

# 2021 Watershed Sanitary Survey Update Whale Rock Reservoir



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# CITY OF SAN LUIS OBISPO

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# Section 1

## Summary of 2021 Watershed Sanitary Survey Update

### 1.1 Report Organization

This report contains five sections with information as detailed below:

#### **Section 1 - Summary**

Section 1 shows how the report is organized and contains the major conclusions and recommendations determined as a result of the preparation of this 2021 Watershed Sanitary Survey Update.

#### **Section 2 - Background and 2016 Water Quality Summary**

Section 2 provides a brief description and background of the Whale Rock Reservoir watershed. Furthermore, the section states the project purpose, summarizes the water quality information provided in tables in the 2016 Update and describes the approach for completion of this 2021 Update.

#### **Section 3 – Past Recommendations and Current Status**

Section 3 lists the recommendations contained in the 2016 Update and provides the implementation status of each recommendation. All prior recommendations have been addressed.

#### **Section 4 - Comments in Relation to the 2016 Watershed Sanitary Survey Update**

Section 4 contains the comments and conclusions from the 2016 Update that are still applicable and updated watershed changes.

#### **Section 5 - Updated Water Quality Information**

Section 5 provides the updated water quality data for the raw water from Whale Rock Reservoir as sampled by the City of San Luis Obispo for its Water Treatment Plant. A narrative of each water quality table is provided.

## 1.2 Major Conclusions

1. There have been no significant changes in the watershed since the 2011 Sanitary Survey Update.
2. The overall raw water quality of Whale Rock Reservoir is good, but at times the water indicates elevated levels of total coliform bacteria.
3. Erosion within the watershed can be a significant source of sediments during the rainy season. High turbidity has not been a major water quality concern due to the location of the reservoir's intake structure being a great distance from creek inlets and the small contributing watershed.
4. Cattle grazing within the confines of the watershed continue to represent a potentially significant source of bacteriological contamination and elevated nutrient levels.
5. Agricultural pesticide/herbicide use in the croplands continues to represent a potential source of contamination within the watershed.
6. The City of San Luis Obispo and the Whale Rock Commission must continue their reliance upon the watershed management practices of the major landowners within the watershed and the government agencies that regulate land use and contaminant discharge within the Whale Rock Reservoir watershed.
7. The existing Water Treatment Plant is more than adequate to continue treating water from Whale Rock Reservoir to meet current surface water treatment regulations.

## 1.3 Recommendations

### **Prior Recommendations Still Applicable From the 2011 Update**

1. The City and the County of San Luis Obispo, together with the Whale Rock Commission, should continue with their current level of effort to protect the watershed and the reservoir from pollution and/or contamination.
2. The current sampling program performed by both City and County staff has been demonstrated to be adequate, and should continue at the present levels and frequencies.
3. Monitoring for invasive species should be evaluated on an ongoing basis. The current invasive mussel monitoring program should continue.
4. Management of the feral pig population should continue as needed to reduce the impacts of erosion within the watershed.
5. In August, 2016, the County implemented routine screening for cyanotoxins. Due to the potential for harmful algal blooms, analyses for Microcystin and Cylindrospermopsin are performed monthly, May through October, and whenever blue-green algae counts are

greater than 2000 cells/ml, November through April. It is recommended that the City and County continue their efforts to ensure requirements for these emerging contaminants are met.

6. Development of trails for hiking and mountain biking are being considered within the current recreational area. It is recommended that protection of the watershed security and potential impacts to water quality (such as erosion, trash and waste) be addressed throughout the planning, construction and management of these facilities.

#### **New Recommendations as a Result of 2021 Update**

1. To address potential impacts of drought, the City should continue to monitor for emerging technology to ensure water quality is able to be maintained as reservoir levels are depleted.
2. The City should address illegal camping and associated illegal waste disposal within the watershed area, specifically in county-owned turnouts directly adjacent to the reservoir along Old Creek Road.

# Section 2

## Background and 2016 Water Quality Summary

### 2.1 Project Background and Purpose

The City of San Luis Obispo (City) contracted with Metcalf & Eddy to prepare the initial Watershed Sanitary Survey of the Whale Rock Reservoir Watershed in 1995. In 2000, the Whale Rock Commission, comprised of representatives from the City of San Luis Obispo, California State Polytechnic University, San Luis Obispo, and California Men's Colony and the City retained Boyle Engineering Corporation to prepare the 5-year update to the Sanitary Survey in order to further their understanding of the potential for surface water contamination within the watershed, as well as to comply with the State Water Resources Control Board (SWRCB) requirements. In 2005, 2011, and 2016 City staff prepared the next 5-year updates. This current update to the Whale Rock Reservoir Watershed Sanitary Survey has also been prepared by City staff.

