FINAL

LOS OSOS BASIN PLAN
GROUNDWATER MONITORING PROGRAM
2022 ANNUAL MONITORING REPORT

Prepared for the

BASIN MANAGEMENT COMMITTEE

JUNE 2023

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Acronyms used in this Annual Report

BBMR	Basin Boundary Modification Request
BMC	Basin Management Committee
CASGEM	California Statewide Groundwater Elevation Monitoring
CCRWQCB	Central Coast Regional Water Quality Control Board
CEC	Constituents of Emerging Concern
CHG	Cleath-Harris Geologists
DEET	Diethyl-meta-tolumide
DWR	Department of Water Resources
EFH	Equivalent Freshwater Head
FW	First Water
GSWC	Golden State Water Company
ISJ	Interlocutory Stipulated Judgement
LA	Lower Aquifer
LOBP	Los Osos Basin Plan
LOCP	Los Osos Community Plan
LOCSD	Los Osos Community Services District
LOHCP	Los Osos Habitat Conservation Plan
LOWRF	Los Osos Water Recycling Facility
NAVD 88	North American Vertical Datum of 1988
NDMA	N-Nitrosodimethylamine
NDMC	National Drought Mitigation Center
NGVD 29	National Geodetic Vertical Datum of 1929
NOAA	National Oceanic and Atmospheric Administration
Qa	Quaternary Alluvium
S&T	S&T Mutual Water Company
SGMA	Sustainable Groundwater Management Act
SNMP	Salt and Nutrient Management Plan
SWRCB	State Water Resource Control Board
TDS	Total Dissolved Solids
UA	Upper Aquifer
USDA	United States Department of Agriculture

EXECUTIVE SUMMARY

The Los Osos Basin Plan Groundwater Monitoring Program – 2022 Annual Report (Annual Report) describes activities related to the Los Osos Basin Plan (LOBP) Groundwater Monitoring Program, and provides results and interpretation of these activities for calendar year 2022. The LOBP Groundwater Monitoring Program is necessary to accomplish the following continuing goals set forth in Section 2.4 of the LOBP (ISJ Group, 2015):

1. Provide for a continuously updated hydrologic assessment of the Los Osos Groundwater Basin (Basin), its water resources and sustainable yield.

2. Create a water resource accounting which is able to meet the information needs for planning, monitoring, trading, environmental management, utility operations, land development and agricultural operations.

The LOBP Groundwater Monitoring Program is also necessary to support other goals of the LOBP, including halting or reversing seawater intrusion, establishing a long-term environmentally and economically sustainable and beneficial use of the Basin, and the equitable allocation of costs associated with Basin management.

Groundwater Production

Groundwater production for calendar year 2022 is summarized in Table ES-1 below. Purveyor (Los Osos Community Services District, Golden State Water Company, and S&T Mutual Water Company) production has decreased by one percent compared to 2021, while total Basin production increase slightly compared to 2021.

Table ES-1. Groundwater Production

Description	2021 Production in Acre-Feet	2022 Production in Acre-Feet
Los Osos Community Services District	503	496
Golden State Water Company	491	491
S&T Mutual Water Company	32	29
Purveyor Subtotal (metered)	**1,026**	**1,016**
Domestic wells[1]	220	220
Community facilities[1]	130	90
Agricultural wells[1]	620	680
Total Estimated Production[1]	**2,000**	**2,010**

[1] Rounded to the nearest 10 acre-feet. Production from non-metered wells (Domestic, Community, Agricultural) estimated per methods described in Appendix F and LOBP Section 4 and Section 7.5.

Basin Status

The status of the Basin in terms of key parameters and metrics are listed below, along with the page reference for definitions and additional details on each key parameter:

> **Precipitation (p. 41)**. The Basin received below average rainfall in 2022. The drought condition for San Luis Obispo County ranged from moderate drought to severe drought conditions during 2022 (NDMC/USDA/NOAA, 2023).
>
> **Seawater intrusion front (p. 56)**. The seawater intrusion front in Zone D retreated toward the coast between Fall 2021 and Fall 2022 (an improvement). This interpretation is based on localized conditions contoured to represent regional trends. The seawater intrusion front in Zone E advanced toward LA11 between Fall 2021 and Fall 2022 (a deterioration).
>
> **Basin Yield Metric (p. 67)**. The Basin Yield Metric increased between 2021 and 2022 (a deterioration) and does not meet the LOBP goal in 2022 due to updated Sustainable Yield methodology implemented in 2022 (discussed in Section 7.5.1).
>
> **Water Level Metric (p. 70)**. The Water Level Metric increased between Spring 2021 and Spring 2022 (an improvement) and has not reached the target value.
>
> **Chloride Metric (p. 72)**. The Chloride Metric decreased between Fall 2021 and Fall 2022 (an improvement) and has not reached the target value.
>
> **Nitrate Metric (p. 74)**. The Nitrate Metric increased between Winter 2021 and Winter 2022 (a deterioration) and has not reached the target value.
>
> **Upper Aquifer Water Level Profile (p. 76)**. Water levels in the Upper Aquifer along the bay remain safely above the Protective Elevation, except for near well UA5, where an increase in chloride concentrations warrants further investigation.

Recommendations for improving the quality and availability of data are contained in Section 9 of the Annual Report. Recommendations from the 2021 Annual Report that are on-hold or in progress include re-evaluating the Water Level, Chloride, and Nitrate Metrics (on-hold), developing a rating curve for stream flow sensor 751 on Los Osos Creek (in progress), and developing a transient Basin model (scheduled to start in 2023). Additional recommendations include continued close monitoring of UA5 water quality, locating and salvaging well FW7 at the Broderson site, and installation of a new Lower Aquifer monitoring well at the east end of Skyline Avenue.

LOBP Metrics

As described in Section 7.5 ("Basin Metrics") of this Annual Report, the LOBP established several Basin metrics to evaluate nitrate impacts to the Upper Aquifer, seawater intrusion into the Lower Aquifer, and the effect of management efforts of the Basin Management Committee (BMC). These metrics allow the BMC, regulatory agencies, and the public to evaluate the status of nitrate levels and seawater intrusion, and the impact of implementation of the LOBP programs in the Basin through objective, numerical criteria that can be tracked over time. The status of key Basin metrics is summarized in Table ES-2.

Table ES-2. LOBP Metric Summary			
Metric[1]	**LOBP Goal**	**Calculated Value from 2022 Data**	**Change in Condition from 2021**
Basin Yield Metric[2]	80 or less	84	Increase from 72 (deterioration)
Water Level Metric	8 feet above mean sea level or higher	2.5 feet above mean sea level	Increase from 2.1 ft. (improvement)
Chloride Metric	100 mg/L or lower	184 mg/L	Decrease from 202 mg/L (improvement)
Nitrate Metric	10 mg/L or lower	17.5 mg/L (NO_3-N)	Increase from 17 mg/L (deterioration)

[1]Revisions to the Water Level, Chloride, and Nitrate Metrics were initiated in 2021 and are currently on hold as the BMC Staff evaluates opportunities to improve the Basin Monitoring Network.
[2]On October 27th, 2021 the BMC unanimously adopted a new methodology for calculating the Sustainable Yield for Basin that reduced the Sustainable Yield estimate from 2,760 to 2,380 AF for Calendar Year 2022. Reducing the Sustainable Yield estimate increased the Basin Yield Metric from 72 to 84, assuming a consistent amount of pumping.

Approval of the Annual Monitoring Report by the BMC does not constitute unanimous approval of actions listed under Section 5.11.4 (Approval Requirements) of the Stipulated Judgment or setting the Sustainable Yield for a given year. These actions require a separate action and unanimous approval by the BMC.

Adaptive Management Program

In addition to the programs described in the LOBP, the following additional measures are recommended in the context of adaptive management. Details regarding each program are provided in Section 10 of this Annual Report.

- Lower Aquifer Monitoring Improvements
- Updated Metric Evaluation
- Program C Adaptive Management
- Lower Aquifer Nitrate Investigation
- Los Osos Basin Well Database
- Evaluation of Water Conservation Measures
- WRFP/Transient Groundwater Model
- Discussion and Recommendation of Criteria for Future Growth

LOBP Infrastructure Programs

The status of LOBP infrastructure programs is summarized Table ES- 3.

Table ES-3. Basin Infrastructure Projects				
Project Name	**Parties Involved**	**Funding Status**	**Capital Cost**	**Status**
Program A				
Water Systems Interconnection	LOCSD/ GSWC			Completed
Upper Aquifer Well (8th Street)	LOCSD			Completed
South Bay Well Nitrate Removal	LOCSD			Completed
Palisades Well Modifications	LOCSD			Completed
Blending Project (Skyline Well)	GSWC			Completed
Water Meters	S&T			Completed
Program B				
LOCSD Wells	LOCSD	Not Funded	BMP: $2.7 mil	Project not initiated
GSWC Wells	GSWC	Not Funded	BMP: $3.2 mil	Project not initiated
Community Nitrate Removal Facility	LOCSD/GSWC/S&T	GSWC Portion Funded	GSWC: $1.23 mil	GSWC's Program A Blending Project might be capable of expanding to be the first phase of the Program B Community Nitrate Removal Facility.

Project Name	Parties Involved	Funding Status	Capital Cost	Status
Program C				
Expansion Well No. 1 (Los Olivos)	GSWC			Completed
Expansion Well No. 2	LOCSD	LOCSD	BMP: $2.5 mil	The well construction and development activities are completed. Construction of the water transmission main to connect the well to the LOCSD system and design of the well equipping is anticipated to be completed in 2023. Completion of all phases of the project is estimated to be June 2024.
Expansion Well 3 and LOVR Water Main Upgrade	GSWC/LOCSD	Cooperative Funding	BMP: $1.6 mil	This project has been deferred under Adaptive Management.
LOVR Water Main Upgrade	GSWC	May be deferred	BMP: $1.53 mil	Project may not be required, depending on the pumping capacity of the drilled Program C wells. It may be deferred to Program D.
S&T/GSWC Interconnection	S&T/ GSWC	Pending	BMP: $30,000	Currently on hold pending further evaluation of the project.

Project Name	Parties Involved	Funding Status	Capital Cost	Status
Program M				
New Zone D/E Lower Aquifer monitoring well in Cuesta by the Sea	All Parties			Completed
Program U				
Creek Discharge Program	All Parties		TBD	These activities are currently on hold. The Transient Model and Water Recycling Funding Study are intended to better inform the BMC on the most effective opportunities for increasing the sustainable yield of the Basin.
8th and El Moro Urban Storm Water Recovery Project	All Parties		TBD	These activities are currently on hold. The Transient Model and Water Recycling Funding Study are intended to better inform the BMC on the most effective opportunities for increasing the sustainable yield of the Basin.

1. INTRODUCTION

The Los Osos Groundwater Basin (the Basin) was adjudicated in October 2015 (*Los Osos Community Services District v. Southern California Water Company [Golden State Water Company] et al.* (San Luis Obispo County Superior Court Case No. CV 040126) and is managed by the Los Osos Groundwater Basin Management Committee (BMC), consisting of representatives from Los Osos Community Services District (LOCSD), Golden State Water Company (GSWC), S&T Mutual Water Company (S&T), and the County of San Luis Obispo (County). This is the eighth Annual Report for the Basin.

The 2022 Annual Report (Annual Report) describes Basin activities related to the Los Osos Basin Plan (LOBP) Groundwater Monitoring Program and provides results and interpretation of these activities. The LOBP Groundwater Monitoring Program is necessary to accomplish the following continuing goals set forth in Section 2.4 of the LOBP (ISJ Group, 2015):

1. Provide for a continuously updated hydrologic assessment of the Basin, its water resources and sustainable yield.

2. Create a water resource accounting which is able to meet the information needs for planning, monitoring, trading, environmental management, utility operations, land development and agricultural operations.

The LOBP Groundwater Monitoring Program is also necessary to support other LOBP goals, including halting or reversing seawater intrusion, establishing a long-term environmentally and economically sustainable and beneficial use of the Basin, and the equitable allocation of costs associated with Basin management (ISJ Group, 2015). The program will provide significant overlap with several regulatory requirements, including:

- The Sustainable Groundwater Management Act (SGMA)

- California Statewide Groundwater Elevation Monitoring (CASGEM) Program

- State Water Resource Control Board's (SWRCB) salt and nutrient monitoring guidelines as adopted in the state Recycled Water Policy. The County Board of Supervisors adopted the Salt and Nutrient Management Plan (SNMP) for the Los Osos Groundwater Basin on January 23, 2018. The SNMP has been reviewed by the Regional Water Quality Control Board.

- Recycled Water Management Plan requirements for the Los Osos Water Recycling Facility (LOWRF)

This report was prepared by Cleath-Harris Geologists (CHG). Confluence Engineering Solutions (ConfluenceES) contributed to the Executive Summary and Section 10 (Adaptive Management).

2. BACKGROUND

In August 2008, the Superior Court of the State of California for the County of San Luis Obispo (Court) approved an Interlocutory Stipulated Judgment (ISJ) between LOCSD, GSWC, S&T, and the County. Under the ISJ, these Parties formed a working group, undertaking technical studies and management discussions that produced the LOBP in January 2015. The LOBP presents a comprehensive groundwater management strategy and serves as the cornerstone of a physical solution to address the significant problems facing the Basin, including seawater intrusion and elevated nitrate concentrations, and for restoration of Basin water resources, while respecting existing water rights. The LOBP Groundwater Monitoring Program is a key component of the LOBP, providing water level and water quality data that serve as measures of effectiveness for LOBP programs and activities with respect to the restoration of Basin water resources. A Stipulated Judgment was approved by the Court on October 14, 2015 and covers the plan areas shown in Figure 1.

In 2019, the Department of Water Resources (DWR) separated the Los Osos Valley groundwater basin (Bulletin 118 basin 3-08) into two jurisdictional subbasins, the Los Osos Area Subbasin and the Warden Creek Subbasin (DWR, 2019). The Los Osos Area Subbasin lies within the LOBP plan area and overlaps with the LOBP Basin but does not replace or update the scientific boundary defined in the 2015 Basin adjudication (see Section 2.2.4 for details). A figure showing the DWR Los Osos Subbasin boundary and the LOBP Basin boundary is included in Appendix A.

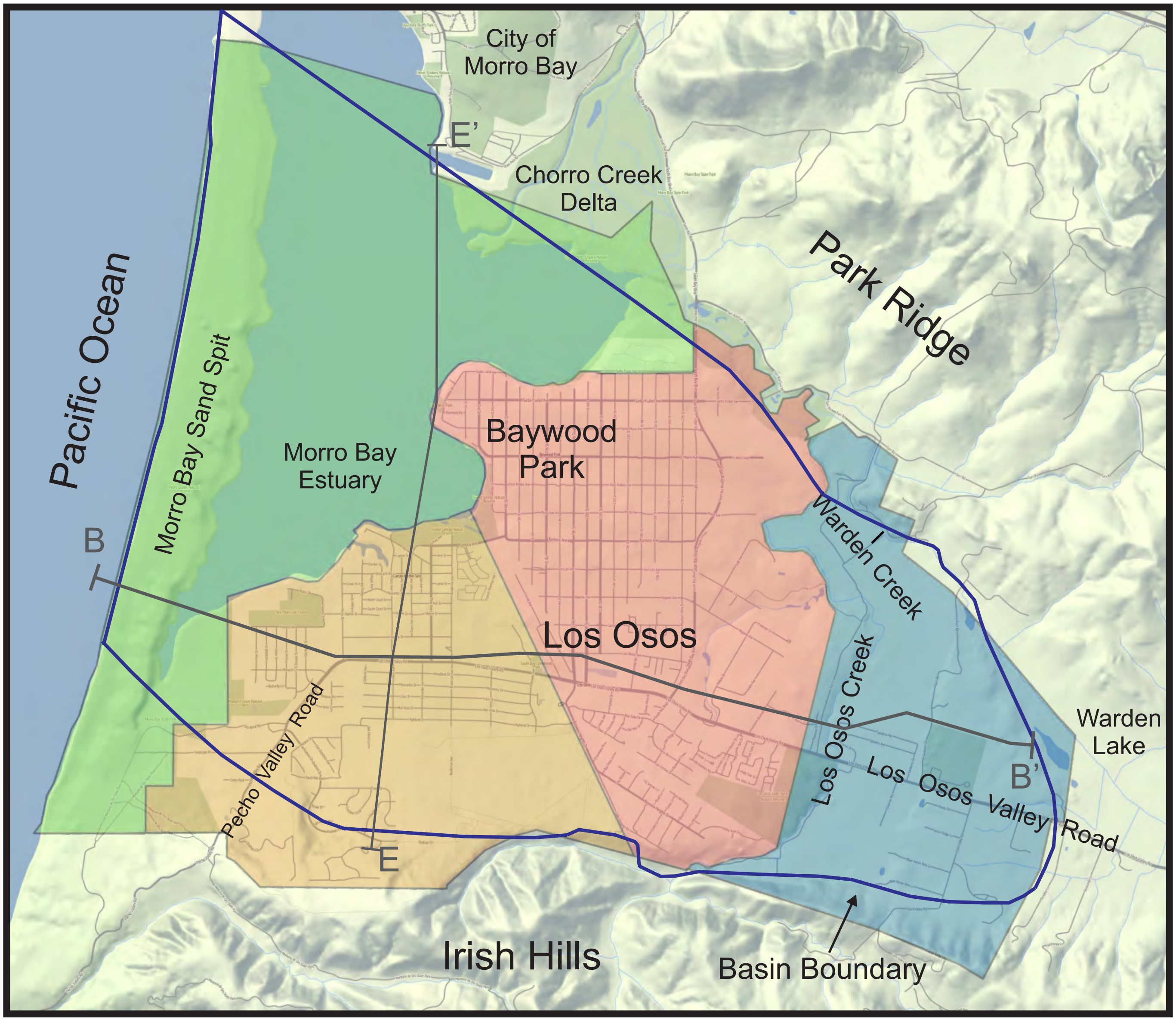
2.1 Groundwater Monitoring History

Groundwater monitoring has been performed by public agencies, water purveyors, and consultants for various Basin studies and programs over several decades. A list of historical investigations, monitoring reports, and monitoring programs with a major focus on Basin water levels and water quality through 2022 is included in Appendix A.

2.2 LOBP Groundwater Monitoring Program Design

The purpose of the LOBP Groundwater Monitoring Program is to collect and organize groundwater data on a regular basis for use in management of the Basin. Design of the LOBP Groundwater Monitoring Program is detailed in Section 7 of the LOBP. The basic elements of the program are as follows:

- Monitor long-term groundwater level trends in a network of wells for three monitoring groups within the Basin: First Water (FW), Upper Aquifer (UA), and Lower Aquifer (LA). These terms are defined in Section 2.2.1 below. The abbreviations are only used for network well numbering purposes (e.g. Lower Aquifer well 41 is LA41).



Base Image: Stamen-Terrain

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Scale: 1 inch ≈ 4,000 feet

Explanation

Basin Plan Areas:

- Dunes and Bay Area
- Western Area
- Central Area
- Eastern Area

Cross-section alignments (Figures 5, 19, 20 and 21). Labeled B-B' and E-E' to be consistent with Basin Plan.

Basin Boundary from Los Osos Plan

Figure 1
Basin Location and Plan Areas
Los Osos Groundwater Basin
2022 Annual Report

Cleath-Harris Geologists

- Monitor seasonal fluctuations and long-term water quality trends at selected wells in each of the three monitoring groups.

- Compare hydrologic data pertinent to Basin management, including groundwater production from the two principal water supply aquifers (Upper Aquifer and Lower Aquifer), wastewater disposal and recycled water use, local precipitation data and County stream gage records for Los Osos Creek.

- Collect data sufficient to evaluate the effectiveness of Basin management strategies adopted in the LOBP via established metrics.

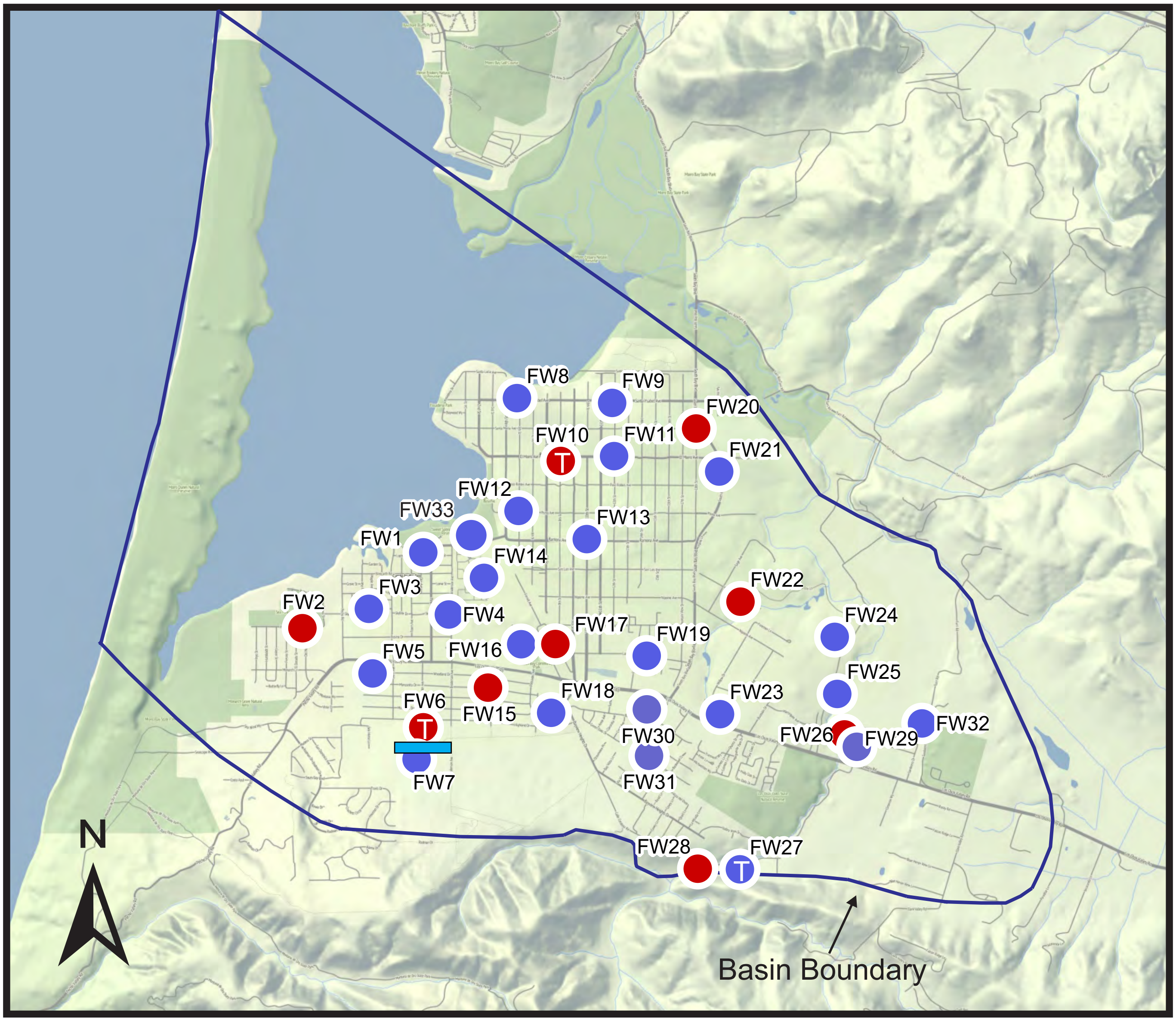
There are currently 93 wells in the LOBP Groundwater Monitoring Program, including 43 BMC member agency monitoring wells, 17 municipal wells (active and inactive) and 33 private wells (Appendix B). Private well participation in the monitoring program during 2022 was approximately 68 percent (22 out of 33 wells in Spring, 23 out of 33 wells in Fall). "Private" wells refer to domestic wells, agricultural irrigation wells, and monitoring wells that are not controlled by BMC member agencies.

Existing groundwater monitoring wells were selected to achieve, to the degree possible, horizontal, and vertical coverage throughout the Basin. The LOBP Groundwater Monitoring Program coverage within the Basin is shown in Figures 2, 3, and 4. Correlation between LOBP Groundwater Monitoring Program well numbers and state well numbers, along with well construction information and monitoring tasks are included in Appendix B.

Despite the relatively high density of available monitoring locations in the Basin, only a few of the wells are dedicated to monitoring Lower Aquifer Zone E, which is the deepest aquifer in the Basin and the most susceptible to seawater intrusion. Over half of the 93 wells in the monitoring network are water supply wells, which are not specifically designed for groundwater monitoring, and may include mixed aquifer zone completions and wellbore leakage. There is a need for additional monitoring locations in the Lower Aquifer (see Section 2.2.5).

2.2.1 Water Level Monitoring

Water level monitoring is a fundamental tool for characterizing Basin hydrology and is performed at LOBP Groundwater Monitoring Program locations. Groundwater elevations in wells are measures of hydraulic head in an aquifer. Groundwater moves in the direction of decreasing head, and groundwater elevation contours can be used to show the general direction and hydraulic gradient associated with groundwater movement. Changes in the amount of groundwater in storage within an aquifer can also be estimated based on changes in hydraulic head, along with other parameters. Fourteen of the monitoring network wells have been equipped with transducers to provide an efficient and high level of resolution for tracking dynamic changes in Basin groundwater levels (see Section 7.2).



Base Image: Stamen-Terrain

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Scale: 1 inch ≈ 4,000 feet

Explanation

- LOBP Water Level Monitoring Well
- Water Level Transducer
- Water Level and Water Quality Monitoring Well
- Water Level Transducer and Water Quality Monitoring Well
- Broderson Leach Field

Note: First Water wells refers to wells screened within the first 50 feet of saturated sediments across the basin, regardless of the aquifer.

Figure 2
Groundwater Monitoring Program
First Water Wells
Los Osos Groundwater Basin
2022 Annual Report

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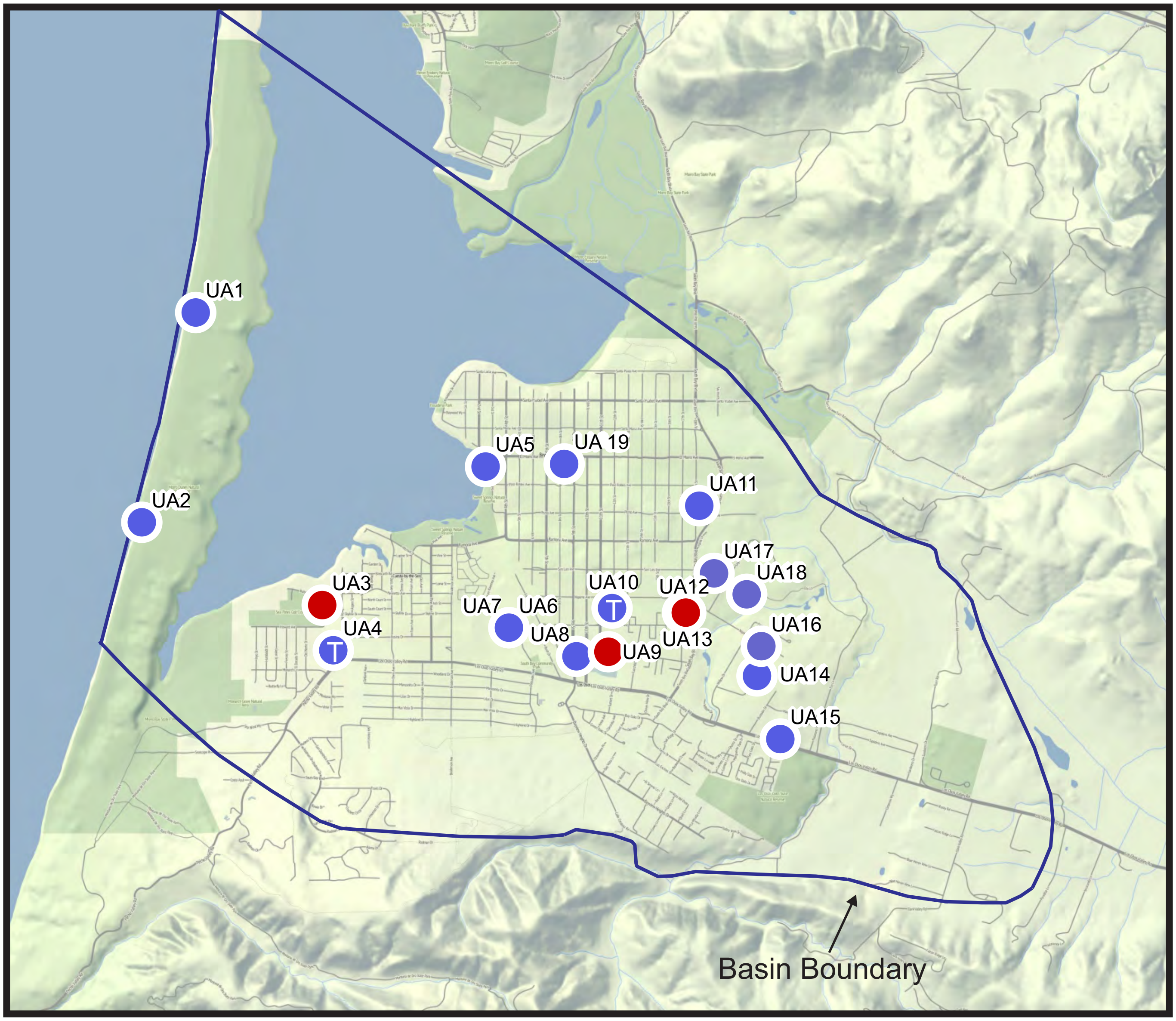

Base Image: Stamen-Terrain

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Scale: 1 inch ≈ 4,000 feet

Explanation

- LOBP Water Level Monitoring Well
- Water Level Transducer
- Water Level and Water Quality Monitoring Well
- Water Level Transducer and Water Quality Monitoring Well

Figure 3
Groundwater Monitoring Program
Upper Aquifer Wells
Los Osos Groundwater Basin
2022 Annual Report

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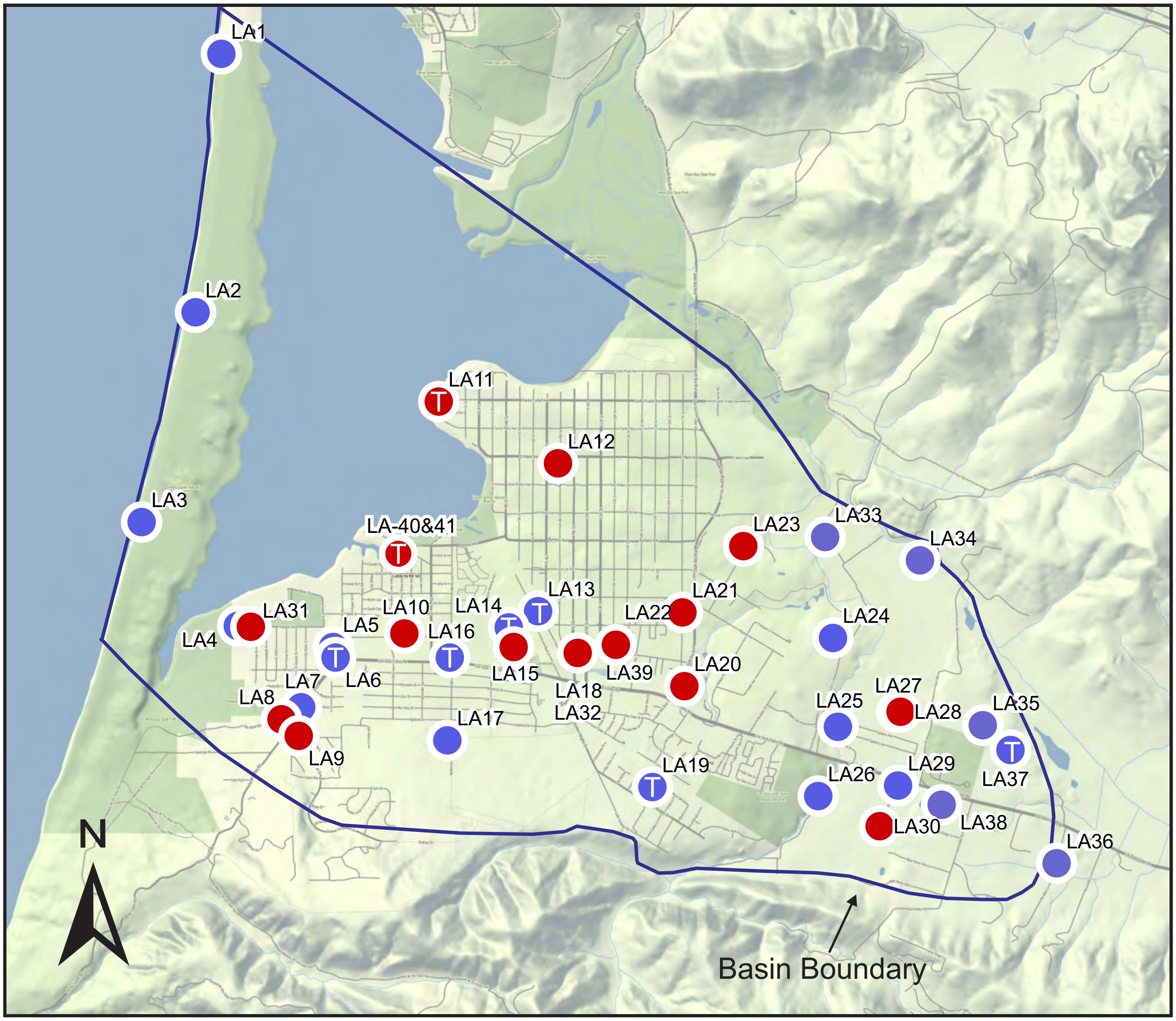

Base Image: Stamen-Terrain

0 2000 4000 6000 8000 ft

Scale: 1 inch ≈ 4,000 feet

Explanation

- LOBP Water Level Monitoring Well
- Water Level Transducer
- Water Level and Water Quality Monitoring Well
- Water Level Transducer and Water Quality Monitoring Well

Note: LA24 & FW24 and LA 40 & 41 are nested wells (same borehole)

LA18 and LA32 at same site (two symbols used in 2016 Annual Report figure to indicate LA32 was a program addition).

Figure 4
Groundwater Monitoring Program
Lower Aquifer Wells
Los Osos Groundwater Basin
2022 Annual Report

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A second phase of wellhead elevation surveying was performed during 2021 (see Section 3.2.1). The survey resulted in adjustments to reference point elevations which are used to calculate groundwater elevations. These adjustments were incorporated into the groundwater elevation contour maps and associated groundwater storage calculations.

Of the 93 wells currently in the LOBP Groundwater Monitoring Program, 33 are representative of First Water, 19 are representative of the Upper Aquifer, and 41 wells are representative of the Lower Aquifer. Spatially, five water level monitoring wells are located in the Dunes and Bay Area, 29 wells are located in the Western Area, 39 wells are located in the Central Area, and 20 wells are located in the Eastern Area.

First Water

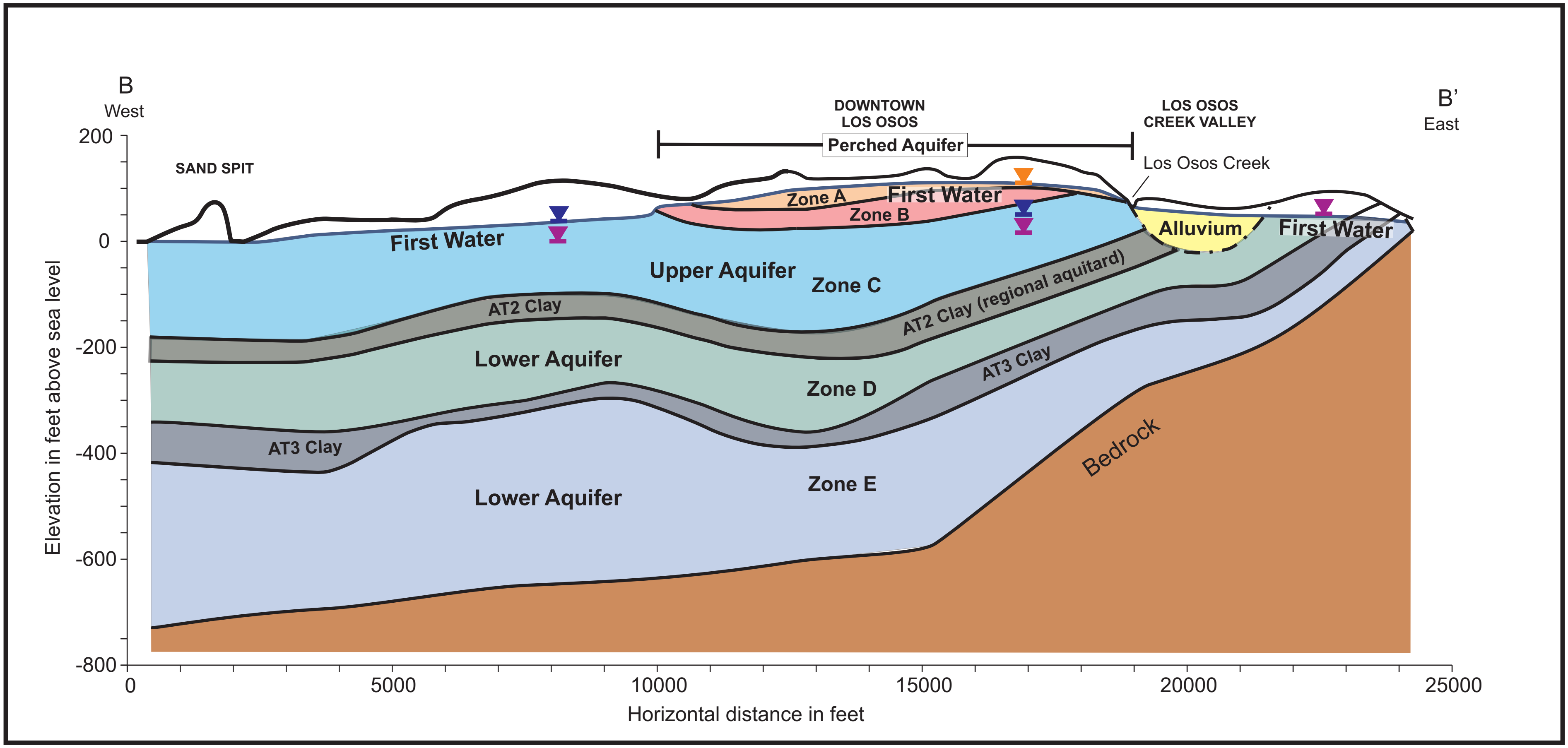
The First Water group refers to wells screened within the first 50 feet of saturated sediments across the Basin, regardless of the aquifer (Figure 5). First Water is the interface where percolating waters, including precipitation and return flows from irrigation and wastewater, mix with Basin waters. This 50-foot thick interface occurs within unconfined sediments and generally rises and falls seasonally with water level fluctuations. Where First Water is close to ground surface, it also impacts drainage and is associated with flooding issues in low-lying areas. First Water extends across the Basin, and may be present in dune sands, Paso Robles Formation deposits, or Los Osos Creek alluvium (Figure 5). Selected First Water wells, including those in downtown Los Osos are used to represent the perched aquifer (Zones A and B), Zone C, and Alluvial Aquifer for water level contouring.

Upper Aquifer

The Upper Aquifer (Zone C) refers to the non-perched aquifer above the regional aquitard (Figure 5). As noted above, a portion of the Upper Aquifer may also be considered First Water in certain Basin areas. Historically, the Upper Aquifer was developed as the main water supply for the community and is still the main source of water for rural residential parcels. A significant increase in Upper Aquifer production could be implemented under LOBP infrastructure Program B. Monitoring the Upper Aquifer in the urban area (properties contained within the Urban Reserve Line as shown in Figure 10 of the LOBP) is important to both local purveyors and rural residential parcels.

Lower Aquifer

The Lower Aquifer refers to water bearing sediments below the regional aquitard. There are both Paso Robles Formation and Careaga Formation deposits in the Lower Aquifer. The base of the Lower Aquifer is claystone and sandstone bedrock, although the effective base of fresh water lies above bedrock at the western edge of the Basin. There are two separate Lower Aquifer zones defined for Basin management and seawater intrusion mitigation. Zone D lies between the regional aquitard (AT2 clay) and a deeper aquitard (AT3 clay). Zone E is below the AT3 clay (Figure 5). Lower Aquifer Zone D is currently the main water supply source for the community.



Cross-section alignment shown in Figure 1

Explanation

Perched Aquifer Water level
Upper Aquifer Water level
Lower Aquifer Water level

Figure 5
Basin Aquifers
Los Osos Groundwater Basin
2022 Annual Report

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Seawater intrusion is a major concern for the Lower Aquifer. The seawater intrusion front corresponds to the position of the 250 mg/L chloride concentration isopleth, which has been advancing inland for decades, and continues to advance under current Basin conditions, based on the monitoring program data. A significant reduction in Lower Aquifer production in the Western Area, together with other LOBP programs, is necessary to halt, slow and/or reverse intrusion.

2.2.2 Groundwater Quality Monitoring

Groundwater quality monitoring refers to the periodic collection and chemical or physical analysis of groundwater from wells. The analytical requirements are highly variable, depending on the purpose of monitoring. General minerals and nitrate are common water quality constituents of analysis for groundwater basin investigations. There are many other classes of water quality constituents of concern, however, such as volatile organic compounds, inorganic compounds (metals), petroleum hydrocarbons or emerging contaminants. Chromium-6 has also been a concern in several shallow wells as described in the 2015 Annual Groundwater Monitoring Report (CHG, 2015). Many water quality constituents are regulated and have drinking water standards.

Monitoring Constituents

Constituents of analysis for the LOBP Groundwater Monitoring Program have been selected to evaluate salt loading and associated nitrate impacts, seawater intrusion, and wastewater disposal. Table 1 lists the general mineral constituents, including nitrate, which will be monitored as part of the program, although additional constituents are quantified in the general mineral suite performed by the analytical laboratory (See Appendix C). Total Dissolved Solids (TDS) and specific conductance are standard measures for groundwater mineralization and salinity. Temperature and pH are parameters that are routinely measured during sampling to confirm that the groundwater samples represent the aquifer. Table 1 presents constituents to be tested in the wells designated for water quality monitoring, which are distributed laterally and vertically across the Basin (Figures 2, 3 and 4).

The Lower Aquifer (via wells LA4, LA14, and LA40) are also monitored using down hole geophysics once every three years (natural gamma and induction logs) to provide a unique measure of seawater intrusion over time in one location within the Basin. Vertical movement of the freshwater-seawater interface has historically averaged two to three feet per year between 1985 and 2015 (CHG, 2015). The practical resolution of the methodology for measuring vertical interface movement is close to five feet, so a three-year monitoring frequency provides sufficient time to identify movement, based on the historical data. LA4 is located at Sea Pines Golf Course in the Western Area, LA14 is located at the north end of Palisades Avenue, and LA40 is on Lupine Avenue. Seawater is highly conductive, compared to fresh water, and an induction log performed in a borehole penetrating the fresh water/seawater interface shows the vertical transition from fresh water to seawater.

Table 1. Water Quality Monitoring Constituents[1]		
Constituent	**Reporting Limit**	**Units**
Specific Conductance	1.0	µS/cm
pH (field)	0.01	pH units
Temperature (field)	0.1	°F
TDS	20	mg/L
Carbonate Alkalinity	10	mg/L
Bicarbonate Alkalinity	10	mg/L
Total Alkalinity as $CaCO_3$	10	mg/L
Chloride	1.0	mg/L
Nitrate – Nitrogen	0.1	mg/L
Sulfate	0.5	mg/L
Boron	0.1	mg/L
Calcium	1.0	mg/L
Magnesium	1.0	mg/L
Potassium	1.0	mg/L
Sodium	1.0	mg/L

[1]From LOBP (ISJ Group, 2015)

Constituents of Emerging Concern

Monitoring Constituents of Emerging Concern (CECs) is a requirement of salt and nutrient management plans adopted pursuant to the SWRCB Recycled Water Policy (SWRCB, 2009). Such monitoring can measure potential dilution and soil-aquifer treatment of recycled water constituents, and travel time and movement of recycled water. As part of LOWRF operation, the County is also required by the Regional Water Quality Control Board Monitoring and Reporting Program (MRP) Order No. R3-2011-0001 to monitor recycled water for CECs on an annual basis.

The initial CECs to be monitored are listed in Table 2, and were selected based on the SWRCB Recycled Water Policy. There are three types of CECs, each of which has a different function. Health-based indicators directly monitor the presence of classes of constituents in groundwater, while performance-based and surrogate indicators measure the effectiveness of the wastewater treatment process. The list of CECs is not intended to be comprehensive, but meant to be representative. CECs may be added to (or removed from) the monitoring list once data has been collected and analyzed, subject to approval by the BMC.

Table 2. CEC Monitoring Constituents[1]			
Constituent or Parameter	**Type of Constituent**	**Type of Indicator**	**Reporting Limit (µg/L)**
17β-estradiol	Steroid Hormones	Health	0.004
Triclosan	Antimicrobial		0.008
Caffeine	Stimulant		0.004
NDMA (N-Nitrosodimethylamine)	Disinfection Byproduct		0.002
Gemfibrozil	Pharmaceutical Residue	Performance	0.004
DEET (Diethyl-meta-toluamide)	Personal Care Product		0.004
Iopromide	Pharmaceutical Residue		0.004
Sucralose	Food additive		0.020
Ammonia	N/A	Surrogate	N/A
Nitrate-Nitrogen	N/A		N/A
Total Organic Carbon	N/A		N/A
UV Light Absorption	N/A		N/A
Specific Conductance	N/A		N/A

[1]From LOBP (ISJ Group, 2015)

2.2.3 Monitoring Frequency

Monitoring frequency is the time interval between data collection. Seasonal fluctuations relating to groundwater levels or quality are typically on quarterly or semi-annual cycles, correlating with seasonal precipitation, recharge, water levels, and often well production. The monitoring schedule for groundwater levels collected under the LOBP Groundwater Monitoring Program will coincide with seasonal water level fluctuations, with higher levels (i.e. elevations) in April (Spring) and lower levels in October (Fall). The LOWRF Groundwater Monitoring Program (First Water and Upper Aquifer groups) is conducted in June and December, although water levels at many of these wells are also measured under the LOBP program in April and October for use in water level contouring and groundwater storage calculations. A semi-annual monitoring frequency provides a measure of seasonal cycles, which can then be distinguishable from the long-term trends. At the transducer-monitored locations, water level measurements are recorded automatically on a daily basis and downloaded during the regular semi-annual water level monitoring events.

