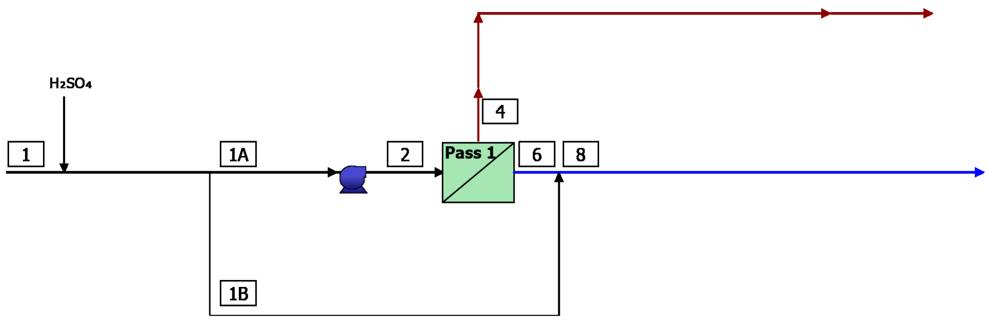
Monitoring Due/Reminder	Due Date
1,2,3-TCP Monitoring – Well 03 (RAW): 1,2,3 TCP monitoring at Well 03 is due 11/2024.	11/30/2024
Hexavalent Chromium Initial Monitoring: New MCL for Hexavalent Chromium is 10 ug/L; effective as of October 1, 2024. Initial monitoring for Hexavalent Chromium due by April 1, 2025	4/1/2025

Attachment B

RO Performance Projections

RO Summary Report

RO System Flow Diagram



#	Description	Flow (gpm)	TDS (mg/L)	Pressure (psi)
1	Raw Feed to RO System	85.0	1,291	0.0
1A	Feed to Pass 1 after bypass	55.0	1,262	0.0
1B	Bypass from Pass 1 Feed to Pass 1 Permeate	30.0	1,262	0.0
2	Net Feed to Pass 1	55.0	1,263	160.8
4	Total Concentrate from Pass 1	8.86	7,808	137.8
6	Net Product from RO System	46.1	6.14	0.0
8	Blend of Pass 1 Permeate and Bypassed Pass 1 Feed	76.1	500.4	0.0

RO System Overview

Total # of Units	1	Online =	1	Standby =	0	RO Recovery	89.6 %
System Flow Rate	(gpm)	Net Feed =	85.0	Net Product =	76.1		

Pass		Pass 1**
Stream Name		Well Water - Med Hardness
Water Type		Well Water (SDI < 3)
Number of Elements		15
Total Active Area	(m^2)	557
Feed Flow per Pass	(gpm)	55.0
Feed TDS[a]	(mg/L)	1,263
Feed Pressure	(psi)	160.8
Flow Factor Per Stage		0.85, 0.85
Permeate Flow per Pass	(gpm)	46.1
Pass Average flux	(gfd)	11.1
Permeate TDS[a]	(mg/L)	6.14
Pass Recovery		83.8 %
Average NDP	(psi)	130.1
Specific Energy	(kWh/m^3)	0.28
Temperature	(°C)	15.0
pH		6.0 (After Adjustment)
Chemical Dose		112.3 mg/L H_2SO
RO System Recovery		89.6 %
Net RO System Recovery		89.6%

Footnotes:

[a]Total Dissolved Solids and Conductivity includes ions, SiO_2 and B. It does not include NH_3 and CO_2

** Design includes Bypass. Please refer to the RO System Diagram.

RO Flow Table (Stage Level) - Pass 1

Stage	Elements	#PV	#Els per PV	Feed				Concentrate			Permeate			
				Feed Flow (gpm)	Recirc Flow (gpm)	Feed Press (psi)	Boost Press (psi)	Conc Flow (gpm)	Conc Press (psi)	Press Drop (psi)	Perm Flow (gpm)	Avg Flux (gfd)	Perm Press (psi)	Perm TDS (mg/L)
1	BW30 PRO-400	2	5	60.5	5.49	156.4	0.0	27.4	148.7	7.6	33.0	11.9	0.0	4.36
2	BW30 PRO-400	1	5	26.3	4.37	144.2	0.0	13.2	137.8	6.4	13.1	9.4	0.0	10.68