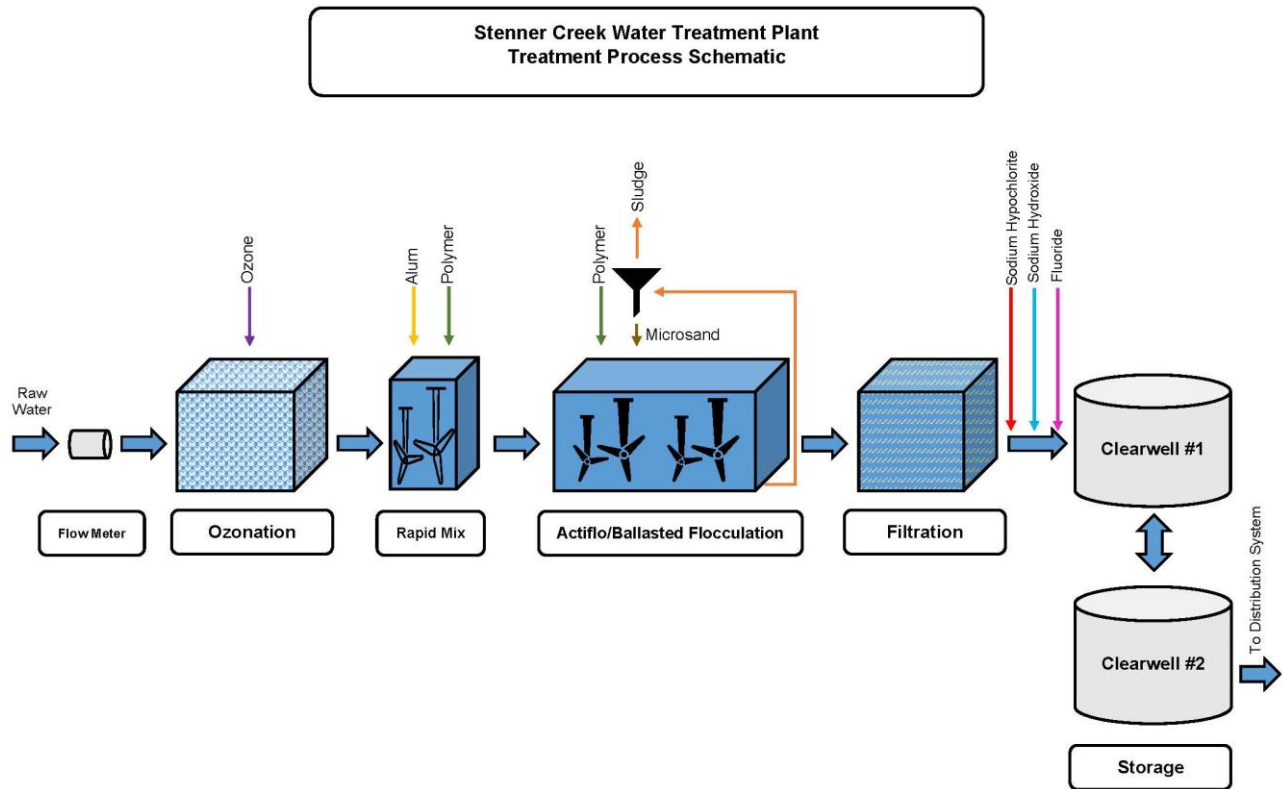
Whale Rock Reservoir is located near the town of Cayucos and is jointly owned by members of the Whale Rock Commission and operated by the City of San Luis Obispo. Construction of the reservoir was completed in 1961 by the State Department of Water Resources with a maximum storage capacity of approximately 38,900 acre-feet.

The Whale Rock watershed is comprised of approximately 13,000 acres located on the west slope of the Santa Lucia range in the northwest portion of San Luis Obispo County. The watershed is located within the boundaries of the Adelaida Planning Area as established by the County of San Luis Obispo. The majority of the watershed is designated agricultural land, however the privately owned land includes residential, rural, agricultural, grazing land and open space, while the remaining land is owned by the State and U.S. Forest Service.

The Whale Rock Reservoir watershed is located within the Old Creek Sub-basin of the Estero Bay Hydrologic Unit as defined by the Regional Water Quality Control Board (RWQCB). The total drainage area of the watershed as defined in the 1996 study is approximately 20.3 square miles. The average annual precipitation for the time period represented by this survey was 19.20 inches according to the County of San Luis Obispo data with the driest year being 2020 at 8.53 total inches. The water from the watershed is directed to the Whale Rock Reservoir via Old Creek, Cottontail Creek, and their tributaries with the largest flows resulting from Old Creek.

Raw water from Whale Rock Reservoir is conveyed through an extensive treatment and distribution system prior to delivery to the community of San Luis Obispo. Raw water is conveyed from the Whale Rock Dam to the City's water treatment plant via 17.6 miles of pipeline and Whale Rock Pump Stations A & B. The general pipeline alignment is along US Highway 1 toward the City's water treatment plant. The reservoir also provides drinking water to the town of Cayucos and

California Men’s Colony, however these facilities have their own water treatment plants and will submit separate sanitary surveys to reflect their operations.



**Figure 1 - Schematic of City of San Luis Obispo Water Treatment Plant**

The City’s Water Treatment Plant treats raw water from Salinas Reservoir, Whale Rock Reservoir, and Nacimiento Lake and serves a distribution system of approximately 16,000 service connections throughout the City of San Luis Obispo. The Water Treatment Plant is designated as a T5 facility by SWRCB-DDW and utilizes ozone for primary disinfection, rapid mix coagulation, ballasted flocculation (Actiflo), conventional anthracite filtration, and the addition of Fluoride, Sodium Hydroxide for pH/corrosion control, and Sodium Hypochlorite to maintain disinfection in the distribution system .

## 2.2 2016 Watershed Sanitary Survey Update Summary

The 2016 update contained water quality information from 2012-2016.



Section 5 of this 2021 update contains water quality information from 2017-2021.

Prior recommendations and their status are contained in Section 3.

## **2.3 Project Approach**

The approach to this update is to build upon the information contained in the initial 1996 Watershed Sanitary Survey and the subsequent 5-year updates. The 2021 Update describes the significant changes that have occurred and will update important water quality information. This update provides the current status of each of the recommendations made in the 2016 Update and provides additional conclusions and recommendations where appropriate. The additional recommendations are as outlined in Sections 1 and 4 of this update.

## **2.4 Watershed Inspection**

The City of San Luis Obispo conducts daily physical inspections of the Whale Rock Reservoir perimeter area as part of the daily monitoring program. City staff conduct routine inspections of the reservoir by boat.

Recreational activities and lake access are limited at Whale Rock Reservoir. While fishing is permitted at the reservoir, fishing and other shoreline access is limited to a short section of shoreline along Old Creek Road. Access to the shoreline is made from a small parking lot with limited vehicle parking. Whale Rock Reservoir supports recreation such as fishing, walking, mountain biking, and picnicking but does not allow for body contact within the reservoir. Boats, float tubes, kayaks, and other vessels are not permitted for use at the reservoir and a series of signs designating “no body contact” are placed along the shore access points. Staff consistently interact with members of the public who are utilizing the facilities when conducting watershed inspections.