The monitoring frequency for water quality sampling and analyses performed under the LOBP Groundwater Monitoring Program will generally be once per year in October (Fall), when groundwater levels (i.e. elevations) are seasonally low and many water quality constituents have historically been at a higher concentration than their corresponding Spring measurement. Lower Aquifer groundwater monitoring will also be performed in April (Spring) as a means of tracking seawater intrusion in greater detail. The schedule for water quality testing performed under the LOWRF Groundwater Monitoring Program (First Water and Upper Aquifer) is in June and December.

2.2.4 SGMA Activities

SGMA took effect on January 1, 2015 and requires that certain actions be taken in groundwater basins designated as either high or medium priority by DWR, including the Basin. Prior to 2019, DWR had identified the Los Osos Valley groundwater basin as a high priority basin subject to critical conditions of overdraft due to seawater intrusion and nitrate impairment (DWR, 2014, 2016, 2018a). The majority of SGMA requirements, however, including formation of a Groundwater Sustainability Agency (GSA) and development and implementation of a Groundwater Sustainability Plan, did not apply to the LOBP plan areas covered by the Stipulated Judgment, since this portion of the DWR Basin is adjudicated.

In order to comply with SGMA, the County formed the Los Osos Fringe Areas GSA to cover Basin areas between the 2016 Bulletin 118 Los Osos Valley groundwater basin boundaries (Basin 3-8) and the LOBP adjudicated area boundary, which were designated as "fringe areas". A Basin Boundary Modification Request (BBMR) was initiated in 2018 (DWR, 2018b). The Los Osos BBMR included scientific external and jurisdictional subdivision modifications intended to improve the community's ability to sustainably manage the Basin. The proposed boundary modifications would better align DWR's Bulletin 118 Basin boundary with current scientific data as well as existing management boundaries in the Basin.

In 2019, DWR published the final basin boundary modifications updating Bulletin 118 and reassessing groundwater basin prioritizations (DWR, 2019). The Los Osos Valley groundwater basin was separated into two jurisdictional subbasins, the Los Osos Area Subbasin (3-08.01) and the Warden Creek Subbasin (3-08.02). Both subbasins are designated as very low priority for SGMA, although the Los Osos Area subbasin is still classified as subject to critical overdraft due to seawater intrusion (DWR, 2021). The Los Osos Area Subbasin, with the exception of minor fringe areas, lies within the LOBP plan area and overlaps with the LOBP Basin, but does not replace or update the scientific boundary defined in the 2015 Basin adjudication. A figure showing the DWR Los Osos Subbasin boundary and the LOBP Basin boundary is included in Appendix A.

2.2.5 Additional Basin Studies

Several Basin studies and activities in addition to regular groundwater monitoring were authorized or completed in 2022, including:

- A sustainable yield estimate for calendar year 2023 of 2,380 acre-feet (unchanged from 2022) was approved by the BMC at the October 19, 2022 Board of Directors meeting.

- The development of a rating curve for the Los Osos Creek stream gauge at Los Osos Valley Road (Station 751) was authorized in 2021, but delayed due to a lack of sufficient stream flow in 2022. Development of the rating curve is scheduled for completion in 2023. The process involves manually measuring stream flow at the existing gauge over a wide range of flows, and converting the historical data that is available in 15-minute intervals to daily flow data in cubic feet per second. The flow data will assist in the development of a transient groundwater flow model and is useful for Basin water balance applications.

- A recycled water beneficial use study was authorized in 2021 to analyze and rank various options for recycled water use in terms of the potential benefits to Basin Sustainable Yield. In 2022, plans for this study were incorporated into the Water Recycling Funding Program Planning Grant Initiative. The grant application was successful and the study was combined with the transient model development project, which is scheduled to begin in 2023.

- LOCSD, a BMC member, completed the second Program C expansion well in 2022 with construction at Site E on Bay Oaks Drive.

- LOCSD additionally completed its Upper Aquifer Well (8^{th} Street) Project in 2022. This marks the completion of all the projects in Program A.

- A draft study was completed in July 2022 that evaluated the feasibility of modifying up to four existing program wells to become dedicated Zone E water quality monitoring locations, and recommended additional Lower Aquifer monitoring well sites (CHG, 2022b). One of the four existing program wells, LA13, was modified for monitoring purposes in 2022 (see Section 7.2). One of the new monitoring locations, Skyline Drive, was selected for funding and construction in 2023 (see Section 7.2).

- Planning and funding for a transient Basin model was initiated in 2021. In 2022, the project was combined with the Recycled Water Funding Program Grant Initiative, and is scheduled to begin in 2023. The transient model would replace the existing steady-state model, once completed.

- The BMC had authorized the continuation into 2022 of a Lower Aquifer nitrate source investigation which had been initiated by S&T in 2021 (CHG, 2021b). The Phase 2 portion of the investigation was delayed, however, pending further input from the Regional Board in 2023 (see Section 7.5.3).

3. CONDUCT OF WORK

This Annual Report covers monitoring activities performed during the 2022 calendar year. While information from prior years is included in data presentation and interpretation, the conduct of work and detailed groundwater monitoring results are reported for 2022.

3.1 Services Provided

All 2022 groundwater monitoring data compiled for this report, unless described otherwise, comes from the following monitoring programs:

- San Luis Obispo County Public Works, Semi-Annual Water Level Monitoring Program: water level data.

- Purveyor water supply well monitoring: water level, water quality and production data.

- LOWRF Waste Discharge Order R3-2011-0001 Groundwater Monitoring Program (CCRWQCB, 2011): water level and water quality data.

- LOBP Groundwater Monitoring Program: water level and water quality data.

3.2 Field Methods

Groundwater level measurement and groundwater sampling are the primary field activities performed for the LOBP Groundwater Monitoring Program. Field activities include measuring and recording water levels in wells and collecting groundwater samples for laboratory analytical testing. The field methods approved for use in the LOBP Groundwater Monitoring Program are presented in Appendix D. These methods are recommended for services performed directly for the BMC and for other monitoring programs that contribute data to the LOBP Groundwater Monitoring Program.

3.2.1 Elevation Datum

The original survey for wells in the County's Semi-Annual Water Level Monitoring Program was likely based on the National Geodetic Vertical Datum of 1929 (NGVD 29), which has been replaced in land surveying practice by the North American Vertical Datum of 1988 (NAVD 88). Monitoring network wells were re-surveyed in 2003, 2005, 2020 and 2021 using NAVD 88. All wells in the LOBP monitoring network that are used in water level contouring have now been surveyed to NAVD 88 (elevations shown in Tables 3 through 8).

3.2.2 Water Level Monitoring Procedures

Groundwater level monitoring typically uses an electric sounder or steel tape. If the well is equipped and active, monitoring would take place when the pump is off, and the water level is relatively static. Fourteen monitoring network wells are currently equipped with a pressure transducer, allowing for automatic water level data collection between regular (manual) monitoring events. These devices are placed below the water surface in a well and record changes in pressure that occur in response to changes in the height of the water column above the transducer. Detailed water level monitoring procedures are included in Appendix D.

3.2.3 Groundwater Sampling Procedures

Groundwater sampling procedures ensure collection of a representative groundwater sample from an aquifer for water quality analysis. Unused or unequipped wells are purged of standing or stagnant water prior to sampling. Stabilization of field measurements for conductivity, pH, and temperature, along with minimum purge volumes, are included in the approved methods. Sampling procedures for general mineral and nitrate sampling (with additional procedures for wastewater indicator compounds) are presented in Appendix D.

3.3 Monitoring Staff Affiliations

Monitoring services that contributed data to the 2022 Annual Report were performed by staff or consultants affiliated with the following agencies:

- San Luis Obispo County monitoring programs. Beginning in 2022, the County has contracted Semi-Annual Water Level Program monitoring services in the Los Osos Basin to outside consultants. The Spring 2022 monitoring event was conducted by Rincon Consultants, and the Fall 2022 monitoring event was conducted by CHG. The County Public Works Department staff continue to collect and maintain precipitation and stream gage records. Rincon Consultants also performed semi-annual (June and December) water level monitoring and water quality sampling at selected private wells and monitoring wells for the LOWRF Groundwater Monitoring Program (data from this program is used in the LOBP Groundwater Monitoring Program).

- Los Osos Water Purveyors (LOCSD, GSWC, S&T). Water agency staff performed semi-annual water level monitoring and water quality sampling at municipal water supply wells.

- Los Osos BMC (LOCSD, GSWC, S&T, and County). CHG performed semi-annual (April and October) water level monitoring, water quality sampling at private wells, monitoring wells, and municipal supply wells for the LOBP Groundwater Monitoring Program.

4. MONITORING RESULTS

The results of groundwater monitoring activities performed in 2022 for the various Basin monitoring programs are summarized below. Overlap between the LOBP Groundwater Monitoring Program and other ongoing monitoring programs are shown in Appendix B. Laboratory analytical reports of groundwater samples collected for the LOWRF Groundwater Monitoring Program are contained in their respective June and December 2022 monitoring program reports (Rincon Consultants, 2022; 2023).

4.1 Water Level Monitoring Results

Tables 3 through 8 present the results of groundwater level measurements at LOBP Groundwater Monitoring Program wells, as reported by the various monitoring programs. Available water levels for wells labeled "private" are not reported herein, but those listed as measured have been used for aggregated water level contour maps. Private wells refer to domestic wells, agricultural irrigation wells, and monitoring wells that are not controlled by BMC member agencies.

Most of the Spring and Fall water levels were measured in April and October 2022, respectively, for the County Semi-Annual Water Level Monitoring Program and the LOBP Groundwater Monitoring Program. The LOWRF Groundwater Monitoring Program schedule moved from April to June and from October to December beginning in Fall 2016. For consistency with the LOBP Groundwater Monitoring Program, however, CHG also monitored water levels at selected LOWRF monitoring program wells in April and October 2022, rather than using the June and December 2022 LOWRF monitoring event values.

Table 3. Spring 2022 Water Levels – First Water					
Well ID	State Well Number	R. P. Elevation (feet NAVD 88)	Date	Water Level (feet)	
				Depth	Elevation
FW1	30S/10E-13A7	PRIVATE (not measured)			
FW2	30S/10E-13L8	32.63	4/20/2022	22.25	10.4
FW3	30S/10E-13G	50.95	4/20/2022	39.90	11.1
FW4	30S/10E-13H	49.33	4/21/2022	23.51	25.8
FW5	30S/10E-13Q2	101.27	4/21/2022	80.82	20.5
FW6	30S/10E-24A	193.04	4/1/2022	139.47	53.6
FW7	30S/10E-24Ab	Not measured (damaged)			
FW8	30S/11E-7L4	45.76	4/20/2022	38.45	7.3
FW9	30S/11E-7K3	90.71	4/21/2022	55.42	35.3
FW10	30S/11E-7Q1	25.29	4/1/2022	9.61	15.7
FW11	30S/11E-7R2	61.93	4/21/2022	25.62	36.3
FW12	30S/11E-18C2	34.55	4/20/2022	20.78	13.8
FW13	30S/11E-18B2	79.89	4/20/2022	23.70	56.2
FW14	30S/11E-18E1	PRIVATE (not measured – destroyed)			
FW15	30S/11E-18N2	125.53	4/20/2022	74.89	50.6
FW16	30S/11E-18L11	88.02	4/14/2022	45.65	42.4
FW17	30S/11E-18L12	103.85	4/22/2022	22.88	81.0
FW18	30S/11E-18P	143.92	4/14/2022	26.11	117.8
FW19	30S/11E-18J7	125.74	4/14/2022	26.92	98.8
FW20	30S/11E-8Mb	94.75			
FW21	30S/11E-8N4	95.99	4/20/2022	41.49	54.5
FW22	30S/11E-17F4	PRIVATE (measured)			
FW23	30S/11E-17N4	PRIVATE (measured)			
FW24	30S/11E-17J2	PRIVATE (measured)			
FW25	30S/11E-17R1	PRIVATE (not measured)			
FW26	30S/11E-20A2	PRIVATE (measured)			
FW27	30S/11E-20L1	PRIVATE (measured)			
FW28	30S/11E-20M2	PRIVATE (measured)			
FW29	30S/11E-20A1	PRIVATE (not measured)			
FW30	30S/11E-18R1	PRIVATE (measured)			
FW31	30S/11E-19A	214.67	4/1/2021	29.70	185.0
FW32	30S/11E-21D14	PRIVATE (measured)			
FW33	30S/11E-18D1S	PRIVATE (measured)			

Table 4. Spring 2022 Water Levels – Upper Aquifer					
Well ID	**State Well Number**	**R. P. Elevation (feet NAVD 88)**	**Date**	**Water Level (feet)**	
				Depth	**Elevation**
UA1	30S/10E-11A1	16.01	4/12/2022	12.60	3.4
UA2	30S/10E-14B1	23.9	4/12/2022	20.98	2.9
UA3	30S/10E-13F1	17.57	4/22/2022	9	8.6
UA4	30S/10E-13L1	40.31	4/1/2022	31.20	9.1
UA5	30S/11E-7N1	10.66	4/14/2022	7.60	3.1
UA6	30S/11E-18L8	79.18	3/29/2022	64.33	14.9
UA7	30S/11E-18L7	79.16	3/29/2022	55.10	24.1
UA8	30S/11E-18K7	137.17	4/14/2022	116.65	20.5
UA9	30S/11E-18K3	123.42	4/22/2022	105	18.4
UA10	30S/11E-18H1	110.02	4/1/2022	92.31	17.7
UA11	30S/11E-17D	PRIVATE (not measured)			
UA12	30S/11E-17E9	107.39	4/20/2022	88.93	18.5
UA13	30S/11E-17E10	107.81	4/14/2022	94.20	13.6
UA14	30S/11E-17P4	PRIVATE (not measured)			
UA15	30S/11E-20B7	PRIVATE (not measured)			
UA16	30S/11E-17L4	PRIVATE (measured)			
UA17	30S/11E-17E1	PRIVATE (measured)			
UA18	30S/11E-17F2	PRIVATE (measured)			
UA19	30S/11E-7Q__	26.80	4/20/2022	18.02	8.8

Table 5. Spring 2022 Water Levels – Lower Aquifer					
Well ID	State Well Number	R. P. Elevation (feet NAVD 88)	Date	Water Level (feet)	
				Depth	Elevation
LA1	30S/10E-2A1	23.13	4/12/2022	15.50	7.6
LA2	30S/10E-11A2	16.07	4/12/2022	10.83	5.2
LA3	30S/10E-14B2	23.89	4/12/2022	21.49	2.4
LA4	30S/10E-13M1	42.70	4/20/2022	43.70	-1.0
LA5	30S/10E-13L7	37.87	4/28/2022	32	5.9
LA6	30S/10E-13L4	70.02	4/1/2022	63.26	6.8
LA7	30S/10E-13P2	PRIVATE (not measured)			
LA8	30S/10E-13N	141.36	4/1/2022	134.70	6.7
LA9	30S/10E-24C1	180.34	4/18/2022	171	9.3
LA10	30S/10E-13J1	98.33	4/18/2022	95	3.3
LA11	30S/10E-12J1	8.43	4/13/2022	3.52	4.9
LA12	30S/11E-7Q3	27.75	4/14/2022	25.40	2.4
LA13	30S/11E-18F2	103.57	4/1/2022	99.56	4.0
LA14	30S/11E-18L6	79.52	4/1/2022	74.98	4.5
LA15	30S/11E-18L2	88.08	4/14/2022	90.10	-2.0
LA16	30S/11E-18M1	108.74	4/1/2022	99.33	9.4
LA17	30S/11E-24A2	212.82	3/30/2022	180.50	32.3
LA18	30S/11E-18K8	137.13	4/14/2022	133.33	3.8
LA19	30S/11E-19H2	257.35	4/1/2022	261.31	-4.0
LA20	30S/11E-17N10	141.22	4/18/2022	150	-8.8
LA21	30S/11E-17E7	107.22	3/30/2022	107.77	-0.5
LA22	30S/11E-17E8	107.27	4/20/2022	134.71	-27.4
LA23 to LA30		PRIVATE (measured LA 24 – LA30, LA 23 not measured)			
LA31	30S/10E-13M2	(Mixed aquifer – used for water quality only)			
LA32	30S/11E-18K9	(Mixed aquifer – used for water quality only)			
LA33	30S/11E-17A1	PRIVATE (measured)			
LA34	30S/11E-8F	26.15	4/8/2022	5.69	20.5
LA35	30S/11E-21Bb	86.80	4/1/2022	70	16.8
LA36	30S/11E-21Ja	PRIVATE (not measured)			
LA37	30S/11E-21B1	81.61	4/1/2022	61.50	20.1
LA38	30S/11E-21E	PRIVATE (measured)			
LA39	30S/11E-18K_	123.17	4/22/2022	137	-13.8
LA40	30S/11E-13Ba	11.47	4/12/2022	7.78	3.7
LA41	30S/11E-13Bb	11.46	4/12/2022	6.73	4.7

Table 6. Fall 2022 Water Levels – First Water					
Well ID	State Well Number	R. P. Elevation (feet NAVD 88)	Date	Water Level (feet)	
				Depth	Elevation
FW1	30S/10E-13A7	PRIVATE (not measured)			
FW2	30S/10E-13L8	32.63	10/4/2022	27.72	4.9
FW3	30S/10E-13G	50.95	10/14/2022	40.37	10.6
FW4	30S/10E-13H	49.33	10/4/2022	25.55	23.8
FW5	30S/10E-13Q2	101.27	10/31/2022	81.19	20.1
FW6	30S/10E-24A	193.04	10/31/2022	140.79	52.3
FW7	30S/10E-24Ab	Not measured (damaged)			
FW8	30S/11E-7L4	45.76	10/4/2022	38.84	6.9
FW9	30S/11E-7K3	90.71	10/5/2022	56.20	34.5
FW10	30S/11E-7Q1	25.29	10/7/2022	10.56	14.7
FW11	30S/11E-7R2	61.93	10/5/2022	26.58	35.4
FW12	30S/11E-18C2	34.55	10/4/2022	21.34	13.2
FW13	30S/11E-18B2	79.89	10/5/2022	25.25	54.6
FW14	30S/11E-18E1	PRIVATE (not measured – destroyed)			
FW15	30S/11E-18N2	125.53	10/18/2022	75.18	50.4
FW16	30S/11E-18L11	88.02	10/18/2022	46.50	41.5
FW17	30S/11E-18L12	103.85	10/18/2022	24.22	79.6
FW18	30S/11E-18P	143.92	10/8/2022	27.60	116.3
FW19	30S/11E-18J7	125.74	10/18/2022	28.49	97.3
FW20	30S/11E-8Mb	94.75	DRY		
FW21	30S/11E-8N4	95.99	10/18/2022	42.41	53.6
FW22	30S/11E-17F4	PRIVATE (measured)			
FW23	30S/11E-17N4	PRIVATE (measured)			
FW24	30S/11E-17J2	PRIVATE (measured)			
FW25	30S/11E-17R1	PRIVATE (not measured)			
FW26	30S/11E-20A2	PRIVATE (measured)			
FW27	30S/11E-20L1	PRIVATE (measured)			
FW28	30S/11E-20M2	PRIVATE (measured)			
FW29	30S/11E-20A1	PRIVATE (not measured)			
FW30	30S/11E-18R1	PRIVATE (measured)			
FW31	30S/11E-19A	214.67	10/7/2022	30.10	184.6
FW32	30S/11E-21D14	PRIVATE (measured)			
FW33	30S/11E-18D1S	PRIVATE (measured)			

Table 7. Fall 2022 Water Levels – Upper Aquifer					
Well ID	State Well Number	R. P. Elevation (feet NAVD 88)	Date	Water Level (feet)	
				Depth	Elevation
UA1	30S/10E-11A1	16.01	10/12/2022	12.58	3.4
UA2	30S/10E-14B1	23.9	10/12/2022	19.92	4.0
UA3	30S/10E-13F1	17.57	10/11/2022	13	4.6
UA4	30S/10E-13L1	40.31	10/7/2022	29.55	10.8
UA5	30S/11E-7N1	10.66	10/12/2022	6.20	4.5
UA6	30S/11E-18L8	79.18	10/7/2022	55.95	23.2
UA7	30S/11E-18L7	79.16	10/7/2022	65.19	14.0
UA8	30S/11E-18K7	137.17	10/10/2022	118.79	18.4
UA9	30S/11E-18K3	123.42	10/10/2022	100	23.4
UA10	30S/11E-18H1	110.02	10/7/2022	95.11	14.9
UA11	30S/11E-17D	PRIVATE (not measured)			
UA12	30S/11E-17E9	107.39	10/17/2022	92.65	14.7
UA13	30S/11E-17E10	107.81	10/12/2022	96.40	11.4
UA14	30S/11E-17P4	PRIVATE (not measured)			
UA15	30S/11E-20B7	PRIVATE (not measured)			
UA16	30S/11E-17L4	PRIVATE (measured)			
UA17	30S/11E-17E1	PRIVATE (measured)			
UA18	30S/11E-17F2	PRIVATE (measured)			
UA19	30S/11E-7Q_	26.80	10/4/2022	18.71	8.1

Table 8. Fall 2022 Water Levels – Lower Aquifer					
Well ID	State Well Number	R. P. Elevation (feet NAVD 88)	Date	Water Level (feet)	
				Depth	Elevation
LA1	30S/10E-2A1	23.13	10/12/2022	15.32	7.8
LA2	30S/10E-11A2	16.07	10/12/2022	10.91	5.2
LA3	30S/10E-14B2	23.89	10/12/2022	21.37	2.5
LA4	30S/10E-13M1	42.70	10/5/2022	43.73	-1.0
LA5	30S/10E-13L7	37.87	10/30/2022	31.80	6.1
LA6	30S/10E-13L4	70.02	10/12/2022	64	6.0
LA7	30S/10E-13P2	PRIVATE (not measured)			
LA8	30S/10E-13N	141.36	10/30/2022	134.10	7.3
LA9	30S/10E-24C1	180.34	10/10/2022	176	4.3
LA10	30S/10E-13J1	98.33	10/10/2022	95	3.3
LA11	30S/10E-12J1	8.43	10/4/2022	3.34	5.1
LA12	30S/11E-7Q3	27.75	10/12/2022	27.10	0.7
LA13	30S/11E-18F2	103.57	10/7/2022	101.87	1.7
LA14	30S/11E-18L6	79.52	10/7/2022	75.71	3.8
LA15	30S/11E-18L2	88.08	10/12/2022	88.50	-0.4
LA16	30S/11E-18M1	108.74	10/7/2022	99.59	9.2
LA17	30S/11E-24A2	212.82	10/17/2022	182.17	30.7
LA18	30S/11E-18K8	137.13	10/10/2022	135.14	2.0
LA19	30S/11E-19H2	257.35	10/7/2022	262.23	-4.9
LA20	30S/11E-17N10	141.22	10/11/2022	162	-20.8
LA21	30S/11E-17E7	107.22	10/10/2022	111.15	-3.9
LA22	30S/11E-17E8	107.27	10/10/2022	147.37	-40.1
LA23 to LA30		PRIVATE (measured LA 24 - 27,29, 30; LA 23 & 28 not measured)			
LA31	30S/10E-13M2	(Mixed aquifer – used for water quality only)			
LA32	30S/11E-18K9	(Mixed aquifer – used for water quality only)			
LA33	30S/11E-17A1	PRIVATE (measured)			
LA34	30S/11E-8F	26.15	10/24/2022	8.60	17.6
LA35	30S/11E-21Bb	86.80	10/7/2022	75	11.8
LA36	30S/11E-21Ja	PRIVATE (not measured)			
LA37	30S/11E-21B1	81.61	10/7/2022	68.90	12.7
LA38	30S/11E-21E	PRIVATE (measured)			
LA39	30S/11E-18K_	123.17	10/10/2022	138	-14.8
LA40	30S/11E-13Ba	11.47	10/12/2022	8.43	3.0
LA41	30S/11E-13Bb	11.46	10/11/2022	7.03	4.4

4.2 Water Quality Results

Available Fall 2022 water quality results for First Water and Upper Aquifer monitoring wells designated for water quality reporting in the LOBP Groundwater Monitoring Program are presented in Table 9. The LOBP Groundwater Monitoring Program does not include Spring 2022 water quality monitoring at First Water or Upper Aquifer Wells. Available Spring and Fall 2022 water quality for Lower Aquifer monitoring wells designated for water quality reporting in the LOBP Groundwater Monitoring Program are presented in Tables 10 and 11. Groundwater monitoring field logs and laboratory analytical reports for the 2022 LOBP Groundwater Monitoring Program are included in Appendix C.

Some of the constituents of analysis that are part of the LOBP Groundwater Monitoring Program listed in Table 1 are not included in the LOWRF Groundwater Monitoring Program. The missing constituents include specific conductance, alkalinity (bicarbonate, carbonate, and total), calcium, magnesium, and potassium.

Lower Aquifer wells LA2 and LA3 on the Morro Bay sand spit are scheduled for water quality monitoring every five years to track changes in salinity at the coast (2015 LOBP). The next scheduled water quality sampling event on the sand spit will be in 2025.

4.2.1 Nitrate and Chloride Results

Results for First Water wells indicate elevated nitrate concentrations across much of the central and western areas, which are attributed to historical septic system discharges in high-density residential areas (LOBP, 2015). A more extensive compilation of shallow water quality, including nitrate and TDS concentration maps, are presented for June and December 2022 in the County's LOWRF Groundwater Monitoring Program reports (Rincon Consultants, 2020, 2021, 2022, 2023). Nitrate concentration trends are tracked using the Nitrate Metric (see Section 7.5.3).

Lower Aquifer water quality results for 2022 show four wells, (LA10, LA11, LA31 and LA40) impacted by seawater intrusion, based on chloride concentrations over 250 mg/L. The overall trend in chloride concentration and seawater intrusion is tracked using the Chloride Metric (see Section 7.5.3).

4.2.2 CEC Results

CEC sampling was conducted at well FW5 and FW6 in October 2022 (CEC constituents list and reporting limits shown in Table 2). FW6, which is the first monitoring well hydraulically downgradient of the Broderson Site, was originally designated in the LOBP (along with FW26) as a CEC monitoring well. Due to drought conditions, there was insufficient water for representative CEC testing at FW6, so FW5 was used as a replacement (CHG, 2017a).

Table 9. Fall 2022 Water Quality Results – First Water and Upper Aquifer																	
LOBP Well	State Well Number	Date	SC	pH (field)	TDS	Alkalinity			Cl	NO3-N	SO4	B	Ca	Mg	K	Na	T (field)
						CO3	HCO3	Total as CaCO3									
			µS/cm	pH units	mg/L												°F
FW2*	30S/10E-13L8	12/7/2022	--	*7.60*	540	--	--	--	130	26	45	0.12	--	--	--	110	67.10
FW5	30S/10E-13Q2	12/7/2022	--	*7.70*	540	--	--	--	190	15	37	0.23	--	--	--	77	63.32
FW6*	30S/10E-24A	12/7/2022	--	*7.90*	510	--	--	--	170	2.5	46	0.27	--	--	--	110	64.94
FW10	30S/11E-7Q1	12/7/2022	--	*8.00*	380	--	--	--	75	15	54	0.22	--	--	--	76	--
FW15*	30S/11E-18N2	12/7/2022	--	*7.50*	440	--	--	--	150	20	56	0.18	--	--	--	67	63.86
FW16*	30S/11E-18L11	12/7/2022	--	*7.60*	220	--	--	--	49	8.1	21	0.08	--	--	--	38	66.38
FW17*	30S/11E-18L12	12/7/2022	--	*7.60*	320	--	--	--	53	24	50	0.11	--	--	--	44	65.48
FW20*	30S/11E-8Mb	Dry															
FW22*	30S/11E-17F4	12/7/2022	--	*7.60*	210	--	--	--	--	6.50	21.0	<0.1	--	--	--	32	56.84
FW26	30S/11E-20A2	Not Sampled															
FW28	30S/11E-20M2	10/5/2022	948	7.69	600	<2.5	440	360	62	<0.1	77.1	0.1	72	53	2	43	58.82
UA1	30S/10E-11A1	Not Sampled															
UA3	30S/10E-13F4	10/19/2022	514	7.15	320	<2.5	70	60	68	16.9	19.8	<0.1	21	19	2	53	68
UA9	30S/11E-18K3	10/19/2022	338	7.46	200	<2.5	60	50	45	9.5	8.2	<0.1	16	13	1	29	68
UA13	30S/11E-17E10	10/6/2022	522	7.97	380	<2.5	100	80	63	15.6	27.5	<0.1	32	33	2	51	67

NOTES: "–" = no result available; SC = specific conductance; TDS = total dissolved solids; CO3 = carbonate; HCO3= bicarbonate; CaCO3 = total alkalinity as calcium carbonate; Cl = chloride; NO3-N = nitrate as nitrogen; SO4 = sulfate; B = boron; Ca = calcium; Mg = magnesium; K = potassium; Na = sodium; T = temperature; µS/cm = microsiemens per centimeter; mg/L = milligrams per liter; °F = degrees Fahrenheit; < indicates less than Practical Quantitation Limit as listed in laboratory report.
* = readings from LOWRF Groundwater Monitoring Program sampling event in December 2022 (Rincon Consultants, 2023; report pending)
only laboratory results available

Table 10. Spring 2022 Water Quality Results – Lower Aquifer

LOBP Well	State Well Number	Date	SC	pH (field)	TDS	Alkalinity			Cl	NO3-N	SO4	B	Ca	Mg	K	Na	T (field)
						CO3	HCO3	CaCO3									
			µS/cm	pH units	mg/L												°F
LA8	30S/10E-13N	4/13/2022	449	8.12	270	<2.5	60	50	76	7.3	12.8	<0.1	16	16	1	40	64.76
LA9	30S/10E-24C1	4/18/2022	533	7.23	330	<2.5	70	60	93	6.2	16.2	<0.1	19	19	2	46	63.86
LA10	30S/10E-13J1	4/18/2022	612	7.12	420	<2.5	70	60	108	5.8	14.9	<0.1	29	29	1	37	63.68
LA11	30S/10E-12J1	4/13/2022	1800	7.32	1020	<2.5	330	270	287	<0.1	183	0.2	90	96	4	87	67.28
LA12	30S/10E-7Q3	4/13/2022	879	7.38	490	<2.5	300	240	94	<0.1	51.5	0.2	43	41	2	50	68.18
LA15	30S/11E-18L2	4/13/2022	876	7.31	470	<2.5	250	200	116	0.5	30.3	<0.1	53	48	2	43	68.72
LA18	30S/11E-18K8	4/15/2022	638	7.53	420	<2.5	290	240	31	<0.1	36.5	<0.1	52	31	2	25	70.34
LA20	30S/11E-17N10	4/18/2022	636	7.43	360	<2.5	280	230	39	0.7	26.6	0.1	36	37	2	42	65.12
LA22	30S/11E-17E8	4/20/2022	518	7.6	320	<2.5	160	130	43	7.4	14.6	<0.1	27	27	1	29	68.18
LA30	30S/11E-20H1	4/20/2022	976	6.99	600	<2.5	400	320	55	<0.1	97.3	0.1	66	59	1	39	64.94
LA31	30S/10E-13M2	5/11/2022	2550	7.57	1540	<2.5	70	50	578	0.6	134	0.1	60	58	3	303	58.28
LA32	30S/11E-18K9	4/13/2022	262	7.64	150	<2.5	70	60	30	3.8	5.2	<0.1	10	10	<1	20	66.02
LA39	30S/11E-18K_	4/18/2022	561	7.64	330	<2.5	250	210	34	<0.1	17.8	<0.1	31	32	2	34	62.78
LA40	30S/10E-13Ba	4/13/2022	8790	7.3	6790	<2.5	270	220	2410	<0.1	187	<0.1	523	601	6	178	68.54
LA41	30S/10E-13Bb	4/12/2022	818	7.25	500	<2.5	330	270	47	<0.1	66.5	<0.1	58	40	2	58	71.42

NOTES:"–" = no result available; SC = specific conductance; TDS = total dissolved solids; CO3 = carbonate; HCO3= bicarbonate; CaCO3 = total alkalinity as calcium carbonate; Cl = chloride; NO3-N = nitrate as nitrogen;SO4 = sulfate; B = boron; Ca = calcium; Mg = magnesium; K = potassium; Na = sodium; T = temperature; µS/cm = microsiemens per centimeter; mg/L = milligrams per liter; °C = Celsius (some values converted from degrees Fahrenheit as reported on field logs); + indicates addition to monitoring program; < indicates less than Practical Quantitation Limit as listed in laboratory report.

Table 11. Fall 2022 Water Quality Results – Lower Aquifer

LOBP Well	State Well Number	Date	SC	pH (field)	TDS	Alkalinity CO3	Alkalinity HCO3	Alkalinity Total as CaCO3	Cl	NO3-N	SO4	B	Ca	Mg	K	Na	T (field)
			µS/cm	pH units	mg/L												°F
LA8	30S/10E-13N	10/4/2022	432	8.01	280	<2.5	60	50	77	6.6	13.1	<0.1	17	16	2	38	65.48
LA9	30S/10E-24C1	10/19/2022	502	7.33	310	<2.5	70	60	93	6.5	15.6	<0.1	19	19	2	48	66
LA10	30S/10E-13J1	12/5/2022	911	7.67	690	<2.5	90	70	235	2	13.4	<0.1	52	48	2	33	65
LA11	30S/10E-12J1	10/6/2022	1720	7.65	1220	<2.5	350	290	279	<0.1	195	0.2	89	100	5	93	69.26
LA12	30S10E-7Q3	10/4/2022	839	7.67	500	<2.5	310	260	94	<0.1	51.5	0.1	45	42	2	52	68.9
LA15	30S/11E-18L2	10/4/2022	885	7.67	610	<2.5	250	210	138	0.8	31.2	<0.1	53	47	2	40	69.26
LA18	30S/11E-18K8	10/10/2022	613	8.02	400	<2.5	310	250	33	<0.1	39.3	<0.1	57	33	2	29	72.5
LA20	30S/11E-17N10	10/19/2022	616	7.58	330	<2.5	300	240	40	0.7	26.4	0.1	37	37	2	43	68
LA22	30S/11E-17E8	10/17/2022	485	7.36	300	<2.5	180	150	45	7	16.5	<0.1	31	33	2	32	70.52
LA30	30S/11E-20H1	10/6/2022	919	7.99	640	<2.5	420	340	60	<0.1	101	<0.1	70	62	1	41	64.4
LA31	30S/10E-13M2	10/6/2022	2520	8.25	1840	<2.5	70	60	636	0.7	145	0.1	79	75	4	268	66.02
LA32	30S/11E-18K9	10/6/2022	461	7.66	260	<2.5	200	160	38	1.4	23.5	<0.1	32	32	2	58	69.26
LA39	30S/11E-18K_	10/19/2022	617	7.56	330	<2.5	310	250	37	<0.1	28	<0.1	37	35	2	44	70
LA40	30S/10E-13Ba	10/12/2022	8860	7.47	8340	<2.5	280	230	2900	<0.1	221	<0.1	569	594	7	186	71.06
LA41	30S/10E-13Bb	10/11/2022	766	7.56	470	<2.5	340	280	48	<0.1	71.1	0.1	62	39	2	57	69.98

NOTES: *LA10 chloride result affected by wellbore leakage (see Section 7.5.3); "–" = no result available; SC = specific conductance; TDS = total dissolved solids; CO3 = carbonate; HCO3= bicarbonate; CaCO3 = total alkalinity as calcium carbonate; Cl = chloride; NO3-N = nitrate as nitrogen; SO4 = sulfate; B = boron; Ca = calcium; Mg = magnesium; K = potassium; Na = sodium; T = temperature; µS/cm = microsiemens per centimeter; mg/L = milligrams per liter; °F = degrees Fahrenheit.

Now that groundwater mounding from the Broderson Site has reached FW6, there is sufficient water column to allow CEC testing. Wells FW5 and FW6 are hydraulically downgradient of the Broderson leach field site, where most of the recycled water from LOWRF is discharged into the Basin, and where high-density (>1 per acre) septic systems were active prior to being connected to the sewer. FW26 is normally included in the CEC analyses every Fall, but the well pump was not operational and it was unavailable for sampling. FW26 is located in the Los Osos Creek Valley, where there are low-density (<1 per acre) septic systems (Figure 2). CEC results are presented in Table 12, with laboratory reports included in Appendix C. As discussed below, CEC testing results are interpreted to indicate wastewater influence at FW5 and FW6, based on sucralose and nitrate concentrations.

Table 12. CEC Monitoring Results

Constituent or Parameter	Units	FW5	FW6	LOWRF Recycled Water[1]
		October 31, 2022		August 8, 2022
Health-based				
17β-estradiol	ng/L	ND (<4)	ND (<4)	ND (<10)
Triclosan	ng/L	ND (<8)	ND (<8)	ND (<50)
Caffeine	ng/L	18	12	ND (<10)
NDMA	ng/L	ND (<2)	ND (<2)	ND (<2.1)
Performance-based				
Gemfibrozil	ng/L	ND (<4)	ND (<4)	11
DEET	ng/L	7	8.9	290
Iopromide	ng/L	ND (<4)	ND (<4)	ND (<10)
Sucralose[2]	ng/L	14,000	43,000	96,000
Surrogate				
Ammonia	mg/L	ND (<0.1)	ND (<0.1)	--
Nitrate-Nitrogen	mg/L	15	2.2	3.2[3]
Total Organic Carbon	mg/L	0.6	0.98	--
UV Light Absorption	1/cm	0.017	0.023	--
Specific Conductance	µmhos/cm	870	930	--

[1]2022 LOWRF Analytical Report, November 10, 2022
[2] High concentrations of analyte warranted dilution in the lab, changing MRL.
[3] October 2022 average for Total Nitrogen.
Ng/L = nanograms per liter; mg/L = milligrams per liter, µmhos/cm = micromhos per centimeter; :”–" = no result available
ND (<) = indicates less than Method Reporting Limit as listed in laboratory report (“not detected”)

CEC Laboratory results, and a summary sheet of the CEC constituents tested, along with analytical method information, is included in Appendix C. Constituents detected above the reporting limits and listed in Table 12 are discussed below.

DEET (Diethyl-meta-toluamide), a personal care product used for insect repellent, was detected in both groundwater samples, no DEET was detected in the laboratory blanks.

Sucralose, an artificial sweetener, was reported at 14,000 nanograms per liter (ng/L) in groundwater from FW5 and is an indicator of wastewater influence (i.e. originating from sources of wastewater including septic discharges or recycled water discharges). Sucralose was detected in FW6 at 43,000 ng/L. Laboratory reports indicated that the detected sucralose concentration was so high in these samples, that dilution was required, which in turn raised the maximum reporting limit (MRL) to 200 ng/L.

Nitrate-nitrogen was reported at 15 mg/L in groundwater from FW5, and 2.2 mg/L in FW6. NDMA (N-Nitroso-dimethylamine) was not detected in either FW5 or FW6. Available CEC-constituent quality of recycled water from LOWRF is also provided in Table 12 for comparison. NDMA is a byproduct of ion-exchange water treatment and chlorine, ozone, or chloramine disinfection. Concentrations of NDMA in Los Osos groundwater were reported at both FW5 and FW6 last year at 7.5 and 7.9 ng/L respectively.

Results of the CEC testing are interpreted to indicate wastewater influence at FW5, based on sucralose and nitrate concentrations. Sucralose concentrations increased from 2,600 ng/L to 14,000 ng/L at FW5 between 2021 and 2022, while nitrate-nitrogen concentrations at the well decreased from 32 mg/L in 2021 to 15 mg/L in 2022. Both sucralose and nitrate concentrations in groundwater at FW5 have shifted significantly in the direction of LOWRF recycled water discharge quality (Table 12).

FW6 is the sentry well for Broderson recycled water discharges entering the Basin. As expected, the CEC results for FW6 also show recycled water influence attributed to Broderson discharges. The nitrate-nitrogen concentrations are an order of magnitude less than concentrations detected prior to Broderson Site operation and are similar to LOWRF effluent. Sucralose concentrations at FW6 continue to increase over time, and (along with FW5) are in the same order of magnitude (over 10,000 ng/L) as LOWRF effluent. Sucralose is a food additive and there is no State notification level for sucralose concentrations in drinking water.

4.3 Geophysics

The most recent induction and natural gamma logging were performed at Lower Aquifer monitoring well LA4, LA14, and LA40 on November 5, 2021. Seawater is highly conductive, compared to fresh water, and an induction log performed in a borehole penetrating the fresh water/seawater interface will show the vertical transition from fresh water to seawater. Because natural gamma emissions are not affected by changes in water quality, the gamma ray log can be used as a depth calibration tool when comparing induction logs from different monitoring events. The fresh water/seawater interface on geophysical logs is selected where resistivity becomes a relatively straight and vertical line close to zero ohm-meters. This interface does not correspond to the 250 mg/L chloride concentration isopleth used to delineate the seawater intrusion front in contour maps, but represents a greater chloride concentration transition that is used for relative comparison between geophysical surveys.

Geophysical monitoring events have been performed in 1985, 2004, 2009, 2014, 2015, 2018 and 2021 at LA4 and LA14. The fresh water/seawater interface at LA4 rose approximately 50 feet between 1985 and 2009, with Lower Aquifer production reaching historical highs. Since 2009, induction logging at well LA4 indicates the fresh water/seawater interface has dropped approximately 18 feet in elevation in response to a general reduction in the west side Lower Aquifer pumping. No evidence of seawater intrusion has been observed in geophysical logging at Lower Aquifer monitoring well LA14. Historical geophysical records were included in the 2021 Annual Report (CHG, 2022).

Geophysical monitoring events were completed in 2019 and 2021 at LA40. The fresh water/seawater interface is interpreted to have remained unchanged at approximately 410 feet depth between monitoring events (CHG, 2022). The next scheduled geophysical logging will be in October of 2024.

5. GROUNDWATER PRODUCTION

Land use and water use areas overlying the Basin, including purveyor service areas, agricultural parcels, domestic parcels, and community facilities are included in Appendix E. Annual Basin groundwater production between 1970 and 2013 was reported in the LOBP (ISJ Group, 2015). Tables 13 and 14 present municipal and Basin production beginning in calendar year 2013.

Table 13. Municipal Groundwater Production (2013-2022)

Year	LOCSD	GSWC	S&T	Total
	Acre-Feet[1]			
2013	726	689	55	1,470
2014	634	564	48	1,246
2015	506	469	32	1,007
2016	519	453	31	1,003
2017	568	450	32	1,050
2018	522	464	32	1,018
2019	506	454	31	991
2020	527	502	34	1,063
2021	503	491	32	1,026
2022	496	491	29	1,016

Note: [1]Metered production

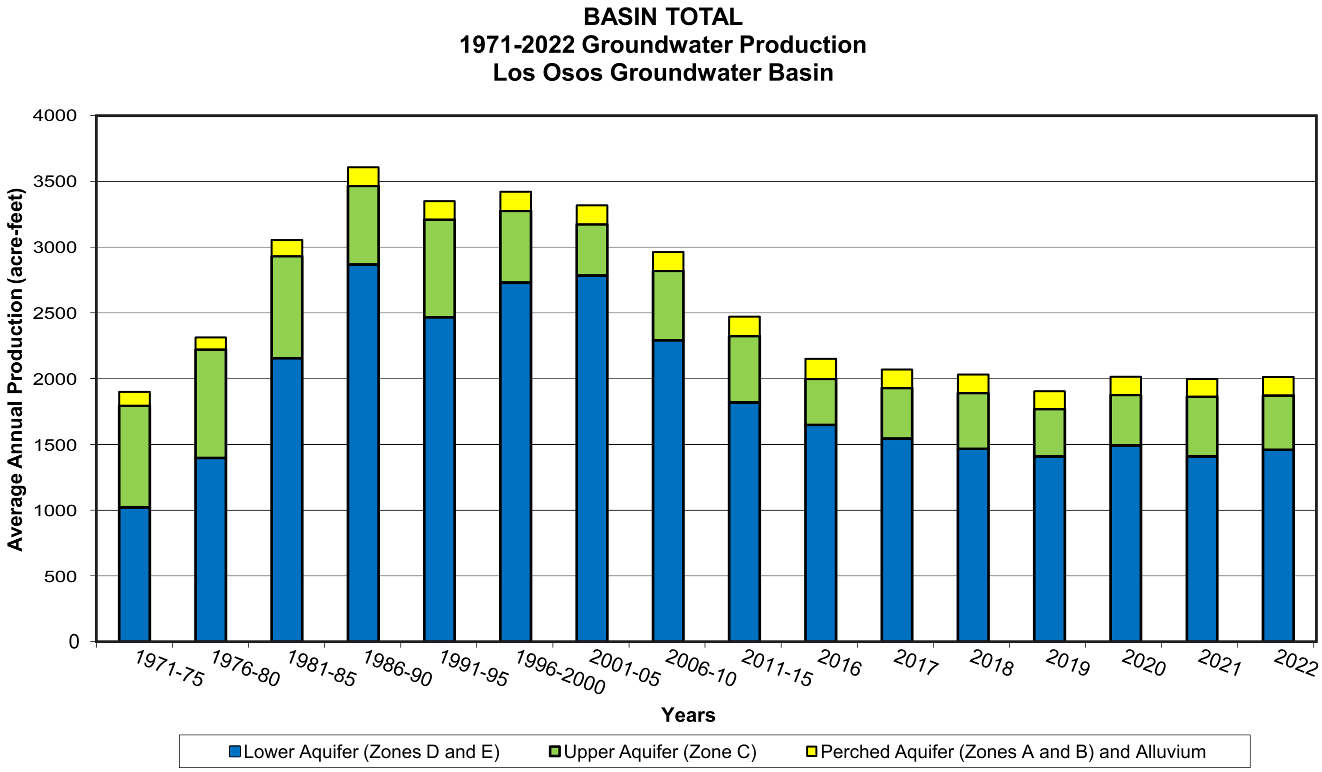
Table 14. Estimated Basin Groundwater Production (2013-2022)					
Year	Purveyors	Domestic	Community	Agriculture	Total
	Acre-Feet[1]				
2013	1,470	200	140	750	2,560
2014	1,246	220	130	800	2,400
2015	1,007	220	140	800	2,170
2016	1,003	220	140	800	2,160
2017	1,050	220	130	670	2,070
2018	1,018	220	120	670	2,030
2019	991	220	60	630	1,900
2020	1,063	220	80	650	2,010
2021	1,026	220	130	620	2,000
2022	1,016	220	90	680	2,010

Note: [1]All figures except Purveyors rounded to the nearest 10 acre-feet. Production from non-metered wells (Domestic, Community, Agricultural) estimated per methods described in Appendix F and LOBP Section 4 and Section 7.5.