RO Solute Concentrations - Pass 1

Concentrations (mg/L as ion)								
	Raw Feed	pH Adjusted Feed	Concentrate		Permeate			
			Stage1	Stage2	Stage1	Stage2	Total	With Bypass
NH^{+}	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
K^{+}	2.89	2.89	7.21	17.72	0.02	0.08	0.04	1.16
Na^{+}	86.68	86.69	216.5	533.4	0.50	1.74	0.86	34.68
Mg^{+2}	71.20	71.21	178.4	441.3	0.06	0.22	0.11	28.12
Ca^{+2}	185.8	185.8	465.2	1,151	0.20	0.68	0.33	73.40
Sr^{+2}	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ba^{+2}	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CO_3^{-2}	1.10	0.01	0.06	0.53	0.00	0.00	0.00	0.00
HCO_3^{-}	218.0	80.85	201.7	496.0	2.05	2.81	2.25	32.46
NO_3^{-}	15.00	15.00	37.29	91.34	0.20	0.68	0.33	6.11
F^{-}	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cl^{-}	130.0	130.0	325.2	803.2	0.39	1.38	0.67	51.64
Br^{-1}	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SO^{-2}	550.0	660.0	1,653	4,089	0.75	2.58	1.27	260.8
PO^{-3}	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SiO_2	30.00	30.00	74.95	184.8	0.15	0.50	0.25	11.98
Boron	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CO_2	5.72	105.5	107.4	109.0	103.2	105.7	103.9	105.1
TDS[a]	1,291	1,262	3,159	7,808	4.36	10.68	6.14	500.4
Cond. µS/cm	2,016	2,072	4,732	10,356	24	24	17	877
pH	7.7	6.0	6.3	6.6	4.6	4.8	4.6	5.7

Footnotes:

[a]Total Dissolved Solids and Conductivity includes ions, SiO_2 and B. It does not include NH_3 and CO_2

RO Design Warnings

None

Special Comments

None

RO Flow Table (Element Level) - Pass 1

Stage	Element	Element Name	Recovery (%)	Feed Flow (gpm)	Feed Press (psi)	Feed TDS (mg/L)	Conc Flow (gpm)	Perm Flow (gpm)	Perm Flux (gfd)	Perm TDS (mg/L)
1	1	BW30 PRO-400	11.4	30.2	156.4	1,435	26.8	3.46	12.4	3.61
1	2	BW30 PRO-400	12.6	26.8	154.1	1,620	23.4	3.38	12.2	3.87
1	3	BW30 PRO-400	14.1	23.4	152.2	1,854	20.1	3.31	11.9	4.23
1	4	BW30 PRO-400	16.1	20.1	150.7	2,158	16.9	3.23	11.6	4.73
1	5	BW30 PRO-400	18.7	16.9	149.6	2,571	13.7	3.15	11.3	5.49
2	1	BW30 PRO-400	10.9	26.3	144.2	3,931	23.5	2.85	10.3	7.60
2	2	BW30 PRO-400	11.7	23.5	142.4	4,408	20.7	2.75	9.9	8.73
2	3	BW30 PRO-400	12.7	20.7	140.8	4,991	18.1	2.63	9.5	10.25
2	4	BW30 PRO-400	13.8	18.1	139.6	5,715	15.6	2.50	9.0	12.37
2	5	BW30 PRO-400	15.1	15.6	138.6	6,630	13.2	2.36	8.5	14.44

Footnotes:

[a]Total Dissolved Solids and Conductivity includes ions, SiO_2 and B. It does not include NH_3 and CO_2

RO Solubility Warnings

Warning	Pass No
Langelier Saturation Index > 0	1
CaSO (% saturation) > 100	1
SiO_2 (% saturation) > 100	1
Anti-scalants may be required. Consult your anti-scalant manufacturer for dosing and maximum allowable system recovery.	1

RO Chemical Adjustments

	Pass 1 Feed before pH Adjust	Pass 1 Feed After pH Decrease	RO 1st Pass Conc
pH	7.7	6.0	6.6
Langelier Saturation Index	0.46	-1.67	0.47
Stiff & Davis Stability Index	0.68	-1.47	-0.01
TDS[a] (mg/l)	1,291	1,262	7,808
Ionic Strength (molal)	0.03	0.03	0.21
HCO_3^- (mg/L)	218.0	80.84	496.0
CO_2 (mg/l)	5.72	105.5	108.9
CO_3^{-2} (mg/L)	1.10	0.01	0.53
CaSO (% saturation)	17.1	20.3	249.4
BaSO (% saturation)	0.00	0.00	0.00
SrSO (% saturation)	0.00	0.00	0.00
CaF_2 (% saturation)	0.00	0.00	0.00
SiO_2 (% saturation)	28.6	25.4	168.0
$Mg(OH)_2$ (% saturation)	0.00	0.00	0.00

Footnotes:

[a]Total Dissolved Solids and Conductivity includes ions, SiO_2 and B. It does not include NH_3 and CO_2