As part of the 2021 Whale Rock Sanitary Survey for the Cayucos Water Treatment Plant the County of San Luis Obispo conducted research regarding potential sources of contamination and risks to the water quality of the reservoir. The County determined there were no significant changes since the previous survey by evaluating risk factors and analyzing data from County databases including but not limited to construction activities, water diversions, wild animal populations, land use, disposal facilities, pesticide use, recreation, and geologic hazards. However, of the 15 different potential contaminate sources evaluated, the County concluded only grazing animals and geologic hazards had the potential to create a significant impact to water quality of the reservoir. Grazing animals and geologic hazards were not presently affecting the reservoir during this survey period.

# Section 3

## Prior Recommendations and Current Implementation Status

The 2011 Watershed Sanitary Survey Update contained specific recommendations for additional sampling previously identified in the 2001 and 2005 Watershed Sanitary Surveys. Those recommendations and status continue with this current update and are as follows:

### Recommendation No. 1

- In order to confirm that the best available water quality is being withdrawn from the reservoir, more frequent testing of physical water quality parameters should be considered by the City as shown below. These samples should be collected not only at the filtration plant influent but also at the different reservoir outlet elevations, including the one in use. At the time of sampling at the reservoir outlet, the outlet elevation being used should be recorded.

Constituent	Whale Rock Reservoir Effluent	Treatment Plant Influent
Turbidity	Twice monthly	Continuously
pH	Twice monthly	Continuously
Temperature	Twice monthly	Daily
Apparent Color	Twice monthly	Daily

### Status

The County continues to conduct these physical analyses on the raw water twice per month at a minimum and provides this data to the City. The City Water Treatment Plant continues to monitor the raw water turbidity and pH every 4 hours at a minimum, or more frequently if needed. Temperature and apparent color are sampled and tested daily, as required by the State, or more frequently as needed.

**Recommendation No. 2**

- The City should consider implementing the following raw water sampling program at the Whale Rock Reservoir outlet works and at the treatment plant influent:

<b>Constituent</b>	<b>Whale Rock Reservoir Effluent</b>	<b>Treatment Plant Influent</b>
Total Coliform and Fecal Coliform Bacteria	Monthly	Weekly

The treatment plant influent sample should be collected upstream from the first chemical injection point.

**Status**

The County continues to conduct these weekly bacterial analyses on the raw reservoir water and provides this data to the City. The City also performs its own monthly bacterial analyses on each of the raw surface water sources delivered to the Water Treatment Plant. It is assumed that the raw water has some coliform and fecal coliform bacteria. The treatment process is designed and operated to disinfect and remove coliform bacteria to required levels. For these reasons, the current level of sampling and testing continues to be considered adequate.

**Recommendation No. 3**

- The City should consider iron and manganese testing at the Whale Rock Reservoir outlet elevation and at the plant influent each month. Water withdrawn from near the bottom of a reservoir is frequently high in manganese and/or iron as the water near the bottom is often anaerobic. This causes metals in the bottom muds to dissolve into the water. This will also show how the pipeline influences water quality in terms of these two metals.

**Status**

The County continues to perform these analyses for each of the 5 intake levels as part of their physical analyses twice per month. The pipeline has not and is not expected to contribute to the levels of iron and manganese in the raw water since the pipeline is cement mortar lined. The additional sampling suggested by this recommendation is considered to be unnecessary. There have not been any issues with iron and manganese in the treated water from the City WTP since the addition of ozonation process in 1994. The WTP’s ozonation process is designed to oxidize iron and manganese for their removal in subsequent treatment processes. Additionally, the WTP facility upgrades in 2021 have improved the ozonation process by increasing the ozone generation capacity while using liquid oxygen to increase ozone concentrations.

**Recommendation No. 4**

- The City should consider monitoring major creek inflows into Whale Rock Reservoir for the following water quality parameters during all months of the year when creek surface flows are occurring:

Parameter	Sampling Frequency
Total/Fecal Coliform (MPN)	Monthly
Turbidity	Monthly
Color	Monthly
Total Nitrogen	Monthly
Total Phosphorus	Monthly

**Status**

Neither the City nor the County performs monitoring of the reservoir inflows. This recommendation is not justified since the quality of the raw water is well known. However, increased monitoring and analysis would be implemented for any raw water quality issues as appropriate.

**Recommendation No. 5**

- The City should consider monitoring the Whale Rock Reservoir outlet line (at the reservoir) in the future as shown below.

Parameter	Recommended Sampling Frequency	Reasons
Bromide (µg/L)	Yearly	Bromate formation
Total Organic Carbon (mg/L)	Monthly	Disinfection by-product formation
Algae Counts	Monthly	Taste and odor control
Giardia/Cryptosporidium Cysts	Quarterly <sup>1</sup>	Public health/safe water

<sup>1</sup>For at least the next 2 years beginning with the fall quarter of October-December 2001.

**Status**

The City is regulated for bromate, rather than bromide. The City’s treated water is tested for bromate on a monthly basis and has never exceeded the regulatory limit of 0.010 mg/L. Total organic carbon is analyzed monthly in accordance with SWRCB requirements. The County performs algae counts twice per month and provides this information to the City. Giardia and cryptosporidium cysts are assumed to be present in the raw water although there were no Cryptosporidium detections during the City’s LT2ESWTR sampling in 2008-2010. No

Cryptosporidium detections have occurred during the City's 2<sup>nd</sup> round of LT2ESWTR sampling beginning in 2016.

**Recommendation No. 6**

- If the raw water shows the presence of cysts, the City and the County should consider monitoring the treated water from their respective filtration plants quarterly (for at least the next 2 years) for viable Giardia/Cryptosporidium cyst levels. This should be done to demonstrate that the existing treatment facilities of each agency adequately removes/deactivates such cysts.