Table 14 shows the recent trend in Basin water use, which is an overall decline since 2013, with a slight increase between 2019 and 2020. Produced water from purveyors declined through 2016, and has remained at a relatively consistent rate since then. Estimated private domestic water use has been stable, while community facilities use was relatively stable through 2018, with lower groundwater use in 2019, 2020, and again in 2022 in response to recycled water deliveries for golf course irrigation. Recycled water deliveries to the golf course increased from 16.5 acre-feet in 2021 to 66 acre-feet in 2022, resulting in decreased community demand. Estimated agricultural irrigation is shown to be increasing from 2021 to 2022 (details in Appendix F). Overall declines in Basin production since 2015 are from declines in estimated production values, rather than metered production.

Figure 6 shows the historical pumping distribution between Basin aquifers since 1970, along with the pumping distribution in the Western Area. Figure 7 shows the historical pumping distribution for the Central and Eastern Areas. There was a 23 percent reduction in Basin production over the last 10 years, of which reduced purveyor pumping from wells in the Lower Aquifer Western Area accounted for approximately 40 percent of the total reduction in Basin pumping (Figure 6). Over the last five-year period (2018-2022), overall Lower Aquifer production in the Basin has stabilized, although in the Western Area annual production has increased by 70 acre-feet (from 200 acre-feet in 2018 to 270 acre-feet in 2022).

Purveyor municipal production data are based on meter readings and reported to the closest acre-foot. Domestic groundwater production estimates are based on the last reported water use estimates for 2013 from the LOBP, with minor adjustments beginning in 2014 for the inclusion of additional residences in the Eastern Area (CHG, 2017a). Production estimates for community facilities and agricultural wells are based on a soil-moisture budget using local precipitation, land use, and evapotranspiration data (Appendix F). Basin groundwater production, which combines metered and unmetered production estimates, is reported to the closest 10 acre-feet. Unmetered production estimates account for approximately half of the total production in the Basin, of which agricultural irrigation is the greatest unmetered component. Potential uncertainty in Basin production has been estimated at +/- 100 acre-feet, or approximately 10 percent of the unmetered production component and five percent of the sustainable yield of the Basin (LOBP page 47; ISJ Group, 2015).



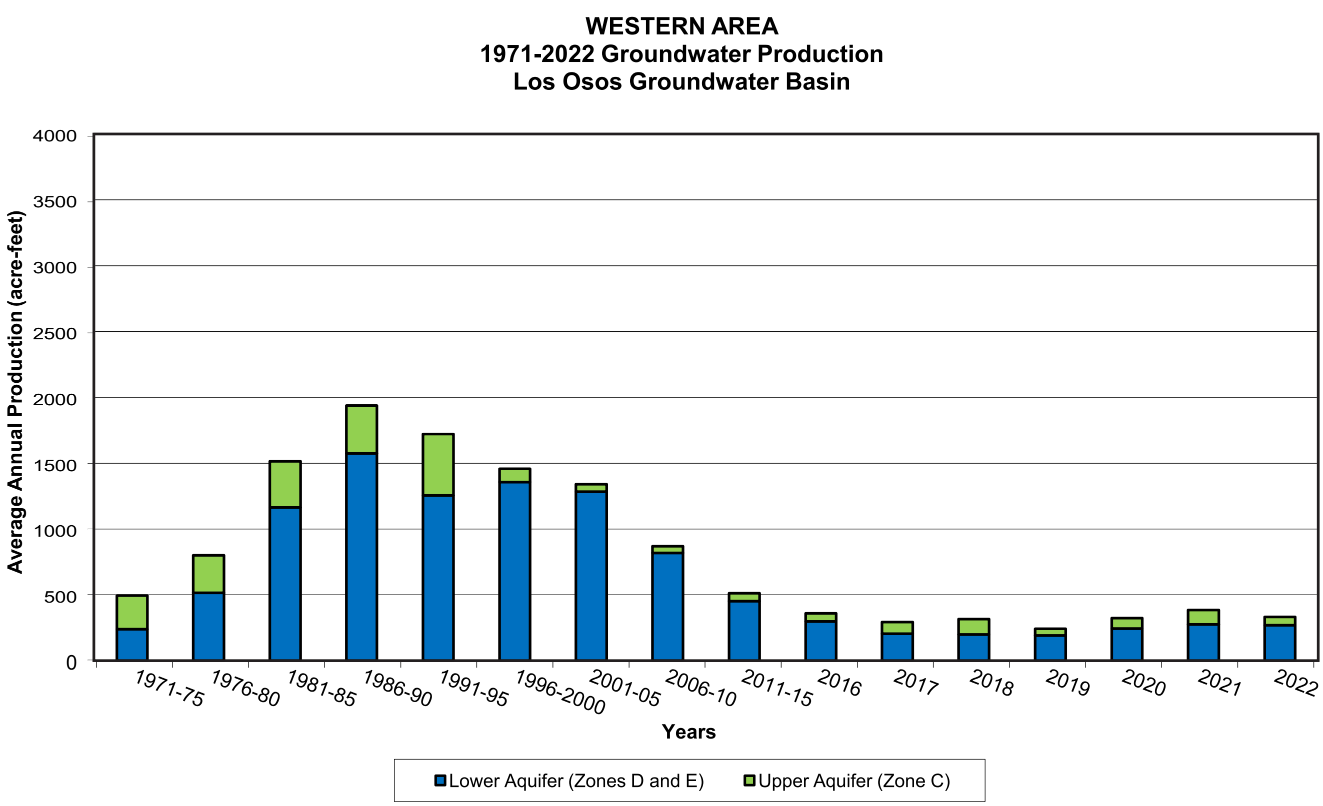


Figure 6
Basin Production 1971-2022
Basin Total and Western Areas
Los Osos Groundwater Basin
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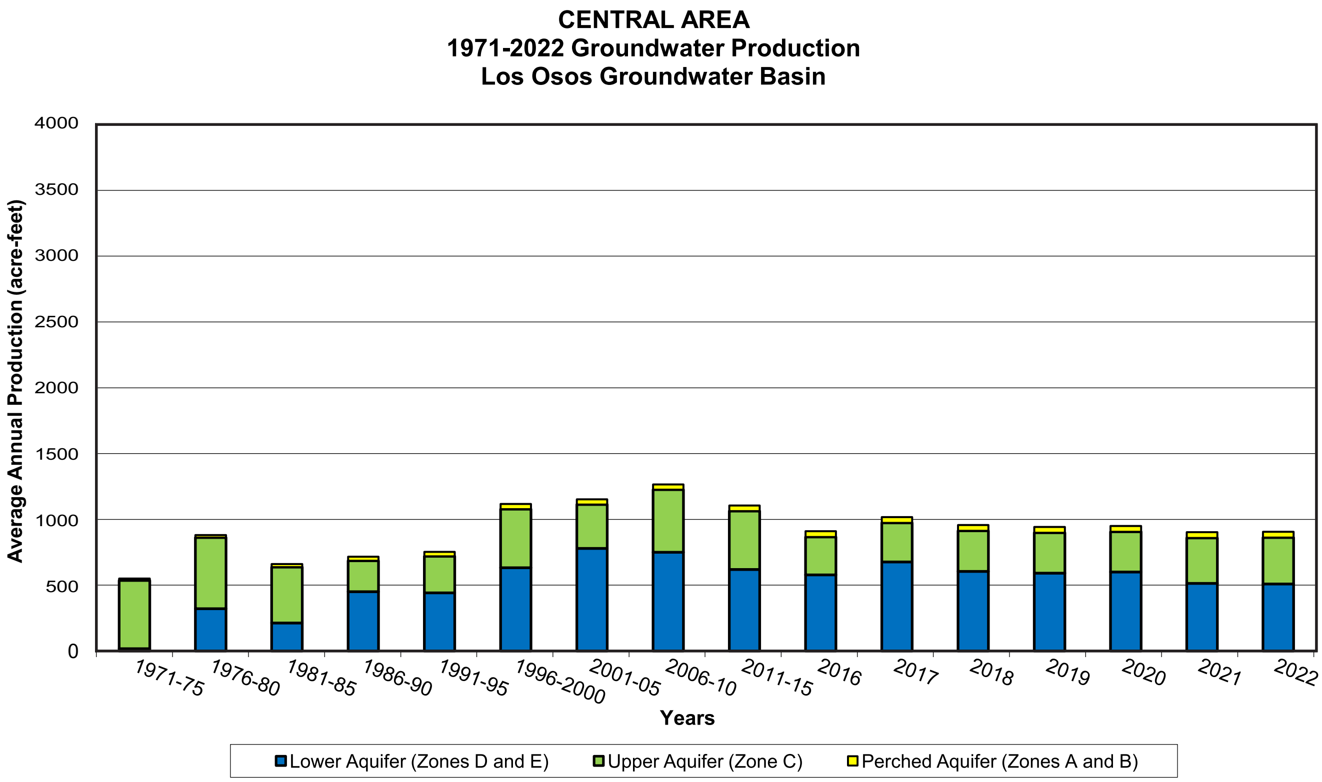

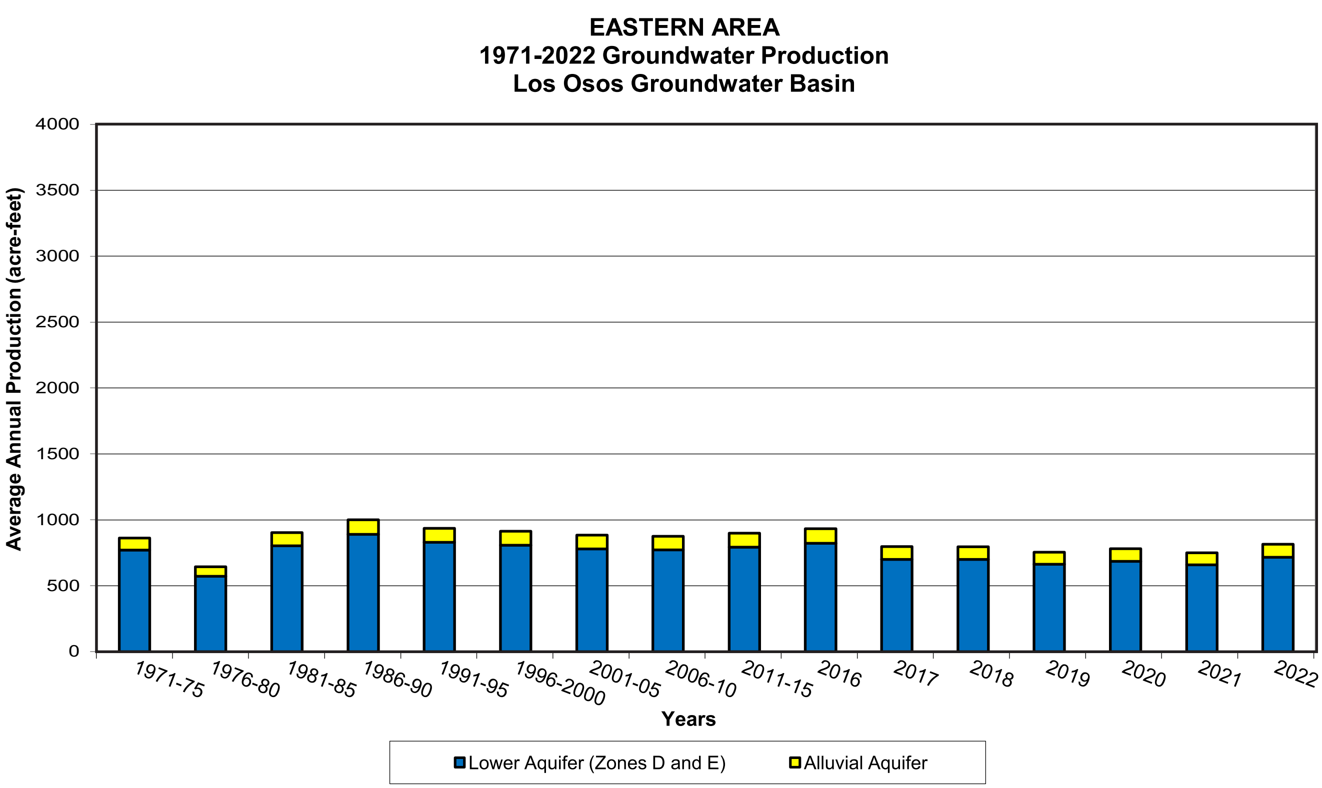

Figure 7
Basin Production 1971-2022
Central and Eastern Areas
Los Osos Groundwater Basin
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6. PRECIPITATION AND STREAMFLOW

Precipitation data are currently available from a County gage located at the former Los Osos landfill (Station #727). Continuous precipitation records for Station #727 are available beginning with the 2006 rainfall year (July 2005 through June 2006), and show that rainfall has averaged 15.79 inches, with a minimum of 6.81 inches in the 2014 rainfall year and a maximum of 31.77 inches in the 2011 rainfall year. Precipitation for the 2022 rainfall year was reported at 13.58 (below average). Records for Station #727 through the calendar year 2022 are included in Appendix G. The average rainfall at Station #727 is lower compared to other Los Osos rain gages due to a relatively short period of record that includes multiple drought years.

Historically, precipitation records at rain gage stations were compiled by the County for the LOCSD maintenance yard on 8th Street (Station #177), at the South Bay fire station on 9th Street (Station #197), and at two private volunteer stations (Station #144.1 in the Los Osos Creek Valley and Station #201.1 on Broderson Avenue). The longest active period of record in the vicinity is at the Morro Bay Fire Department (Station #152). A summary of precipitation data for these stations is presented in Table 15.

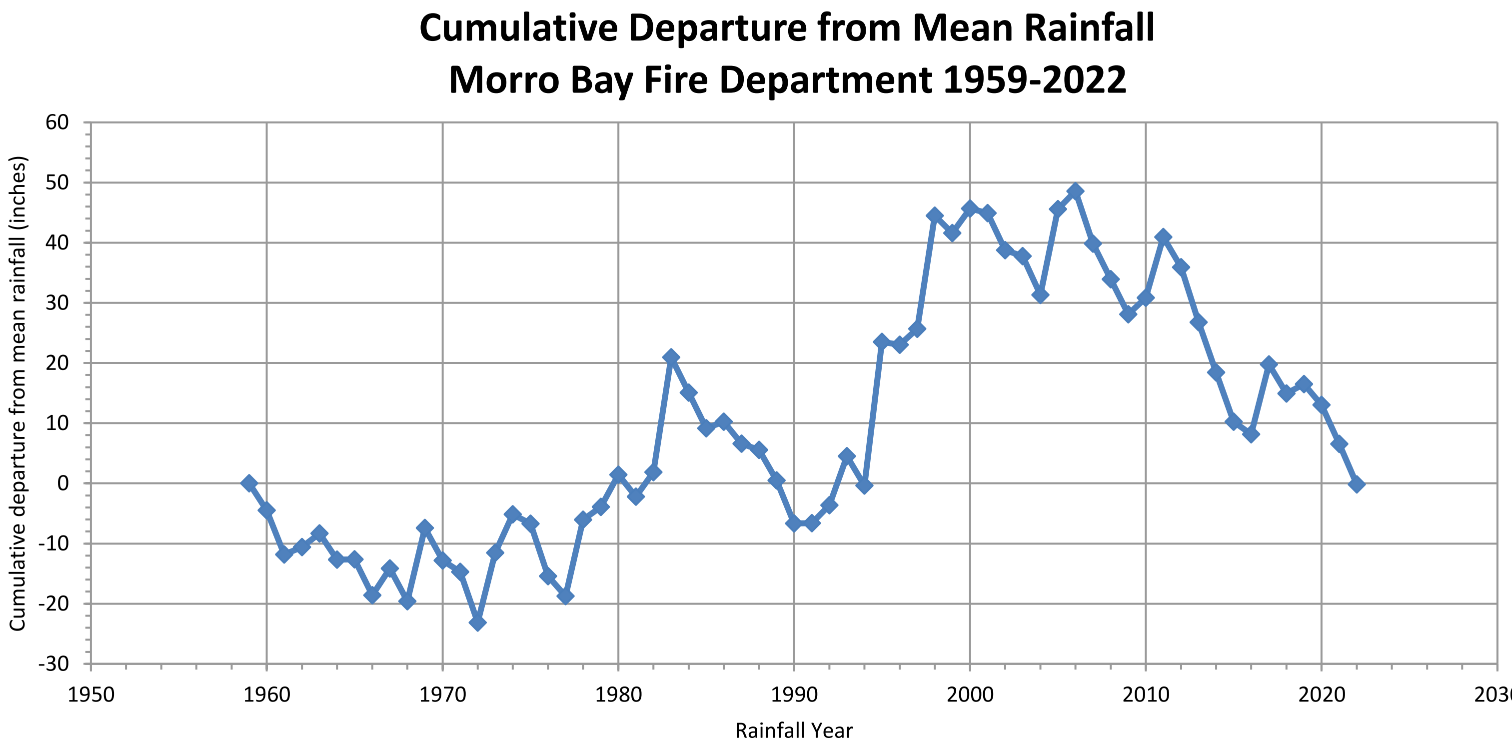
Table 15. Active and Former Precipitation Stations

Station No.	Name	Period of Record (rainfall years)	Average Annual Precipitation (inches)
144.1	Bender	1955-1987	19.17
152	Morro Bay Fire Dept.	1959-2022 (active)	15.93
		2006-2022 (active)	13.24
177	CSA9 Baywood Park	1967-1980	17.49
197	South Bay Fire	1975-2001	19.52
201.1	Simas	1976-1983	21.16
727	Los Osos Landfill	**2006-2022** (active)	15.79*

NOTE: *lower average due to short period of record that includes seven years of below normal rainfall.

Figure 8 shows the long-term cumulative departure from mean precipitation at Station #152. Note that between 2006 and 2022 (the period of record for Station #727), rainfall at Station #152 was averaging more than two inches per year below normal (Table 15). Once data for Los Osos Landfill Station #727 becomes more representative of long-term climatic conditions, it would be appropriate to use the gage in the cumulative departure from mean precipitation graph.

The U.S. Drought Monitor, a partnership of federal agencies, monitors drought conditions across the country based on various climatological indexes and data inputs. San Luis Obispo County started 2022 with moderate drought conditions in January. Severe drought conditions were reported at the end of the calendar year in December 2022 (NDMC/USDA/NOAA, 2022).



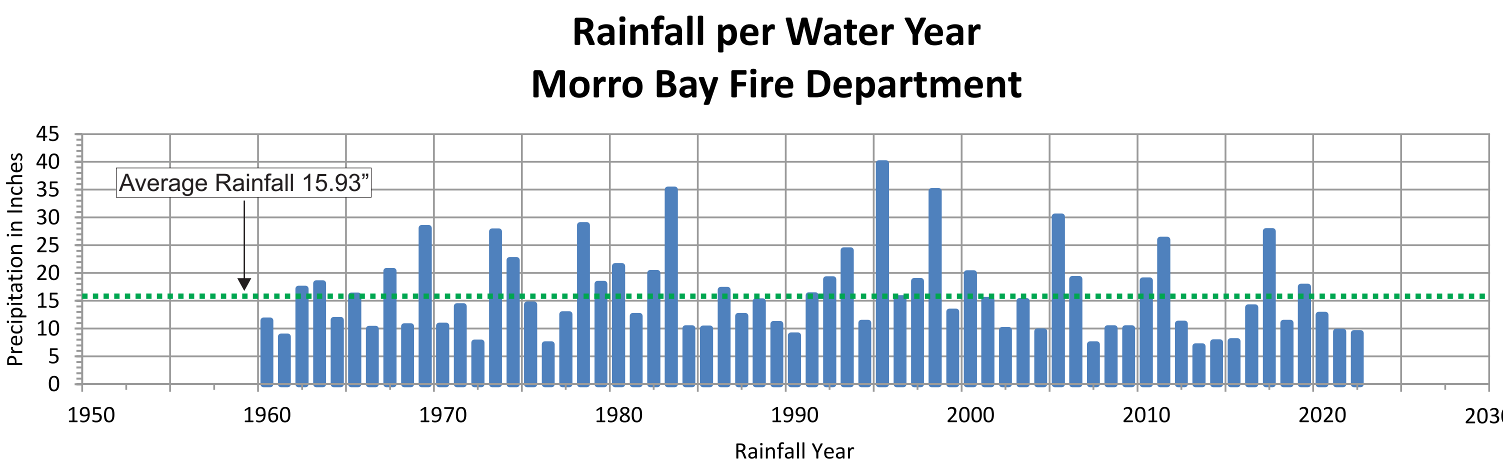


Figure 8
Cumulative Departure from
Mean Rainfall at Morro Bay Fire Department
Los Osos Groundwater Basin
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The Basin model is a steady-state numerical groundwater flow and transport model that assumes a long-term average annual rainfall of 17.3 inches across the Basin. As shown in the cumulative departure curve in Figure 8, the climate has been mostly dry since 2006, with a cumulative drop of 48 inches from the long-term average, equivalent to 3 inches per year below average. Station #727 records begin in 2006, therefore, the current average rainfall of 15.79 for that station is interpreted to be below the long-term average for the Basin.

Los Osos Creek drains the Clark Valley watershed. Streamflow on Los Osos Creek is monitored by a County gage (formerly Gage #6, now Sensor 751) at the Los Osos Valley Road bridge. The location has been gaged intermittently since 1976, with 18 years of flow records ending in 2001. The average measured flow on Los Osos Creek at the gage (drainage area of 7.6 square miles) was 3,769 acre-feet per year between 1976 and 2001 (San Luis Obispo County, 2005). A summary of the available annual streamflow data is in Appendix G.

Streamflow was recorded at the gage for 29 individual days during the 2022 water year (October 1, 2021 to September 30, 2022), during continuous flow periods between December 13-15, 2021, and December 23, 2021-January 17, 2022. The dates and maximum stage value from Station #751 for the peak flow days in each month are listed below in Table 16.

Table 16. Maximum Stream Stage for Los Osos Creek, 2022 Water Year

Date	Maximum Stream Stage County Sensor #751 (feet)
12/14/21	4.00
12/23/21	7.08
1/1/22	3.45

Development of a rating curve for Sensor 751 to convert historical stage data into flow measurements is scheduled for completion in 2023. Los Osos Creek stream flow records are useful for Basin water balance and sustainable yield interpretation, for the analysis of potential benefits from recycled water discharges to the creek, and for Basin model calibration. Graphs of the available stream stage data over time for water years 2011 through 2022 are included in Appendix G.

Warden Creek (Figure 1) drains approximately nine square miles of the eastern Los Osos Valley. This creek flows along 3,700 feet of the northern Basin boundary, at low invert elevations (less than 20 feet above sea level) in an area underlain by shallow bedrock. The U.S. Geological Survey reported winter flows in Warden Creek similar to Los Osos Creek, but with greater baseflow during the summer, because Warden Creek serves as a drain (point of groundwater discharge) for shallow groundwater at the north end of the Los Osos Creek floodplain (Yates and Wiese, 1988).

7. DATA INTERPRETATION

Groundwater level and groundwater quality data for 2022, together with selected historical data, have been used to develop the following information:

- Groundwater elevation contour maps for the Perched Aquifer, Upper Aquifer (with Alluvial Aquifer), and Lower Aquifer for both Spring and Fall 2022 conditions.

- Water level hydrographs for wells representative of aquifers in the Western, Central, and Eastern Areas of the Basin.

- The lateral extent of seawater intrusion and the Fall 2022 position of the seawater intrusion front.

- Estimates of groundwater in storage for Spring and Fall 2022, including amount above mean sea level.

- Estimates of changes to groundwater in storage from Spring 2021 to Spring 2022, including the volume of seawater intrusion.

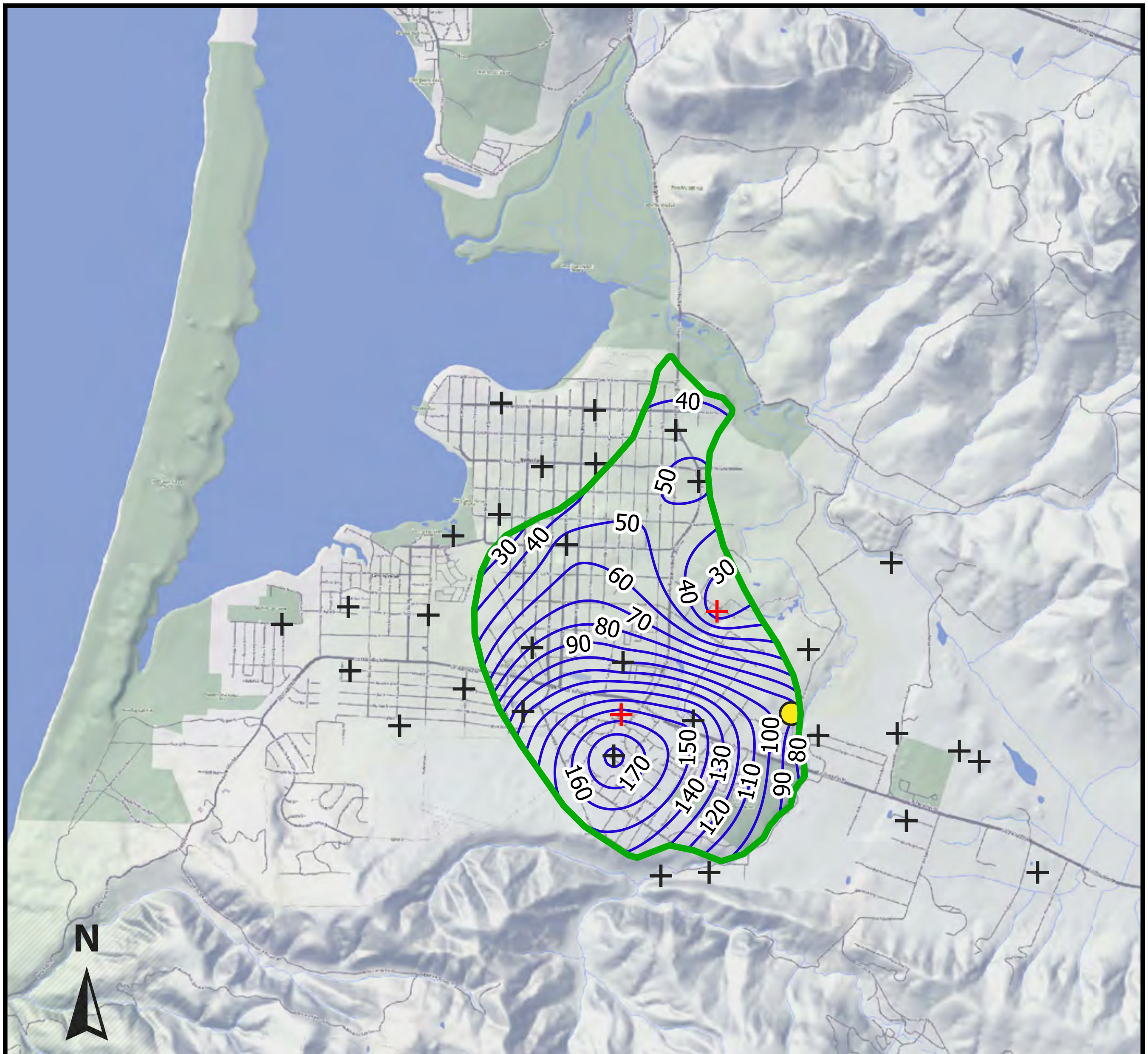
- Basin Yield Metric, Basin Development Metric, Water Level Metric, Chloride Metric, and Nitrate Metric.

- Upper Aquifer Water Level Profile

7.1 Water Level Contour Maps

Water level contour maps for Spring 2022 are presented in Figures 9, 10, and 11 for the Perched Aquifer, Upper Aquifer with Alluvial Aquifer, and Lower Aquifer, respectively. Corresponding water level contour maps for Fall 2022 are presented in Figures 12, 13, and 14. The water level elevations are shown at a 5-foot contour interval for the Upper and Lower Aquifers, and a 10-foot contour interval for the perched aquifer, based on the ordinary kriging interpolation method, which provides a best (least-squares) estimate of values at unmeasured points based on the mapped values.

Water level data available from private irrigation and domestic wells were used in the development of the water level contour maps, although these water levels are not listed in the data tables in this report (Table 3 through 8). Private well participation in the monitoring program during 2022 was approximately 68 percent (22 out of 33 wells in Spring, 23 out of 33 wells in Fall). With completion of the 2021 wellhead elevation survey, all of the LOBP monitoring network wells that are used for water level monitoring now have NAVD 88 elevations as reported by a licensed land surveyor.



Base Image: Stamen-Terrain

0 2,000 4,000 6,000 8,000 ft

Scale: 1 inch ≈ 4,000 feet

Explanation

Approximate limits of Perched Aquifer

Groundwater elevation contour in feet above sea level (NAVD 88 datum)

Spring seep used for groundwater elevation

Spring 2022 groundwater elevation data point (contours not applicable outside of Perched Aquifer limits)

Alternate date groundwater elevation data point

Figure 9
Spring 2022 Water Level Contours
Perched Aquifer
Los Osos Groundwater Basin
2022 Annual Report

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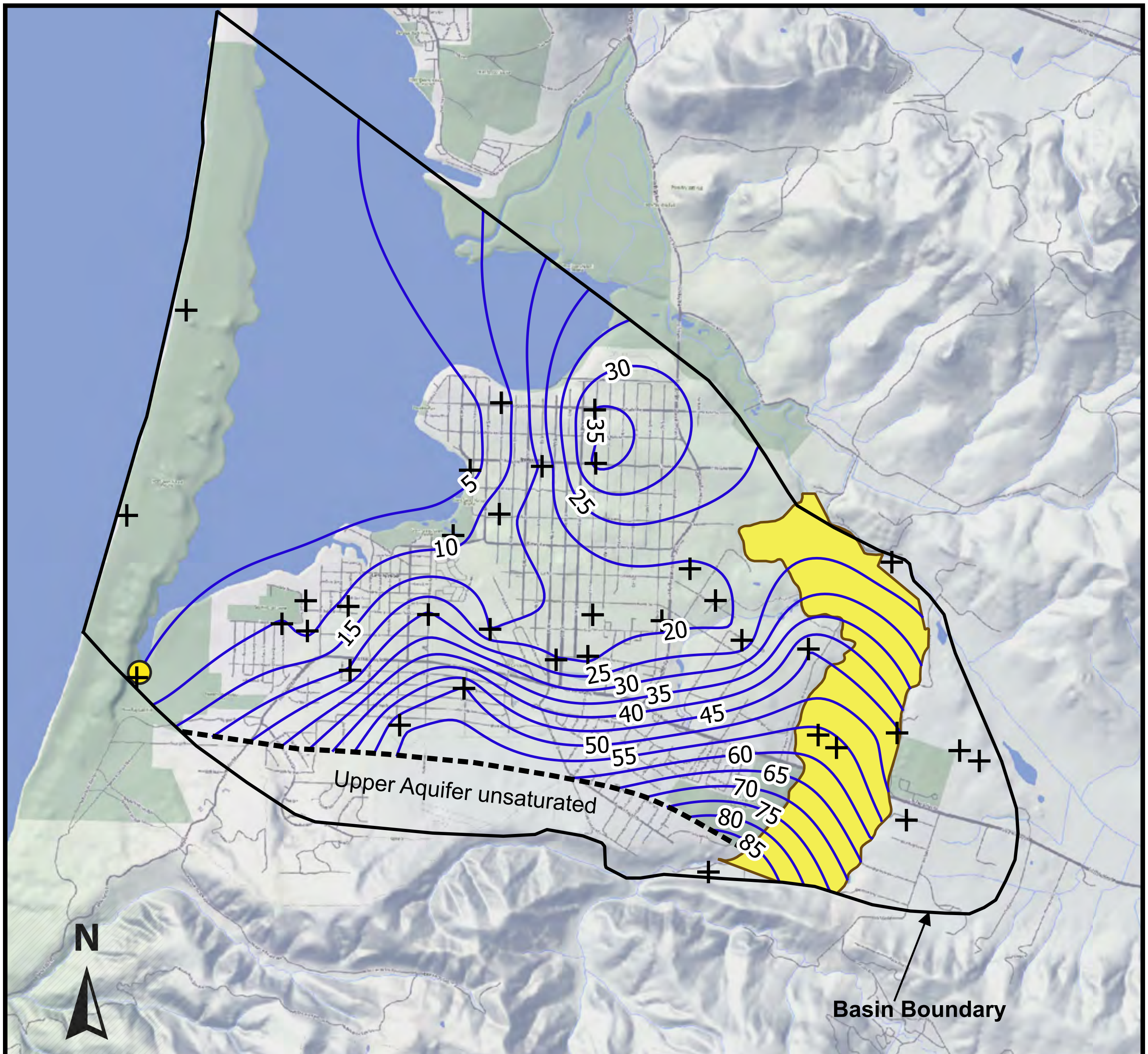

Base Image: Stamen-Terrain

0 2,000 4,000 6,000 8,000 ft

Scale: 1 inch ≈ 4,000 feet

Explanation

Groundwater elevation contour
in feet above sea level (NAVD 88 datum)

Limits of Alluvial Aquifer

Spring 2022 groundwater elevation data point

Spring seep used for groundwater elevation

Figure 10
Spring 2022 Water Level Contours
Upper Aquifer
Los Osos Groundwater Basin
2022 Annual Report

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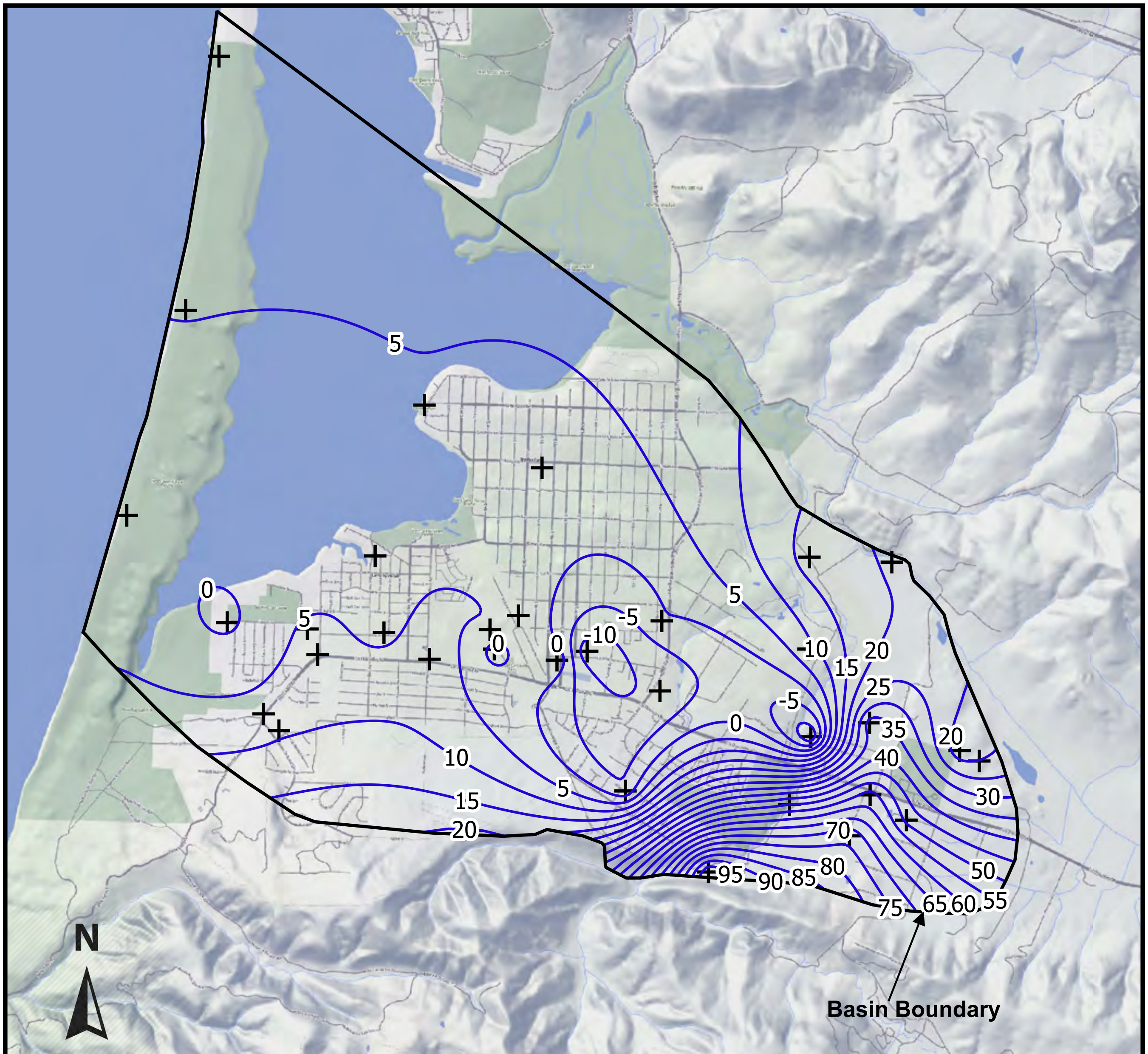

Base Image: Stamen-Terrain

0 2,000 4,000 6,000 8,000 ft

Scale: 1 inch ≈ 4,000 feet

Explanation

Groundwater elevation contour in feet above sea level (NAVD 88 datum)

+ Spring 2022 groundwater elevation data point

Figure 11
Spring 2022 Water Level Contours
Lower Aquifer
Los Osos Groundwater Basin
2022 Annual Report

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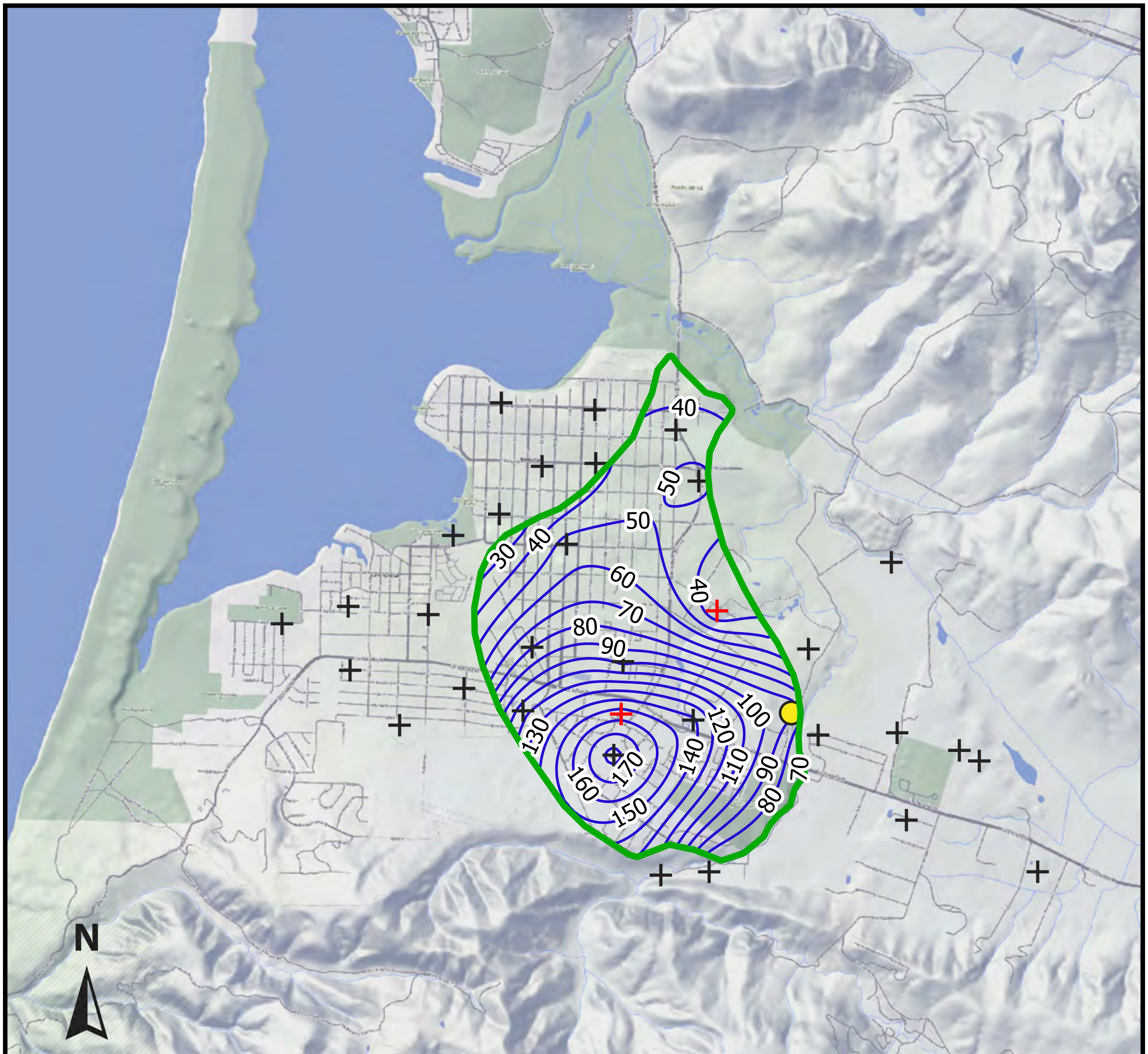

Base Image: Stamen-Terrain

0 2,000 4,000 6,000 8,000 ft

Scale: 1 inch ≈ 4,000 feet

Explanation

Approximate limits of Perched Aquifer

Groundwater elevation contour in feet above sea level (NAVD88 datum)

Spring seep used for groundwater elevation

Fall 2022 groundwater elevation data point (contours not applicable outside of Perched Aquifer limits)

Alternate date groundwater elevation data point

Figure 12
Fall 2022 Water Level Contours
Perched Aquifer
Los Osos Groundwater Basin
2022 Annual Report

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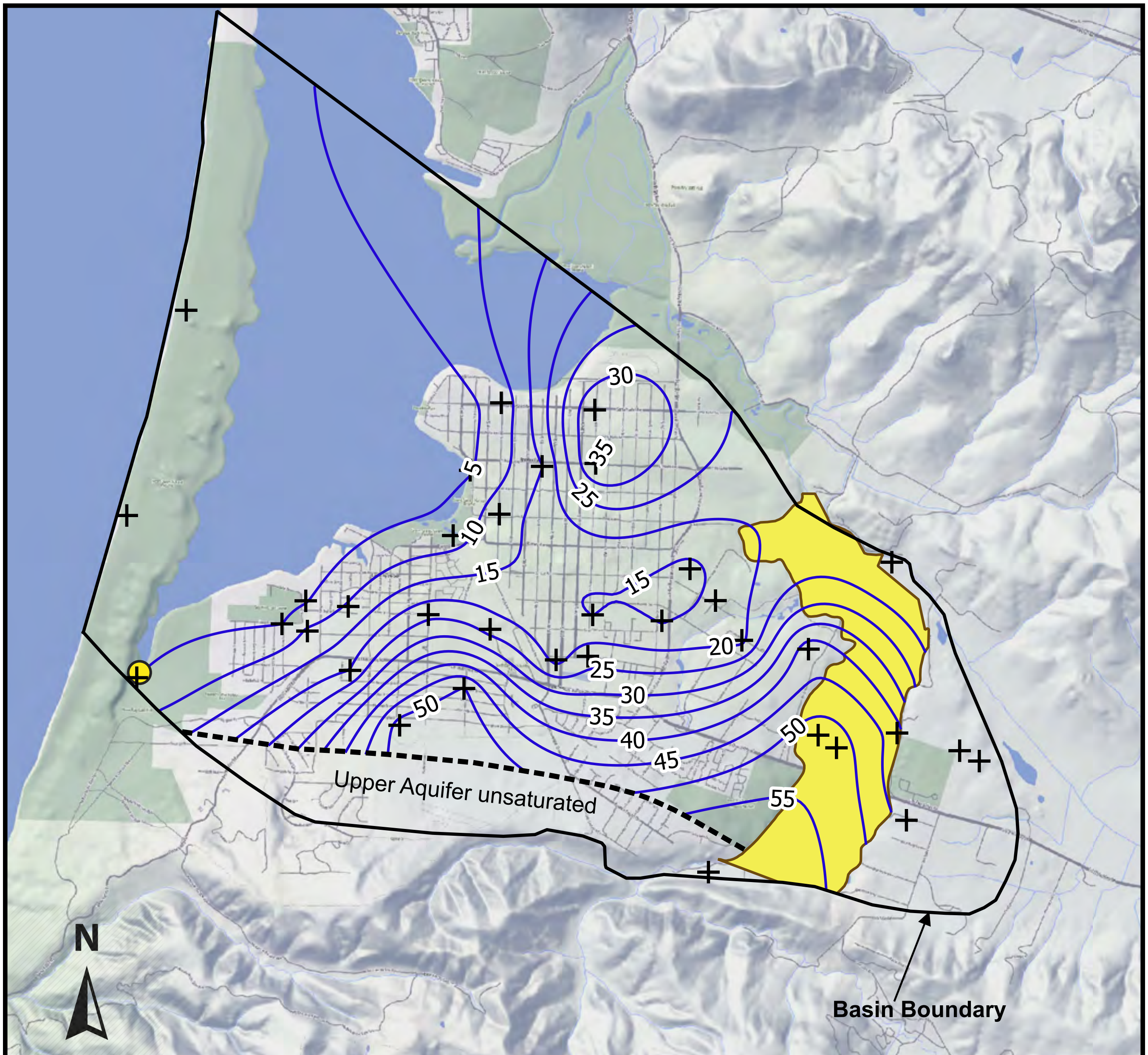

Base Image: Stamen-Terrain

0 2,000 4,000 6,000 8,000 ft

Scale: 1 inch ≈ 4,000 feet

Explanation

Groundwater elevation contour
in feet above sea level (NAVD 88 datum)

Limits of Alluvial Aquifer

Fall 2022 groundwater elevation data point

Spring seep used for groundwater elevation

Figure 13
Fall 2022 Water Level Contours
Upper Aquifer
Los Osos Groundwater Basin
2022 Annual Report

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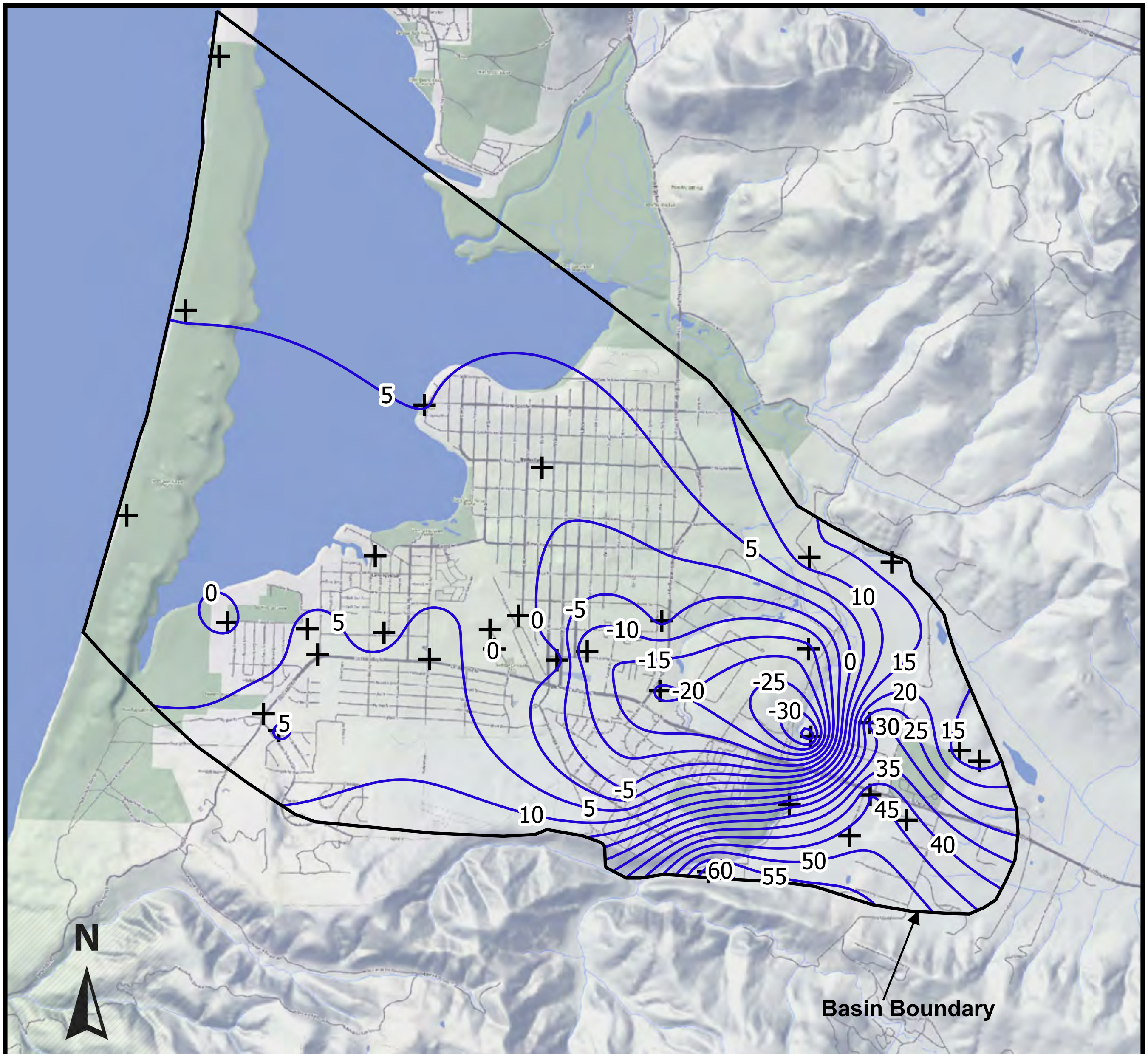

Base Image: Stamen-Terrain

0 2,000 4,000 6,000 8,000 ft

Scale: 1 inch ≈ 4,000 feet

Explanation

Groundwater elevation contour in feet above sea level (NAVD 88 datum)

+ Fall 2022 groundwater elevation data point

Figure 14
Fall 2022 Water Level Contours
Lower Aquifer
Los Osos Groundwater Basin
2022 Annual Report

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Perched Aquifer water level contour maps (Figures 9 and 12) show the highest groundwater elevations at Well FW31 in the Bayridge Estates (at the Bayridge Estates recycled water disposal field), with a radial direction of groundwater flow from the higher topographic elevations to lower elevations. Overall Perched Aquifer groundwater levels declined approximately 2.6 feet from Spring to Fall 2022, which is normal (water levels typically decline in the fall and recover in the spring). The average seasonal water level decline in the Perched Aquifer over the last five years has been 2.5 feet, followed by water level recovery in the spring.

Contour maps for the Upper Aquifer and Alluvial Aquifer (Figures 10 and 13) show the highest groundwater elevations are at the southern edge of the Los Osos Creek alluvial valley. The general direction of groundwater flow is to the northeast along the creek valley and to the northwest toward the Morro Bay estuary. Significant features include a pumping depression interpreted to be present in the area of downtown Los Osos, and a groundwater high interpreted to be present beneath dune sand ridges in Baywood Park. Upper Aquifer groundwater elevation contours averaged approximately 3.1 feet of water level decline from Spring to Fall 2022, which is normal. The average seasonal water level decline in the Upper Aquifer over the last five years has been 2.3 feet, followed by water level recovery in the spring.

Contour maps for the Lower Aquifer (Figures 11 and 14) show the highest groundwater elevations are at the southern edge of the Los Osos Creek alluvial valley and near the eastern Basin boundary. The steep hydraulic gradient between the Upper Creek Valley and downtown Los Osos suggests significant permeability restrictions between these two areas, possibly fault related (Yates and Weise, 1988; Cleath & Associates, 2005). Groundwater flow in the Lower Aquifer is generally toward Central Area pumping depressions which are below sea level. Lower Aquifer groundwater elevations averaged approximately 4.2 feet of water level decline from Spring to Fall 2022, which is normal. The average seasonal water level decline in the Lower Aquifer over the last five years has been 4.9 feet, followed by water level recovery in the spring.

7.2 Water Level Hydrographs

Water level hydrographs for representative First Water, Upper Aquifer, and Lower Aquifer wells have been compiled for the Western and Central Basin Areas, including one of the Lower Aquifer wells in the Dunes and Bay Area. These wells present the general water level trends. The hydrographs are shown in Figures 15, 16, and 17, respectively.

In previous reports, trends for the First Water wells have been analyzed in ten-year spans. There was a lapse in monitoring between 2006 and 2012 for three of the five representative First Water wells, however, so beginning in 2017 a five-year trend was analyzed, increasing by one year with each subsequent report until the First Water trend analysis returns to a ten-year span. The ten-year trend is complete again as of 2022.

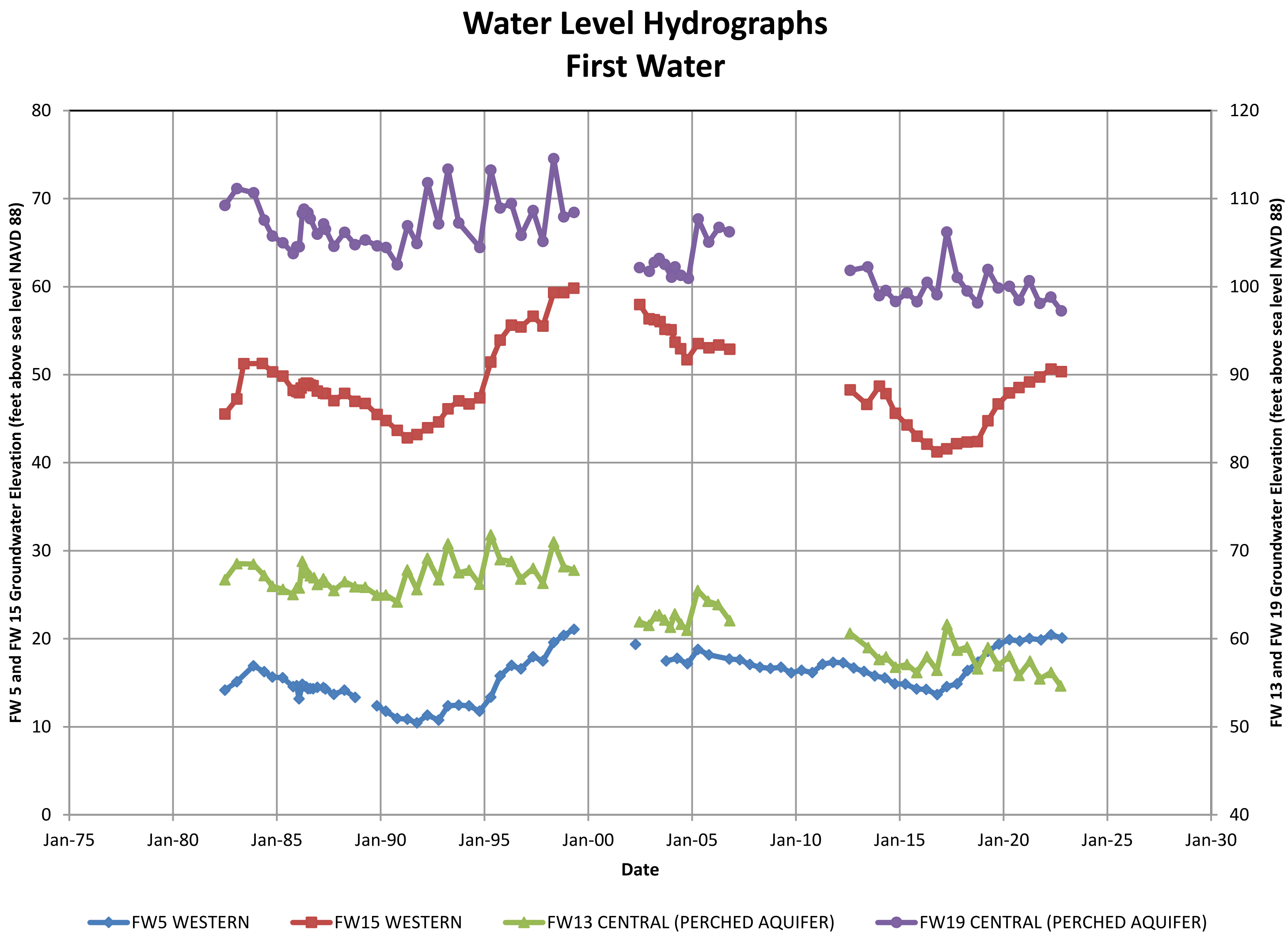

Figure 15
Water Level Hydrographs
Perched Aquifer / First Water
Los Osos Groundwater Basin
2022 Annual Report

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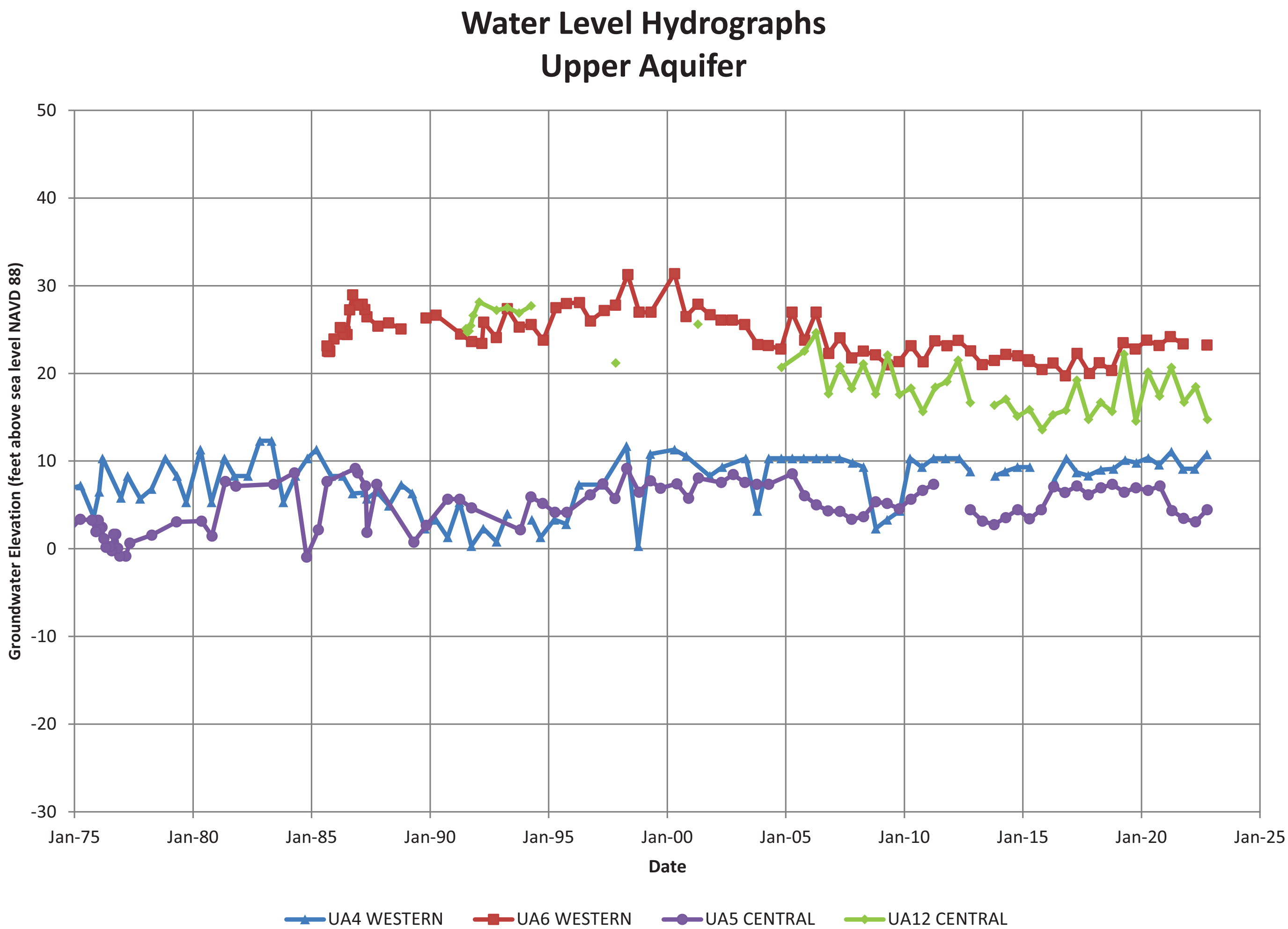

Figure 16
Water Level Hydrographs
Upper Aquifer
Los Osos Groundwater Basin
2022 Annual Report

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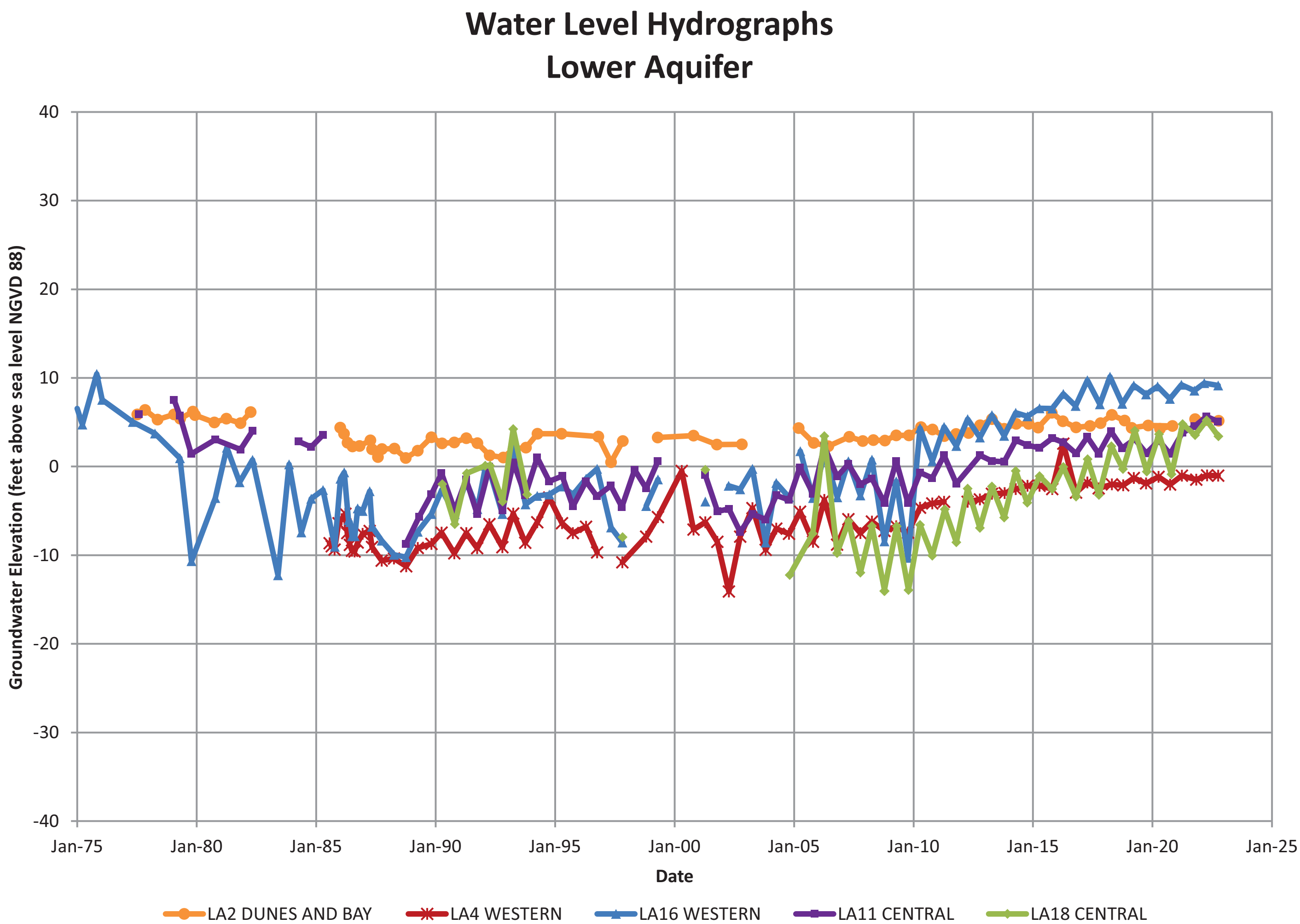


Figure 17
Water Level Hydrographs
Lower Aquifer
Los Osos Groundwater Basin
2022 Annual Report

Cleath-Harris Geologists

The Spring-to-Spring water level trend for the last ten years (2012-2022), based on First Water hydrographs in Western and Central Area wells was 0.05 feet of decline per year (Figure 15). For Upper and Lower Aquifer wells, the Spring-to-Spring water level trend over the last ten years (2012-2022), based on representative Central and Western wells was a decrease in 0.20 feet per year in the Upper Aquifer, and 0.36 feet of rise per year in Lower Aquifer water levels (Figures 16 and 17, respectively).

Hydrographs for fourteen wells equipped with pressure transducers are shown in Appendix H. Transducer locations are shown in Figures 2, 3, and 4. The transducers have been installed to provide greater detail of water level trends and fluctuations. There are three First Water wells, two Upper Aquifer wells, and nine Lower Aquifer wells equipped with transducers.

Seven of the transducer hydrographs were initiated in 2016-17. Data from these wells have been interpreted to show the following trends:

- FW6 is screened in the Upper Aquifer near the Broderson leach field in the Western Area of the Basin. Starting in June 2017, water levels have shown a steady rise of approximately 23 feet through March 2022 (Appendix H). The rise in water level is credited to groundwater mounding on the regional aquitard beneath the Broderson leach field. This mounding is expected to increase the downward hydraulic gradient and promote leakage through the regional aquitard, which will help to mitigate seawater intrusion in the Western Area. Beginning in mid-2022, the hydrograph at FW6 shows a slight decline in water levels, indicating possible stabilization of the Broderson groundwater mound. Additional monitoring data will be needed to confirm this.

  There is another monitoring well at the Broderson site that was damaged and lost (buried) during tree removal for leach field construction. FW7, if salvaged, could contribute valuable information on mound development. The general location of FW7 is known, and efforts to relocated and salvage the well are recommended.

- FW10 is screened at the top of the Upper Aquifer in the Central Area of the Basin, while UA4 and UA10 are screened at the base of the Upper Aquifer in the Western Area and Central Area of the Basin, respectively. These wells have displayed seasonal fluctuations of two to five feet (i.e., lower elevations during the summer and higher elevations during the winter and spring), including one to two feet of interference related to nearby pumping wells. Overall water level trends have been relatively flat to rising slightly since 2016 (Appendix H).

- FW27 is screened in the Alluvial Aquifer in the Eastern Area of the Basin. The well was equipped with a transducer in April of 2017, near the seasonal high-water period, and has shown seasonal fluctuations since then between 20 and 40 feet (Appendix H). The relatively large seasonal fluctuations are attributable to the well's location in the upper Los Osos Creek alluvial valley (Figure 2), where the majority of seasonal recharge from stream seepage in the Basin occurs.

- LA37 is screened in the Lower Aquifer in the Eastern Area of the Basin. It displays a seasonal fluctuation of approximately six to seven feet, including interference related to nearby pumping wells. Overall water level trends have been flat since 2017 (Appendix H).

- LA13 displays a seasonal fluctuation of approximately five to seven feet. Overall water level trends have been mostly rising slightly since 2016 (Appendix H). In 2022, LA13 underwent reconstruction in order to stabilize the old steel casing and to convert it into a monitoring well. It remains screened in the Lower Aquifer in the Central Area of the Basin; but the new construction only screens Zone E of the Lower Aquifer. The well completion (modification) report and construction diagram are presented in Appendix I.

The remaining seven transducers were installed in 2021, and have close to one year of recorded data. The y-axis (vertical scale) of the hydrographs at the wells with newly installed transducers are set to 10 feet (instead of 50 feet), due to the short monitoring interval. The hydrographs from these wells are interpreted to show the following trends:

- Tidal influence is observed in the hydrographs for LA11, LA40 and LA41, which are dedicated Lower Aquifer monitoring wells close to the bay. The tidal influence is interpreted to be a result of pressure loading and unloading to aquifers underlying the bay as the tides ebb and flow. Overall short-term trends, besides the dominant tidal effects and seasonal fluctuation, are stable water levels in LA11 and flat to slightly declining water levels in LA40 and LA41.

- LA6, LA14, LA16, and LA19 all show flat to slightly rising water levels as of December 2022.

7.3 Seawater Intrusion

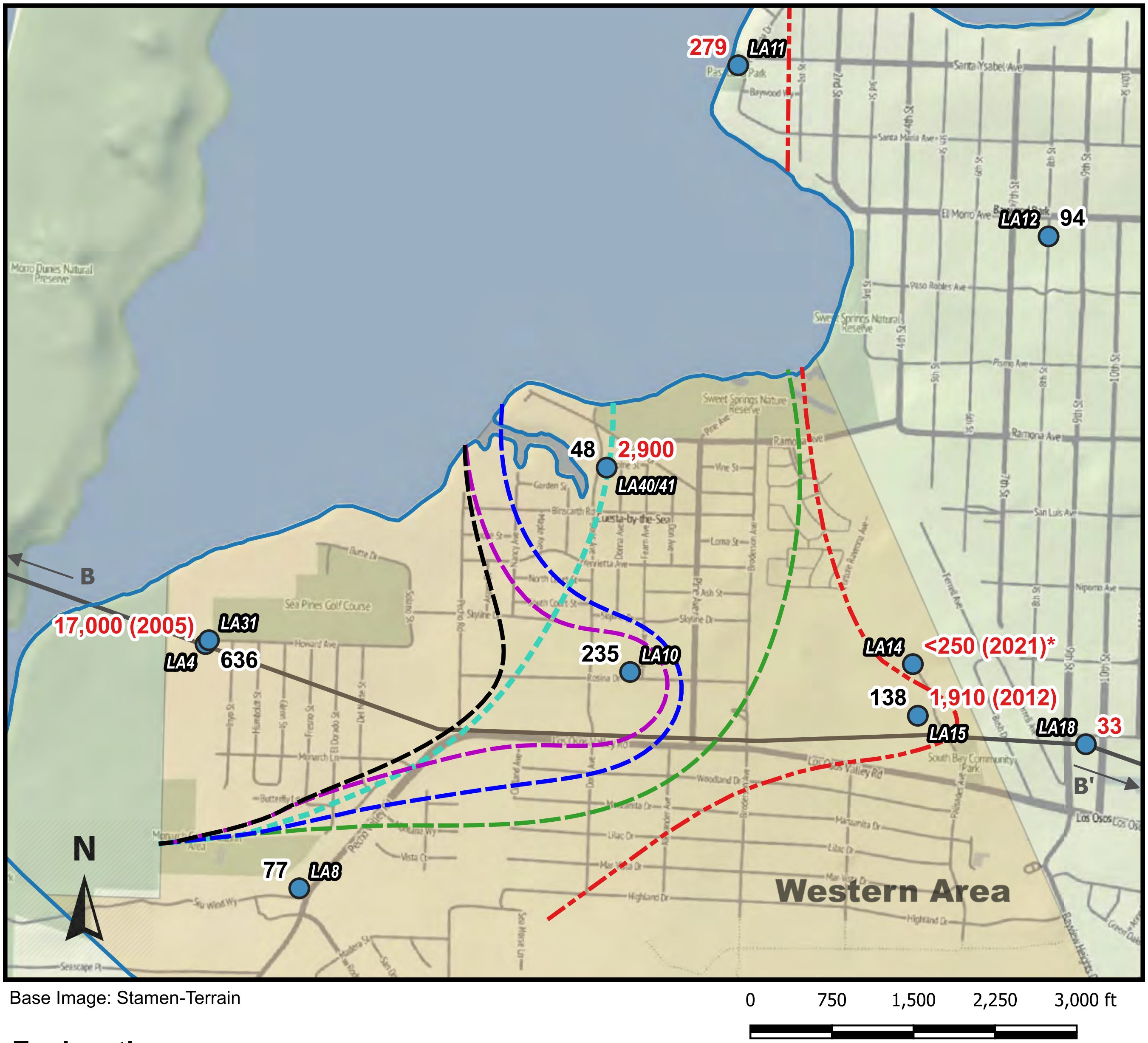
The estimated position of the Fall 2022 seawater intrusion front in Lower Aquifer Zone D is shown in Figure 18, along with selected prior years. There is insufficient information to represent current Lower Aquifer Zone E intrusion in a plan view figure, but a generalized plan view interpretation of Zone E intrusion using data from various years is included in Figure 18. The seawater intrusion front corresponds to the position of the 250 mg/L chloride concentration isopleth, based on water quality samples from Lower Aquifer wells.

The addition of LA41 (Lupine Avenue Zone D) in 2019 contributed to a refinement of the location of the seawater intrusion front in Zone D along the bay, compared to prior years, and resulting in a more westerly (improved) position compared to previous years (Figure 18). Based on the contours, the seawater intrusion front in Zone D moved close to 1,000 feet seaward between Fall 2021 and Fall 2022 (an improvement), although this is interpreted to be the result of localized chloride fluctuations at LA10 rather than broad intrusion front movement. Figure 18 is a simplification of Basin conditions, and the calculated position of the intrusion front and associated velocity of the intrusion front movement can vary significantly from year to year, and from Spring to Fall due to localized chloride fluctuations, particularly at well LA10. Furthermore, although the seawater intrusion front shown in Figure 18 is generally representative of Zone D, LA10 is completed in both Lower Aquifer Zone D and the top of Zone E, and LA11 is completed in Zone E.

Contouring for the intrusion front (250 mg/L chloride isopleth) shown in Figure 18 uses the ordinary kriging interpolation method, which provides a best (least-squares) estimate of values at unmeasured points based on the mapped values. Chloride concentrations at Dunes and Bay Area wells LA2 and LA3 were not analyzed in 2022, but in general they are two orders of magnitude greater than the Western Area wells and are not used for contouring the intrusion front in the Western Area. The ordinary kriging interpolation method involves weighted linear interpolation, whereas the chloride concentrations approaching wells LA2 and LA3 on the sandspit do not appear to follow linear gradients.

The location of the intrusion front is also shown in cross-section on Figure 19 and Figure 20 (cross-section alignments shown in Figure 1). Figure 19 (Basin cross-section B'B') runs from the sandspit to the eastern Basin boundary. The intrusion front in the Upper Aquifer remains beneath the sandspit, based on the triennial geophysics performed at 13M1 (see Section 4.3) and on water quality data from active bayfront municipal supply well UA3. Zone D intrusion has retreated west from LA10 and is closer to Pecho Road. In Zone E, the intrusion front reached LA15 (Palisades Avenue) in 2013, after which the zone was sealed off from production. There has been no evidence of further inland movement west of Palisades Avenue along the B-B' cross-section, based on the latest geophysics at LA14 (Section 4.3) and on water quality monitoring at Zone E monitoring well LA32 (10th Street). Inland movement of the Zone E front toward LA11, however, has been detected, as LA11 had a chloride concentration of 279 mg/L in October of 2022, which is an increase from October of 2021 at 258 mg/L (Figure 20). Chloride concentrations at LA40 were increasing between 2019 and 2021, but 2022 data do not show increases in Spring to Spring or Fall to Fall measurements. Seawater intrusion into Zone E is a significant threat to basin sustainability and has been for decades.

Figure 20 (section E-E') runs from Morro Bay on the north to the Los Osos fault on the south, and crosses section B-B' at Los Osos Valley Road (Figure 1). Zone D intrusion is interpreted in section E-E' to have reached LA10 near the middle of the basin, with the lateral extent along the section constrained by LA40 on the north, and by the rising limb of the syncline on the south. The intrusion front is not present along the Basin synclinal axis at the new Lupine Avenue nested monitoring well location, where the chloride concentration in LA41 is 48 mg/l. In Zone E, seawater intrusion is interpreted to be laterally pervasive in the Western Area, based on the elevated concentration in LA40 (Lupine Avenue) and an increasing trend in chloride concentrations at LA11 (Pasadena Drive) which indicates a worsening condition over time. Additional deep monitoring wells are needed to further define the extent and movement of intrusion in both Zone D and Zone E. Summary tables with historical water quality for individual Lower Aquifer wells are included in Appendix J for reference.



Explanation

Cross-section alignment (Figures 5 and 19)

Bulletin 118 Basin Boundary

235
33
Well with **Zone D** and/or **Zone E** chloride concentration (mg/L)
(Value for Fall 2021 except where year noted)

* LA14 Zone E value based on geophysics

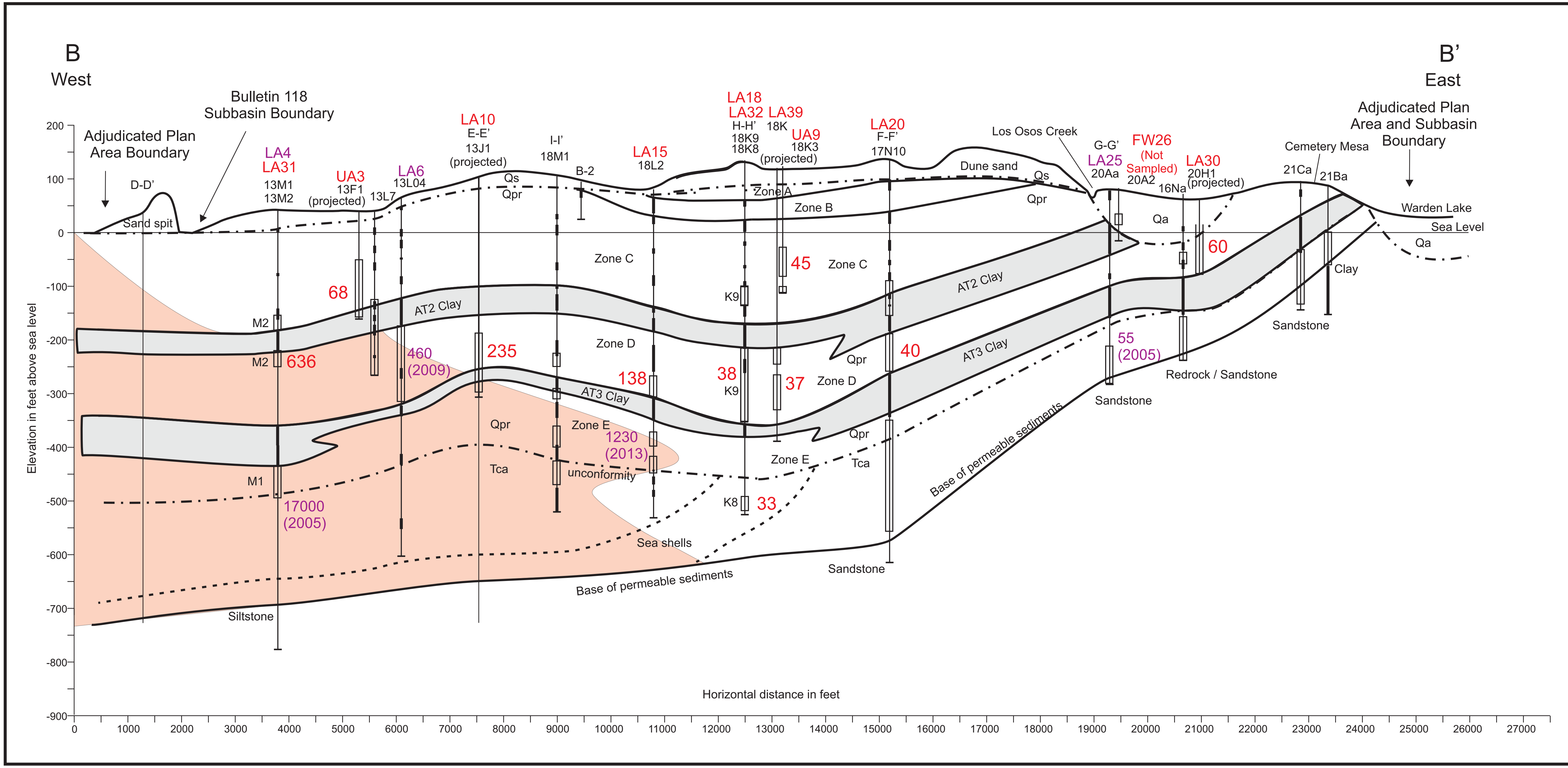
Seawater intrusion front in Western Area (250 mg/L chloride isopleth)

- Winter 2005 - Zone D (Pre LA40/41)
- Fall 2016 - Zone D (Pre LA40/41)
- Fall 2020 - Zone D
- Fall 2021 - Zone D
- Fall 2022 - Zone D
- Zone E (Generalized with data from various years)

Figure 18
Seawater Intrusion Front
Western Area
Lower Aquifer Zone D and E

Los Osos Groundwater Basin
2022 Annual Report

Cleath-Harris Geologists



Aquifer Zones:
Zone A - Perched Aquifer
Zone B - Transitional Aquifer
Zone C - Upper Aquifer
Zone D - Lower Aquifer (shallow)
Zone E - Lower Aquifer (deep)

Well data point
18M1 Well ID
Clay layer
Well screen
Clay layers not shown at projected wells

Formation:
Qa - alluvium
Qs - dune sand
Qpr - Paso Robles Formation
Tca - Careaga Formation

Cross-section alignment shown in Figure 1

LA31 - LOBP Monitoring Network ID

310 - Chloride concentration in mg/L (Fall 2022)

Estimated extent of seawater intrusion (Fall 2022)

460 - Historical Chloride concentration in mg/L (year listed)

Figure 19

Seawater Intrusion Front
Cross-Section B-B'
Los Osos Groundwater Basin
2022 Annual Report

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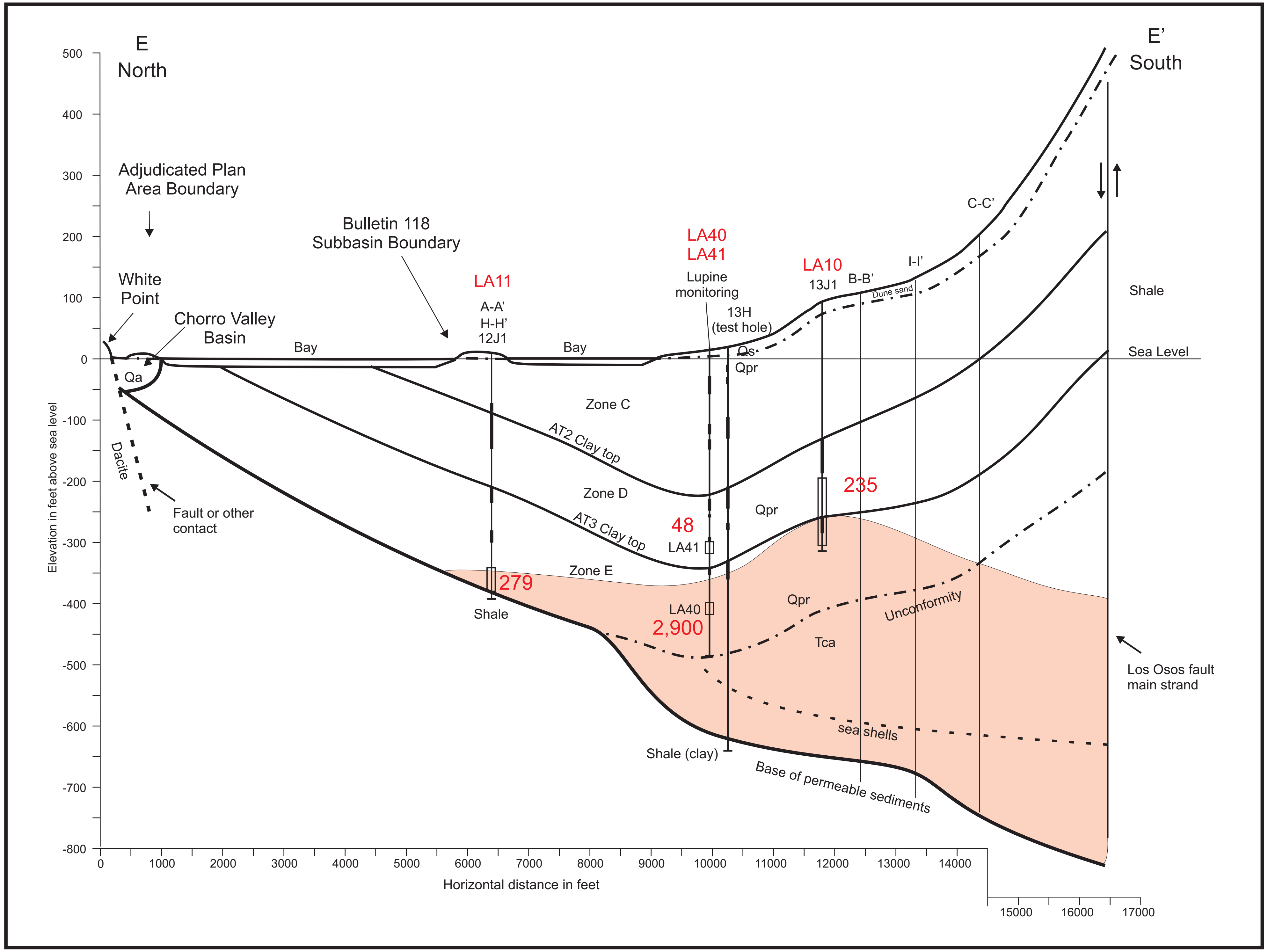

Aquifer Zones:
Zone A - Perched Aquifer
Zone B - Transitional Aquifer
Zone C - Upper Aquifer
Zone D - Lower Aquifer (shallow)
Zone E - Lower Aquifer (deep)

Well data point
12J1 Well ID
Clay layer
Well screen

Formation:
Qa - alluvium
Qs - dune sand
Qpr - Paso Robles Formation
Tca - Careaga Formation

Cross-section alignment shown in Figure 1

LA31 - LOBP Monitoring Network ID

235 - Chloride concentration in mg/L (Fall 2022)

Estimated extent of seawater intrusion (Fall 2022)

Figure 20

Seawater Intrusion Front
Cross-Section E-E'
Los Osos Groundwater Basin
2022 Annual Report

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Seawater intrusion in Zone E is anticipated to be halted through a combination of reduced pumping in the Western Area together with increased recharge across the regional aquitard, following development of the groundwater mound beneath the Broderson disposal site. The redistribution of pumping and development of the Broderson groundwater mound are both still in progress, although the mound may have stabilized in the Upper Aquifer in 2022.

7.4 Groundwater in Storage

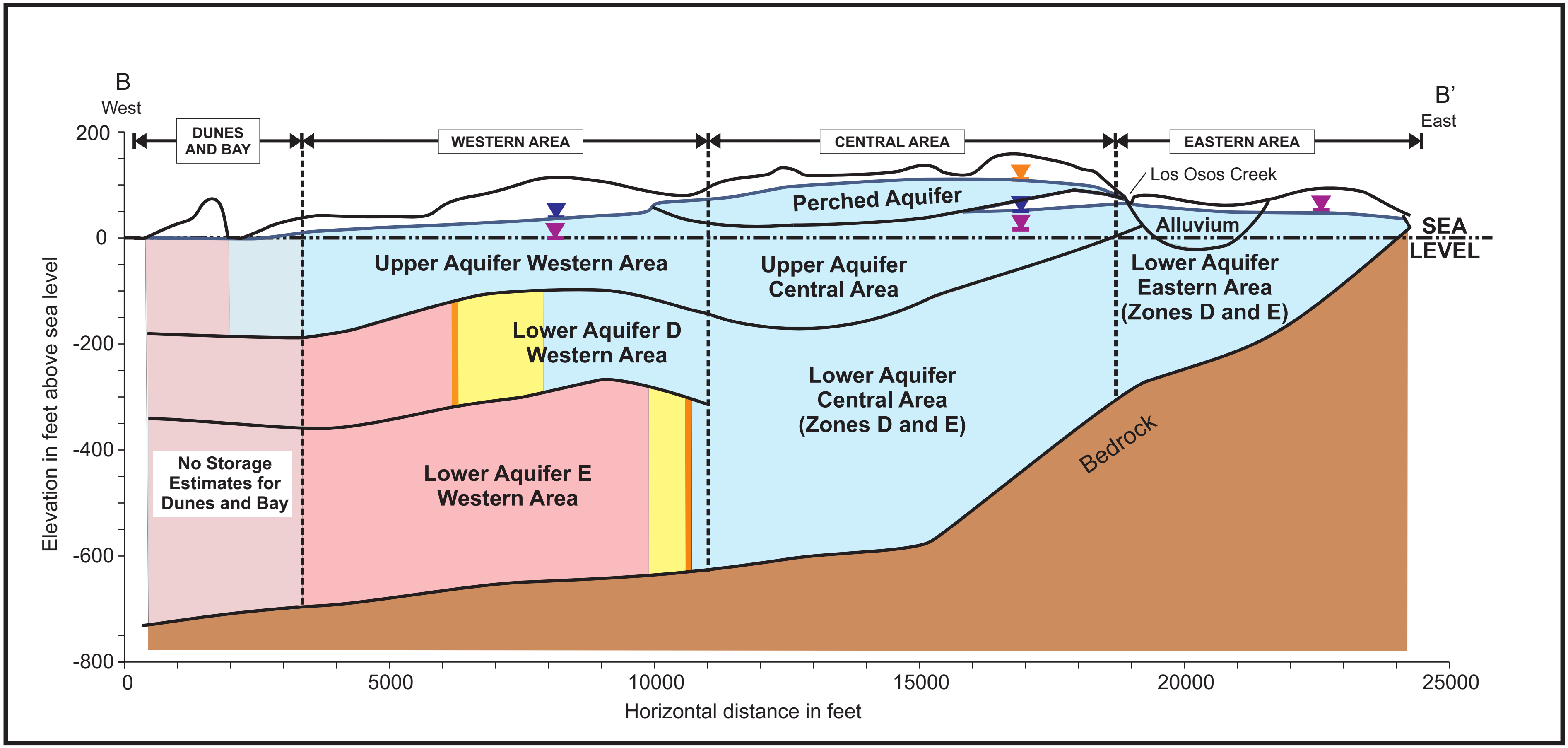
Groundwater in storage for Basin areas and aquifers has been estimated through a systematic approach of water level contouring, boundary definition, volume calculations, and aquifer property estimation. The methodology was developed to facilitate change in storage calculations from year to year. An example storage calculation for the Eastern Area is shown in Appendix K.

There are uncertainties with groundwater storage estimates. A sensitivity analysis was performed for the 2017 Annual Report (CHG, 2018a). The analysis evaluated variables related to tape bias/survey error, specific yield error, and data gaps. Results of the sensitivity analysis indicated the potential error for storage and change in storage was within 20 percent (+/- 20 percent) of the estimated storage values for most variables and storage compartments.

Storage estimates were performed for Spring and Fall 2022 and included separate estimates for the following areas and aquifers shown in Figure 21:

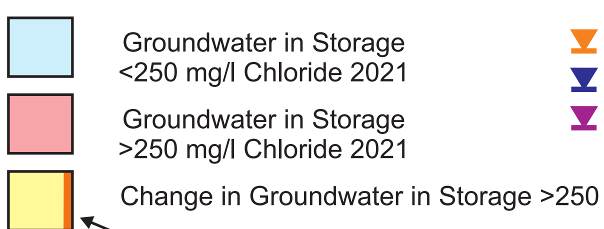
- Perched Aquifer
- Western Area Upper Aquifer
- Western Area Lower Aquifer
- Central Area Upper Aquifer
- Central Area Lower Aquifer
- Eastern Area Alluvial and Lower Aquifer

The various storage compartments are shown conceptually in Figure 21. Storage estimates for the Lower Aquifer in the Western and Central Areas combine fixed pore space volume and confined pore space volume components. The fixed volume component of storage is based on the specific yield of the aquifer sediments and is fixed because the Lower Aquifer is never dewatered in the Western and Central Areas. The confined component adds a relatively small volume of transient storage associated with the aquifer pressure and is based on the storativity of the aquifer. Specific yield values for aquifer zones are shown in Table 17. Detailed lithologic log correlations were provided in the 2018 Annual Report (CHG, 2019b).