**Status**

This recommendation is considered to not be necessary as the City had no detections for Cryptosporidium during its LT2ESWTR sampling in 2008-2010 nor in the 2<sup>nd</sup> round of LT2ESWTR sampling beginning in 2016. All samples completed by the County in 2017 resulted in non-detection of Cryptosporidium.

# Section 4

## Comments in Relation to the 2011 Watershed Sanitary Survey Update

### 4.1 Comments Still Applicable From the 2011 Report

- There are no municipal or industrial wastewater treatment plants located within the Whale Rock Reservoir watershed.
- There are no wastewater collection systems, such as wastewater pipelines, pump stations, or storage tanks located within the watershed.
- There are approximately 30 residential septic tank/leach field systems located within the watershed. These systems are predominantly located along the Santa Rita and Cottontail Creek Roads.
- A public restroom and septic tank/leach field system is also located at the parking lot for the original Whale Rock parking lot and public access area. This facility is no longer utilized and has been replaced with a series of eight portable toilets located along the public access trail.
- Whale Rock staff inspects and maintains vault toilets located throughout the recreational area. There were no problems associated with these facilities.
- No significant problems associated with failed septic systems have been identified by the Regional Water Quality Control Board (RWQCB) or the San Luis Obispo County Health Department.
- There is no use of recycled wastewater in the watershed.
- There are no urban or industrial areas located within the Whale Rock watershed. The only exception to this is the Pacific Gas and Electric's Cayucos substation which is located west of Old Creek Road approximately 1 mile east of the Whale Rock Dam. The facility includes a storm drainage collection system which consists of a concrete berm and a concrete pad which slopes away from the Whale Rock Reservoir to a concrete sump. The sump collects the storm water generated from the site such that a PG&E representative can inspect the collected storm water prior to release. In the event the collected storm water appears contaminated (oily sheen, etc.), the collected water is pumped and disposed of at an alternate location.

- No visual evidence of transformer oil or other contaminants were observed during the site investigation of this site.
- The principal agricultural crops in the watershed are citrus, avocado, and grapes. These croplands are located within 1 to 3 miles upstream from the north end of the reservoir along Santa Rita Road, Old Creek Road, and Cottontail Creek Road.
- Agricultural crops continue to represent a potential source of non-point pollution sources in the watershed. However, the lands designated as agricultural cropland comprises approximately 5% of the total watershed area. Therefore, potential impacts resulting from agricultural operations are minimal.
- Cattle grazing continues on private lands throughout much of the Whale Rock watershed, particularly in the grassland and wooded grassland areas in the mid to lower elevations of the watershed.
- Cattle grazing is not permitted on the publicly owned (State) property which encompasses Whale Rock Reservoir. A barbed wire fence placed approximately 100 feet from the reservoir high water line near Cottontail Creek to ¼ mile from the reservoir high water line along the steep ridges at the southern end of the watershed, surrounds the reservoir to prevent livestock from gaining access to the reservoir.
- Generally low to moderate cattle densities were observed within the watershed and no significantly overgrazed areas were identified.
- Cattle continue to have unrestricted access to the tributary streams and riparian corridors while grazing within the privately owned lands of the watershed and, as a result, continue to represent a potential source of microbiological contamination within the watershed. Furthermore, the unrestricted access to the tributary streams and riparian corridors located within the privately owned areas may increase erosion and result in an increase of the sediment loading of the reservoir.
- No concentrated animal facilities exist within the watershed.
- Pesticides/herbicides continue to represent a potential source of organic chemical contamination within the watershed; however, the amount of total croplands in the watershed is relatively small (approximately 5%) and no pesticide/herbicide compounds have been detected in the raw or treated water by the City of San Luis Obispo during the period of record.
- Wild animal populations within the Whale Rock Reservoir watershed remain low to moderate, yet their presence within the watershed continues to represent a potential source of pathogens (cysts/virus and pathogenic bacteria).
- There are no active mines within the watershed.

- One inactive rock quarry and five inactive mines have been identified within the watershed. Abandoned mines, rock quarries, and associated tailings have the potential to contribute sediment to downstream water bodies. Water quality data to date does not indicate that these abandoned facilities represent a significant source of contamination within the watershed.
- There are no known solid or hazardous waste disposal facilities located within the watershed.
- No large scale commercial logging operations are conducted within the watershed and based upon the minimal quantity of commercially harvestable trees within the watershed, the potential for future commercial logging is low.
- No logging is allowed within the Los Padres National Forest. Minor fuel woodcutting is conducted within the privately owned areas of the watershed. However, there are no known impacts to surface water quality resulting from the minimal logging activities that have occurred in the past within the watershed.
- With regard to recreational activities within the watershed, fishing is allowed at Whale Rock reservoir along approximately 1-1/2 miles of the east shoreline year around, but access is limited during periods of rainfall in order to maintain the condition of the walking/biking trail. Access to the reservoir for fishing is restricted to one location: a gate near the PG&E substation. However, the Agricultural and Open Space Element of the County of San Luis Obispo General Plan (Adopted December 15, 1998) notes a proposal to work with the Whale Rock Commission to improve access, fishing, and open hiking trails. To date, expanded access has not been requested by County staff or officials.
- Recreation is allowed within the small portion of the Los Padres National Forest located at the east boundary of the watershed.
- Routine patrols of the state property surrounding the reservoir are conducted by Whale Rock staff. No illegal dumpsites or incidents of disposal of hazardous materials resulting in surface water degradation have been identified.
- Minor dumping of solid waste has been identified within the watershed; no significant illegal dumping sites with impacts to surface water quality were identified.
- The major transportation corridors within the watershed consist of Old Creek Road, Santa Rita Road, and Cottontail Creek Road. These roads are not considered primary routes for the transportation of hazardous material.
- No railroad lines are located within the watershed.
- A petroleum transmission line from the Standard Oil Tank farm, located in the hills northeast of Morro Bay, passes through the watershed from north to south and crosses the watershed at Old Creek approximately 0.5 mile northeast of the Whale Rock Reservoir. No spills or leaks have been reported for this facility.