Cross-section alignment shown in Figure 18

Explanation



Groundwater in Storage <250 mg/l Chloride 2021

Groundwater in Storage >250 mg/l Chloride 2021

Change in Groundwater in Storage >250 mg/l Chloride Winter 2005-2022

Fall 2022 seawater intrusion front

Perched Aquifer Water level

Upper Aquifer Water level

Lower Aquifer Water level

Figure 21
Basin Storage Compartments
Los Osos Groundwater Basin
2022 Annual Report

Cleath-Harris Geologists

Table 17. Estimated Specific Yield Values	
Aquifer Zone	**Specific yield[1] (percent of volume)**
Zone A&B	12.8
Zone C	10.2
Zone D	8.8
Zone E	10.5
Qal [2]	13.0
Zones D&E [3]	9.8
Qal, Zones D&E [4]	10.1

Notes: [1] Weighted specific yield values based on log correlations shown in the 2018 Annual Report.
[2] Los Osos Creek Valley alluvium
[3] Used for Central Area storage calculations
[4] Used for Eastern Area storage calculations

Beginning in 2018, Basin storage calculations have been based on specific yields for each individual aquifer zone. Confined and semi-confined aquifer storativity values are typically orders of magnitude less than the specific yield. The average specific yield for Basin sediments is estimated to range from 9.8 percent to 13 percent (Table 17). The storativity value used for the confined aquifer in the Western and Central Areas is estimated at 0.0008 (Cleath & Associates, 2005).

The storage component of the Lower Aquifer in the Western Area Zone D represents the groundwater volume with a chloride concentration of 250 mg/L or less. Zone E in the Western Area is excluded from the storage calculations, because chloride concentrations are interpreted as mostly above 250 mg/L (Figure 18 and Figure 21).

All storage calculations were based on upper and lower contoured surfaces specific to the aquifer (fixed volume and confined volume were combined). For example, elevation contours on the base of the Perched Aquifer were used as the lower bounding surface for Perched Aquifer storage calculations, so no storage was assigned to unsaturated pore space between the base of the perched aquifer and saturated Upper Aquifer sediments (Figure 21). Appendix K includes a list of wells used for 2022 groundwater elevation contours and associated upper surfaces for storage calculations. Fixed surfaces used for storage calculations (base of perched aquifer, base of Upper Aquifer, base of Lower Aquifer Zone D, and base of permeable sediments were developed from existing contour maps and control points presented in prior reports (Cleath & Associates, 2003, 2005; CHG, 2015). Table 18 summarizes the estimates of fresh groundwater in storage for 2022.

Table 18. Groundwater in Storage Spring and Fall 2022 (<250 mg/L Chloride)						
Basin Area	**Aquifer**	**Zone**	**Spring 2022**		**Fall 2022**	
			Total	**Above Sea Level**	**Total**	**Above Sea Level**
			ACRE-FEET			
Western and Central	Perched	A, B	5,500	5,500	5,400	5,400
	Upper	C	28,700	6,800	27,700	5,900
Western	Lower[1]	D[2]	16,200	<10	15,900	<10
Central	Lower[1]	D, E	55,100	<10	55,100	<10
Eastern	Alluvial and Lower	Alluvial, D, E	19,000	4,500	18,200	3,700
TOTAL			124,500	16,800	122,300	15,000

NOTES:[1]Includes fixed and confined storage.
[2]Western Area Zone E not included due to chloride>250 mg/L.

Total estimated fresh groundwater in storage for the Basin (excluding Dunes and Bay Area) averaged 124,500 acre-feet in Spring 2022, with an estimated 16,800 acre-feet above sea level (Table 18). There was a calculated net seasonal storage decline of 2,200 acre-feet between Spring 2022 and Fall 2022, with 300 acre-feet of that being a loss of freshwater storage in Lower Aquifer Zone D. Changes to freshwater storage in Zone D are based on shifts in the position of the 250 mg/L contour line as shown in Figure 18 (results for Fall monitoring events shown). Storage losses are recoverable.

There is approximately 70,000 acre-feet of fresh groundwater in storage within the Lower Aquifer in the Western Area Zone D and Central Area Zones D and E (Table 18). Because groundwater levels in the Lower Aquifer within the Western and Central Areas average more than 100 feet above the top of the aquifer, dewatering is unlikely, and this volume of storage will only change with movement of the seawater intrusion front. The Lower Aquifer storage includes a relatively small component (less than 200 acre-feet) of confined pore space volume, representing water that is available without dewatering any portion of the Lower Aquifer (the pressure component). Water is relatively incompressible, so once the pore spaces of an aquifer have been filled, substantial confining pressure is required to further increase the storage volume. Conversely, there is a much greater drop in aquifer water levels for storage withdrawals under confined conditions, compared to unconfined conditions. This smaller storage volume assumes a confined aquifer storativity of 0.0008, compared to the unconfined specific yields of 0.098 to 0.13. Table 19 compares Spring 2021 groundwater in storage with Spring 2022.

Table 19. Change in Storage Spring 2021 to Spring 2022 (<250 mg/L Chloride)						
Basin Area	**Aquifer**	**Zone**	**Spring 2021**		**Change from Spring 2021 to Spring 2022**	
			Total	**Above Sea Level**	**Total**	**Above Sea Level**
			ACRE-FEET			
Western and Central	Perched	A, B	5,800	5,800	-300	-300
	Upper	C	28,800	7,000	-100	-200
Western	Lower[1]	D[2]	15,700	<10	500	0
Central	Lower[1]	D, E	55,100	<10	0	0
Eastern	Alluvial and Lower	Alluvial, D, E	19,100	4,600	-100	-100
TOTAL			124,500	17,400	0	-600

NOTES:[1]Includes fixed and confined storage.
[2] Western Area Zone E not included due to chloride>250 mg/L.

As reported in Table 19, there was an estimated gain of 500 acre-feet of freshwater storage in the Lower Aquifer between Spring 2021 and Spring 2022. There was a loss of 500 acre-feet in fresh water storage in other areas of the Basin over the same period, resulting in no net change in Basin storage between Spring 2021 and Spring 2022. Note that Spring to Spring storage is a measure of annual change, while Spring to Fall storage is a measure of seasonal fluctuation.

Groundwater in storage above sea level is a measure of basin health and sustainability. Basin production from both the Upper and Lower Aquifers needs to be replenished over time from storage above sea level, otherwise seawater intrusion will advance inland. Most of the groundwater stored in the Lower Aquifer is below sea level. Therefore, to be sustainable, water pumped from the Lower Aquifer in the Western and Central areas needs to be replenished by an equal amount of recharge from the Upper Aquifer, boundary inflows, or inflows from the Eastern area where storage is mostly above sea level. The Basin model can simulate these dynamic processes, but tracking groundwater in storage from monitoring data, similar to tracking associated water levels or water quality, also reflects these complex processes.

Storage estimates show the volume of groundwater in storage has been relatively stable in the Basin over the last five years, despite below average rainfall. Table 20 shows the Spring and Fall storage estimates from 2018 to 2022.

Table 20. Groundwater in Storage above Sea Level			
Year	Spring	Fall	Rainfall (Sta. 727)
	acre-feet		inches
2018	17,000	15,100	13.63
2019	17,600	16,600	23.82
2020	17,700	15,800	13.61
2021	17,400	15,200	13.94
2022	16,800	15,000	13.58

The seasonal change in groundwater storage above sea level (spring to fall) during dry years ranges from 1,800 acre-feet to 2,200 acre-feet, which appears reasonable considering that there is a similar amount of annual groundwater production in the basin. During the one wet year (2019) the seasonal decline in storage was only 1,000 acre-feet, which can be attributable to greater seasonal recharge. Overall, estimated groundwater in storage above sea level has only decreased by 200 acre-feet from Spring 2018 to Spring 2022.

7.5 Basin Metrics

LOBP Section 1.3.1 established two methods for measuring progress in management of seawater intrusion (ISJ Group, 2015): one based on comparing annual groundwater extractions with the estimated sustainable yield of the Basin as calculated by the Basin numerical groundwater model, and one based on evaluating water level and water quality data from the LOBP Groundwater Monitoring Program. The first method involves the Basin Yield Metric and the Basin Development Metric, while the latter method involves the Water Level Metric, The Chloride Metric, and the Nitrate Metric.

One of the components used to calculate the Basin Yield Metric is the Sustainable Yield. On October 27, 2021, the BMC considered and adopted a revised methodology for estimating sustainable yield, along with a sustainable yield for Year 2022. The Sustainable Yield for 2021 and prior years was estimated (using the Basin model) as the maximum amount of water that may be extracted from the Basin with no further inland advance of the front (i.e. a stationary front under steady-state conditions) and with none of the active wells producing water with chloride concentration in excess of 250 mg/L (ISJ Group, 2015). The updated methodology adopted by the BMC adds the condition that no further inland advance is allowed from threshold lines drawn parallel to the coast that represent the 2021 position of the seawater intrusion front in the Lower Aquifer. In accordance with the Stipulated Judgement Section 4.2, the BMC used the updated methodology to adopt a Sustainable Yield value for 2022.

Based on developed purveyor infrastructure capacity for year-end 2021, along with the updated methodology, a sustainable yield of 2,380 acre-feet was approved by the BMC for year 2022.

7.5.1 Basin Yield Metric

The Basin Yield Metric compares the actual amount of groundwater extracted in a given year with the estimated sustainable yield of the Basin under then-current conditions. Sustainable yield for Year 2022 was estimated, using the Adaptive Method and the Basin model, as the maximum amount of groundwater that may be extracted from the Basin with a stationary seawater intrusion front at a position no further inland that the 2021 position, and with none of the active wells producing water with chloride concentration in excess of 250 mg/L (CHG, 2022). A chloride concentration of 250 mg/L is the recommended limit for drinking water (one-half of the Secondary Maximum Contaminant Level Upper Limit of 500 mg/L). Further assumptions for the Basin Yield Metric in 2022 are that the Broderson mound is at 50 percent development (CHG 2022, Appendix M) and the long-term rainfall average for the Basin is 17.3 inches per year. The Basin Yield Metric for 2022 is a ratio expressed as follows:

$$\frac{\text{2022 Groundwater Production}}{\text{2022 Sustainable Yield}} * 100$$

Groundwater production in 2022 was 2,010 acre-feet. The sustainable yield of the Basin with the infrastructure in place at year-end 2021 was estimated using the Basin model to be 2,380 acre-feet[1], per year (CHG, 2022). The resulting Basin Yield Metric for 2022 is 84. The LOBP objective for the Basin Yield Metric is 80 or less, and has been exceeded for 2022. Approval of the Annual Monitoring Report by the BMC does not constitute unanimous approval of actions listed under Section 5.11.4 (Approval Requirements) of the Stipulated Judgment or setting the Sustainable Yield for a given year. These actions require a separate action and unanimous approval by the BMC.

The estimated Sustainable Yield is not just a volume of water that can be pumped from anywhere in the basin, however. Sustainability is achieved through a balanced distribution of groundwater pumping across the Basin, both vertically and laterally, that maintains a stationary seawater front, with no active well producing water with chloride concentrations above 250 mg/L. Long-term climatic conditions are incorporated into the estimated sustainable yield.

Figure 22 compares the Basin Yield Metric and area production in the Basin. The Basin Yield Metric has dropped from an average of 106 between 2010 and 2014 to 84 in 2022. A no further development scenario from the LOBP (modified using Adaptive Method for sustainable yield) is also provided for comparison in Figure 22.

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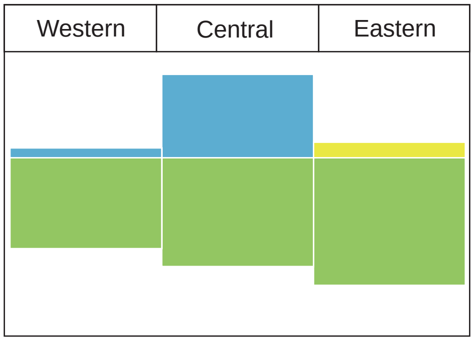
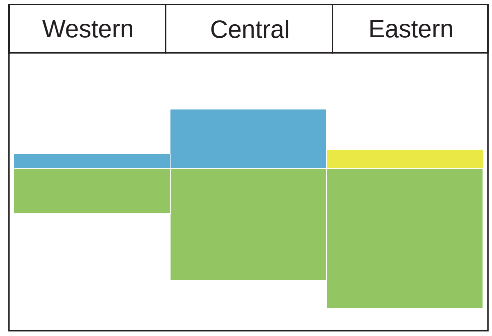
[1]2015 LOBP established the sustainable yield methodology and estimated it to be 2,450 AFY. The subsequent 2015 Stipulated Judgement set the default sustainable yield at 2,400 AFY. On June 30, 2016, the BMC unanimously approved the 2015 Annual Report with a sustainable yield of 2,450 AFY. On June 21, 2017, the BMC unanimously approved the 2016 Annual Report with a sustainable yield of 2,760 AFY. On June 16, 2021, the BMC approved submitting the 2020 Final Draft Annual Report to the Court with a Sustainable Yield of 2,760 AFY, but clarified that approval of the report should not be construed as "evaluating, setting, or establishing" the sustainable yield under the terms of the Stipulated Judgement. In October 2021, a sustainable yield of 2,380 AF for 2022 was approved by the BMC.

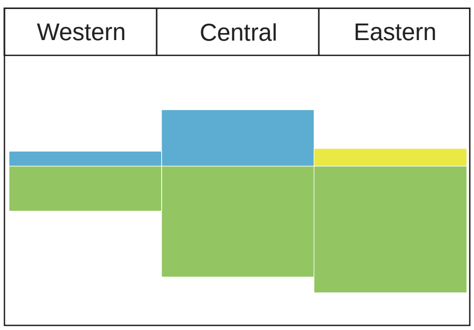
2010-2014
Average Production 2,600 AFY
Sustainable Yield 2,450 AFY
Basin Yield Metric = 106



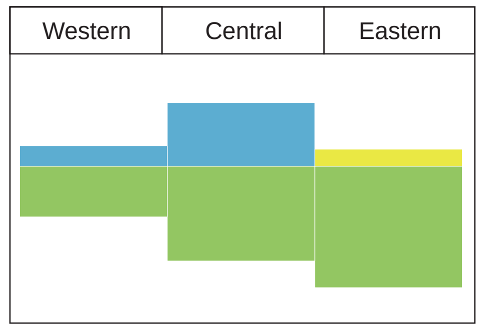
2015-2019
Average Production 2,070 AFY
Sustainable Yield 2,760 AFY
Basin Yield Metric = 75



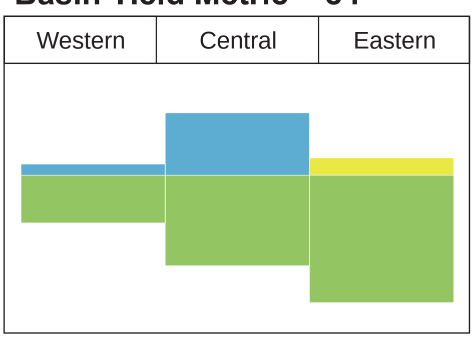
Year 2020
Average Production 2,010 AF
Sustainable Yield 2,760 AF
Basin Yield Metric = 73



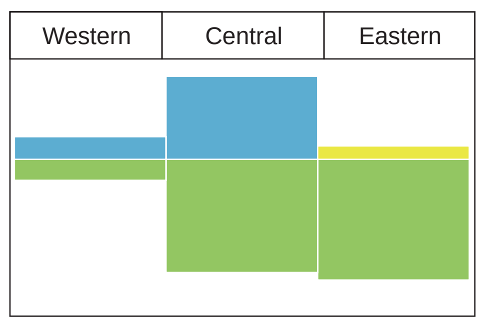
Year 2021
Average Production 2,000 AF
Sustainable Yield 2,760 AF
Basin Yield Metric = 72



Year 2022
Average Production 2,010 AF
Sustainable Yield* 2,380 AF
Basin Yield Metric = 84



E+AC+U (No Further Development Scenario)
refer to Basin Plan for full description
Average Production 2,000 AFY
Sustainable Yield* 2,610 AFY
Basin Yield Metric* = 77



Explanation:

Size of rectangle is proportional to groundwater production

Alluvial Aquifer

Upper and Perched Aquifer

Lower Aquifer

Note: historical (pre-2015) Basin Yield Metrics are from LOBP.

*Sustainable Yield decreased due to methodology revision in 2021.

Figure 22
Basin Yield Metric Comparison
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The estimated sustainable yield of the Basin has been reported to the closest 10 acre-feet, similar to the other components of inflow and outflow to the Basin water balance estimated using the Basin model (LOBP Figures 74 and 75, 2015). This level of rounding is based on the precision, not the accuracy, of the Basin model. Estimating the sustainable yield of the Basin is directly associated with mitigating seawater intrusion. The ability of the Basin model to accurately simulate seawater intrusion was evaluated during model conversion to Equivalent Freshwater Head (EFH) in 2005 (Cleath & Associates 2005) and again during model conversion to SEAWAT in 2009 (CHG, 2009a). In 2005, the EFH model estimated 620 acre-feet per year of seawater intrusion along the coast under long-term climatic conditions with 1999-2001 Basin pumping, while an analytical approach using available hydrogeologic data and Darcy's Law estimated 500 acre-feet per year of intrusion, indicating the numerical analysis (flow model) was more conservative as a Basin management tool than the analytical approach. A subsequent comparison of seawater intrusion at the coast between the EFH model and upgraded SEAWAT model showed the two models were within 2 percent of each other. The SEAWAT model also matched the historical average velocity of seawater intrusion into the Lower Aquifer of 50-60 feet per year (from water quality data), although the simulated velocity was higher in Zone D (80 feet per year) and lower in Zone E (40 feet per year).

There have been no significant changes to the Basin model since 2009. A peer review was conducted by Stetson Engineers (2010) which characterized the model as an appropriate planning tool that could be utilized as intended, and that would benefit from updates as more data is collected. A peer review of the model is also required by the Stipulated Judgement every 10 years. Upgrading the steady-state model to a fully transient model is recommended prior to a peer review, and is currently planned (Section 10.2).

7.5.2 Basin Development Metric

The Basin Development Metric compares the estimated sustainable yield of the Basin in a given year with the estimated maximum sustainable yield of the Basin with all potential LOBP Projects implemented (see Section 10 for a brief overview of LOBP Programs). The Basin Development Metric for 2022 is a ratio expressed as follows:

$$\frac{\text{2022 Sustainable Yield}}{\text{Maximum Sustainable Yield}} * 100$$

The 2022 sustainable yield is estimated at 2,380 acre-feet. The maximum sustainable yield with all LOBP projects implemented was estimated at 3,500 acre-feet in the LOBP, but has not been re-evaluated using the Adaptive Method. Therefore, no Basin Development Metric has been calculated for 2022. The purpose of the metric is to inform the BMC on the percentage of the Basin's maximum sustainable yield that has been developed. There is no LOBP objective for the Basin Development Metric.

As presented in the LOBP, the estimated sustainable yield of the Basin will increase beginning with urban water reinvestment Program U and Basin infrastructure Programs A and C, which are currently in progress. The BMC may consider updating the Maximum Sustainable Yield, now that the location of the second Program C expansion well is established at Bay Oaks Drive, in order to incorporate changes to the LOBP, including revised expectations for recycled water availability and changes to sustainable yield methodology implemented for 2022.

7.5.3 Water Level, Chloride, and Nitrate Metrics

The Water Level, Chloride, and Nitrate Metrics are measurements of the effectiveness of Basin management. The Water Level and Chloride Metrics address changes in the Lower Aquifer related to seawater intrusion mitigation, while the Nitrate Metric addresses changes in First Water and the Upper Aquifer related to nitrate contamination mitigation.

Water Level Metric

The Water Level Metric is defined as the average Spring groundwater elevation, measured in feet above mean sea level, in five Lower Aquifer wells. These wells are LA2, LA3, LA11, LA14, and LA16 (Figure 4).

Two Water Level Metric wells (LA14 and LA16) are positioned in the Western Area near the current seawater intrusion front (250 mg/L chloride isopleth) and one well is in the Central Area on the bay front (LA11). As Basin production is redistributed through the Basin infrastructure program, these Water Level Metric wells will monitor Lower Aquifer groundwater levels in critical areas near the seawater intrusion front. The last two Water Level Metric wells are located on the Morro Bay sand spit (LA2 and LA3), where monitoring will help evaluate regional effects, rather than just localized water level rebound. Figure 23 graphs historical trends in the metric. Table 21 presents the 2022 Water Level Metric.

Table 21. 2022 Water Level Metric

Metric Well	Spring 2022 Groundwater Elevation (feet above sea level – NGVD 29 Datum*)
LA2	2.44
LA3	-0.40
LA11	2.11
LA14	1.74
LA16	6.61
Water Level Metric (average)	2.5

Data Source: LOBP and County Groundwater Monitoring Programs
*Subtracted 2.8 feet from NAVD 88 elevations in Table 5 to convert to NGVD 29 datum for metric.

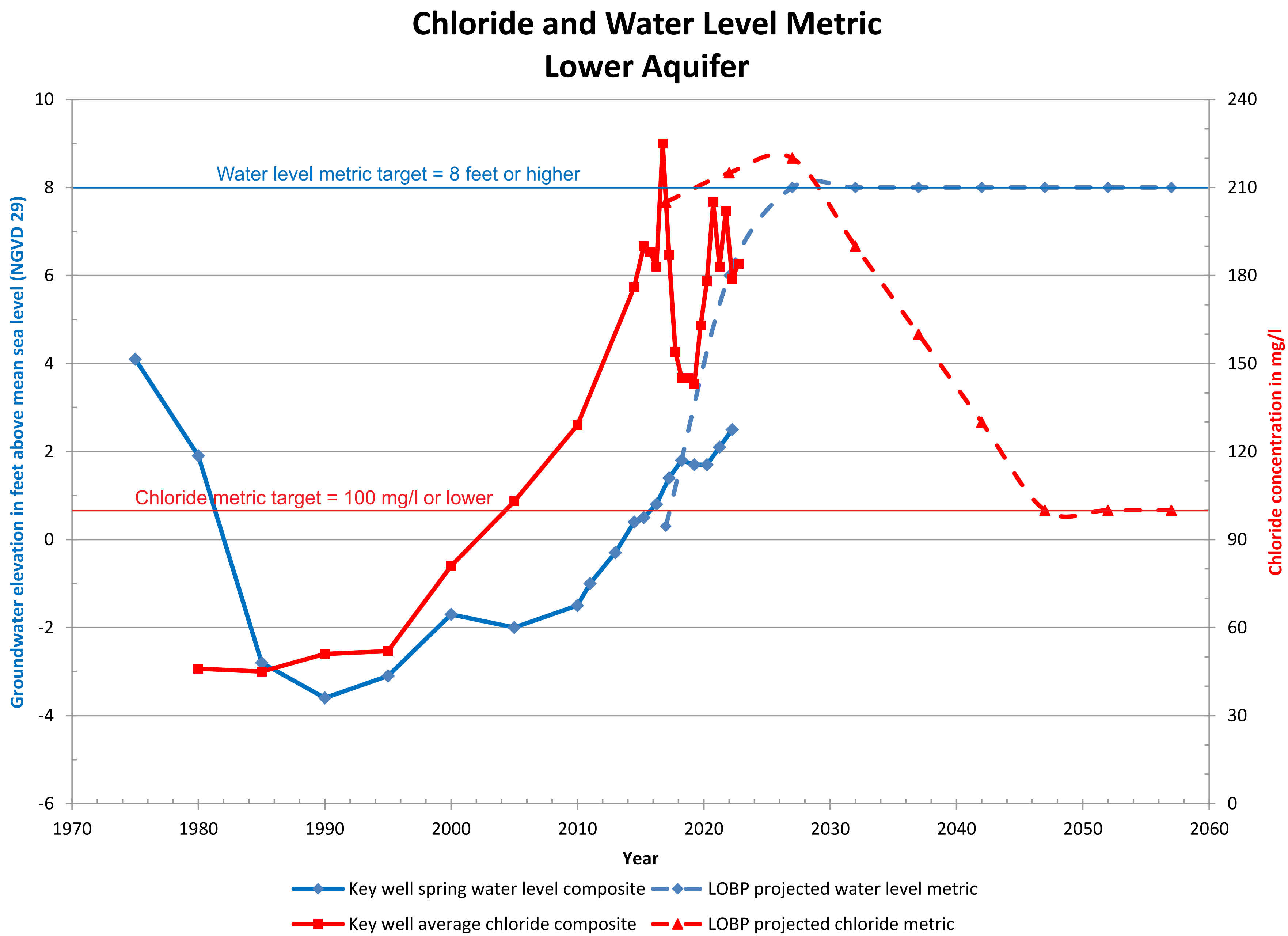

Figure 23
Chloride and Water Level Metric
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The NGVD 29 datum is still used for the Water Level Metric because it matches the Basin model datum and conveniently equates zero elevation with mean sea level. Groundwater elevations have been adjusted to the NGVD 29 datum using a 2.8 feet downward shift, based on North American Vertical Datum Conversion (VERTCON) data reviewed for the Basin, as published by the National Geodetic Society.

The Spring 2022 Water Level Metric is 2.5 feet NGVD 29 (approximately 5.3 feet NAVD 88). Mean sea level is approximately 0 feet in the NGVD 29 datum, and 2.8 feet in the NAVD 88 datum for the central coast of California, where the Basin is located. The metric was rising (an improvement) from 2005 through 2018, likely in response to a decrease in Lower Aquifer production. Following a flat interval between 2018 and 2020, the metric continued rising in 2022 (Figure 23). Since 2015, the Water Level Metric has increased by 2 feet. The LOBP objective for the Water Level Metric is 8 feet or higher (ISJ Group, 2015).

Included in Figure 23 are projected trendlines for the Water level and Chloride Metric from the LOBP. The actual metrics are not expected to follow straight lines, but the trendlines are useful to depict the general nature of the anticipated trends. Several years of continued rise in the Water Level metric is expected before reaching the LOBP objective.

A re-evaluation of the Water Level Metric (and other metrics discussed below) was initiated in 2021, in coordination with completion of the Phase 2 wellhead survey, as recommended in the 2020 Annual Report. This effort is currently on hold as the BMC Staff evaluates opportunities to improve the Basin Monitoring Network (Section 10.2). Expansion of the Lower Aquifer transducer network was implemented at the end of 2021, which will help to identify groundwater mounding effects within the Lower Aquifer from treated wastewater disposal at the Broderson Site and provide support for interpreting Water Level Metric trends in the future.

Chloride Metric

The Chloride Metric is defined as the weighted average concentration of chlorides in four key Lower Aquifer wells. One key well (LA10) is within the historical path of seawater intrusion (Cleath & Associates, 2005). Reduction in pumping from the Lower Aquifer should result in measurable declines in chloride concentrations at this well, as the hydraulic head in the Lower Aquifer increases and the inland movement of seawater decreases or is reversed. The Chloride Metric target level is 100 mg/L or lower, and the LOBP Groundwater Monitoring Program schedule for measuring the Chloride Metric is in the Spring and Fall.

There are also three key wells on the perimeter of the seawater intrusion front (LA8, LA11, and LA12). Wells LA11 and LA12 monitor Lower Aquifer chloride concentrations in the northern portion of the Basin, while LA8 monitors chloride concentrations in the southern portion. When calculating the Chloride Metric, the concentration of Well LA10 is given twice the weight of the other three wells, in order to increase the sensitivity of the metric to management actions (refer to the LOBP for a description of the development of the metric). The Chloride Metric is a simplification of Basin conditions and can vary significantly from year to year due to localized chloride fluctuations, particularly at well LA10 due to wellbore leakage from the Upper Aquifer (2018 Annual Report, Appendix J). Table 22 presents the Spring and Fall 2022 Chloride Metric. Figure 23 graphs historical values in the metric.

One of the new monitoring well locations recommended in the draft July 2022 memorandum was at the east end of Skyline Avenue (CHG, 2022b). A set of Zone D and Zone E wells at this location could serve to replace LA10 in the Chloride Metric and help resolve the problem with Upper Aquifer influence from wellbore leakage on seawater intrusion monitoring.

Table 22. 2022 Chloride Metric

Metric Well (Aquifer Zone)	Spring 2022 Chloride Concentrations	Fall 2022 Chloride Concentrations
LA8 (Zone D)	76 mg/L	77 mg/L
LA10 (Zone D/E)	220 mg/L (double counted for average)*	235 mg/L (double counted for average)
LA11 (Zone E)	287 mg/L	279 mg/L
LA12 (Zone D)	94 mg/L	94 mg/L
Chloride Metric (weighted average)	179 mg/L	184 mg/L

Data Source: LOBP Groundwater Monitoring Program (Appendix C)
*The Spring 2022 value of 108 mg/L at LA10 (Appendix C) was substituted with purveyor data from March 1, 2022 to better represent Lower Aquifer conditions.

The 2022 Chloride Metric indicates a slight retreat of the seawater intrusion front (fall to fall), compared to prior years. Seawater intrusion is typically most active in the fall, when water levels (fresh water pressures) are lowest, although chloride concentrations at individual wells may vary based on local influences. A comparison between Spring 2022 and Fall 2022 shows an increase in the metric, although the Chloride Metric has decreased relative to the target value between Fall 2021 (202 mg/L) and Fall 2022 (184 mg/L), indicating an overall improvement during 2022 (Figure 23).

Table 22 also lists the Lower Aquifer zone tapped by the individual Chloride Metric wells. Two wells are in Zone D, one is Zone E, and one is mixed Zone D/E. The Zone E and Zone D/E wells show the greatest impact from seawater intrusion, and Zone E is interpreted to have much higher chloride concentrations than Zone D in most of the Western Area (Figure 19). As with the Water Level Metric, a re-evaluation of the Chloride Metric was initiated in 2021 and is currently on hold, pending BMC Staff evaluation of opportunities to improve the Basin Monitoring Network (Section 10.2).

As previously mentioned, Figure 23 includes projected trendlines for the Water level and Chloride Metric from the LOBP. Several years of continued rise in the Chloride Metric (deterioration in Basin conditions) is expected before the metric trend reverses, followed by many years of gradual decline in the metric before reaching the LOBP objective.

Nitrate Metric

The Nitrate Metric is defined as the average concentration of nitrate in five First Water key wells located in areas of the Basin that have been impacted by elevated nitrate concentrations. The Nitrate Metric data is obtained from the LOWRF Groundwater Monitoring Program's winter sampling event and focuses on shallow, adversely impacted wells to track changes in nitrate concentrations in groundwater over time. Table 23 presents the Nitrate Metric for 2022. Figure 24 graphs historical values in the metric, along with the 5-year average for 2002-2006 and a 5-year running average beginning in 2012-2016. The Nitrate Metric target level is 10 mg/L or lower.

Table 23. 2022 Nitrate Metric

Metric Well	Winter 2022 Nitrate-Nitrogen (NO_3-N) Concentrations
FW2	26 mg/L
FW6	2.5 mg/L
FW10	15 mg/L
FW15	20 mg/L
FW17	24 mg/L
Nitrate Metric (average)	17.5 mg/L

Data Source: LOWRF Groundwater Monitoring Program (Rincon Consultants, 2022)

The Nitrate Metric for Winter 2022 was calculated at 17.5 mg/L nitrate-nitrogen (NO_3-N), which is above the Maximum Contaminant Level of 10 mg/L (the drinking water standard). There was a 0.5 mg/L increase in the Nitrate Metric from Winter 2021 (17 mg/L), to Winter 2022 (17.5 mg/L), which is a slight deterioration (Figure 24). The greatest decrease in NO_3-N over the last several years was measured at key well FW6, where concentrations measured 15 mg/L in 2016 and have declined to 2.5 mg/L in 2021, where the concentration remains in 2022. FW6 is hydraulically downgradient of the Broderson site, and NO_3-N declines are largely attributable to recycled water discharges at Broderson. In 2022, another well hydraulically downgradient of the Broderson site (FW5; not a metric well) also began showing a significant decline in nitrate concentrations, from 32 mg/L NO_3-N in 2021 to 15 mg/L in 2022.

Independent of LOBP actions, construction, and operation of the community sewer system and LOWRF have largely stopped nitrate loading in the Basin from septic disposal within the wastewater service area. Nitrate concentrations in First Water (includes portions of the Perched Aquifer and Upper Aquifer) are expected to begin declining over the next decade, and in 2021 the Nitrate Metric reached the lowest point recorded since 2013. The five-year running average (currently 2018-2022), which represents long term trends, continues to decrease (Figure 24).

Included in Figure 24 is the projected trendline for the Nitrate Metric from the LOBP. The actual metric is not expected to follow straight lines, but a trendline is useful to depict the general nature of the anticipated trend. The anticipated trend following wastewater project implementation was

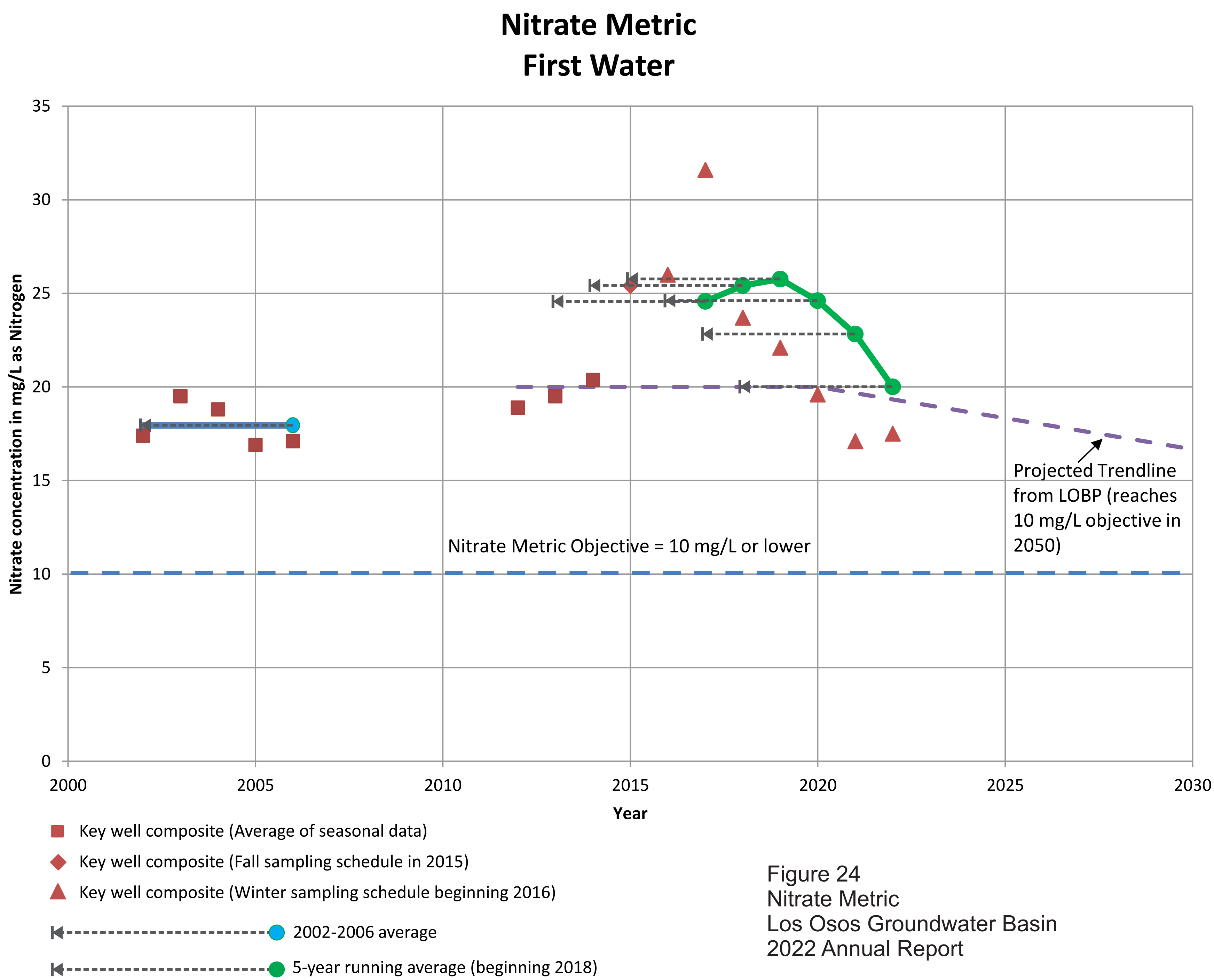

Figure 24
Nitrate Metric
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several years of stable (but elevated) nitrate-nitrogen concentrations, followed by a gradual and long-term decline in the Nitrate Metric, reaching the LOBP objective mid-century.

Lower Aquifer Nitrate

The Nitrate Metric is specific to the Upper Aquifer, however, nitrate is also a concern in areas of the Lower Aquifer. Nitrate concentrations in Lower Aquifer groundwater have been increasing historically, and a reduction in nitrate loading to the Basin does not prevent the movement of existing nitrate from the Upper Aquifer into the Lower Aquifer, which is expected to continue adversely impacting Lower Aquifer water quality. Development of a Nitrate Metric specific to the Lower Aquifer was initiated in 2021 as part of the metric re-evaluations and is currently on hold, pending BMC Staff evaluation of opportunities to improve the Basin Monitoring Network (Section 10.2).

A 2019 Technical Memorandum prepared for the BMC (CHG, 2019a) identified two areas where nitrate concentrations were threatening Lower Aquifer community water supply wells, one in the Western Area near LA8 and LA9, and the other in the Central Area near LA21 and LA22 (Figure 4). S&T funded an investigation focused on identifying the sources of Lower Aquifer nitrate in groundwater produced by LA8, which concluded that septic system discharges from Cabrillo Estates appeared to be the primary source, although there were others (CHG, 2021b). The BMC subsequently authorized Phase 2 of the Lower Aquifer Nitrate investigation, which has since been delayed, pending further input from the Regional Board in 2023.

7.5.4 Upper Aquifer Water Level Profile

Metrics allow the BMC, regulatory agencies, and the public to evaluate the status of nitrate concentrations and seawater intrusion in the Basin through objective, numerical criteria that can be tracked over time (LOBP, 2015). The Upper Aquifer has a Nitrate Metric, but does not have Water Level Metric or Chloride Metric because seawater intrusion is not occurring in the Upper Aquifer. Seawater intrusion affects chloride concentrations in groundwater and moves primarily in response to changes in water levels and associated hydraulic head in an aquifer.

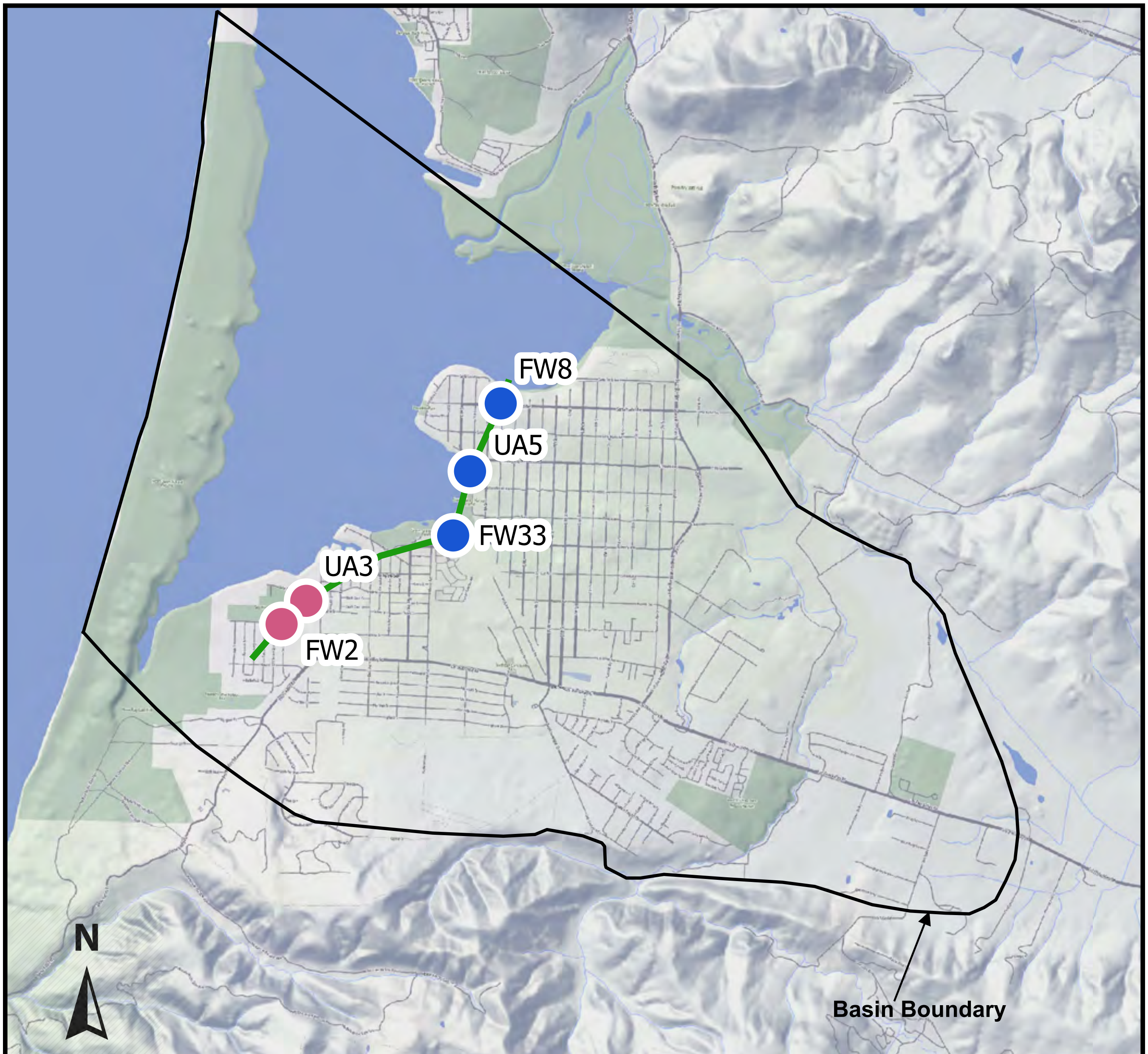
A Water Level Metric and Chloride Metric for the Upper Aquifer was recommended in the 2016 Annual Report to provide the BMC with a management tool for addressing the potential for seawater intrusion into the Upper Aquifer as Upper Aquifer production increases. There are only a few Upper Aquifer wells, however, along the shoreline of the Morro Bay estuary where seawater intrusion would be most likely to occur. An alternative management tool proposed for the Upper Aquifer is the Water Level Profile. The benefit of a profile, rather than a metric, is that spatial information is included. Conditions for seawater intrusion along the Water Level Profile could occur before an equivalent metric-based threshold is reached, since there is no averaging in the Water Level Profile. Metrics were not designed for early detection, which is what is needed for Upper Aquifer seawater intrusion monitoring.

Seawater has a density that is 1.025 times greater than fresh water. For every foot of fresh water head above sea level, the seawater interface will be displaced 40 feet below sea level, according to the Ghyben-Herzberg relation (Freeze and Cherry, 1979). Using the Ghyben-Herzberg relation and elevation contours on the base of the Upper Aquifer, a profile showing the groundwater elevations needed to avoid seawater intrusion beneath the bay shoreline (the Protective Elevation) has been prepared, along with the Spring 2022 Upper Aquifer groundwater elevations along the same profile, adjusted to the NGVD 29 datum. The resulting comparison of the Upper Aquifer Water Level Profile and the Protective Elevation is shown in Figures 25 and 26.

Water levels along the Water Level Profile in Spring 2022 were above the Protective Elevation except for near UA5, which is an Upper Aquifer supply well along the bay in Baywood Park (Figure 25). Spring 2022 water levels shown above ground surface in low-lying areas near the bay represent artesian pressures in the aquifer, and incorporate pressure measured in an artesian well at Sweet Springs. Groundwater seeps and springs are common along the bay shoreline, including Sweet Springs and the 3rd Street marsh.

If water levels decline below the Protective Elevation, there would be a theoretical potential under hydrostatic conditions (zero hydraulic gradient) for seawater intrusion to occur at the base of the Upper Aquifer. Water levels have been below the Protective Elevation in the past along portions of the profile without any seawater intrusion detected, particularly during drought periods (e.g. mid 1970's at UA5 and early 1990's at UA3).

Water levels at UA5 declined below the Protective Elevation beginning in Spring 2021, so this is the second consecutive year with low water level conditions. Chloride concentrations from UA5 available from purveyor records indicated a relatively sharp rise in chlorides between Fall 2020 (32 mg/L) and Fall 2021 (64 mg/L), with a lesser increase through Fall 2022 (74 mg/L). Although these concentrations are relatively low (250 mg/L is the recommended limit and 500 mg/L is the upper limit for drinking water), the trend warrants close monitoring by the water purveyor.



Base Image: Stamen-Terrain

0 2,000 4,000 6,000 8,000 ft

Scale: 1 inch ≈ 4,000 feet

Explanation

- LOBP Water Level Monitoring Well
- Water Level and Water Quality Monitoring Well
- Water Level Profile Alignment

Figure 25
Water Level Profile Alignment
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2022 Annual Report

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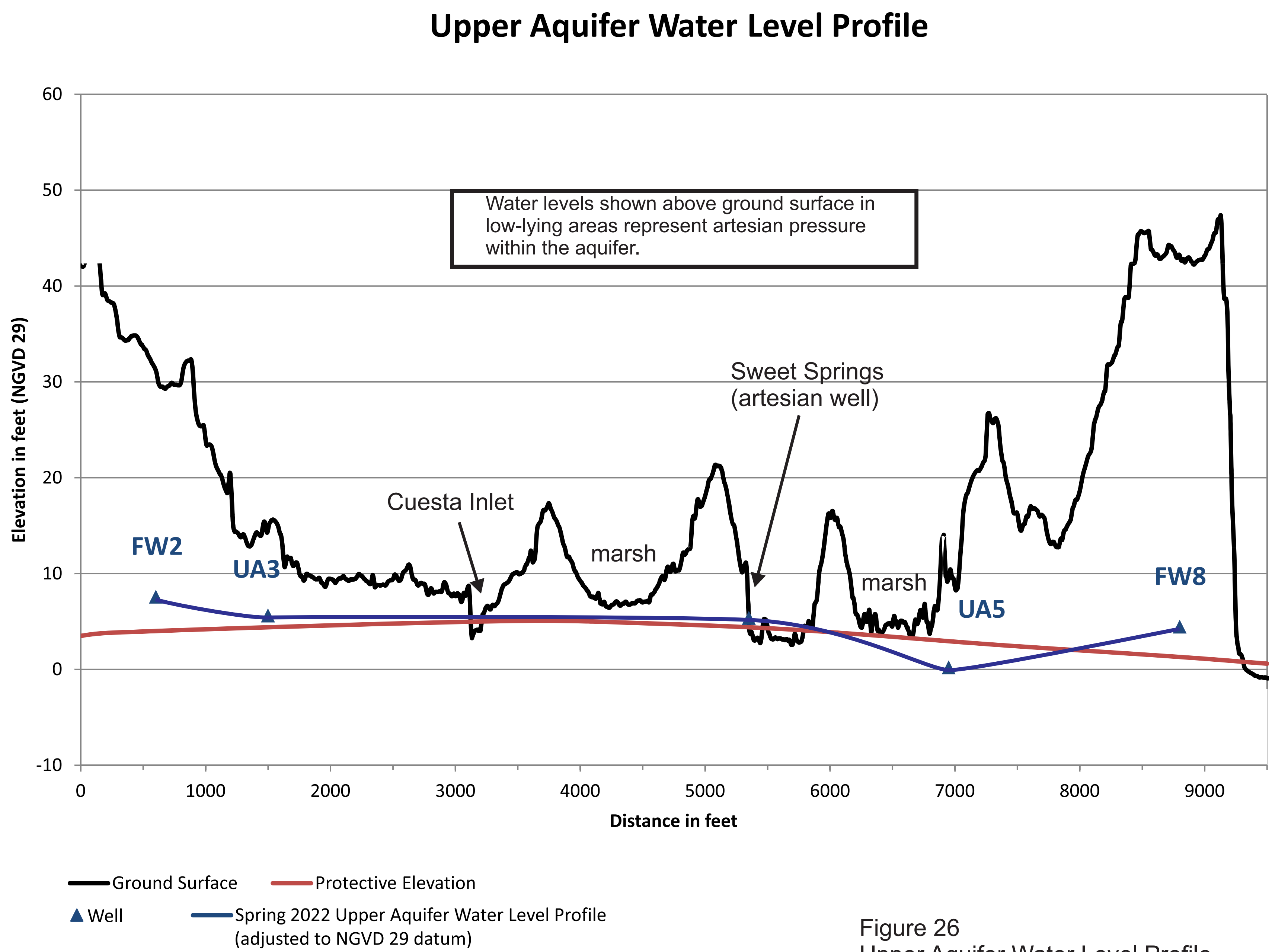

Note: Sweet Springs artesian well marker at estimated wellhead pressure.

Figure 26
Upper Aquifer Water Level Profile
Los Osos Groundwater Basin
2022 Annual Report

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8. BASIN STATUS

The status of the Basin in 2022 is summarized as follows:

- The Basin received below normal rainfall in 2022. San Luis Obispo County started 2022 with severe drought conditions, and ended 2022 with severe drought conditions, trending to extreme on the eastern border, and moderate in the northwest corner of the county (NDMC/USDA/NOAA, 2023).

- Groundwater production for the Basin totaled an estimated 2,010 acre-feet in the 2022 calendar year, which is 10 acre-feet more than in 2021. Purveyor groundwater production decreased by an estimated 10 acre-feet, while production for community facilities decreased by an estimated 40 acre-feet in 2022, compared to 2021. Production for agricultural irrigation increased by an estimated 60 acre-feet in 2022, compared to 2021.

- Long-term water level trends over the last 10 years in representative First Water wells averaged 0.05 feet of decline per year. Long-term water level trends over the last 10 years in representative Upper Aquifer wells averaged 0.20 feet of decline per year, and in Lower Aquifer wells averaged 0.36 feet of rise per year.

- The seawater intrusion front in Zone D retreated toward the coast between 2021 and 2022, with a corresponding 500 acre-feet of increase in freshwater storage in the Western Area of the Lower Aquifer. There was an estimated net loss of 500 acre-feet of Basin freshwater storage in other areas due to continuing drought conditions, resulting in no net change in Basin storage between Spring 2021 and Spring 2022. The seawater intrusion front in Zone E is interpreted as moving inland toward LA11.

- Beginning in 2022, the updated Sustainable Yield methodology has resulted in a lower Sustainable Yield. This has increased the Basin Yield Metric to 84, which is above the LOBP goal of 80.

- The Basin Development Metric was not estimated in 2022, pending application of the updated Sustainable Yield methodology to all LOBP programs. There is no LOBP objective for the Basin Development Metric.

- The Water Level Metric increased between 2021 and 2022 from 2.1 to 2.5 feet, indicating a slight improvement, but still remains several feet below the target value of 8 feet.

- The Chloride Metric decreased relative to the 100 mg/L target value between Fall 2021 (202 mg/L) and Fall 2022 (184 mg/L), indicating improvement in 2022.

- The Nitrate Metric remains above the 10 mg/L target value, increasing from 17 mg/L NO_3-N in 2020 to 17.5 mg/L NO_3-N in 2022, indicating slightly deteriorating conditions in 2022.

- Upper Aquifer water levels were above the Protective Elevation along the bay, except for near UA5, where an increase in chloride concentrations warrants close monitoring.

9. RECOMMENDATIONS

The following LOBP Groundwater Monitoring Program recommendations from the 2021 Annual Report were completed in 2022, or are in progress and planned for completion in 2023:

- Evaluate feasibility and cost of modifying up to four existing program wells to become dedicated Zone E water quality monitoring locations (Section 7.3). – ***Completed***

- In conjunction with the above evaluation of well modifications, prepare a list of feasible sites where new Lower Aquifer monitoring wells may be constructed to improve seawater intrusion definition and monitoring in both Zone D and Zone E (Section 7.3). – ***Completed***

- Updating the Maximum Sustainable Yield now that the location of the second Program C expansion well is finalized in order to incorporate changes to the LOBP, including revised expectations for recycled water availability and revisions to the sustainable yield methodology (Section 7.5.2). – ***Completed for Program C***

- Re-evaluate Water Level Metric target after completion of wellhead surveys (Section 7.5.3). This task has been expanded to include Water Level, Chloride, and Nitrate Metric updates – ***On hold, pending new monitoring well construction***

- Develop a rating curve for stream flow Sensor 751 on Los Osos Creek (Section 6) – ***In Progress***

- A peer review of the Basin model is required by the Stipulated Judgement every 10 years. Upgrading to a fully transient Basin model would be recommended prior to the next peer review (Section 7.5.2). Planning and funding efforts for a transient Basin model was initiated in 2021. The transient Basin model would replace the existing steady-state model, once completed. – ***Budget approved – transient model work to begin in 2023***

The following additional LOBP Groundwater Monitoring Program recommendations are provided for BMC consideration. Recommendations on Adaptive Management are provided in Section 10:

- Water levels at UA5 are below the Protective Elevation for the second consecutive year and chloride concentrations are increasing. Continued close monitoring of UA5 water quality by the water purveyor is recommended (Section 7.5.4).

- Attempt to locate and salvage well FW7 for monitoring groundwater mounding beneath the Broderson leach field (Section 7.2).

- Install a Lower Aquifer monitoring well at the east end of Skyline Avenue in order to better monitor the movements of the seawater intrusion front (Section 7.2).

10. STATUS OF BASIN METRICS, BMC INITIATIVES AND LOBP PROGRAM IMPLEMENTATION

The LOBP provides for periodic review of the implementation of the LOBP through establishment of an Adaptive Management Plan that allows the BMC to do the following:

- Evaluate trends of key Basin metrics;
- Identify additional data needs;
- Report the data analysis to various interested parties;
- Modify the LOBP programs and schedule, if necessary, in response to current conditions and observed trends in the Basin;
- Modify procedures to utilize current best management practices; and
- Modify pumping, treatment, and/or water reuse procedures in response to Basin conditions and trends that show signs of water quality degradation, including increased levels of contamination and/or increased levels of seawater intrusion.

The following sections provide a status update on the Basin metrics, BMC Initiatives and LOBP Program implementation. The Adaptive Management Plan offers a tool with which the BMC can modify the LOBP programs, based on the performance of Basin metrics and other monitoring results, to better meet overall LOBP objectives.

10.1 Basin Metrics

As noted in Section 7 ("Data Interpretation") of this Annual Report, the LOBP established several metrics to measure nitrate impacts to the Upper Aquifer, seawater intrusion into the Lower Aquifer, and the effect of management efforts on the Basin. These metrics allow the BMC, regulatory agencies and the public to evaluate the status of nitrate levels, seawater intrusion, and the impact of implementation of the LOBP programs, through objective and numerical criteria that can be tracked over time. The 2022 metric values are summarized in Table 24 for easy reference during discussion and evaluation of the LOBP programs.

Table 24. LOBP Metric Summary			
Metric	**LOBP Goal**	**Calculated Value from 2022 Data**	**Change in Condition from 2021**
Basin Yield Metric: Comparison of current well production to sustainable yield	80 or less	84	Increase from 72 (deterioration)[2]
Water Level Metric: Average groundwater elevation in 5 key wells in the Lower Aquifer	8 feet above mean sea level or higher	2.5 feet above mean sea level	Increase from 2.1 ft. (improvement)
Chloride Metric: Weighted average chloride concentration in 4 key wells in the Lower Aquifer	100 mg/L or lower	184 mg/L	Decrease from 202 mg/L (improvement)
Nitrate Metric: Average nitrate concentration in 5 key wells in the Upper Aquifer	10 mg/L or lower	17.5 mg/L (NO_3-N)	Increase from 17 mg/L (deterioration)

10.2 Update on BMC Initiatives

Based on the Basin status (Section 8) and recommendations (Section 9), the BMC intends to continuously develop and pursue additional measures to improve Groundwater Monitoring and Management. The following is an update on additional measures related to BMC Groundwater Monitoring and Management:

Lower Aquifer Monitoring Improvements: At its October 27th, 2021 Meeting, the BMC authorized CHG to evaluate the feasibility and cost of modifying existing wells or construction of new monitoring well(s) to improve monitoring of Lower Aquifer water quality and seawater intrusion. The recommendations from the CHG evaluation were

[2] On October 27th, 2021 the BMC unanimously adopted a new methodology for calculating the Sustainable Yield for Basin that reduced the Sustainable Yield estimate from 2,760 to 2,380 AF for Calendar Year 2022. Reducing the Sustainable Yield estimate increased the Basin Yield Metric from 72 to 84, assuming a consistent amount pumping.

presented to the BMC at the July 28th, 2022 BMC Meeting and at the September 21st, 2022 BMC Meeting, the BMC authorized funding for modifications to the Ferrell Well (LA 13) to improve its ability to monitor seawater intrusion in Zone E. The LOCSD contracted with Filipponi and Thompson Drilling to complete the modifications in December 2022, see Appendix I for additional detailed information on the well modification. Sampling data from this new well will be incorporated into the BMC's annual groundwater monitoring program and included in future Annual Monitoring Reports.

Updated Metric Evaluation. In Calendar Year 2021, BMC Staff began evaluating the existing Basin Monitoring Metrics to determine if there were opportunities to improve those metrics and/or add additional metrics to be able to better assess the health of the Basin. Evaluating and updating the Basin metrics will take into account monitoring data collected after development of the Basin Plan, along with new monitoring locations/wells (e.g. Lupine/Cuesta by the Sea Monitoring Well). This effort is currently on hold as the BMC Staff evaluates opportunities to improve the Basin Monitoring Network (i.e. modification of existing wells or new monitoring wells to improve data collection). Any modifications to the LOBP Metrics will require approval by the BMC through the Adaptive Management process.

Program C Adaptive Management. At its April 20th, 2022 Meeting, the BMC approved CHG to evaluate the re-inclusion of the 3rd Well into Program C. Additional detail regarding the history of the 3rd Program C Well is available in the April 20th, 2022 BMC Agenda Packet. This analysis includes evaluation of the anticipated increase in the Sustainable Yield that the 2nd and 3rd Program C Wells would provide utilizing the updated criteria for calculating the Sustainable Yield approved by the BMC at their October 27th, 2021 Meeting. In 2023, the BMC will consider whether or not to re-include the 3rd Well into Program C.

Lower Aquifer Nitrate Investigation. On October 19th, 2022 the BMC authorized CHG to perform additional Nitrate Source Investigations to better understand the source of nitrate impacting the S&T Mutual Water Company's LA8 Well. However, due to the inability to obtain well owner permission to sample the desired wells, much of that work was not completed in 2022. Additional information on the Lower Aquifer Nitrate Investigation is included in Section 7.5.3 Water Level, Chloride, and Nitrate Metrics of this Annual Report.

Los Osos Basin Well Database. On September 19th, 2022 the BMC authorized CHG to develop a Geographic Information System (GIS) Well Database for wells in the Basin. This Database will incorporate available information that can be found on well locations, uses, depths, screened intervals, status and other attributes from BMC, County Public Health Department, Department of Water Resources and other datasets. The Well Database is anticipated to be completed in 2023.

Evaluation of Water Conservation Measures. To improve the understanding of the effectiveness of existing conservation programs and the future conservation potential within the community, the purveyors are collaborating with the County on a Title 19 Water Offset Study to update water usage estimates for urban and rural residences sourcing water from the Los Osos Groundwater Basin, propose new water conservation measures for the retrofit-to-build program, and estimate remaining water savings potential for the community. This study is anticipated to be completed in 2023.

WRFP Study/Transient Groundwater Model: At its October 27th, 2021 Meeting, the BMC authorized the preparation of a Water Recycling Funding Program Grant Application and to request access to the $150,000 of funding that the County budgeted to develop a transient groundwater model. The LOCSD is the lead agency for the grant on behalf of the BMC and on February 2nd, 2022 submitted an application for a WRFP grant to develop a transient model and analyze recycled water and supplemental water projects to improve the sustainability of the Basin (WRFP Study). LOCSD was notified of the award of the grant in January 2023. With the award of the grant, the LOCSD will solicit proposals from hydrogeologic and engineering consulting firms through a Request for Proposal (RFP) process to procure the necessary services to complete the WRFP Study.

Discussion and Recommendation of Criteria for Future Growth. At its May 2017 meeting, to provide input into the Los Osos Community Plan (LOCP), including consideration of Basin metrics and defined goals as they relate to the timing of future growth within the Basin, the BMC authorized the release of a letter to the County Planning Department and Coastal Commission staff recommending that future development should be subject to the following provisions:

1. Any growth projections in the updated LOCP should be consistent with the water supply estimates provided in the LOBP.

2. The LOCP should acknowledge any infrastructure projects contemplated by the LOBP that would require coastal planning action subject to the authority of the Coastal Commission. This provision would help expedite completion of any affected projects.

3. Amendments to the County's Growth Management Ordinance [separate from the LOCP/LCP] should provide a growth rate for Los Osos consistent with the adaptive management provisions of the LOBP. In particular, the rate of growth must be set so that the monitoring provisions of the LOBP confirm the adequacy of a sustainable water supply in support of any contemplated future growth.

On December 15, 2020, the County Board of Supervisors adopted the LOCP and Final Environmental Impact Report and tentatively adopted amendments to the Growth Management Ordinance that would establish a residential growth rate for the Los Osos urban area[3]. The adopted LOCP is still subject to change based on Coastal Commission review, which is currently underway. If the LOCP is certified by the Coastal Commission with no changes, the Growth Management Ordinance amendments to establish a growth rate for Los Osos become effective upon Coastal Commission certification. If the Coastal Commission recommends changes, then the growth rate may need to be further considered at another County Board of Supervisors hearing.

The purveyors are currently working with the County, at the request of the Coastal Commission, to evaluate water supply availability in the Basin and the triggers for water offset requirements for allowing additional development within the Basin.

10.3 LOBP Programs

The LOBP outlines a number of programs developed to meet the goals of the various metrics outlined above. The BMC has analyzed the impacts of implementing various combinations of programs on the Basin[4]. In particular, the BMC modeled the impact of each combination on the Basin Yield Metric, Water Level Metric and Chloride Metric. Based on this analysis, the LOBP recommends the following programs for immediate implementation:

- Groundwater Monitoring Program;
- Urban Water Use Efficiency Program;
- Urban Water Reinvestment Program;
- Basin Infrastructure Programs A and C; and
- Wellhead Protection Program.

Two additional programs were included in the LOBP and are recommended for implementation if the County and the Coastal Commission were to allow future development in Los Osos as part of the LOCP and the Los Osos Habitat Conservation Plan (LOHCP): (1) Basin Infrastructure Program B; and (2) either Basin Infrastructure Program D or the Agricultural Water Reinvestment Program. Per the LOBP, a funding mechanism to pay for additional costs required to accommodate the water demand associated with new development will need to be established.

Since additional development has not been approved through the LOCP update, Programs B and D have not been initiated at this point.

10.3.1 Groundwater Monitoring Program

In order to allow calculation of the above metrics with a higher degree of accuracy, the BMC has implemented the Groundwater Monitoring Program. The Groundwater Monitoring Program is designed to collect, organize and report data regarding the health of the Basin from a current

[3]The LOCP and Growth Management Ordinance policies considered by the Board on December 15 are available at: https://agenda.slocounty.ca.gov/iip/sanluisobispo/agendaitem/details/12683

[4]The LOBP analyzed the following seven potential programs: (1) Groundwater Monitoring Program; (2) Urban Water Use Efficiency Program: (3) Water Reinvestment Program; (4) Basin Infrastructure Program; (5) Supplemental Water Program; (6) Imported Water Program; (7) Wellhead Protection Program.

network of 93 wells.[5] In addition to facilitating the calculation of metrics, this data provides information needed to manage the Basin for long-term sustainability. Implementation of the Groundwater Monitoring Program also satisfies various external monitoring requirements, such as the California Statewide Groundwater Elevation Monitoring Program (CASGEM) and waste discharge and recycled water permits for the LOWRF. Monitoring under the program began in 2014 and will continue to occur in the spring and fall of each year when water levels are typically at their highest and lowest. This Annual Report represents the eighth monitoring event under the Groundwater Monitoring Program. The BMC plans to continue to report the values for all Basin metrics and other relevant, non-proprietary data to the Parties, the Court and the public in its future Annual Reports. Additional recommendations and planned actions relating to the Groundwater Monitoring Program are described in Section 9. Table 25 summarizes the status of the various implementation tasks set forth in the LOBP that is related to the Groundwater Monitoring Program.

10.3.2 Urban Water Use Efficiency Program

In order to reduce annual groundwater production from the Basin, and thus reduce the Basin Yield Metric, the LOBP recommends implementation of the Urban Water Use Efficiency Program. As described previously, the purveyors and the County are performing an updated evaluation of the conservation potential for the community. The evaluation will better inform the BMC and the BMC Parties on the potential future water savings that could be achieved through conservation efforts and programs. Additional information on the status of the current water conservation programs offered by the BMC Parties can be found on their respective websites.

[5]The wells are distributed laterally across the Western, Central and Eastern Areas and vertically among First Water and the Upper and Lower Aquifers. Eighteen existing wells and two new wells have been added to the program since 2015.

Table 25. Basin Groundwater Monitoring Program Status			
Recommended Implementation Measure	**Current Status**	**Funding Status**	**Projected Completion**
Wellhead Surveys: Perform wellhead surveys to establish reference point elevations and locations	Complete		
Protocols and Objectives: Establish well monitoring protocols and data quality objectives	Complete		
Water Level Monitoring: Assign water level monitoring responsibilities to the Parties or other stakeholders	Complete		
Access to Private Wells: Contact private well owners to request permission for participation in the groundwater elevation and water quality portions of the Groundwater Monitoring Program	Most contacts made as of April 2019.	Fully funded	Ongoing
Water Quality Monitoring: Assign water quality monitoring responsibilities. The BMC will adopt a set of procedures for recording groundwater elevations and sampling for water quality.	Complete		
Data: Assign data compilation, organization and reporting duties	Complete		

10.3.3 Urban Water Reinvestment Program

Implementation of the Urban Water Reinvestment Program was recommended in the LOBP to increase the sustainable yield of the Basin (and thus further reduce the Basin Yield Metric). The Water Reinvestment Program will accomplish the LOBP's goal of reinvesting all water collected and treated by the LOWRF in the Basin, either through direct percolation to the aquifers or reuse. Water treated by the LOWRF will be of a sufficient quality to directly percolate into the Basin or to reuse for landscape or agricultural irrigation purposes. The planned uses of that water are listed in Table 26, along with the actual uses and amounts of reused water from 2022[6].

[6]This Table was reproduced (with slight edits) from Table 2 of the LOBP.

Table 26. Planned Recycled Water Uses in the Urban Water Reinvestment Program		
Potential Use	**LOBP Planned Annual Volume (AFY)**	**Actual Annual Volume in 2022 (AFY)**
Broderson Leach Fields	448	437
Bayridge Estates Leach Fields	33	17.4
Urban Reuse	63	0
Sea Pines Golf Course	40	66
Los Osos Valley Memorial Park	50	0
Agricultural Reuse	146	3.1
Construction Water	0	0.5
Total	780	524

The LOWRF construction was completed in March 2016. Through May 12, 2021, the sewer service area had connected 99.4 percent of parcels that are required to connect. Flows to the wastewater plant in 2022 averaged approximately 468,000 gallons per day and totaled 524 AF for the year. Average wastewater flows are lower than anticipated due to conservation measures implemented by the community. Projecting the average flow per connection for 100 percent of the parcels required to connect results in a total estimated effluent inflow volume of 530 AFY, which is 250 AFY less than the anticipated 780 AFY of recycled water available for the urban water reinvestment program.

Recycled water in 2022 was conveyed to the Broderson and Bayridge Estates leach fields, Agricultural users, Sea Pines Golf Course, the median in Los Osos Valley Road between South Bay Blvd and Fairchild Way and used for construction water. It is envisioned that recycled water for irrigation will be provided to the schools, parks, and various additional agricultural areas, however those connections were not made in 2022. The purveyors have executed agreements with the County of San Luis Obispo to supply recycled water to the schools and the County is utilizing funding provided by the America Rescue Plan Act (ARPA) to improve recycled water distribution system operations and connect the schools to the recycled water system.

The anticipated groundwater mound[7] resulting from infiltration of treated wastewater disposal to leach fields at the Broderson site was detected hydraulically downgradient beginning in June 2017. As of 2022, it is estimated that the Broderson mound has reached 50% of its anticipated maximum height. Additional information on the current status of the Broderson Mound can be found in Section 7.2 Water Level Hydrographs of this Annual Report.

[7]Cleath & Associates, 2000, Hydrogeologic Investigation of the Broderson Site, Phase 2 Impacts Assessment, prepared for Los Osos Community Services District, November 2000.

The BMC received notification of obtaining grant funding in Calendar Year 2022 for the development of a Transient Groundwater Model and completion of a recycled water and supplemental water supply alternatives study. This study is intended to analyze benefits of delivering recycled water to Broderson, Bay Ridge, Sea Pines and/or other future locations (e.g. ag reuse, school landscape irrigation, Los Osos Creek, etc.). It will additionally evaluate opportunities to utilize recycled for Indirect and Direct Potable Reuse to improve water supply conditions in the Basin.

10.3.4 Basin Infrastructure Programs

Implementation of the Basin Infrastructure Program is designed to reduce Purveyor groundwater production from the Lower Aquifer in the Western Area and replace it with additional pumping from the Upper Aquifer and Central and Eastern Areas. This shift will increase the Basin's sustainable yield, which in turn will help lower or improve the Basin Yield Metric if groundwater production does not increase.

The Program is divided into four parts, designated Programs A through D. Programs A and B shift groundwater production from the Lower Aquifer to the Upper Aquifer, and Programs C and D shift production within the Lower Aquifer from the Western Area to the Central and Eastern Areas, respectively. A fifth program, Program M, was also established in the LOBP for the development of a Groundwater Monitoring Program (See Chapter 7 of the BMP), and a new Lower Aquifer monitoring well in the Cuesta by the Sea area was recommended in the 2015 Annual Report and completed in 2019. Table 27 provides an overview of the status of the Projects that are currently moving forward or have been completed. Note, no projects are currently moving forward in Program D, thus they are not shown in Table 27.

10.3.5 Wellhead Protection Program

The Wellhead Protection Program is designed to protect water quality in the Basin by managing activities within a delineated source area or protection zone around drinking water wells. This program consists primarily of the Purveyors conducting Drinking Water Source Assessment and Protection surveys for each of their wells, as well as construction and operation of the LOWRF. The BMC will identify specific actions to protect water quality in the Basin as deemed appropriate in the future, though no specific actions are recommended at this time.

Table 27. Basin Infrastructure Projects				
Project Name	**Parties Involved**	**Funding Status**	**Capital Cost**	**Status**
Program A				
Water Systems Interconnection	LOCSD/ GSWC			Completed
Upper Aquifer Well (8^{th} Street)	LOCSD			Completed
South Bay Well Nitrate Removal	LOCSD			Completed
Palisades Well Modifications	LOCSD			Completed
Blending Project (Skyline Well)	GSWC			Completed
Water Meters	S&T			Completed
Program B				
LOCSD Wells	LOCSD	Not Funded	BMP: $2.7 mil	Project not initiated
GSWC Wells	GSWC	Not Funded	BMP: $3.2 mil	Project not initiated
Community Nitrate Removal Facility	LOCSD/GSWC/S&T	GSWC Portion Funded	GSWC: $1.23 mil	GSWC's Program A Blending Project might be capable of expanding to be the first phase of the Program B Community Nitrate Removal Facility.

Project Name	Parties Involved	Funding Status	Capital Cost	Status
Program C				
Expansion Well No. 1 (Los Olivos)	GSWC			Completed
Expansion Well No. 2	LOCSD	LOCSD	BMP: $2.5 mil	The well construction and development activities are complete. Construction of the water transmission main to connect the well to the LOCSD system and design of the well equipping is anticipated to be completed in 2023. Completion of all phases of the project is estimated to be June 2024.
Expansion Well 3 and LOVR Water Main Upgrade	GSWC/LOCSD	Cooperative Funding	BMP: $1.6 mil	This project has been deferred under Adaptive Management.
LOVR Water Main Upgrade	GSWC	May be deferred	BMP: $1.53 mil	Project may not be required, depending on the pumping capacity of the drilled Program C wells. It may be deferred to Program D.
S&T/GSWC Interconnection	S&T/ GSWC	Pending	BMP: $30,000	Currently on hold pending further evaluation of the project.

Project Name	Parties Involved	Funding Status	Capital Cost	Status
Program M				
New Zone D/E Lower Aquifer monitoring well in Cuesta by the Sea	All Parties			Completed
Program U				
Creek Discharge Program	All Parties		TBD	These activities are currently on hold. The Transient Model and Water Recycling Funding Study are intended to better inform the BMC on the most effective opportunities for increasing the sustainable yield of the Basin.
8th and El Moro Urban Storm Water Recovery Project	All Parties		TBD	These activities are currently on hold. The Transient Model and Water Recycling Funding Study are intended to better inform the BMC on the most effective opportunities for increasing the sustainable yield of the Basin.

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APPENDIX A

Groundwater Monitoring History

Groundwater Monitoring History

Groundwater monitoring has been performed by public agencies, water purveyors, and consultants for various Basin studies and programs over several decades. The following lists include historical investigations, monitoring reports, and monitoring programs with a major focus on Basin water levels and water quality through December 31, 2022, which is the end of the period covered by this Annual Report. Figure A1 compares the scientific basin boundary used for the LOBP and prior work with the new jurisdictional boundary defined by the DWR for the Los Osos Area Subbasin.

Historical Investigations

- *Los Osos-Baywood Ground Water Protection Study* (DWR, 1973);
- *Morro Bay Sandspit Investigation* (DWR, 1979);
- *Los Osos -Baywood Park Phase I Water Quality Management Study* (Brown & Caldwell, 1983);
- *Hydrogeology and Water Resources of the Los Osos Valley Ground-Water Basin, San Luis Obispo County, Water-Resources Investigation 88-4081* (U.S. Geological Survey, 1988);
- *Task F – Sanitary Survey and Nitrate Source Study* (Metcalf & Eddy, 1995);
- *Sea Water Intrusion Assessment and Lower Aquifer Source Investigation of the Los Osos Valley Groundwater Basin* (Cleath & Associates, 2005);
- *Task 3 Upper Aquifer Water Quality Characterization* (Cleath & Associates, 2006);
- *Los Osos Valley Groundwater Basin Fringe Areas Characterization, Technical Memorandum (CHG, 2018).*
- *Los Osos Valley Groundwater Basin Boundary Modification Request, Technical Memorandum (CHG, 2018).*

Monitoring Reports:

- *Baywood Groundwater Study – Fourth Quarter 1998 (San Luis Obispo County Engineering Department, 1999)*;

- *Quarterly and Semi-Annual Groundwater Monitoring Reports for the Los Osos Nitrate Monitoring Program* (Cleath & Associates, 2002-2006)

- *Water Quality Monitoring Results Summary, November 2009-January 2010, Los Osos Valley Groundwater Basin* (CHG, 2010);

- *Semi-Annual Groundwater Monitoring Reports for Los Osos Water Recycling Facility Baseline Groundwater Quality Monitoring* (CHG, 2012-2013);

- *Semi-Annual Groundwater Monitoring Reports for Los Osos Water Recycling Facility Baseline Groundwater Quality Monitoring* (Rincon Consultants, 2014, 2016-2022; CHG, 2015);

- *Semi-Annual Groundwater Monitoring Reports for Lower Aquifer* (CHG, 2014-2015);

- *Annual Groundwater Monitoring Reports for Los Osos Basin Plan* (CHG, 2015, 2016, 2017, 2018, 2019, 2020, 2021);

- Consumer Confidence Reports (Water Quality Reports) published annually by the water purveyors.

Monitoring Programs:

- *San Luis Obispo County Public Works, Semi-Annual Water Level Monitoring Program. Period of record for individual wells varies; most begin in 1970's and 1980's, and some end in 1999; program remains active.*

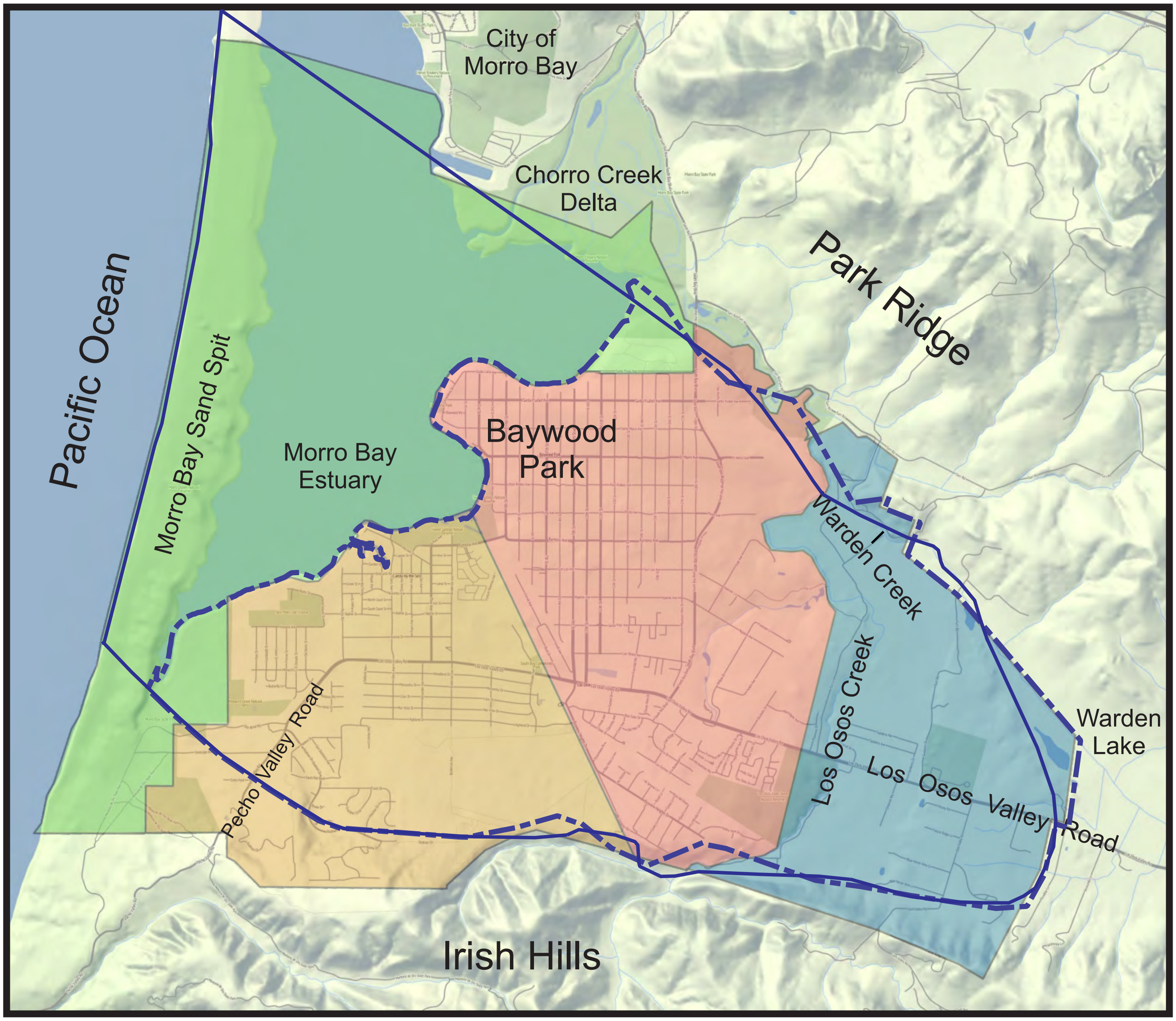
- *Purveyor Water Supply Well Monitoring per SWRCB-Division of Drinking Water requirements. Period of record for individual wells varies; program remains active.*

- *2002-2006 Los Osos Nitrate Monitoring Program. Water levels measured quarterly to semi-annually; program ended October 2006.*

- *2012-2022 Los Osos Water Recycling Facility Groundwater Monitoring Program. Water levels measured semi-annually, currently on a June and December schedule; program remains active.*

- *2014-2015 Lower Aquifer Monitoring Program. Water levels measured semi-annually; program ended in 2015 (replaced by LOBP Groundwater Monitoring Program).*

In addition to water quality and water level reporting, this 2022 Annual Report compiles groundwater production, precipitation, and stream flow data from water purveyors (LOCSD, GSWC, and S&T, providing metered production records) and San Luis Obispo County Department of Public Works, providing precipitation at the Los Osos Landfill and stream flow data for Los Osos Creek. Purveyor municipal production data are based on meter readings. Domestic groundwater production estimates are based on the last reported water use estimates for 2013 from the LOBP, with minor adjustments in 2016 for the inclusion of additional residences in the Eastern Area (CHG, 2016). Production estimates for community facilities and agricultural wells are based on a soil-moisture budget using local precipitation, land use, and evapotranspiration data (Appendix F).



Base Image: Stamen-Terrain

0 2000 4000 6000 8000 ft

Scale: 1 inch ≈ 4,000 feet

Explanation

Basin Plan Areas:

Dunes and Bay Area

Western Area

Central Area

Eastern Area

DWR Bulletin 118 Basin Boundary (Los Osos Area Subbasin)

Basin Boundary from Los Osos Basin Plan

Figure A1
Basin Location and Plan Areas
Los Osos Groundwater Basin
2022 Annual Report

Cleath-Harris Geologists

APPENDIX B

Los Osos Basin Plan
Groundwater Monitoring Program Well Information

Los Osos Basin Plan
Monitoring Well Network
First Water/Perched Aquifer Group

Program ID	State Well Number	Name/Location	Basin Area	Coordinates			Well Type	Current Well Owner	Well Data				Aquifer				
				Latitude	Longitude	RP Elevation* (feet amsl)			Screened Interval (feet bgs)	Borehole Depth (ft bgs)	Well Depth (feet bgs)	Casing Diameter (inches)	Creek Valley Alluvium	Zone A/B	Zone C	Zone D	Zone E
FW1	30S/10E-13A7							PRIVATE									
FW2	30S/10E-13L8	Howard/ Del Norte	Western	35.3149	120.8552	32.63	MW	LOCSD	26-36	37	36	2			x		
FW3	30S/10E-13G	South Court	Western	35.3162	120.8498	50.95	MW	LOCSD	47-52	54	52	2			x		
FW4	30S/10E-13H	Broderson/Skyline	Western	35.3158	120.8432	49.33	MW	LOCSD	29-34	35	34	2			x		
FW5	30S/10E-13Q2	Woodland Dr.	Western	35.3119	120.8495	101.27	MW	LOCSD	95-105	105	105	2			x		
FW6	30S/10E-24A	Highland/Alexander	Western	35.3083	120.8453	193.04	MW	LOCSD	154-164	165	164	2			x		
FW7	30S/10E-24Ab	Broderson leach field	Western	35.3065	120.8460	255	MW	LOCSD	200-240	243	240	5			x		
FW8	30S/11E-7L4	Santa Ysabel/5th	Central	35.3302	120.8377	45.76	MW	LOCSD	40-50	50	50	2			x		
FW9	30S/11E-7K3	12th/ Santa Ysabel	Central	35.3299	120.8300	90.71	MW	LOCSD	60-70	70	70	2			x		
FW10	30S/11E-7Q1	LOCSD 8th Street - shallow	Central	35.3260	120.8342	25.29	MW	LOCSD	29-43, 54-75	76	75	8			x		
FW11	30S/11E-7R2	El Moro/12th St.	Central	35.3263	120.8298	61.93	MW	LOCSD	25-35	35	35	2			x		
FW12	30S/11E-18C2	Pismo Ave./ 5th St.	Central	35.3227	210.8376	34.55	MW	LOCSD	25-35	35	35	2			x		
FW13	30S/11E-18B2	Ramona/10th	Central	35.3208	120.8320	79.89	MW	LOCSD	25-35	35	35	2		x			
FW14	30S/11E-18E1							PRIVATE									
FW15	30S/11E-18N2	Manzanita/Ravenna	Central	35.3109	120.8401	125.53	MW	LOCSD	85-95	95	95	2		x			
FW16	30S/11E-18L11	Palisades Ave.	Western	35.3138	120.8374	88.02	MW	LOCSD	45-55	55	55	2		x			
FW17	30S/11E-18L12	Ferrell Ave.	Central	35.3138	120.8346	103.85	MW	LOCSD	25-35	35	35	2		x			
FW18	30S/11E-18P	Sunnyside #1	Western	35.3095	120.8352	143.92	MW	SLCUSD	15-35	35	35	2		x			
FW19	30S/11E-18J7	Los Olivos/Fairchild	Central	35.3130	120.8271	125.74	MW	LOCSD	25-35	35	35	2		x			
FW20	30S/11E-8Mb	Santa Maria/18th Street	Central	35.3287	120.8233	94.75	MW	LOCSD	37-47	75	47	2		x			
FW21	30S/11E-8N4	South Bay Blvd. OBS	Central	35.3253	120.8213	95.99	MW	LOCSD	40-50	50	50	2		x			
FW22	30S/11E-17F4							PRIVATE									
FW23	30S/11E-17N4							PRIVATE									
FW24	30S/11E-17J2	USGS Eto North - shallow	Eastern	35.3142	120.8119	84.95	MW	PRIVATE[1]	50-70	79	70	2			x		
FW25	30S/11E-17R1							PRIVATE									
FW26	30S/11E-20A2							PRIVATE									
FW27	30S/11E-20L1							PRIVATE									
FW28	30S/11E-20M2							PRIVATE									
FW29	30S/11E-20A1							PRIVATE									
FW30	30S/11E-18R1							PRIVATE									
FW31	30S/11E-19A	Bayridge Field #2	Central	35.3066	120.8276	214.67	MW	LOCSD	18-38	38	38	4		x			
FW32	30S/11E-21D14							PRIVATE									
FW33	30S/11E-18D1S							PRIVATE									

[1] FW24 is former USGS monitorng well (information in public domain)

*NAVD 88 Datum	MW = Monitoring Well

State Well Numbers for Reconstructed Wells

	NEW (2002)	OLD (1982)
FW2	30S/10E-13L8	30S/10E-13L5
FW5	30S/10E-13Q2	30S/10E-13Q1
FW8	30S/11E-7L4	30S/11E-7L3
FW9	30S/11E-7K3	30S/11E-7K2
FW11	30S/11E-7R2	30S/11E-7R1
FW12	30S/11E-18C2	30S/11E-18C1
FW13	30S/11E-18B2	30S/11E-18B1
FW15	30S/11E-18N2	30S/11E-18N1
FW16	30S/11E-18L11	30S/11E-18L3
FW17	30S/11E-18L12	30S/11E-18L4
FW19	30S/11E-18J7	30S/11E-18J6
FW21	30S/11E-8N4	30S/11E-8N2

Los Osos Basin Plan
Monitoring Well Network
Upper Aquifer Group

Program ID	State Well Number	Name/Location	Basin Area	Coordinates			Well Type	Current Well Owner	Well Data				Aquifer				
				Latitude	Longitude	RP Elevation* (feet amsl)			Screened Interval (feet bgs)	Borehole Depth (ft bgs)	Well Depth (feet bgs)	Casing Diameter (inches)	Creek Valley Alluvium	Zone A/B	Zone C	Zone D	Zone E
UA1	30S/10E-11A1	Sandspit #1 West	Dunes and bay	35.3358	120.8638	16.01	MW	SLO CO.	150-160	440	160	2			x		
UA2	30S/10E-14B1	Sandspit #3 Shallow	Dunes and bay	35.3219	120.8682	23.90	MW	SLO CO.	190-200	687	200	1.5			x		
UA3	30S/10E-13F1	GSWC Skyline #1	Western	35.3165	120.8533	17.57	M	GSWC	90-195	206	195	14			x		
UA4	30S/10E-13L1	S&T Mutual #1	Western	35.3148	120.8531	40.31	M	S&T	100-140	140	140	8			x		
UA5	30S/11E-7N1	LOCSD 3rd St. Well	Central	35.3256	120.8401	10.66	M	LOCSD	73-83	84	80	8			x		
UA6	30S/11E-18L8	USGS Palisades OBS East 2"	Western	35.3149	120.8381	79.18	MW	SLO CO.	100-140	620	140	2			x		
UA7	30S/11E-18L7	USGS Palisades OBS West 2"	Western	35.3149	120.8381	79.16	MW	SLO CO.	180-220	620	220	2			x		
UA8	30S/11E-18K7	LOCSD 10th St. Observation West	Central	35.3130	120.8326	137.17	MW	LOCSD	200-220	220	220	2			x		
UA9	30S/11E-18K3	GSWC Los Olivos #3	Central	35.3133	120.8300	123.42	M	GSWC	148-202, 222-232	247	232	8			x		
UA10	30S/11E-18H1	LOCSD - 12th St.	Central	35.3161	120.8297	110.02	M	LOCSD	112-125, 145-159, 172-186, 216-231	232	232	10			x		
UA11	30S/11E-17D							PRIVATE									
UA12	30S/11E-17E9	So. Bay Blvd OBS shallow	Central	35.3158	120.8240	107.39	MW	LOCSD	184-194	563	204	2			x		
UA13	30S/11E-17E10	LOCSD South Bay upper	Central	35.3159	120.8239	107.81	M	LOCSD	170-210	240	220	8			x		
UA14	30S/11E-17P4							PRIVATE									
UA15	30S/11E-20B7							PRIVATE									
UA16	30S/11E-17L4							PRIVATE									
UA17	30S/11E-17E10							PRIVATE									
UA18	30S/11E-17F2							PRIVATE									
UA19	30S/11E-	LOCSD 8th Street - shallow	Central	35.3259	120.8341	26.80	M	LOCSD							x		