- There are no known surface water quality issues associated with the natural discharge from uncapped artesian wells in the watershed.
- There are no known impacts from groundwater with elevated salinity or nitrates.
- The reservoir is located within 1 mile of the ocean, however the reservoir is up gradient and is therefore not subject to seawater intrusion.
- The watershed is vulnerable to landslides, earthquakes, and floods.
- Areas of high landslide risk have been identified in over 50% of the watershed area including the steep slopes within 1 mile west and south of the reservoir and within 3 miles north and northeast of the reservoir.
- The Nacimiento Fault, located approximately 12 miles north, is the nearest major inland fault of concern for the Whale Rock Reservoir watershed. This fault does not intersect the dam, reservoir, or raw water conveyance infrastructure.
- Following significant precipitation events, Old Creek, Cottontail Creek and their tributaries have the propensity for flooding. The largest flood prone area consists of the Lower Cottontail Creek. Potential impacts due to the high probability of floods in the area include, but are not limited to, increased erosion and sediment loading.
- The California Department of Forestry continues to list the Whale Rock Reservoir watershed as a “very high” fire hazard area.
- No significant wildfires have occurred within the watershed for some time.
- Due to the steep slopes, man-made disturbances, and seasonal rain, contaminant sources associated with soil erosion are significant in the watershed. The sources include, and are not limited to, paved and unpaved roads, livestock trails, agricultural crops, erodible slopes, etc.
- Current zoning designations within the Whale Rock Reservoir watershed include agricultural, rural lands, open space, and recreation. The Land use designations within the Whale Rock Reservoir watershed are not anticipated to change significantly in the future.
- No current or future industrial uses are planned in the watershed.
- The majority of the land within the Whale Rock Reservoir watershed is privately owned. As a result, the City of San Luis Obispo and the Whale Rock Commission must continue to rely upon the control measures of the major landowners of the watershed as well as the government agencies which regulate land use and contaminant discharge.
- The City of San Luis Obispo and the Whale Rock Commission do however maintain and control the activities within the State owned land, which is limited to the reservoir and the land immediately surrounding the reservoir.

- There is no formal management structure for the specific purpose of watershed management for water quality control purposes.
- The City and the Whale Rock Commission have not developed a watershed management plan of this type primarily due to their lack of jurisdiction over activities within the privately held areas of the watershed.
- The United States Forest Service (USFS) have developed a Land and Resource Management Plan for the Los Padres National Forest which contains elements related to watershed management and water quality protection.
- The Whale Rock Commission continues to conduct daily inspections by vehicle of the reservoir perimeter roads and the portions of the creeks which are publicly accessible. Commission staff also conducts regular inspections of the reservoir by boat.
- The inspections primarily focus on general watershed conditions, including potential sources of contamination. Any unusual occurrences are noted in a daily log.
- The Commission does not conduct inspections of the remainder of the watershed due to their lack of authority to conduct such inspections on private lands.
- Whale Rock Reservoir is designated as a sensitive and scenic area under the County of San Luis Obispo's General Plan due to the presence of unique and/or sensitive plants and animal habitats.
- The Whale Rock Reservoir watershed falls within the boundaries of the Adelaida Area Plan as developed by County of San Luis Obispo. The land use element of the Adelaida Area Plan provides development standards related to specific land use issues which have impacts upon the management of the watershed.
- As previously stated, the easternmost portion of the watershed lies within the Los Padres National Forest, Santa Lucia Wilderness, and is addressed in the Los Padres National Forest Land and Resource Management Plan which has specific policies addressing recreation, mining, and erosion control.
- There are no current oil or gas extraction operations in the watershed.
- The Los Padres National Forest Land and Resource Management Plan contains the following sections relative to the management of the watershed:
  - Limited public access including visitor entry and use restrictions.
  - Managing habitats to support viable populations of fish and wildlife.
  - Removing improvements not essential to wilderness management.
  - Constructing and maintaining trails in a manner that protects the environment.

- Constructing bridges to facilitate stream crossings.
  - Rehabilitating fire-disturbed areas to as natural a state as possible.
  - Emphasizing use of non-mechanized fire suppression methods
  - Restoring abandoned roads or other disturbances.
  - Restoring gullies or channels which have been disturbed by debris, overgrazing and road encroachment.
  - Instituting grazing practices that will restore stream bank cover and stabilize channels.
- The quality of the raw water from the Whale Rock Reservoir is generally good.
  - The City’s Water Treatment Plant continues to maintain the ability to switch to Salinas Reservoir and/or Nacimiento Lake water in the event water from the Whale Rock Reservoir begins to exhibit undesirable or untreatable characteristics.
  - The City of San Luis Obispo continues to collect raw water samples at the influent lines to the City’s Water Treatment Plant, and the County of San Luis Obispo continues to collect raw water samples from the various intake levels located at the Whale Rock Dam.
  - The raw water has exceeded the treated water MCLs for turbidity, pH, and odor. No data has been generated with respect to the color of the raw water.
  - The raw water continues to show detectable concentrations of coliform/fecal coliform bacteria.
  - The City continues to meet the applicable drinking water standards relative to bacteriological contamination in the treated water out of the City’s water treatment plant.
  - The concentrations of cations and anions in the raw water have consistently been below the treated water MCLs for the period of record.
  - The concentration of metals in the raw water continues to be consistently below the treated water MCLs.
  - The raw water has consistently been well below the treated water MCLs for concentrations of radiological chemicals.

## **4.2 Conclusions from the 2011 Update That Are Still Applicable**

- Eroding sediments are a significant contaminant of concern in the watershed.
- Cattle remain a potentially significant source of bacteriological contamination due to their direct access to tributary streams within privately owned portions of the watershed.
- Pesticide/herbicide use on croplands continues to represent a potential source of organic contamination within the watershed.
- The City of San Luis Obispo and the Whale Rock Commission must continue their reliance upon the watershed management practices of the major landowners and government agencies that regulate land use and contaminant discharge.
- Potential sources of contamination from wastewater treatment plants, concentrated animal facilities, solid/hazardous waste disposal facilities, and seawater intrusion are not present in the watershed.
- The City's existing Water Treatment Plant is more than adequate to continue processing water from Whale Rock Reservoir to meet current surface water treatment regulations.

## **4.3 Major Changes and Comments since the 2011 Update**

- No significant changes have occurred within the watershed since the 2016 Update.
- The City and County implemented a Quagga Mussel monitoring program although the risk of Quagga Mussel is low due to not allowing boating or body contact on the reservoir.
- Although the Whale Rock Reservoir watershed remains resilient, drought is an increasing concern during this survey period and should continually be addressed in planning and management efforts.
- Due to the Covid-19 Pandemic that began in March 2019, routine raw water sampling conducted by the County was put on hold for 11 months to ensure the health and safety of County and City staff. During this time, the City continued to sample raw water at the Water Treatment Plant influent. When operations resumed at the Reservoir, the County instituted a monthly raw water sampling schedule.

# Section 5

## Updated Water Quality Information

This section presents the updated raw water quality as provided by the City of San Luis Obispo for its Water Treatment Plant. The updated water quality tables are placed at the end of this section in order to simplify reading this report.

### 5.1 Raw Water Quality – General Physical Characteristics

The City conducts general physical water quality testing on a yearly frequency at the City filtration plant influent. The test results obtained during 2017-2021 are summarized in Table 5-1.

### 5.2 Raw Water Quality – Total/Fecal Coliform Bacteria

The City conducts sampling for bacteriological parameters on the raw water received from Whale Rock Reservoir. The data collected during 2017-2021 is summarized on Table 5-2. The data show the raw water to contain high amounts of coliform bacteria that may be attributed to cattle grazing. Levels may increase after rain events or during warm weather.

### 5.3 Raw Water Quality – General Mineral Constituents

The City conducts general mineral sampling on the raw water received from Whale Rock Reservoir once per year. The results obtained during 2017-2021 are summarized in Table 5-3. The raw water meets all of the applicable treated water MCL's. There have been no observable increases in any constituent, and nitrate/nitrite levels are extremely low.

### 5.4 Raw Water Quality – Inorganic Constituents

The City conducts inorganic chemical testing on the raw water received from Whale Rock Reservoir once per year. The results obtained during 2017-2021 are summarized in Table 5-4. The raw water meets all of the applicable treated water MCL's, except for manganese. Manganese is relatively easy to remove through the treatment process, and the treated water has always exceeded State standards for these constituents.

## **5.5 Raw Water Quality – Radiological Constituents**

Table 5-5 indicates the concentration of gross alpha and total radium 228 radioactivity in the raw water received from Whale Rock Reservoir. Testing for gross alpha radioactivity was last conducted in 2013. The 2013 sample verified that the concentration of gross alpha radioactivity in the raw water was well below the MCL of 15 pCi/L and the 2006 samples verified that the concentration of radium 228 was below the 1 pCi/L trigger for continued monitoring.

## **5.6 Raw Water Quality – Organic Chemical Constituents**

The City has been sampling the raw water on the raw water received from Whale Rock Reservoir annually for certain organic chemicals. The sampling results generated during 2017-2021 are summarized in Table 5-6. To date, no organic chemicals have been found at levels above laboratory detection levels.

## **5.7 Raw Water – Miscellaneous Sampling**

Due to the pristine nature of the raw water in Whale Rock Reservoir, additional sampling and testing of the water flowing into the reservoir is not warranted.

## **5.8 Overall Conclusions**

The existing Water Treatment Plant owned and operated by the City of San Luis Obispo is more than adequate to effectively and reliably process raw water from Whale Rock Reservoir for turbidity reduction, disinfection, and taste/odor control. This conclusion is supported by the treatment plant evaluation that was performed by Boyle Engineering in conjunction with the 2001, 2005 and 2011 Watershed Sanitary Survey Updates. The Water Treatment Plant Review, dated February 2002, was submitted to SWRCB following the 2001 Watershed Sanitary Survey.

The City of San Luis Obispo continues to anticipate more stringent water quality regulations and considers the potential for such requirements with every periodic upgrade to water treatment plant facilities. Since the 2016 update, several upgrades have been made to improve the treatment technology, efficiency, and infrastructure of the plant. The water treatment plant recently completed an upgrade to replace the ozone disinfection system. The new ozone system allows for increased operational flexibility and reliability, increases overall ozone generation capacity and uses liquid oxygen to increase ozone concentration. The City continues to monitor for emerging technology to improve plant processes and operations.

To address water quality concerns related to Total Trihalomethane (THM), a trihalomethane (THM) removal system, was added in 2020 to two of the City's treated water storage facilities, including Clearwell #2 located on site at the Water Treatment Plant. An automated THM analyzer was added to the Treatment Plant's laboratory to allow for control of the THM removal equipment based on daily real time speciated THM sampling data and historical trending of the WTP's effluent THM data via the plant SCADA system. The onsite THM analyzer also allows for analysis of grab samples from the City's water distribution system. At the Enda Saddle storage facility located in the

City's South Hills Open Space, an automated chlorine feed system, tank mixer, and vent blower were installed to mitigate THM formation in the distribution system. The City will continue to incorporate and address water quality concerns in future upgrades to the water treatment and water distribution systems.

Lastly, the County's Whale Rock Reservoir Sanitary Survey for the Cayucos Water Treatment Plant concludes that the major sources of potential contamination lie in cattle grazing and eroding sediments. Cattle have the potential to introduce bacteria into the reservoir, however the County concluded no major issues have been observed and therefore the current measures to maintain grazing are sufficient. Sedimentation has the potential to affect water treatment plant processes, however no issues have been observed during this survey period.