*NAVD 88 Datum	M = Municipal
	MW = Monitoring Well

Los Osos Basin Plan
Monitoring Well Network
Lower Aquifer Group

Program ID	State Well Number	Name/Location	Basin Area	Coordinates: Latitude	Coordinates: Longitude	Coordinates: RP Elevation* (feet amsl)	Well Type	Well Owner	Well Data: Screened Interval (feet bgs)	Well Data: Borehole Depth (ft bgs)	Well Data: Well Depth (feet bgs)	Well Data: Casing Diameter (inches)	Aquifer: Creek Valley Alluvium	Aquifer: Zone A/B	Aquifer: Zone C	Aquifer: Zone D	Aquifer: Zone E
LA1	30S/10E-2A1	Sandspit #2 North	Dunes and Bay	35.3530	120.8617	23.13	MW	SLO CO.	220-230	480	230	2					x
LA2	30S/10E-11A2	Sandspit #1 East	Dunes and Bay	35.3358	120.8638	16.07	MW	SLO CO.	234-244	440	244	2				x	
LA3	30S/10E-14B2	Sandspit #3 Deep	Dunes and Bay	35.3219	120.8682	19.47	MW	SLO CO.	270-280	687	280	2				x	
LA4	30S/10E-13M1	USGS Howard West	Western	35.3149	120.8597	42.70	MW	PRIVATE	477-537	820	550	6					x
LA5	30S/10E-13L7	S&T Mutual #4	Western	35.3146	120.8531	37.87	M	S&T	160-300	305	300	8					
LA6	30S/10E-13L4	GSWC Pecho #1	Western	35.3129	120.8522	70.02	M	GSWC	240-380	675	390	14				x	
LA7	30S/10E-13P2							PRIVATE									
LA8	30S/10E-13N	S&T Mutual #5	Western	35.3088	120.8565	141.36	M	S&T	260-340	500	350	8				x	
LA9	30S/10E-24C1	GSWC Cabrillo #1	Western	35.3077	120.8552	180.34	M	GSWC	250-500	500	508	10				x	
LA10	30S/10E-13J1	GSWC Rosina #1	Western	35.3145	120.8468	98.33	M	GSWC	290-406	410	407	10				x	x
LA11	30S/10E-12J1	Morro Bay Observation #5	Central	35.3299	120.8440	8.43	MW	SLO CO.	349-389	389	402	2					x
LA12	30S/11E-7Q3	LOCSD 8th St. Lower	Central	35.3259	120.8342	27.75	M	LOCSD	230-270	411	270	10				x	
LA13	30S/11E-18F2	LOCSD Ferrell #2 (modified 2022)	Central	35.3159	120.8358	103.57	MW	LOCSD	510-530	645	530	2.5					x
LA14	30S/11E-18L6	USGS Palisades OBS 6"	Western	35.3149	120.8381	79.52	MW	SLO CO.	355-375, 430-480, 550-600	620	605	6				x	x
LA15	30S/11E-18L2	LOCSD Palisades (modified 2013)	Western	35.3136	120.8377	88.08	M	LOCSD	340-380	612	394	12				x	
LA16	30S/11E-18M1	Former CCW #5 - Broderson OBS	Western	35.3128	120.8430	108.74	MW	PRIVATE	330-355, 395-415, 465-505, 530-575	630	577	10				x	x
LA17	30S/11E-24A2	USGS Broderson	Western	35.3074	120.8433	212.82	MW	SLO CO.	800-860 (collapsed 440-480)	960	860	6				x	x
LA18	30S/11E-18K8	10th St. Observation East	Central	35.3130	120.8325	137.13	MW	LOCSD	630-650	660	650	2					x
LA19	30S/11E-19H2	USGS Bayview Heights 6"	Central	35.3043	120.8266	257.35	MW	SLO CO.	280-380	740	400	6				x	
LA20	30S/11E-17N10	GSWC South Bay #1	Central	35.3111	120.8240	141.22	M	GSWC	225-295, 325-395, 485-695	750	715	12			x	x	x
LA21	30S/11E-17E7	So. Bay Blvd OBS deep #3	Central	35.3158	120.8240	107.22	MW	LOCSD	480-490, 500-510	563	520	2					x
LA22	30S/11E-17E8	So. Bay Blvd OBS middle #2	Central	35.3158	120.8240	107.27	MW	LOCSD	270-280, 370-380	563	390	2				x	
LA23	30S/11E-17C1							PRIVATE									
LA24	30S/11E-17J1	USGS Eto North - deep	Eastern	35.3142	120.8119	87.00	I	PRIVATE[1]	160-190, 245-260	337	260	6				x	x
LA25	30S/11E-20Aa							PRIVATE									
LA26	30S/11E-20G2	USGS Eto South	Eastern	35.3037	120.8131	99.66	I	PRIVATE[1]	300-360	380	370	6					x
LA27	30S/11E-16Nb							PRIVATE									
LA28	30S/11E-16Na							PRIVATE									
LA29	30S/11E-21E3							PRIVATE									
LA30	30S/11E-20H1							PRIVATE									
LA31	30S/11E-13M2							PRIVATE									
LA32	30S/11E-18K9	LOCSD 10th Street Production	Central	35.3103	120.8325	137.17	M	LOCSD	235-270, 350-490	522	490	14			x	x	
LA33	30S/11E-17A1							PRIVATE									
LA34	30S/11E-8F	Los Osos Landfill MW-11	Eastern	35.3201	120.8052	26.15	MW	SLO CO.	37.5-47.5	49	47.5					x	
LA35	30S/11E-21Bb	LOWRF South Well	Eastern	35.3076	120.7993	86.8	Ind	SLO CO.	180-230	240	230						x
LA36	30S/11E-21Ja							PRIVATE									
LA37	30S/11E-21B1	Andre Windmill Well	Eastern	35.3069	120.7976	81.61	MW	SLO CO.				6					x
LA38	30S/11E-21E							PRIVATE									
LA39	30S/11E-18K_	Los Olivos #5	Central			123.17	M	GSWC	335-365, 385-450	495	460	12				x	
LA40	30S/10E-	30S/11E-13Ba	Western	35.31966	120.8478	11.47	MW	LOCSD	390-410	500	490	2.5					x
LA41	30S/10E-	30S/11E-13Bb	Western	35.31966	120.8478	11.46	MW	LOCSD	310-330	500	350	2.5				x	

[1] LA24 amd LA26 are former USGS monitorng wells (information in public domain)

*NAVD 88 Datum	M = Municipal
	MW = Monitoring Well
	Ind = Industrial Well
	I = Irrigation

Los Osos Basin Plan
Monitoring Well Network 2022
FIRST WATER

Program Well ID	Well Owner	Basin Plan Monitoring Code	County Water Level Program	LOWRF Groundwater Monitoring Program[1]	**2022 Basin Plan Monitoring Program[2]**
FW1	PRIVATE	L			**L**
FW2	LOCSD	L, G		L, G	**L**
FW3	LOCSD	L		L	**L**
FW4	LOCSD	L		L	**L**
FW5	LOCSD	L		L	**L, CEC**
FW6	LOCSD	TL, G, CEC		G	**TL, CEC**
FW7	LOCSD	L			**L**
FW8	LOCSD	L		L	**L**
FW9	LOCSD	L		L	**L**
FW10	LOCSD	TL, G		G	**TL**
FW11	LOCSD	L		L	**L**
FW12	LOCSD	L		L	**L**
FW13	LOCSD	L		L	**L**
FW14	PRIVATE	L		L	**L**
FW15	LOCSD	L, G		L,G	**L**
FW16	LOCSD	L		L	**L**
FW17	LOCSD	L, G		L,G	**L**
FW18	SLCUSD	L			**L**
FW19	LOCSD	L		L	**L**
FW20	LOCSD	L, G		L, G	**L**
FW21	LOCSD	L		L	**L**
FW22	PRIVATE	L, G		L, G	**L**
FW23	PRIVATE	L		L	**L**
FW24	PRIVATE	L	L		
FW25	PRIVATE	L	L		
FW26	PRIVATE	L, G, CEC			**L, G, CEC**
FW27	PRIVATE	TL			**TL**
FW28	PRIVATE	L, G	L		**G**
FW29	PRIVATE	(added in 2015)	L		
FW30	PRIVATE	(added in 2015)		L	
FW31	SLO CO.	(added in 2015)			**L**
FW32	PRIVATE	(added in 2017)			**L**
FW33	PRIVATE	(added in 2018)			**L**

L = WATER LEVEL
G = GENERAL MINERAL
CEC = CONSTITUENTS OF EMERGING CONCERN
TL = TRANSDUCER WATER LEVEL

LOCSD = Los Osos Community Services District
SLCUSD = San Luis Coastal Unified School District
SLO CO. = San Luis Obispo County

NOTES:

1 - Summer and winter monitoring schedule

2 - Spring and Fall water levels, water quality in Fall only

Los Osos Basin Plan
Monitoring Well Network 2022
UPPER AQUIFER

Program Well ID	Well Owner	Basin Plan Monitoring Code	County Water Level Program	LOWRF Groundwater Monitoring Program[1]	**2022 Basin Plan Monitoring Program[2]**
UA1	SLO CO.	L	L		
UA2	SLO CO.	L	L		
UA3	GSWC	L, G			**L, G**
UA4	S&T	TL			**TL**
UA5	LOCSD	L		L	**L**
UA6	SLO CO.	L	L		
UA7	SLO CO.	L	L		
UA8	LOCSD	L			**L**
UA9	GSWC	L, G			**L, G**
UA10	LOCSD	TL			**TL**
UA11	PRIVATE	L		L	**L**
UA12	LOCSD	L		L	**L**
UA13	LOCSD	L, G			**L, G**
UA14	PRIVATE	L			**L**
UA15	PRIVATE	L			**L**
UA16	PRIVATE	(added in 2015)	L		
UA17	PRIVATE	(added in 2015)	L		
UA18	PRIVATE	(added in 2015)	L		
UA19	LOCSD	(added in 2019)			**L**

L = WATER LEVEL
G = GENERAL MINERAL
TL = TRANSDUCER WATER LEVEL

LOCSD = Los Osos Community Services District
SLO CO. = San Luis Obispo County
GSWC = Golden State Water Company
S&T = S&T Mutual Water Company

NOTES:
1 - Summer and winter monitoring schedule
2 - Spring and Fall water levels, water quality in Fall only

Los Osos Basin Plan
Monitoring Well Network 2022
LOWER AQUIFER

Program Well ID	Well Owner	Basin Plan Monitoring Code	County Water Level Program	**2022 Basin Plan Monitoring Program[1]**
LA1	SLO CO.	L	L	
LA2	SLO CO.	L	L	
LA3	SLO CO.	L	L	
LA4	PRIVATE	L, GL		**L, GL**
LA5	S&T	L	L	
LA6	GSWC	L, G	L	
LA7	PRIVATE	TL		**TL**
LA8	S&T	L, G		**L , G**
LA9	GSWC	L		**L , G**
LA10	GSWC	L, G		**L , G**
LA11	SLO CO.	L, G		**L , G**
LA12	LOCSD	L, G		**L , G**
LA13	LOCSD	TL		**TL**
LA14	SLO CO.	L, GL	L	**GL**
LA15	LOCSD	L, G		**L , G**
LA16	PRIVATE	L	L	
LA17	SLO CO.	L	L	
LA18	LOCSD	L, G		**L , G**
LA19	SLO CO.	L	L	
LA20	GSWC	L, G		**L , G**
LA21	LOCSD	L	L	
LA22	LOCSD	L	L	**G**
LA23	PRIVATE	L, G		no access
LA24	PRIVATE	L	L	
LA25	PRIVATE	L		**L**
LA26	PRIVATE	L	L	
LA27	PRIVATE	TL		**L**
LA28	PRIVATE	L, G		**L**
LA29	PRIVATE	L	L	
LA30	PRIVATE	L, G		**L,G**
LA31	PRIVATE	(added in 2015)	L	**G**
LA32	LOCSD	(added in 2015)	L	**G**
LA33	PRIVATE	(added in 2015)	L	
LA34	SLO CO.	(added in 2015)	L	
LA35	SLO CO.	(added in 2015)		**L**
LA36	PRIVATE	(added in 2015)		no access
LA37	SLO CO.	(added in 2017)		**TL**
LA38	PRIVATE	(added in 2017)		**L**
LA39	GSWC	(added in 2019)		**L,G**
LA40	LOCSD	(added in 2019)		**L,G, GL**
LA41	LOCSD	(added in 2019)		**L,G**

L = WATER LEVEL **LOCSD = Los Osos Community Services District**
G = GENERAL MINERAL **SLO CO. = San Luis Obispo County**
GL = GEOPHYSICAL LOG (triennial) **GSWC = Golden State Water Company**
TL = TRANSDUCER WATER LEVEL **S&T = S&T Mutual Water Company**

1 - Water level and water quality both Spring and Fall

APPENDIX C

Field Logs and Laboratory Analytical Reports for 2022 BMC Monitoring

Note: There are no Groundwater Monitoring Field Logs for Wells LA9, LA10, LA20, UA9, and UA3; These wells were sampled by owner (GSWC).

Spring 2022 Field Logs and Analytical Results

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 4/13/2022
Operator: AB/CC
Well number and location: 30S/11E-13N (LA8)
Site and wellhead conditions: Sunny, clear, windy, cold. Well has been running for 14 minutes

Static water depth (feet):	134.7
Well depth (feet):	350
Water column (feet):	215.3
Casing diameter (inches):	8
Minimum purge volume (gal)	flush line
Purge rate (gpm):	--
Pumping water level (feet):	--
Pump setting (feet):	--
Minimum purge time (min):	flush line
Time begin purge:	13:47

Time	Gallons	EC (µS/cm)	pH	Temp. (°C)	Comments*
13:47	flush line	513.5	8.51	18.4	Clear, colorless, odorless
13:50	flush line	449.4	8.34	18.2	Clear, colorless, odorless
13:52	flush line	435.9	8.26	18.1	Clear, colorless, odorless
13:53	flush line	435.9	8.12	18.2	Clear, colorless, odorless
					Sampled @ 13:54

*Turbidity, color, odor, sheen, debris, etc.

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 4/13/2022
Operator: T. Mihelic
Well number and location: 30S/10E-12J1 (LA11)
Site and wellhead conditions: Sunny and breezy, cap in place, site secure.

Static water depth (feet): 2.80
Well depth (feet): 389
Water column (feet): 386.2
Casing diameter (inches): 2
Minimum purge volume (gal) 190
Purge rate (gpm): 1.4
Pumping water level (feet): 8.08
Pump setting (feet): 25
Minimum purge time (min): 135
Time begin purge: 10:05

Time	Gallons	EC (µS/cm)	pH	Temp. (°C)	Comments*
10:05	0.1	1,443	8.28	17.4	Clear, colorless, odorless, slight sulfur smell
10:08	1	1,363	7.85	17.6	Clear, colorless, odorless, slight sulfur smell
10:12	5	1,365	7.57	17.6	Clear, colorless, odorless, slight sulfur smell
10:17	10	1,361	7.44	17.6	Clear, colorless, odorless
10:20	15	1,353	7.38	18.1	Clear, colorless, odorless
10:23	20	1,354	7.34	18.5	Clear, colorless, odorless
10:27	25	1,344	7.33	18.7	Clear, colorless, odorless
10:29	30	1,352	7.14	18.4	Clear, colorless, odorless
10:36	40	1,334	7.21	19.0	Clear, colorless, odorless
10:43	50	1,582	7.14	19.0	Clear, colorless, odorless
10:49	60	1,740	7.21	19.4	Clear, colorless, odorless
10:56	70	1,785	7.22	19.3	Slightly cloudy, odorless
11:04	80	1,770	7.37	19.1	Slightly cloudy, odorless
11:11	90	1,752	7.32	19.4	Clear, colorless, odorless
11:18	100	1,754	7.31	19.7	Clear, colorless, odorless
11:26	110	1,745	7.22	19.5	Clear, colorless, odorless

*Turbidity, color, odor, sheen, debris, etc.

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 4/13/2022
Operator T. Mihelic
Well number and location: 30S/10E-12J1 (LA11)
Site and wellhead conditions: Sunny and breezy, cap in place, site secure.

Static water depth (feet): 2.80
Well depth (feet): 389
Water column (feet): 386.2
Casing diameter (inches): 2
Minimum purge volume (gal) 190
Purge rate (gpm): 1.4
Pumping water level (feet): 8.08
Pump setting (feet): 25
Minimum purge time (min): 135
Time begin purge: 10:05

Time	Gallons	EC (µS/cm)	pH	Temp. (°C)	Comments*
11:33	120	1,741	7.30	19.3	Clear, colorless, odorless
11:40	140	1,738	7.26	19.6	Clear, colorless, odorless
11:53	150	1,729	7.35	19.6	Clear, colorless, odorless
12:00	160	1,721	7.16	19.6	Clear, colorless, odorless
12:07	170	1,724	7.36	19.4	Clear, colorless, odorless
12:14	180	1,724	7.36	19.7	Clear, colorless, odorless
12:21	190	1,724	7.24	19.6	Clear, colorless, odorless
12:26	200	1,722	7.32	19.6	Clear, colorless, odorless
					Sampled @ 12:26

*Turbidity, color, odor, sheen, debris, etc.

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 4/13/2022
Operator: T. Mihelic
Well number and location: 30S/11E-7Q3 (LA12)
Site and wellhead conditions: Sunny and breezy, site is secure.

Static water depth (feet): 25.4
Well depth (feet): 270
Water column (feet): 245
Casing diameter (inches): 10
Minimum purge volume (gal) flush line
Purge rate (gpm): --
Pumping water level (feet): --
Pump setting (feet): --
Minimum purge time (min): flush line
Time begin purge: 13:49

Time	Gallons	EC (µS/cm)	pH	Temp. (°C)	Comments*
13:50	flush line	850	7.45	20.4	Clear, colorless, odorless
13:52	flush line	857	7.47	19.7	Clear, colorless, odorless
13:54	flush line	858	7.37	19.9	Clear, colorless, odorless
13:56	flush line	858	7.38	20.1	Clear, colorless, odorless
					Sampled @ 13:56 PM

*Turbidity, color, odor, sheen, debris, etc.

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 4/13/2022
Operator: T. Mihelic
Well number and location: 30S/11E-18L2 (LA15)
Site and wellhead conditions: Sunny and breezy. Well has been running since 7:30 AM

Static water depth (feet): 90.1
Well depth (feet): 394
Water column (feet): 304
Casing diameter (inches): 12
Minimum purge volume (gal) flush line
Purge rate (gpm): --
Pumping water level (feet): --
Pump setting (feet): --
Minimum purge time (min): flush line
Time begin purge: 13:03

Time	Gallons	EC (µS/cm)	pH	Temp. (°C)	Comments*
13:04	flush line	865.0	7.63	20	Clear, colorless, odorless
13:06	flush line	860.0	7.44	20.1	Clear, colorless, odorless
13:06	flush line	863.0	7.31	20.4	Clear, colorless, odorless
					Sampled @ 13:07

*Turbidity, color, odor, sheen, debris, etc.

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 4/14/2022
Operator: J. Carlson
Well number and location: 30S/11E-18K8 (LA18)
Site and wellhead conditions: Sunny, breezy. Site is secure and cap is in place.

Static water depth (feet):	133.33
Well depth (feet):	650
Water column (feet):	516.7
Casing diameter (inches):	2
Minimum purge volume (gal)	255
Purge rate (gpm):	0.6
Pumping water level (feet):	134.83
Pump setting (feet):	160
Minimum purge time (min):	--
Time begin purge:	11:43

Time	Gallons	EC (µS/cm)	pH	Temp. (°C)	Comments*
11:43	0	649.0	7.95	20.9	Clear, colorless, odorless
11:48	5	456.8	7.94	20.5	Clear, colorless, odorless
12:47	15	467.9	8.11	21.2	Clear, colorless, odorless
12:50	20	454.8	7.75	21.1	Clear, colorless, odorless
13:13	60	595.1	7.35	22.0	Clear, colorless, odorless
13:34	100	589.4	7.69	22.9	Clear, colorless, odorless
13:55	140	592.5	7.67	23.1	Clear, colorless, odorless
4/15/2022					
11:22	180	595.7	8.34	22.2	Clear, colorless, odorless
12:13	200	594.6	7.93	21.5	Clear, colorless, odorless
13:11	220	591.9	7.94	22.1	Clear, colorless, odorless
14:06	240	590.2	7.92	21.5	Clear, colorless, odorless
14:20	245	585.5	7.68	21.3	Clear, colorless, odorless
14:32	250	582.1	7.67	21.2	Clear, colorless, odorless
14:45	255	583.3	7.53	21.3	Clear, colorless, odorless
					Sampled @ 14:46

*Turbidity, color, odor, sheen, debris, etc.

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 4/20/2022
Operator: T. Mihelic
Well number and location: 30S/11E-17E8 (LA22)
Site and wellhead conditions: Sunny and breezy. Site is secure.

Static water depth (feet): 143.91
Well depth (feet): 380
Water column (feet): 236.1
Casing diameter (inches): 2
Minimum purge volume (gal) 121
Purge rate (gpm): 0.5
Pumping water level (feet): 146.76
Pump setting (feet): 150
Minimum purge time (min): --
Time begin purge: 10:07

Time	Gallons	EC (µS/cm)	pH	Temp. (°C)	Comments*
10:07	0.1	550.0	8.02	19.7	Clear, colorless, odorless
10:21	5	552.0	7.97	20.4	Clear, colorless, odorless
10:34	10	556	7.80	20.3	Clear, colorless, odorless
10:59	20	528	7.61	20.1	Clear, colorless, odorless
11:46	40	541	7.78	21.0	Clear, colorless, odorless
12:42	60	528	7.80	21.2	Clear, colorless, odorless
13:17	80	524	7.76	20.6	Clear, colorless, odorless
13:51	100	524	7.70	20.7	Clear, colorless, odorless
14:10	110	523	7.62	20.3	Clear, colorless, odorless
14:32	120	524	7.62	20.5	Clear, colorless, odorless
14:35	121	522	7.60	20.1	Clear, colorless, odorless
					Sampled @ 14:37

*Turbidity, color, odor, sheen, debris, etc.

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 4/20/2022
Operator: J. Carlson
Well number and location: 30S/11E-20H1 (LA30)
Site and wellhead conditions: Sunny and breezy, owner is present.

Static water depth (feet): 15.13
Well depth (feet): 140
Water column (feet): 124.87
Casing diameter (inches): 6
Minimum purge volume (gal) flush line
Purge rate (gpm): --
Pumping water level (feet): --
Pump setting (feet): --
Minimum purge time (min): flush line
Time begin purge: 13:08

Time	Gallons	EC (µS/cm)	pH	Temp. (°C)	Comments*
13:08	5	863.3	7.13	20.2	Clear, colorless, odorless
13:09	10	863.2	6.92	18.5	Clear, colorless, odorless
13:10	15	857.9	6.89	18.2	Clear, colorless, odorless
13:11	20	860.4	6.88	18.3	Clear, colorless, odorless
13:12	25	859.0	6.87	18.2	Clear, colorless, odorless
13:13	30	857.1	6.92	18.1	Clear, colorless, odorless
13:15	35	857.5	6.93	18.3	Clear, colorless, odorless
13:16	40	856.7	6.96	18.2	Clear, colorless, odorless
					Sampled @ 13:18

*Turbidity, color, odor, sheen, debris, etc.

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 5/11/2022
Operator: A. Berge
Well number and location: 30S/10E-13M2 (LA31)
Site and wellhead conditions: Sunny and windy. Well has been run recently.

Static water depth (feet): 36.3
Well depth (feet): --
Water column (feet): --
Casing diameter (inches): 8
Minimum purge volume (gal) flush line
Purge rate (gpm): 20
Pumping water level (feet): --
Pump setting (feet): --
Minimum purge time (min): flush line
Time begin purge: 12:28

Time	Gallons	EC (mS/cm)	pH	Temp. (°C)	Comments*
12:05	1	1.003	7.62	19	Clear, colorless, odorless
12:28	5	2.16	7.96	14.2	Clear, colorless, odorless
12:31	50	2.14	7.94	14.9	Clear, colorless, odorless
12:46		2.12	7.57	14.6	Clear, colorless, odorless
					Sampled @ 12:47

*Turbidity, color, odor, sheen, debris, etc.

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 4/13/2022
Operator: T. Mihelic
Well number and location: 30S/11E-18K9 (LA32)
Site and wellhead conditions: Sunny and breezy, site is secure. Well has been running since 6:00 PM, 4/12/2022.
Static water depth (feet): 146.3
Well depth (feet): --
Water column (feet): --
Casing diameter (inches): --
Minimum purge volume (gal) flush line
Purge rate (gpm): --
Pumping water level (feet): --
Pump setting (feet): --
Minimum purge time (min): flush line
Time begin purge: 13:20

Time	Gallons	EC (µS/cm)	pH	Temp. (°C)	Comments*
13:21	flush line	277.0	8.53	19.2	Clear, colorless, odorless
13:24	flush line	258.0	8.15	18.8	Clear, colorless, odorless
13:25	flush line	250.0	7.94	19.1	Clear, colorless, odorless
13:26	flush line	260.0	7.86	19.2	Clear, colorless, odorless
13:26	flush line	267	7.73	19.2	Clear, colorless, odorless
13:27	flush line	266	7.67	19.0	Clear, colorless, odorless
13:28	flush line		7.64	18.9	Clear, colorless, odorless
					Sampled @ 13:28

*Turbidity, color, odor, sheen, debris, etc.

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 4/13/2022
Operator: J. Carlson
Well number and location: 30S/11E-13Ba (LA40)
Site and wellhead conditions: Sunny and breezy. Site is secure.

Static water depth (feet):	7.83
Well depth (feet):	487.5
Water column (feet):	479.67
Casing diameter (inches):	2.26
Minimum purge volume (gal)	255
Purge rate (gpm):	0.6
Pumping water level (feet):	102.80
Pump setting (feet):	150
Minimum purge time (min):	--
Time begin purge:	10:14

Time	Gallons	EC (mS/cm)	pH	Temp. (°C)	Comments*
10:14	0	5.56	7.46	18.5	Clear, colorless, odorless
10:21	5	5.50	7.46	18.2	Clear, colorless, odorless
10:30	10	5.61	7.48	19.0	Clear, colorless, odorless
10:39	20	5.49	7.43	19.1	Clear, colorless, odorless
11:09	40	5.39	7.66	20.2	Clear, colorless, odorless
11:33	60	5.18	7.67	21.5	Clear, colorless, odorless
11:57	80	5.53	7.67	21.7	Clear, colorless, odorless
12:11	100	5.66	7.81	21.1	Clear, colorless, odorless
12:32	120	6.03	7.65	21.7	Clear, colorless, odorless
12:53	140	6.17	7.82	21.7	Clear, colorless, odorless
13:14	160	6.19	7.64	22.3	Clear, colorless, odorless
13:34	180	6.12	7.49	22.5	Clear, colorless, odorless
14:58	200	6.26	7.34	21.5	Clear, colorless, odorless
15:33	240	6.25	6.94	21.3	Clear, colorless, odorless
15:42	245	6.20	7.32	20.8	Clear, colorless, odorless
15:51	250	6.22	7.27	20.5	Clear, colorless, odorless
16:00	255	6.11	7.30	20.5	Clear, colorless, odorless
16:09	260	6.10	7.30	20.3	Clear, colorless, odorless
					Sampled @ 16:12

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 4/12/2022
Operator: J. Carlson
Well number and location: 30S/11E-13Bb (LA41)
Site and wellhead conditions: Sunny, cool, and breezy. Site is secure.

Static water depth (feet): 6.73
Well depth (feet): 350.00
Water column (feet): 343.27
Casing diameter (inches): 2.26
Minimum purge volume (gal) 215
Purge rate (gpm): 1.0
Pumping water level (feet): --
Pump setting (feet): 150
Minimum purge time (min): --
Time begin purge: 10:55

Time	Gallons	EC (µS/cm)	pH	Temp. (°C)	Comments*
10:55	0	674.5	7.70	19.2	Clear, colorless, slight sulfur smell
11:09	5	727.9	7.57	18.2	Clear, colorless, slight sulfur smell
11:17	10	740.3	7.32	18.9	Clear, colorless, slight sulfur smell
11:29	20	740.6	7.67	19.5	Clear, colorless, slight sulfur smell
11:56	40	712.2	7.63	21.1	Clear, colorless, slight sulfur smell
12:15	60	738.4	7.71	21.9	Clear, colorless, slight sulfur smell
12:34	80	734.0	7.46	22.3	Clear, colorless, odorless
12:53	100	735.1	7.67	22.5	Clear, colorless, odorless
13:12	120	724.1	7.63	22.5	Clear, colorless, odorless
13:29	140	728.8	7.34	22.3	Clear, colorless, odorless
13:47	160	729.1	7.04	23.6	Clear, colorless, odorless
13:55	170	726.5	7.14	22.4	Clear, colorless, odorless
14:04	180	724.7	7.39	22.3	Clear, colorless, odorless
14:12	190	725.9	7.37	22.5	Clear, colorless, odorless
14:22	200	726.2	7.28	22.4	Clear, colorless, odorless
14:30	210	724.5	7.44	22.4	Clear, colorless, odorless
14:35	215	722.6	7.25	21.9	Clear, colorless, odorless
					Sampled @ 14:37

*Turbidity, color, odor, sheen, debris, etc.

ENVIRONMENTAL AGRICULTURAL
Analytical Chemists

April 29, 2022

Lab ID : CC 2281328-001
Customer ID : 8-514

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

Sampled On : April 13, 2022-13:54
Sampled By : Andrea Berge
Received On : April 13, 2022-14:31
Matrix : Ground Water

Description : 13N (LA8)
LA 8
Project : Los Osos BMC Monitoring

Sample Result - Inorganic

Constituent	Result	PQL	Units	Note	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
General Mineral								
Total Hardness as CaCO3	106	2.5	mg/L		200.7	04/15/22:204156	200.7	04/18/22:205570
Calcium	16	1	mg/L		200.7	04/15/22:204156	200.7	04/18/22:205570
Magnesium	16	1	mg/L		200.7	04/15/22:204156	200.7	04/18/22:205570
Potassium	1	1	mg/L		200.7	04/15/22:204156	200.7	04/18/22:205570
Sodium	40	1	mg/L		200.7	04/15/22:204156	200.7	04/18/22:205570
Total Cations	3.9	---	meq/L		200.7	04/15/22:204156	200.7	04/18/22:205570
Boron	ND	0.1	mg/L		200.7	04/15/22:204156	200.7	04/18/22:205570
Copper	ND	10	ug/L		200.7	04/15/22:204156	200.7	04/18/22:205570
Iron	ND	30	ug/L		200.7	04/15/22:204156	200.7	04/18/22:205570
Manganese	ND	10	ug/L		200.7	04/15/22:204156	200.7	04/18/22:205570
Zinc	ND	20	ug/L		200.7	04/15/22:204156	200.7	04/18/22:205570
SAR	1.7	0.1	--		200.7	04/15/22:204156	200.7	04/18/22:205570
Total Alkalinity (as CaCO3)	50	10	mg/L		2320B	04/26/22:204573	2320B	04/26/22:205994
Hydroxide as OH	ND	10	mg/L		2320B	04/26/22:204573	2320B	04/26/22:205994
Carbonate as CO3	ND	10	mg/L		2320B	04/26/22:204573	2320B	04/26/22:205994
Bicarbonate as HCO3	60	10	mg/L		2320B	04/26/22:204573	2320B	04/26/22:205994
Sulfate	12.8	0.5	mg/L		300.0	04/14/22:204078	300.0	04/14/22:205417
Chloride	76	1	mg/L		300.0	04/14/22:204078	300.0	04/14/22:205417
Nitrate as NO3	32.1	0.4	mg/L		300.0	04/14/22:204078	300.0	04/14/22:205417
Nitrite as N	ND	0.2	mg/L		300.0	04/14/22:204078	300.0	04/14/22:205417
Nitrate + Nitrite as N	7.3	0.1	mg/L		300.0	04/14/22:204078	300.0	04/14/22:205417
Fluoride	ND	0.1	mg/L		300.0	04/14/22:204078	300.0	04/14/22:205417
Total Anions	3.9	---	meq/L		2320B	04/26/22:204573	2320B	04/26/22:205994
pH (Field)	8.12	---	units		4500-H B	04/13/22:204193	4500HB	04/13/22:205452
Specific Conductance	449	1	umhos/cm		2510B	04/20/22:204299	2510B	04/20/22:205612
Total Dissolved Solids	270	20	mg/L		2540CE	04/15/22:204137	2540C	04/18/22:205467
MBAS Screen	Negative	0.1	mg/L		5540C	04/15/22:204212	5540C	04/15/22:205475
Aggressiveness Index	11.4	1	--		4500-H B	04/13/22:204193	4500HB	04/13/22:205452
Langelier Index (20°C)	-0.4	1	--		4500-H B	04/13/22:204193	4500HB	04/13/22:205452
Nitrate Nitrogen	7.3	0.1	mg/L		300.0	04/14/22:204078	300.0	04/14/22:205417

ND=Non-Detected. PQL=Practical Quantitation Limit. * PQL adjusted for dilution.

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April 29, 2022

Lab ID : CC 2281328-001
Customer ID : 8-514

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

Sampled On : April 13, 2022-13:54
Sampled By : Andrea Berge
Received On : April 13, 2022-14:31
Matrix : Ground Water

Description : 13N (LA8) LA 8
Project : Los Osos BMC Monitoring

Sample Result - Support

Constituent	Result	PQL	Units	Note	Sample Preparation		Sample Analysis	
					Method	Date/ID	Method	Date/ID
Field Test								
Temperature	18.2		°C			04/13/22 13:54	2550B	04/13/22 13:54

ND=Non-Detected. PQL=Practical Quantitation Limit. * PQL adjusted for dilution.

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CA ELAP Certification No. 2810

May 4, 2022

Lab ID : CC 2281368-001
Customer ID : 8-514

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

LA 9

Description : Cabrillo
Project : Los Osos BMC Monitoring

Sampled On : April 18, 2022-10:45
Sampled By : Jerome D
Received On : April 18, 2022-14:33
Matrix : Ground Water

Sample Result - Inorganic

Constituent	Result	PQL	Units	Note	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
General Mineral								
Total Hardness as CaCO3	126	2.5	mg/L		200.7	04/21/22:204390	200.7	04/21/22:205748
Calcium	19	1	mg/L		200.7	04/21/22:204390	200.7	04/21/22:205748
Magnesium	19	1	mg/L		200.7	04/21/22:204390	200.7	04/21/22:205748
Potassium	2	1	mg/L		200.7	04/21/22:204390	200.7	04/21/22:205748
Sodium	46	1	mg/L		200.7	04/21/22:204390	200.7	04/21/22:205748
Total Cations	4.6	---	meq/L		200.7	04/21/22:204390	200.7	04/21/22:205748
Boron	ND	0.1	mg/L		200.7	04/21/22:204390	200.7	04/21/22:205748
Copper	ND	10	ug/L		200.7	04/21/22:204390	200.7	04/21/22:205748
Iron	30	30	ug/L		200.7	04/21/22:204390	200.7	04/21/22:205748
Manganese	ND	10	ug/L		200.7	04/21/22:204390	200.7	04/21/22:205748
Zinc	ND	20	ug/L		200.7	04/21/22:204390	200.7	04/21/22:205748
SAR	1.8	0.1	--		200.7	04/21/22:204390	200.7	04/21/22:205748
Total Alkalinity (as CaCO3)	60	10	mg/L		2320B	04/27/22:204634	2320B	04/27/22:206074
Hydroxide as OH	ND	10	mg/L		2320B	04/27/22:204634	2320B	04/27/22:206074
Carbonate as CO3	ND	10	mg/L		2320B	04/27/22:204634	2320B	04/27/22:206074
Bicarbonate as HCO3	70	10	mg/L		2320B	04/27/22:204634	2320B	04/27/22:206074
Sulfate	16.2	0.5	mg/L		300.0	04/19/22:204277	300.0	04/19/22:205692
Chloride	93	1	mg/L		300.0	04/19/22:204277	300.0	04/19/22:205692
Nitrate as NO3	27.6	0.4	mg/L		300.0	04/19/22:204277	300.0	04/19/22:205692
Nitrite as N	ND	0.2	mg/L		300.0	04/19/22:204277	300.0	04/19/22:205692
Nitrate + Nitrite as N	6.2	0.1	mg/L		300.0	04/19/22:204277	300.0	04/19/22:205692
Fluoride	ND	0.1	mg/L		300.0	04/19/22:204277	300.0	04/19/22:205692
Total Anions	4.6	---	meq/L		2320B	04/27/22:204634	2320B	04/27/22:206074
pH (Field)	7.23	---	units		4500-H B	04/18/22:204498	4500HB	04/18/22:205836
Specific Conductance	533	1	umhos/cm		2510B	04/22/22:204411	2510B	04/22/22:205741
Total Dissolved Solids	330	20	mg/L		2540CE	04/20/22:204344	2540C	04/21/22:205676
MBAS Screen	Negative	0.1	mg/L		5540C	04/20/22:204507	5540C	04/20/22:205845
Aggressiveness Index	10.7	1	--		4500-H B	04/18/22:204498	4500HB	04/18/22:205836
Langelier Index (20°C)	-1.2	1	--		4500-H B	04/18/22:204498	4500HB	04/18/22:205836
Nitrate Nitrogen	6.2	0.1	mg/L		300.0	04/19/22:204277	300.0	04/19/22:205692

ND=Non-Detected. PQL=Practical Quantitation Limit. * PQL adjusted for dilution.

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CA ELAP Certification No. 2810

May 4, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401
Description : Cabrillo
Project : Los Osos BMC Monitoring

LA 9

Lab ID : CC 2281368-001
Customer ID : 8-514

Sampled On : April 18, 2022-10:45
Sampled By : Jerome D
Received On : April 18, 2022-14:33
Matrix : Ground Water

Sample Result - Support

Constituent	Result	PQL	Units	Note	Sample Preparation		Sample Analysis	
					Method	Date/ID	Method	Date/ID
Field Test								
Temperature	17.7		°C			04/18/22 10:45	2550B	04/18/22 10:45
Conductivity	0.54		umhos/cm			04/18/22 10:45	2510B	04/18/22 10:45
pH (Field)	7.23		units			04/18/22 10:45	4500HB	04/18/22 10:45

ND=Non-Detected. PQL=Practical Quantitation Limit. * PQL adjusted for dilution.

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CA ELAP Certification No. 2810

May 4, 2022

Lab ID : CC 2281368-002
Customer ID : 8-514

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

Sampled On : April 18, 2022-09:30
Sampled By : Jerome D
Received On : April 18, 2022-14:33
Matrix : Ground Water

Description : 13J1 LA10 Rosina LA 10
Project : Los Osos BMC Monitoring

Sample Result - Inorganic

Constituent	Result	PQL	Units	Note	Sample Preparation		Sample Analysis	
					Method	Date/ID	Method	Date/ID
General Mineral								
Total Hardness as CaCO3	192	2.5	mg/L		200.7	04/21/22:204390	200.7	04/21/22:205748
Calcium	29	1	mg/L		200.7	04/21/22:204390	200.7	04/21/22:205748
Magnesium	29	1	mg/L		200.7	04/21/22:204390	200.7	04/21/22:205748
Potassium	1	1	mg/L		200.7	04/21/22:204390	200.7	04/21/22:205748
Sodium	37	1	mg/L		200.7	04/21/22:204390	200.7	04/21/22:205748
Total Cations	5.5	---	meq/L		200.7	04/21/22:204390	200.7	04/21/22:205748
Boron	ND	0.1	mg/L		200.7	04/21/22:204390	200.7	04/21/22:205748
Copper	ND	10	ug/L		200.7	04/21/22:204390	200.7	04/21/22:205748
Iron	660	30	ug/L		200.7	04/21/22:204390	200.7	04/21/22:205748
Manganese	ND	10	ug/L		200.7	04/21/22:204390	200.7	04/21/22:205748
Zinc	ND	20	ug/L		200.7	04/21/22:204390	200.7	04/21/22:205748
SAR	1.2	0.1	--		200.7	04/21/22:204390	200.7	04/21/22:205748
Total Alkalinity (as CaCO3)	60	10	mg/L		2320B	04/27/22:204634	2320B	04/27/22:206074
Hydroxide as OH	ND	10	mg/L		2320B	04/27/22:204634	2320B	04/27/22:206074
Carbonate as CO3	ND	10	mg/L		2320B	04/27/22:204634	2320B	04/27/22:206074
Bicarbonate as HCO3	70	10	mg/L		2320B	04/27/22:204634	2320B	04/27/22:206074
Sulfate	14.9	0.5	mg/L		300.0	04/19/22:204277	300.0	04/19/22:205692
Chloride	108	2*	mg/L		300.0	04/19/22:204277	300.0	04/19/22:205692
Nitrate as NO3	25.5	0.4	mg/L		300.0	04/19/22:204277	300.0	04/19/22:205692
Nitrite as N	ND	0.2	mg/L		300.0	04/19/22:204277	300.0	04/19/22:205692
Nitrate + Nitrite as N	5.8	0.1	mg/L		300.0	04/19/22:204277	300.0	04/19/22:205692
Fluoride	ND	0.1	mg/L		300.0	04/19/22:204277	300.0	04/19/22:205692
Total Anions	4.9	---	meq/L		2320B	04/27/22:204634	2320B	04/27/22:206074
pH (Field)	7.12	---	units		4500-H B	04/18/22:204498	4500HB	04/18/22:205836
Specific Conductance	612	1	umhos/cm		2510B	04/27/22:204631	2510B	04/27/22:205991
Total Dissolved Solids	420	20	mg/L		2540CE	04/20/22:204344	2540C	04/21/22:205676
MBAS Screen	Negative	0.1	mg/L		5540C	04/20/22:204507	5540C	04/20/22:205845
Aggressiveness Index	10.8	1	--		4500-H B	04/18/22:204498	4500HB	04/18/22:205836
Langelier Index (20°C)	-1.1	1	--		4500-H B	04/18/22:204498	4500HB	04/18/22:205836
Nitrate Nitrogen	5.8	0.1	mg/L		300.0	04/19/22:204277	300.0	04/19/22:205692

ND=Non-Detected. PQL=Practical Quantitation Limit. * PQL adjusted for dilution.

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May 4, 2022

Lab ID : CC 2281368-002
Customer ID : 8-514

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

Sampled On : April 18, 2022-09:30
Sampled By : Jerome D
Received On : April 18, 2022-14:33
Matrix : Ground Water

Description : 13J1 LA10 Rosina LA 10
Project : Los Osos BMC Monitoring

Sample Result - Support

Constituent	Result	PQL	Units	Note	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
Field Test								
Temperature	17.6		°C			04/18/22 09:30	2550B	04/18/22 09:30
Conductivity	0.66		umhos/cm			04/18/22 09:30	2510B	04/18/22 09:30
pH (Field)	7.12		units			04/18/22 09:30	4500HB	04/18/22 09:30

ND=Non-Detected. PQL=Practical Quantitation Limit. * PQL adjusted for dilution.

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April 29, 2022

Lab ID : CC 2281331-001
Customer ID : 8-514

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

Sampled On : April 13, 2022-12:20
Sampled By : Tanner Mihelic
Received On : April 13, 2022-15:40
Matrix : Ground Water

Description : 12J1 (LA11)
LA 11
Project : Los Osos BMC Monitoring

Sample Result - Inorganic

Constituent	Result	PQL	Units	Note	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
General Mineral								
Total Hardness as CaCO3	620	2.5	mg/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Calcium	90	1	mg/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Magnesium	96	1	mg/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Potassium	4	1	mg/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Sodium	87	1	mg/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Total Cations	16.3	---	meq/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Boron	0.2	0.1	mg/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Copper	ND	10	ug/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Iron	30	30	ug/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Manganese	40	10	ug/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Zinc	ND	20	ug/L		200.7	04/15/22:204156	200.7	04/15/22:205476
SAR	1.5	0.1	--		200.7	04/15/22:204156	200.7	04/15/22:205476
Total Alkalinity (as CaCO3)	270	10	mg/L		2320B	04/26/22:204573	2320B	04/26/22:205994
Hydroxide as OH	ND	10	mg/L		2320B	04/26/22:204573	2320B	04/26/22:205994
Carbonate as CO3	ND	10	mg/L		2320B	04/26/22:204573	2320B	04/26/22:205994
Bicarbonate as HCO3	330	10	mg/L		2320B	04/26/22:204573	2320B	04/26/22:205994
Sulfate	183	0.5	mg/L		300.0	04/14/22:204078	300.0	04/14/22:205417
Chloride	287	6*	mg/L		300.0	04/14/22:204078	300.0	04/15/22:205417
Nitrate as NO3	ND	0.4	mg/L		300.0	04/14/22:204078	300.0	04/14/22:205417
Nitrite as N	ND	0.2	mg/L		300.0	04/14/22:204078	300.0	04/14/22:205417
Nitrate + Nitrite as N	ND	0.1	mg/L		300.0	04/14/22:204078	300.0	04/14/22:205417
Fluoride	0.1	0.1	mg/L		300.0	04/14/22:204078	300.0	04/14/22:205417
Total Anions	17.3	---	meq/L		2320B	04/26/22:204573	2320B	04/26/22:205994
pH (Field)	7.32	---	units		4500-H B	04/13/22:204193	4500HB	04/13/22:205452
Specific Conductance	1800	1	umhos/cm		2510B	04/20/22:204299	2510B	04/20/22:205612
Total Dissolved Solids	1020	20	mg/L		2540CE	04/15/22:204137	2540C	04/18/22:205467
MBAS Screen	Negative	0.1	mg/L		5540C	04/15/22:204212	5540C	04/15/22:205475
Aggressiveness Index	12.1	1	--		4500-H B	04/13/22:204193	4500HB	04/13/22:205452
Langelier Index (20°C)	0.2	1	--		4500-H B	04/13/22:204193	4500HB	04/13/22:205452
Nitrate Nitrogen	ND	0.1	mg/L		300.0	04/14/22:204078	300.0	04/14/22:205417

ND=Non-Detected. PQL=Practical Quantitation Limit. * PQL adjusted for dilution.

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April 29, 2022

Lab ID : CC 2281331-004
Customer ID : 8-514

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

Sampled On : April 13, 2022-13:56
Sampled By : Tanner Mihelic
Received On : April 13, 2022-15:40
Matrix : Ground Water

Description : 7Q3 (LA12) LA 12
Project : Los Osos BMC Monitoring

Sample Result - Inorganic

Constituent	Result	PQL	Units	Note	Sample Preparation		Sample Analysis	
					Method	Date/ID	Method	Date/ID
General Mineral								
Total Hardness as CaCO3	276	2.5	mg/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Calcium	43	1	mg/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Magnesium	41	1	mg/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Potassium	2	1	mg/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Sodium	50	1	mg/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Total Cations	7.7	---	meq/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Boron	0.2	0.1	mg/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Copper	ND	10	ug/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Iron	40	30	ug/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Manganese	50	10	ug/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Zinc	20	20	ug/L		200.7	04/15/22:204156	200.7	04/15/22:205476
SAR	1.3	0.1	--		200.7	04/15/22:204156	200.7	04/15/22:205476
Total Alkalinity (as CaCO3)	240	10	mg/L		2320B	04/26/22:204573	2320B	04/26/22:205994
Hydroxide as OH	ND	10	mg/L		2320B	04/26/22:204573	2320B	04/26/22:205994
Carbonate as CO3	ND	10	mg/L		2320B	04/26/22:204573	2320B	04/26/22:205994
Bicarbonate as HCO3	300	10	mg/L		2320B	04/26/22:204573	2320B	04/26/22:205994
Sulfate	51.5	0.5	mg/L		300.0	04/14/22:204078	300.0	04/14/22:205417
Chloride	94	1	mg/L		300.0	04/14/22:204078	300.0	04/14/22:205417
Nitrate as NO3	ND	0.4	mg/L		300.0	04/14/22:204078	300.0	04/14/22:205417
Nitrite as N	ND	0.2	mg/L		300.0	04/14/22:204078	300.0	04/14/22:205417
Nitrate + Nitrite as N	ND	0.1	mg/L		300.0	04/14/22:204078	300.0	04/14/22:205417
Fluoride	ND	0.1	mg/L		300.0	04/14/22:204078	300.0	04/14/22:205417
Total Anions	8.6	---	meq/L		2320B	04/26/22:204573	2320B	04/26/22:205994
pH (Field)	7.38	---	units		4500-H B	04/13/22:204193	4500HB	04/13/22:205452
Specific Conductance	879	1	umhos/cm		2510B	04/19/22:204271	2510B	04/19/22:205552
Total Dissolved Solids	490	20	mg/L		2540CE	04/15/22:204137	2540C	04/18/22:205467
MBAS Screen	Negative	0.1	mg/L		5540C	04/15/22:204212	5540C	04/15/22:205475
Aggressiveness Index	11.8	1	--		4500-H B	04/13/22:204193	4500HB	04/13/22:205452
Langelier Index (20°C)	-0.07	1	--		4500-H B	04/13/22:204193	4500HB	04/13/22:205452
Nitrate Nitrogen	ND	0.1	mg/L		300.0	04/14/22:204078	300.0	04/14/22:205417

ND=Non-Detected. PQL=Practical Quantitation Limit. * PQL adjusted for dilution.