Security of the watershed continues to be considered adequate. This is reinforced with the City's Emergency Response Plan developed in 2005 and to be updated by the end of 2021. The watershed is relatively sparsely populated. The City has good on-going relationships with County staff, law enforcement, and nearby residents. The likelihood that something detrimental to water quality could happen within the watershed without the City being notified is considered remote.

Security of the Water Treatment Plant is considered to be adequate. The Water Treatment Plant maintains a fenced perimeter with a locked security gate limiting access. Water Treatment Plant buildings are protected by an alarm system, and contract security patrol is maintained for additional after-hours security. Finally, security is addressed in the 2004 City's Emergency Response Plan. As part of the America's Water Infrastructure Act of 2018, the City of San Luis Obispo has conducted a risk assessment and is updating its Emergency Response Plan which is scheduled to be completed in December 2021.

**Table 5-1**  
**Raw Water Quality - General Characteristics**  
**Whale Rock Reservoir Sanitary Survey**  
**City of San Luis Obispo**

<b>Constituent</b>	<b>Units</b>	<b>MCL<sup>1</sup></b>	<b>9/17</b>	<b>9/18</b>	<b>9/19</b>	<b>9/20</b>	<b>9/21</b>
Turbidity	NTU	5	2.5	0.8	6.6	0.2	4
pH	pH units	6.0 - 8.5	7.7	8.0	7.6	8.0	8.17
Temperature	°C	None	--	--	--	--	--
A. Color	pcu	15	50	ND	12	5	ND
Odor	TON	3	4	ND	4	4	ND
T. Alkalinity	mg/L	None	170	230	240	230	220
Hardness	mg/L	None	279	289	276	283	264

<sup>1</sup>MCLs for treated water.



**Table 5-2**  
**Raw Water Quality - Total and Fecal Coliform Bacteria**  
**Whale Rock Reservoir Sanitary Survey**  
**City of San Luis Obispo**  
(MPN/100 mL)

Date	Total Coliform	Fecal Coliform	Date	Total Coliform	Fecal Coliform
1/17	7.8	<1.8	7/19	-	-
2/17	79	2	8/19	141	<1.0
3/17	240	4.5	9/19	>2420	<1.0
4/17	2	<1.8	10/19	56.5	<1.0
5/17	6.8	<1.8	11/19	166	1
6/17	2	<1.8	12/19	196	2
7/17	4.5	<1.8	1/20	770	1
8/17	23	<1.8	2/20	137	<1.0
9/17	4.5	<1.8	3/20	165.8	<1.0
10/17	7.8	<1.8	4/20	-	-
11/17	<1.8	<1.8	5/20	-	-
12/17	2	<1.8	6/20	1	<1
1/18	<1.8	<1.8	7/20	77	<1.0
2/18	2	<1.8	8/20	>2419.6	<1.0
3/18	2	<1.8	9/20	178	<1
4/18	13.4	<1.0	10/20	667	1
5/18	13.5	<1.0	11/20	1553.1	2
6/18	461.1	<1.0	12/20	>2420	<1
7/18	5.2	<1.0	1/21	>2420	1
8/18	1414	<1.0	2/21	579.4	2
9/18	727	<1.0	3/21	921	1
10/18	21	<1.0	4/21	1046	<1
11/18	9.8	2	5/21	-	-
12/18	6.3	<1.0	6/21	-	-
1/19	<1.0	<1.0	7/21	-	-
2/19	77	2	8/21	-	-
3/19	4.1	<1.0	9/21	2	-
4/19	365	<1.0	10/21	<1.0	<1.0
5/19	394	<1.0	11/21	-	-
6/19	45	<1.0	12/21	-	-

**Table 5-3  
General Mineral Water Quality  
Whale Rock Reservoir Sanitary Survey  
City of San Luis Obispo**

<b>Constituent</b>	<b>Units</b>	<b>MCL<sup>1</sup></b>	<b>9/17</b>	<b>9/18</b>	<b>9/19</b>	<b>9/20</b>	<b>9/21</b>
Calcium	mg/L	--	51	50	48	44	32
Magnesium	mg/L	--	37	40	38	42	43
Sodium	mg/L	--	31	37	30	34	38
Potassium	mg/L	--	2	2	2	2	2
Hydroxide	mg/L	--	ND	ND	ND	ND	ND
Carbonate	mg/L	--	ND	ND	ND	ND	ND
Bicarbonate	mg/L	--	210	280	290	290	270
Sulfate	mg/L	500	88.3	89.5	91.2	95.7	103
Chloride	mg/L	500	25	26	25	28	30
Nitrate as NO <sub>3</sub>	mg/L	45	ND	ND	ND	ND	ND
Fluoride	mg/L	2	0.3	0.3	0.3	0.3	0.3

<sup>1</sup>MCLs for treated water.

**Table 5-4**  
**Raw Water Quality - Trace Minerals**  
**Whale Rock Reservoir Sanitary Survey**  
**City of San Luis Obispo**

<b>Constituent</b>	<b>Units</b>	<b>MCL<sup>1</sup></b>	<b>9/17</b>	<b>9/18</b>	<b>9/19</b>	<b>9/20</b>	<b>9/21</b>
Aluminum	µg/L	1000	20	ND	ND	ND	320
Antimony	µg/L	6	ND	ND	ND	ND	ND
Arsenic	µg/L	10	ND	2	3	2	3
Barium	µg/L	1000	ND	ND	ND	ND	ND
Beryllium	µg/L	4	ND	ND	ND	ND	ND
Boron	µg/L	-	100	100	ND	ND	100
Cadmium	µg/L	5	ND	ND	ND	ND	ND
Chromium, total	µg/L	50	ND	ND	ND	ND	ND
Copper	µg/L	1000	ND	ND	ND	ND	ND
Cyanide	µg/L	150	ND	ND	ND	ND	ND
Iron	µg/L	300	ND	ND	130	70	130
Lead	µg/L	15	ND	ND	ND	ND	ND
Manganese	µg/L	50	150	ND	70	ND	90
Mercury	µg/L	2	ND	ND	ND	ND	ND
Nickel	µg/L	100	ND	ND	ND	ND	ND
Selenium	µg/L	50	ND	ND	ND	ND	ND
Silver	µg/L	100	ND	ND	ND	ND	ND
Thallium	µg/L	2	ND	ND	ND	ND	ND
Zinc	µg/L	5000	ND	ND	ND	ND	ND

<sup>1</sup>MCLs for treated water.

**Table 5-5**  
**Raw Water Quality - Radiological Constituents**  
**Whale Rock Reservoir Sanitary Survey**  
**City of San Luis Obispo**

<b>Date</b>	<b>Total Alpha (pCi/L)</b>	<b>Total Beta (pCi/L)</b>
MCL	15	50
8/96	0.8±1.0	2.0±2.0
5/04	4.36±1.45	--
8/04	0.549±1.19	--
11/04	2.61±1.49	--
2/05	0.000±0.746	--
10/13	3.62±1.47	--
9/19	3.07±1.57	--

<b>Date</b>	<b>Total Radium 228</b>	<b>Counting Error</b>
3/06	0.000	±0.376
6/06	0.000	±0.439

**Table 5-6**  
**Raw Water Quality - Organic Chemicals**  
**Whale Rock Reservoir Sanitary Survey**  
**City of San Luis Obispo**

<b>Constituent</b>	<b>Units</b>	<b>9/17</b>	<b>9/18</b>	<b>9/19</b>	<b>9/20</b>	<b>9/21</b>
Bromodichloromethane	µg/L	ND	ND	ND	ND	ND
Bromoform	µg/L	ND	ND	ND	ND	ND
Chloroform	µg/L	ND	ND	ND	ND	ND
Dibromochloromethane	µg/L	ND	ND	ND	ND	ND
Total Trihalomethanes	µg/L	ND	ND	ND	ND	ND
Benzene	µg/L	ND	ND	ND	ND	ND
Carbon tetrachloride	µg/L	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	µg/L	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	µg/L	ND	ND	ND	ND	ND
1,1-Dichloroethane	µg/L	ND	ND	ND	ND	ND
1,2-Dichloroethane	µg/L	ND	ND	ND	ND	ND
1,1-Dichloroethylene	µg/L	ND	ND	ND	ND	ND
cis-1,2-Dichloroethylene	µg/L	ND	ND	ND	ND	ND
trans-1,2-Dichloroethylene	µg/L	ND	ND	ND	ND	ND
Dichloromethane	µg/L	ND	ND	ND	ND	ND
1,2-Dichloropropane	µg/L	ND	ND	ND	ND	ND
Total 1,3-Dichloropropene	µg/L	ND	ND	ND	ND	ND
Ethylbenzene	µg/L	ND	ND	ND	ND	ND
Monochlorobenzene	µg/L	ND	ND	ND	ND	ND
Styrene	µg/L	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	µg/L	ND	ND	ND	ND	ND
Tetrachloroethylene	µg/L	ND	ND	ND	ND	ND
Toluene	µg/L	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	µg/L	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	µg/L	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	µg/L	ND	ND	ND	ND	ND
Trichloroethylene	µg/L	ND	ND	ND	ND	ND
Trichlorofluoromethane(Freon 11)	µg/L	ND	ND	ND	ND	ND
Trichlorotrifluoroethane(Freon 113)	µg/L	ND	ND	ND	ND	ND
Vinyl Chloride	µg/L	ND	ND	ND	ND	ND
m,p-xylene	µg/L	ND	ND	ND	ND	ND
o-xylene	µg/L	ND	ND	ND	ND	ND
Total xylenes	µg/L	ND	ND	ND	ND	ND
Bromobenzene	µg/L	ND	ND	ND	ND	ND
Bromochloromethane	µg/L	ND	ND	ND	ND	ND
Bromomethane	µg/L	ND	ND	ND	ND	ND
n-Butylbenzene	µg/L	ND	ND	ND	ND	ND
sec-Butylbenzene	µg/L	ND	ND	ND	ND	ND
Tert-Butylbenzene	µg/L	ND	ND	ND	ND	ND
Chloroethane	µg/L	ND	ND	ND	ND	ND
Chloromethane	µg/L	ND	ND	ND	ND	ND
2-Chlorotoluene	µg/L	ND	ND	ND	ND	ND
4-Chlorotoluene	µg/L	ND	ND	ND	ND	ND
Dibromomethane	µg/L	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	µg/L	ND	ND	ND	ND	ND
Dichlorodifluoromethane	µg/L	ND	ND	ND	ND	ND

<b>Constituent</b>	<b>Units</b>	<b>9/17</b>	<b>9/18</b>	<b>9/19</b>	<b>9/20</b>	<b>9/21</b>
1,3-Dichloropropane	µg/L	ND	ND	ND	ND	ND
2,2-Dichloropropane	µg/L	ND	ND	ND	ND	ND
1,1-Dichloropropene	µg/L	ND	ND	ND	ND	ND
Hexachlorobutadiene	µg/L	ND	ND	ND	ND	ND
Isopropylbenzene	µg/L	ND	ND	ND	ND	ND
p-Isopropyltoluene	µg/L	ND	ND	ND	ND	ND
Methyl tert-Butyl Ether (MTBE)	µg/L	ND	ND	ND	ND	ND
Naphthalene	µg/L	ND	ND	ND	ND	ND
n-Propylbenzene	µg/L	ND	ND	ND	ND	ND
1,1,1,2-Tetrachloroethane	µg/L	ND	ND	ND	ND	ND

# Section 6

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