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April 29, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401
Description : 18L2 (LA15) LA 15
Project : Los Osos BMC Monitoring

Lab ID : CC 2281331-002
Customer ID : 8-514

Sampled On : April 13, 2022-13:07
Sampled By : Tanner Mihelic
Received On : April 13, 2022-15:40
Matrix : Ground Water

Sample Result - Inorganic

Constituent	Result	PQL	Units	Note	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
General Mineral								
Total Hardness as CaCO3	330	2.5	mg/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Calcium	53	1	mg/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Magnesium	48	1	mg/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Potassium	2	1	mg/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Sodium	43	1	mg/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Total Cations	8.5	---	meq/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Boron	ND	0.1	mg/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Copper	ND	10	ug/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Iron	ND	30	ug/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Manganese	ND	10	ug/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Zinc	20	20	ug/L		200.7	04/15/22:204156	200.7	04/15/22:205476
SAR	1.0	0.1	--		200.7	04/15/22:204156	200.7	04/15/22:205476
Total Alkalinity (as CaCO3)	200	10	mg/L		2320B	04/26/22:204573	2320B	04/26/22:205994
Hydroxide as OH	ND	10	mg/L		2320B	04/26/22:204573	2320B	04/26/22:205994
Carbonate as CO3	ND	10	mg/L		2320B	04/26/22:204573	2320B	04/26/22:205994
Bicarbonate as HCO3	250	10	mg/L		2320B	04/26/22:204573	2320B	04/26/22:205994
Sulfate	30.3	0.5	mg/L		300.0	04/14/22:204078	300.0	04/14/22:205417
Chloride	116	3*	mg/L		300.0	04/14/22:204078	300.0	04/15/22:205417
Nitrate as NO3	2.3	0.4	mg/L		300.0	04/14/22:204078	300.0	04/14/22:205417
Nitrite as N	ND	0.2	mg/L		300.0	04/14/22:204078	300.0	04/14/22:205417
Nitrate + Nitrite as N	0.5	0.1	mg/L		300.0	04/14/22:204078	300.0	04/14/22:205417
Fluoride	ND	0.1	mg/L		300.0	04/14/22:204078	300.0	04/14/22:205417
Total Anions	8.0	---	meq/L		2320B	04/26/22:204573	2320B	04/26/22:205994
pH (Field)	7.31	---	units		4500-H B	04/13/22:204193	4500HB	04/13/22:205452
Specific Conductance	876	1	umhos/cm		2510B	04/20/22:204299	2510B	04/20/22:205612
Total Dissolved Solids	470	20	mg/L		2540CE	04/15/22:204137	2540C	04/18/22:205467
MBAS Screen	Negative	0.1	mg/L		5540C	04/15/22:204212	5540C	04/15/22:205475
Aggressiveness Index	11.7	1	--		4500-H B	04/13/22:204193	4500HB	04/13/22:205452
Langelier Index (20°C)	-0.1	1	--		4500-H B	04/13/22:204193	4500HB	04/13/22:205452
Nitrate Nitrogen	0.5	0.1	mg/L		300.0	04/14/22:204078	300.0	04/14/22:205417

ND=Non-Detected. PQL=Practical Quantitation Limit. * PQL adjusted for dilution.

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May 10, 2022

Lab ID : CC 2281350-001
Customer ID : 8-514

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

Sampled On : April 15, 2022-14:46
Sampled By : James Carlson
Received On : April 15, 2022-15:22
Matrix : Ground Water

LA 18

Description : 18K8 (LA18)
Project : Los Osos BMC Monitoring

Sample Result - Inorganic

Constituent	Result	PQL	Units	Note	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
General Mineral								
Total Hardness as CaCO3	257	2.5	mg/L		200.7	04/18/22:204254	200.7	04/18/22:205570
Calcium	52	1	mg/L		200.7	04/18/22:204254	200.7	04/18/22:205570
Magnesium	31	1	mg/L		200.7	04/18/22:204254	200.7	04/18/22:205570
Potassium	2	1	mg/L		200.7	04/18/22:204254	200.7	04/18/22:205570
Sodium	25	1	mg/L		200.7	04/18/22:204254	200.7	04/18/22:205570
Total Cations	6.3	---	meq/L		200.7	04/18/22:204254	200.7	04/18/22:205570
Boron	ND	0.1	mg/L		200.7	04/18/22:204254	200.7	04/18/22:205570
Copper	ND	10	ug/L		200.7	04/18/22:204254	200.7	04/18/22:205570
Iron	ND	30	ug/L		200.7	04/18/22:204254	200.7	04/18/22:205570
Manganese	80	10	ug/L		200.7	04/18/22:204254	200.7	04/18/22:205570
Zinc	ND	20	ug/L		200.7	04/18/22:204254	200.7	04/18/22:205570
SAR	0.7	0.1	--		200.7	04/18/22:204254	200.7	04/18/22:205570
Total Alkalinity (as CaCO3)	240	10	mg/L		2320B	04/27/22:204634	2320B	04/27/22:206074
Hydroxide as OH	ND	10	mg/L		2320B	04/27/22:204634	2320B	04/27/22:206074
Carbonate as CO3	ND	10	mg/L		2320B	04/27/22:204634	2320B	04/27/22:206074
Bicarbonate as HCO3	290	10	mg/L		2320B	04/27/22:204634	2320B	04/27/22:206074
Sulfate	36.5	0.5	mg/L		300.0	04/19/22:204277	300.0	04/19/22:205692
Chloride	31	1	mg/L		300.0	04/19/22:204277	300.0	04/19/22:205692
Nitrate as NO3	ND	0.2	mg/L		4500NO3F	04/19/22:204293	4500NO3F	04/19/22:205603
Nitrite as N	ND	0.1	mg/L		4500NO2B	04/16/22:204300	4500NO2B	04/16/22:205590
Nitrate + Nitrite as N	ND	0.2	mg/L		4500NO3F	04/19/22:204293	4500NO3F	04/19/22:205603
Fluoride	0.4	0.1	mg/L		300.0	04/19/22:204277	300.0	04/19/22:205692
Total Anions	6.4	---	meq/L		2320B	04/27/22:204634	2320B	04/27/22:206074
pH	8.3	---	units		4500-H B	05/04/22:204891	4500HB	05/04/22:206372
Specific Conductance	638	1	umhos/cm		2510B	04/27/22:204602	2510B	04/27/22:205914
Total Dissolved Solids	420	20	mg/L		2540CE	04/19/22:204275	2540C	04/20/22:205628
MBAS Screen	Negative	0.1	mg/L		5540C	04/16/22:204221	5540C	04/16/22:205477
Aggressiveness Index	12.8	1	--		4500-H B	05/04/22:204891	4500HB	05/04/22:206372
Langelier Index (20°C)	0.9	1	--		4500-H B	05/04/22:204891	4500HB	05/04/22:206372
Nitrate Nitrogen	ND	0.2	mg/L		4500NO3F	04/19/22:204293	4500NO3F	04/19/22:205603

ND=Non-Detected. PQL=Practical Quantitation Limit. * PQL adjusted for dilution.

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May 4, 2022

Lab ID : CC 2281368-003
Customer ID : 8-514

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

Sampled On : April 18, 2022-10:00
Sampled By : Jerome D
Received On : April 18, 2022-14:33
Matrix : Ground Water

Description : 17N10 LA20 South Bay LA 20
Project : Los Osos BMC Monitoring

Sample Result - Inorganic

Constituent	Result	PQL	Units	Note	Sample Preparation		Sample Analysis	
					Method	Date/ID	Method	Date/ID
General Mineral								
Total Hardness as CaCO3	242	2.5	mg/L		200.7	04/21/22:204390	200.7	04/21/22:205748
Calcium	36	1	mg/L		200.7	04/21/22:204390	200.7	04/21/22:205748
Magnesium	37	1	mg/L		200.7	04/21/22:204390	200.7	04/21/22:205748
Potassium	2	1	mg/L		200.7	04/21/22:204390	200.7	04/21/22:205748
Sodium	42	1	mg/L		200.7	04/21/22:204390	200.7	04/21/22:205748
Total Cations	6.7	---	meq/L		200.7	04/21/22:204390	200.7	04/21/22:205748
Boron	0.1	0.1	mg/L		200.7	04/21/22:204390	200.7	04/21/22:205748
Copper	ND	10	ug/L		200.7	04/21/22:204390	200.7	04/21/22:205748
Iron	ND	30	ug/L		200.7	04/21/22:204390	200.7	04/21/22:205748
Manganese	ND	10	ug/L		200.7	04/21/22:204390	200.7	04/21/22:205748
Zinc	ND	20	ug/L		200.7	04/21/22:204390	200.7	04/21/22:205748
SAR	1.2	0.1	--		200.7	04/21/22:204390	200.7	04/21/22:205748
Total Alkalinity (as CaCO3)	230	10	mg/L		2320B	04/27/22:204634	2320B	04/27/22:206074
Hydroxide as OH	ND	10	mg/L		2320B	04/27/22:204634	2320B	04/27/22:206074
Carbonate as CO3	ND	10	mg/L		2320B	04/27/22:204634	2320B	04/27/22:206074
Bicarbonate as HCO3	280	10	mg/L		2320B	04/27/22:204634	2320B	04/27/22:206074
Sulfate	26.6	0.5	mg/L		300.0	04/19/22:204277	300.0	04/19/22:205692
Chloride	39	1	mg/L		300.0	04/19/22:204277	300.0	04/19/22:205692
Nitrate as NO3	3.0	0.4	mg/L		300.0	04/19/22:204277	300.0	04/19/22:205692
Nitrite as N	ND	0.2	mg/L		300.0	04/19/22:204277	300.0	04/19/22:205692
Nitrate + Nitrite as N	0.7	0.1	mg/L		300.0	04/19/22:204277	300.0	04/19/22:205692
Fluoride	0.1	0.1	mg/L		300.0	04/19/22:204277	300.0	04/19/22:205692
Total Anions	6.3	---	meq/L		2320B	04/27/22:204634	2320B	04/27/22:206074
pH (Field)	7.43	---	units		4500-H B	04/18/22:204498	4500HB	04/18/22:205836
Specific Conductance	636	1	umhos/cm		2510B	04/27/22:204631	2510B	04/27/22:205991
Total Dissolved Solids	360	20	mg/L		2540CE	04/20/22:204344	2540C	04/21/22:205676
MBAS Screen	Negative	0.1	mg/L		5540C	04/20/22:204507	5540C	04/20/22:205845
Aggressiveness Index	11.7	1	--		4500-H B	04/18/22:204498	4500HB	04/18/22:205836
Langelier Index (20°C)	-0.1	1	--		4500-H B	04/18/22:204498	4500HB	04/18/22:205836
Nitrate Nitrogen	0.7	0.1	mg/L		300.0	04/19/22:204277	300.0	04/19/22:205692

ND=Non-Detected. PQL=Practical Quantitation Limit. * PQL adjusted for dilution.

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CA ELAP Certification No. 2810

May 4, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401
Description : 17N10 LA20 South Bay
Project : Los Osos BMC Monitoring

LA 20

Lab ID : CC 2281368-003
Customer ID : 8-514

Sampled On : April 18, 2022-10:00
Sampled By : Jerome D
Received On : April 18, 2022-14:33
Matrix : Ground Water

Sample Result - Support

Constituent	Result	PQL	Units	Note	Sample Preparation		Sample Analysis	
					Method	Date/ID	Method	Date/ID
Field Test								
Temperature	18.4		°C			04/18/22 10:00	2550B	04/18/22 10:00
Conductivity	0.68		umhos/cm			04/18/22 10:00	2510B	04/18/22 10:00
pH (Field)	7.43		units			04/18/22 10:00	4500HB	04/18/22 10:00

ND=Non-Detected. PQL=Practical Quantitation Limit. * PQL adjusted for dilution.

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May 10, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401
Description : 17E8 (LA22)
Project : Los Osos BMC Monitoring

LA 22

Lab ID : CC 2281406-001
Customer ID : 8-514

Sampled On : April 20, 2022-14:37
Sampled By : Tanner Mihelic
Received On : April 20, 2022-15:34
Matrix : Ground Water

Sample Result - Inorganic

Constituent	Result	PQL	Units	Note	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
General Mineral								
Total Hardness as CaCO3	178	2.5	mg/L		200.7	04/22/22:204433	200.7	04/22/22:205876
Calcium	27	1	mg/L		200.7	04/22/22:204433	200.7	04/22/22:205876
Magnesium	27	1	mg/L		200.7	04/22/22:204433	200.7	04/22/22:205876
Potassium	1	1	mg/L		200.7	04/22/22:204433	200.7	04/22/22:205876
Sodium	29	1	mg/L		200.7	04/22/22:204433	200.7	04/22/22:205876
Total Cations	4.9	---	meq/L		200.7	04/22/22:204433	200.7	04/22/22:205876
Boron	ND	0.1	mg/L		200.7	04/22/22:204433	200.7	04/22/22:205876
Copper	ND	10	ug/L		200.7	04/22/22:204433	200.7	04/22/22:205876
Iron	ND	30	ug/L		200.7	04/22/22:204433	200.7	04/22/22:205876
Manganese	ND	10	ug/L		200.7	04/22/22:204433	200.7	04/22/22:205876
Zinc	30	20	ug/L		200.7	04/22/22:204433	200.7	04/22/22:205876
SAR	0.9	0.1	--		200.7	04/22/22:204433	200.7	04/22/22:205876
Total Alkalinity (as CaCO3)	130	10	mg/L		2320B	05/03/22:204849	2320B	05/03/22:206385
Hydroxide as OH	ND	10	mg/L		2320B	05/03/22:204849	2320B	05/03/22:206385
Carbonate as CO3	ND	10	mg/L		2320B	05/03/22:204849	2320B	05/03/22:206385
Bicarbonate as HCO3	160	10	mg/L		2320B	05/03/22:204849	2320B	05/03/22:206385
Sulfate	14.6	0.5	mg/L		300.0	04/21/22:204365	300.0	04/21/22:205772
Chloride	43	1	mg/L		300.0	04/21/22:204365	300.0	04/21/22:205772
Nitrate as NO3	32.8	0.4	mg/L		300.0	04/21/22:204365	300.0	04/21/22:205772
Nitrite as N	ND	0.2	mg/L		300.0	04/21/22:204365	300.0	04/21/22:205772
Nitrate + Nitrite as N	7.4	0.1	mg/L		300.0	04/21/22:204365	300.0	04/21/22:205772
Fluoride	ND	0.1	mg/L		300.0	04/21/22:204365	300.0	04/21/22:205772
Total Anions	4.7	---	meq/L		2320B	05/03/22:204849	2320B	05/03/22:206385
pH (Field)	7.6	---	units		4500-H B	04/20/22:204498	4500HB	04/20/22:205836
Specific Conductance	518	1	umhos/cm		2510B	04/28/22:204655	2510B	04/28/22:206050
Total Dissolved Solids	320	20	mg/L		2540CE	04/22/22:204412	2540C	04/25/22:205849
MBAS Screen	Negative	0.1	mg/L		5540C	04/22/22:204521	5540C	04/22/22:205852
Aggressiveness Index	11.5	1	--		4500-H B	04/20/22:204498	4500HB	04/20/22:205836
Langelier Index (20°C)	-0.3	1	--		4500-H B	04/20/22:204498	4500HB	04/20/22:205836
Nitrate Nitrogen	7.4	0.1	mg/L		300.0	04/21/22:204365	300.0	04/21/22:205772

ND=Non-Detected. PQL=Practical Quantitation Limit. * PQL adjusted for dilution.

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May 10, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401
Description : 20HI (LA30)
Project : Los Osos BMC Monitoring

LA 30

Lab ID : CC 2281407-001
Customer ID : 8-514

Sampled On : April 20, 2022-13:18
Sampled By : James Carlson
Received On : April 20, 2022-15:34
Matrix : Ground Water

Sample Result - Inorganic

Constituent	Result	PQL	Units	Note	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
General Mineral								
Total Hardness as CaCO3	407	2.5	mg/L		200.7	04/22/22:204433	200.7	04/22/22:205876
Calcium	66	1	mg/L		200.7	04/22/22:204433	200.7	04/22/22:205876
Magnesium	59	1	mg/L		200.7	04/22/22:204433	200.7	04/22/22:205876
Potassium	1	1	mg/L		200.7	04/22/22:204433	200.7	04/22/22:205876
Sodium	39	1	mg/L		200.7	04/22/22:204433	200.7	04/22/22:205876
Total Cations	9.9	---	meq/L		200.7	04/22/22:204433	200.7	04/22/22:205876
Boron	0.1	0.1	mg/L		200.7	04/22/22:204433	200.7	04/22/22:205876
Copper	ND	10	ug/L		200.7	04/22/22:204433	200.7	04/22/22:205876
Iron	440	30	ug/L		200.7	04/22/22:204433	200.7	04/22/22:205876
Manganese	200	10	ug/L		200.7	04/22/22:204433	200.7	04/22/22:205876
Zinc	ND	20	ug/L		200.7	04/22/22:204433	200.7	04/22/22:205876
SAR	0.8	0.1	--		200.7	04/22/22:204433	200.7	04/22/22:205876
Total Alkalinity (as CaCO3)	320	10	mg/L		2320B	05/03/22:204849	2320B	05/03/22:206385
Hydroxide as OH	ND	10	mg/L		2320B	05/03/22:204849	2320B	05/03/22:206385
Carbonate as CO3	ND	10	mg/L		2320B	05/03/22:204849	2320B	05/03/22:206385
Bicarbonate as HCO3	400	10	mg/L		2320B	05/03/22:204849	2320B	05/03/22:206385
Sulfate	97.3	0.5	mg/L		300.0	04/21/22:204365	300.0	04/21/22:205772
Chloride	55	1	mg/L		300.0	04/21/22:204365	300.0	04/21/22:205772
Nitrate as NO3	ND	0.4	mg/L		300.0	04/21/22:204365	300.0	04/21/22:205772
Nitrite as N	ND	0.2	mg/L		300.0	04/21/22:204365	300.0	04/21/22:205772
Nitrate + Nitrite as N	ND	0.1	mg/L		300.0	04/21/22:204365	300.0	04/21/22:205772
Fluoride	0.2	0.1	mg/L		300.0	04/21/22:204365	300.0	04/21/22:205772
Total Anions	10.1	---	meq/L		2320B	05/03/22:204849	2320B	05/03/22:206385
pH (Field)	6.99	---	units		4500-H B	04/20/22:204498	4500HB	04/20/22:205836
Specific Conductance	976	1	umhos/cm		2510B	04/28/22:204655	2510B	04/28/22:206050
Total Dissolved Solids	600	20	mg/L		2540CE	04/22/22:204412	2540C	04/25/22:205849
MBAS Screen	Negative	0.1	mg/L		5540C	04/22/22:204521	5540C	04/22/22:205852
Aggressiveness Index	11.7	1	--		4500-H B	04/20/22:204498	4500HB	04/20/22:205836
Langelier Index (20°C)	-0.2	1	--		4500-H B	04/20/22:204498	4500HB	04/20/22:205836
Nitrate Nitrogen	ND	0.1	mg/L		300.0	04/21/22:204365	300.0	04/21/22:205772

ND=Non-Detected. PQL=Practical Quantitation Limit. * PQL adjusted for dilution.

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ENVIRONMENTAL FGL AGRICULTURAL
Analytical Chemists

June 7, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

Description : 13M2 (LA31) LA 31
Project : Los Osos BMC Monitoring

Lab No. : CC 2281650-001
Customer No. : 8000514

Sampled On : May 11, 2022 at 12:47
Sampled By : Andrea Berge
Received On : May 11, 2022 at 13:45
Matrix : Ground Water

Sample Results - Inorganic

Constituent	Result	RL	Units	Note	Dil.	DQF	Sample Preparation			Sample Analysis			
General Mineral							Date	Time	Who	Method	Date	Time	Who
Total Hardness as CaCO3	388	2.5	mg/L		1		05/18/2022	10:00	ac	EPA 200.7	05/18/2022	17:30	ac
Calcium	60	1	mg/L		1		05/18/2022	10:00	ac	EPA 200.7	05/18/2022	17:30	ac
Magnesium	58	1	mg/L		1		05/18/2022	10:00	ac	EPA 200.7	05/18/2022	17:30	ac
Potassium	3	1	mg/L		1		05/18/2022	10:00	ac	EPA 200.7	05/18/2022	17:30	ac
Sodium	303	1	mg/L		1		05/18/2022	10:00	ac	EPA 200.7	05/18/2022	17:30	ac
Total Cations	21.0	---	meq/L		1		05/18/2022	10:00	ac	EPA 200.7	05/18/2022	17:30	ac
Boron	0.1	0.1	mg/L		1		05/18/2022	10:00	ac	EPA 200.7	05/18/2022	17:30	ac
Copper	ND	10	ug/L		1	J	05/18/2022	10:00	ac	EPA 200.7	05/18/2022	17:30	ac
Iron	110	30	ug/L		1		05/18/2022	10:00	ac	EPA 200.7	05/18/2022	17:30	ac
Manganese	ND	10	ug/L		1	J	05/18/2022	10:00	ac	EPA 200.7	05/18/2022	17:30	ac
Zinc	40	20	ug/L		1		05/18/2022	10:00	ac	EPA 200.7	05/18/2022	17:30	ac
SAR	6.7	0.1	--		1		05/18/2022	10:00	ac	EPA 200.7	05/18/2022	17:30	ac
Total Alkalinity (as CaCO3)	50	10	mg/L		1		05/23/2022	13:08	amm	SM 2320 B	05/23/2022	17:10	amm
Hydroxide as OH	ND	10	mg/L		1	UI	05/23/2022	13:08	amm	SM 2320 B	05/23/2022	17:10	amm
Carbonate as CO3	ND	10	mg/L		1	UI	05/23/2022	13:08	amm	SM 2320 B	05/23/2022	17:10	amm
Bicarbonate as HCO3	70	10	mg/L		1		05/23/2022	13:08	amm	SM 2320 B	05/23/2022	17:10	amm
Sulfate	134	0.5	mg/L		1		05/12/2022	13:19	njb	EPA 300.0	05/12/2022	15:19	njb
Chloride	578	14*	mg/L		14		05/12/2022	13:19	njb	EPA 300.0	05/13/2022	03:17	njb
Nitrate as NO3	2.7	0.4	mg/L		1		05/12/2022	13:19	njb	EPA 300.0	05/12/2022	15:19	njb
Nitrite as N	ND	0.1	mg/L		1	U	05/12/2022	13:19	njb	EPA 300.0	05/12/2022	15:19	njb
Nitrate + Nitrite as N	0.6	0.1	mg/L		1		05/12/2022	13:19	njb	EPA 300.0	05/12/2022	15:19	njb
Fluoride	ND	0.1	mg/L		1	J	05/12/2022	13:19	njb	EPA 300.0	05/12/2022	15:19	njb
Total Anions	20.3	---	meq/L		1	IJ	05/23/2022	13:08	amm	SM 2320 B	05/23/2022	17:10	amm
pH	7.57	---	units		1		05/11/2022	12:47	ab	SM 4500-H+B	05/11/2022	12:47	ab
Specific Conductance	2550	1	umhos/cm		1		05/17/2022	10:08	sta	SM 2510 B	05/17/2022	10:08	sta
Total Dissolved Solids	1540	20	mg/L		1		05/13/2022	11:01	ctl	SM 2540 C	05/16/2022	13:37	ctl
MBAS (foaming agents)	Negative	0.1	mg/L		1	U	05/13/2022	05:25	jba	SM 5540 C	05/13/2022	05:29	jba
Aggressiveness Index	11.4	1	--		1		05/11/2022	12:47	ab	SM 4500-H+B	05/11/2022	12:47	ab
Langelier Index (20°C)	-0.5	1	--		1		05/11/2022	12:47	ab	SM 4500-H+B	05/11/2022	12:47	ab
Nitrate Nitrogen	0.6	0.1	mg/L		1		05/12/2022	13:19	njb	EPA 300.0	05/12/2022	15:19	njb

DQF Flags Definition:
J Reported value is estimated; detected at a concentration below the PQL and above the laboratory MDL.
U Constituent results were non-detect.
I The RPD for the laboratory duplicate exceeded laboratory criteria.

ND=Non-Detected, RL=Reporting Level * RL adusted for dilution, Dil.=Dilution

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June 7, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

Description : 13M2 (LA31) LA 31
Project : Los Osos BMC Monitoring

Lab No. : CC 2281650-001
Customer No. : 8000514

Sampled On : May 11, 2022 at 12:47
Sampled By : Andrea Berge
Received On : May 11, 2022 at 13:45
Matrix : Ground Water

Sample Results - Field Test

Constituent	Result	RL	Units	Note	Sample Preparation	Sample Analysis	
Field Test					Date	Method	Date
Temperature	14.6		°C		05/11/2022 12:47	2550B	05/11/2022 12:47
Conductivity	2.12		umhos/cm		05/11/2022 12:47	2510B	05/11/2022 12:47

ND=Non-Detected, RL=Reporting Level. * RL adusted for dilution

Page 3 of 6

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April 29, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401
Description : 18K9 (LA32)
Project : Los Osos BMC Monitoring

LA 32

Lab ID : CC 2281331-003
Customer ID : 8-514

Sampled On : April 13, 2022-13:28
Sampled By : Tanner Mihelic
Received On : April 13, 2022-15:40
Matrix : Ground Water

Sample Result - Inorganic

Constituent	Result	PQL	Units	Note	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
General Mineral								
Total Hardness as CaCO3	66.1	2.5	mg/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Calcium	10	1	mg/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Magnesium	10	1	mg/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Potassium	ND	1	mg/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Sodium	20	1	mg/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Total Cations	2.2	---	meq/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Boron	ND	0.1	mg/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Copper	20	20*	ug/L		200.7	04/15/22:204156	200.7	04/18/22:205570
Iron	ND	30	ug/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Manganese	ND	10	ug/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Zinc	70	20	ug/L		200.7	04/15/22:204156	200.7	04/15/22:205476
SAR	1.1	0.1	--		200.7	04/15/22:204156	200.7	04/15/22:205476
Total Alkalinity (as CaCO3)	60	10	mg/L		2320B	04/26/22:204573	2320B	04/26/22:205994
Hydroxide as OH	ND	10	mg/L		2320B	04/26/22:204573	2320B	04/26/22:205994
Carbonate as CO3	ND	10	mg/L		2320B	04/26/22:204573	2320B	04/26/22:205994
Bicarbonate as HCO3	70	10	mg/L		2320B	04/26/22:204573	2320B	04/26/22:205994
Sulfate	5.2	0.5	mg/L		300.0	04/14/22:204078	300.0	04/14/22:205417
Chloride	30	1	mg/L		300.0	04/14/22:204078	300.0	04/14/22:205417
Nitrate as NO3	16.9	0.4	mg/L		300.0	04/14/22:204078	300.0	04/14/22:205417
Nitrite as N	ND	0.2	mg/L		300.0	04/14/22:204078	300.0	04/14/22:205417
Nitrate + Nitrite as N	3.8	0.1	mg/L		300.0	04/14/22:204078	300.0	04/14/22:205417
Fluoride	ND	0.1	mg/L		300.0	04/14/22:204078	300.0	04/14/22:205417
Total Anions	2.4	---	meq/L		2320B	04/26/22:204573	2320B	04/26/22:205994
pH (Field)	7.64	---	units		4500-H B	04/13/22:204193	4500HB	04/13/22:205452
Specific Conductance	262	1	umhos/cm		2510B	04/20/22:204299	2510B	04/20/22:205612
Total Dissolved Solids	150	20	mg/L		2540CE	04/15/22:204137	2540C	04/18/22:205467
MBAS Screen	Negative	0.1	mg/L		5540C	04/15/22:204212	5540C	04/15/22:205475
Aggressiveness Index	10.8	1	--		4500-H B	04/13/22:204193	4500HB	04/13/22:205452
Langelier Index (20°C)	-1.0	1	--		4500-H B	04/13/22:204193	4500HB	04/13/22:205452
Nitrate Nitrogen	3.8	0.1	mg/L		300.0	04/14/22:204078	300.0	04/14/22:205417

ND=Non-Detected. PQL=Practical Quantitation Limit. * PQL adjusted for dilution.

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May 4, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401
Description : Los Olivos 5
Project : Los Osos BMC Monitoring

LA 39

Lab ID : CC 2281368-004
Customer ID : 8-514

Sampled On : April 18, 2022-08:10
Sampled By : Jerome D
Received On : April 18, 2022-14:33
Matrix : Ground Water

Sample Result - Inorganic

Constituent	Result	PQL	Units	Note	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
General Mineral								
Total Hardness as CaCO3	209	2.5	mg/L		200.7	04/21/22:204390	200.7	04/21/22:205748
Calcium	31	1	mg/L		200.7	04/21/22:204390	200.7	04/21/22:205748
Magnesium	32	1	mg/L		200.7	04/21/22:204390	200.7	04/21/22:205748
Potassium	2	1	mg/L		200.7	04/21/22:204390	200.7	04/21/22:205748
Sodium	34	1	mg/L		200.7	04/21/22:204390	200.7	04/21/22:205748
Total Cations	5.7	---	meq/L		200.7	04/21/22:204390	200.7	04/21/22:205748
Boron	ND	0.1	mg/L		200.7	04/21/22:204390	200.7	04/21/22:205748
Copper	ND	10	ug/L		200.7	04/21/22:204390	200.7	04/21/22:205748
Iron	50	30	ug/L		200.7	04/21/22:204390	200.7	04/21/22:205748
Manganese	ND	10	ug/L		200.7	04/21/22:204390	200.7	04/21/22:205748
Zinc	ND	20	ug/L		200.7	04/21/22:204390	200.7	04/21/22:205748
SAR	1.0	0.1	--		200.7	04/21/22:204390	200.7	04/21/22:205748
Total Alkalinity (as CaCO3)	210	10	mg/L		2320B	04/27/22:204634	2320B	04/27/22:206074
Hydroxide as OH	ND	10	mg/L		2320B	04/27/22:204634	2320B	04/27/22:206074
Carbonate as CO3	ND	10	mg/L		2320B	04/27/22:204634	2320B	04/27/22:206074
Bicarbonate as HCO3	250	10	mg/L		2320B	04/27/22:204634	2320B	04/27/22:206074
Sulfate	17.8	0.5	mg/L		300.0	04/19/22:204277	300.0	04/19/22:205692
Chloride	34	1	mg/L		300.0	04/19/22:204277	300.0	04/19/22:205692
Nitrate as NO3	0.4	0.4	mg/L		300.0	04/19/22:204277	300.0	04/19/22:205692
Nitrite as N	ND	0.2	mg/L		300.0	04/19/22:204277	300.0	04/19/22:205692
Nitrate + Nitrite as N	ND	0.1	mg/L		300.0	04/19/22:204277	300.0	04/19/22:205692
Fluoride	ND	0.1	mg/L		300.0	04/19/22:204277	300.0	04/19/22:205692
Total Anions	5.4	---	meq/L		2320B	04/27/22:204634	2320B	04/27/22:206074
pH (Field)	7.64	---	units		4500-H B	04/18/22:204498	4500HB	04/18/22:205836
Specific Conductance	561	1	umhos/cm		2510B	04/27/22:204631	2510B	04/27/22:205991
Total Dissolved Solids	330	20	mg/L		2540CE	04/20/22:204344	2540C	04/21/22:205676
MBAS Screen	Negative	0.1	mg/L		5540C	04/20/22:204507	5540C	04/20/22:205845
Aggressiveness Index	11.9	1	--		4500-H B	04/18/22:204498	4500HB	04/18/22:205836
Langelier Index (20°C)	0.006	1	--		4500-H B	04/18/22:204498	4500HB	04/18/22:205836
Nitrate Nitrogen	ND	0.1	mg/L		300.0	04/19/22:204277	300.0	04/19/22:205692

ND=Non-Detected. PQL=Practical Quantitation Limit. * PQL adjusted for dilution.

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May 4, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401
Description : Los Olivos 5 LA 39
Project : Los Osos BMC Monitoring

Lab ID : CC 2281368-004
Customer ID : 8-514

Sampled On : April 18, 2022-08:10
Sampled By : Jerome D
Received On : April 18, 2022-14:33
Matrix : Ground Water

Sample Result - Support

Constituent	Result	PQL	Units	Note	Sample Preparation		Sample Analysis	
					Method	Date/ID	Method	Date/ID
Field Test								
Temperature	17.1		°C			04/18/22 08:10	2550B	04/18/22 08:10
Conductivity	0.61		umhos/cm			04/18/22 08:10	2510B	04/18/22 08:10
pH (Field)	7.64		units			04/18/22 08:10	4500HB	04/18/22 08:10

ND=Non-Detected. PQL=Practical Quantitation Limit. * PQL adjusted for dilution.

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May 4, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401
Description : 13 Ba (LA40) LA 40
Project : Los Osos BMC Monitoring

Lab ID : CC 2281332-001
Customer ID : 8-514

Sampled On : April 13, 2022-16:12
Sampled By : James Carlson
Received On : April 14, 2022-09:24
Matrix : Ground Water

Sample Result - Inorganic

Constituent	Result	PQL	Units	Note	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
General Mineral								
Total Hardness as CaCO3	3780	2.5	mg/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Calcium	523	1	mg/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Magnesium	601	5*	mg/L		200.7	04/15/22:204156	200.7	04/19/22:205618
Potassium	6	1	mg/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Sodium	178	1	mg/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Total Cations	83.4	---	meq/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Boron	ND	0.1	mg/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Copper	ND	10	ug/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Iron	30	30	ug/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Manganese	500	10	ug/L		200.7	04/15/22:204156	200.7	04/15/22:205476
Zinc	30	20	ug/L		200.7	04/15/22:204156	200.7	04/15/22:205476
SAR	1.3	0.1	--		200.7	04/15/22:204156	200.7	04/15/22:205476
Total Alkalinity (as CaCO3)	220	10	mg/L		2320B	04/26/22:204573	2320B	04/26/22:205994
Hydroxide as OH	ND	10	mg/L		2320B	04/26/22:204573	2320B	04/26/22:205994
Carbonate as CO3	ND	10	mg/L		2320B	04/26/22:204573	2320B	04/26/22:205994
Bicarbonate as HCO3	270	10	mg/L		2320B	04/26/22:204573	2320B	04/26/22:205994
Sulfate	187	2.5*	mg/L		300.0	05/02/22:204780	300.0	05/02/22:206298
Chloride	2410	50*	mg/L		300.0	05/02/22:204780	300.0	05/03/22:206298
Nitrate as NO3	ND	0.2	mg/L		4500NO3F	04/15/22:204164	4500NO3F	04/15/22:205430
Nitrite as N	ND	0.2	mg/L		4500NO3F	04/15/22:204165	4500NO3F	04/15/22:205425
Nitrate + Nitrite as N	ND	0.2	mg/L		4500NO3F	04/15/22:204164	4500NO3F	04/15/22:205430
Fluoride	ND	0.5*	mg/L		300.0	05/02/22:204780	300.0	05/02/22:206298
Total Anions	76.3	---	meq/L		2320B	04/26/22:204573	2320B	04/26/22:205994
pH (Field)	7.3	---	units		4500-H B	04/13/22:204193	4500HB	04/13/22:205452
Specific Conductance	8790	1	umhos/cm		2510B	04/20/22:204299	2510B	04/20/22:205612
Total Dissolved Solids	6790	20*	mg/L		2540CE	04/18/22:204205	2540C	04/19/22:205564
MBAS Screen	Negative	0.1	mg/L		5540C	04/15/22:204212	5540C	04/15/22:205475
Aggressiveness Index	12.8	1	--		4500-H B	04/13/22:204193	4500HB	04/13/22:205452
Langelier Index (20°C)	0.8	1	--		4500-H B	04/13/22:204193	4500HB	04/13/22:205452
Nitrate Nitrogen	ND	0.2	mg/L		4500NO3F	04/15/22:204164	4500NO3F	04/15/22:205430

ND=Non-Detected. PQL=Practical Quantitation Limit. * PQL adjusted for dilution.

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May 4, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401
Description : 13 Ba (LA40) LA 40
Project : Los Osos BMC Monitoring

Lab ID : CC 2281332-001
Customer ID : 8-514

Sampled On : April 13, 2022-16:12
Sampled By : James Carlson
Received On : April 14, 2022-09:24
Matrix : Ground Water

Sample Result - Support

Constituent	Result	PQL	Units	Note	Sample Preparation		Sample Analysis	
					Method	Date/ID	Method	Date/ID
Field Test								
pH (Field)	7.30		units			04/13/22 16:12	4500HB	04/13/22 16:12

ND=Non-Detected. PQL=Practical Quantitation Limit. * PQL adjusted for dilution.

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April 27, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401
Description : 13Bb (LA41) LA 41
Project : Los Osos BMC Monitoring

Lab ID : CC 2281298-001
Customer ID : 8-514

Sampled On : April 12, 2022-14:37
Sampled By : James C
Received On : April 12, 2022-15:30
Matrix : Ground Water

Sample Result - Inorganic

Constituent	Result	PQL	Units	Note	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
General Mineral								
Total Hardness as CaCO3	309	2.5	mg/L		200.7	04/14/22:204098	200.7	04/14/22:205370
Calcium	58	1	mg/L		200.7	04/14/22:204098	200.7	04/14/22:205370
Magnesium	40	1	mg/L		200.7	04/14/22:204098	200.7	04/14/22:205370
Potassium	2	1	mg/L		200.7	04/14/22:204098	200.7	04/14/22:205370
Sodium	58	1	mg/L		200.7	04/14/22:204098	200.7	04/14/22:205370
Total Cations	8.8	---	meq/L		200.7	04/14/22:204098	200.7	04/14/22:205370
Boron	ND	0.1	mg/L		200.7	04/14/22:204098	200.7	04/14/22:205370
Copper	ND	10	ug/L		200.7	04/14/22:204098	200.7	04/14/22:205370
Iron	220	30	ug/L		200.7	04/14/22:204098	200.7	04/14/22:205370
Manganese	90	10	ug/L		200.7	04/14/22:204098	200.7	04/14/22:205370
Zinc	ND	20	ug/L		200.7	04/14/22:204098	200.7	04/14/22:205370
SAR	1.4	0.1	--		200.7	04/14/22:204098	200.7	04/14/22:205370
Total Alkalinity (as CaCO3)	270	10	mg/L		2320B	04/25/22:204539	2320B	04/25/22:205896
Hydroxide as OH	ND	10	mg/L		2320B	04/25/22:204539	2320B	04/25/22:205896
Carbonate as CO3	ND	10	mg/L		2320B	04/25/22:204539	2320B	04/25/22:205896
Bicarbonate as HCO3	330	10	mg/L		2320B	04/25/22:204539	2320B	04/25/22:205896
Sulfate	66.5	0.5	mg/L		300.0	04/13/22:204038	300.0	04/13/22:205325
Chloride	47	1	mg/L		300.0	04/13/22:204038	300.0	04/13/22:205325
Nitrate as NO3	ND	0.4	mg/L		300.0	04/13/22:204038	300.0	04/13/22:205325
Nitrite as N	ND	0.2	mg/L		300.0	04/13/22:204038	300.0	04/13/22:205325
Nitrate + Nitrite as N	ND	0.1	mg/L		300.0	04/13/22:204038	300.0	04/13/22:205325
Fluoride	0.1	0.1	mg/L		300.0	04/13/22:204038	300.0	04/13/22:205325
Total Anions	8.1	---	meq/L		2320B	04/25/22:204539	2320B	04/25/22:205896
pH	8.31	---	units		4500-H B	04/27/22:204601	4500HB	04/27/22:205961
Specific Conductance	818	1	umhos/cm		2510B	04/20/22:204299	2510B	04/20/22:205612
Total Dissolved Solids	500	20	mg/L		2540CE	04/14/22:204071	2540C	04/15/22:205392
MBAS Screen	Negative	0.1	mg/L		5540C	04/13/22:204210	5540C	04/13/22:205474
Aggressiveness Index	12.9	1	--		4500-H B	04/27/22:204601	4500HB	04/27/22:205961
Langelier Index (20°C)	1.0	1	--		4500-H B	04/27/22:204601	4500HB	04/27/22:205961
Nitrate Nitrogen	ND	0.1	mg/L		300.0	04/13/22:204038	300.0	04/13/22:205325

ND=Non-Detected. PQL=Practical Quantitation Limit. * PQL adjusted for dilution.

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Fall 2022 Field Logs and Analytical Results

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 10/5/2022
Operator: IP/AB
Well number and location: 30S/11E-20M2 (FW28)
Site and wellhead conditions: Cloudy and cool, pump kicking on and off

Static water depth (feet): 35.48
Well depth (feet): 102
Water column (feet): 66.52
Casing diameter (inches): --
Minimum purge volume (gal) flush line
Purge rate (gpm): --
Pumping water level (feet): --
Pump setting (feet): --
Minimum purge time (min): flush line
Time begin purge: 10:56

Time	Gallons	EC (µS/cm)	pH	Temp. (°C)	Comments*
10:57	flush line	835.0	8.14	15.1	Clear, colorless, odorless
10:59	flush line	819.9	7.92	14.9	Clear, colorless, odorless
11:01	flush line	817.0	7.77	14.8	Clear, colorless, odorless
11:04	flush line	816.6	7.69	14.9	Clear, colorless, odorless
					Sampled @ 11:05

*Turbidity, color, odor, sheen, debris, etc.

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 10/6/2022
Operator: AB/IP
Well number and location: 30S/11E-17E10 (UA13)
Site and wellhead conditions: Sunny and hot, pump on since 6 am

Static water depth (feet):	96.4
Well depth (feet):	142
Water column (feet):	45.6
Casing diameter (inches):	8
Minimum purge volume (gal)	flush line
Purge rate (gpm):	--
Pumping water level (feet):	--
Pump setting (feet):	--
Minimum purge time (min):	flush line
Time begin purge:	11:45

Time	Gallons	EC (µS/cm)	pH	Temp. (°C)	Comments*
11:45	flush line	502.8	7.98	19.4	Clear, colorless, odorless
11:47	flush line	490	7.98	19.2	Clear, colorless, odorless
11:48	flush line	489.6	7.97	19.2	Clear, colorless, odorless
					Sampled @ 11:50

*Turbidity, color, odor, sheen, debris, etc.

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 10/6/2022
Operator: IP/AB
Well number and location: 30S/10E-12J1 (LA11)
Site and wellhead conditions: Cloudy and cool, site clear, cap in place

Static water depth (feet): 3.10
Well depth (feet): 398
Water column (feet): 394.9
Casing diameter (inches): 2
Minimum purge volume (gal) 194 -200
Purge rate (gpm): 2.4
Pumping water level (feet): 3.71
Pump setting (feet): 25
Minimum purge time (min): 82
Time begin purge: 9:56

Time	Gallons	EC (µS/cm)	pH	Temp. (°C)	Comments*
9:58	1	1,160	8.03	18.4	Pale yellow, sulfury
9:59	5	1,163	8.16	18.2	Clear, sulfur odor
10:02	10	1,156	7.91	18.3	Clear, sulfur odor
10:05	20	1,156	7.85	18	Clear, sulfur odor
10:12	45	1,139	7.96	19.5	Clear, sulfur odor
10:20	60	1,329	7.72	20.1	Cloudy, colorless, sulfur odor
10:26	75	1,469	7.63	20.6	Cloudy, colorless, sulfur odor
10:37	100	1,430	7.89	20.6	Cloudy, colorless, sulfur odor
10:46	120	1,412	7.63	20.8	Slightly cloudy, slight sulfur odor
10:55	145	1,406	7.72	20.6	Slightly cloudy, no odor
11:05	170	1,400	7.57	20.8	Clear, colorless, slight sulfur odor
11:14	190	1,398	7.73	20.7	Clear, colorless, slight sulfur odor
11:15	195	1,393	7.65	20.7	Clear, colorless, slight sulfur odor
11:20	200	1,390	7.65	20.7	Clear, colorless, slight sulfur odor
					Sampled @ 11:20

*Turbidity, color, odor, sheen, debris, etc.

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 10/4/2022
Operator: IP/AB
Well number and location: 30S/11E-7Q3 (LA12)
Site and wellhead conditions: Clear and sunny, shack unlocked for entry

Static water depth (feet): 27.1
Well depth (feet): 270
Water column (feet): 243
Casing diameter (inches): 10
Minimum purge volume (gal) flush line
Purge rate (gpm): --
Pumping water level (feet): --
Pump setting (feet): --
Minimum purge time (min): flush line
Time begin purge: 10:38

Time	Gallons	EC (µS/cm)	pH	Temp. (°C)	Comments*
10:39	flush line	752.4	7.92	21.0	Clear, colorless, sulfury odor
10:41	flush line	745.4	7.65	20.6	Clear, colorless, sulfury odor
10:43	flush line	741.6	7.66	20.7	Clear, colorless, sulfury odor
10:45	flush line	741.5	7.66	20.5	Clear, colorless, sulfury odor
10:46	flush line	741.4	7.67	20.5	Clear, colorless, sulfury odor
					Sampled @ 10:49

*Turbidity, color, odor, sheen, debris, etc.

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 10/4/2022
Operator: IP/AB
Well number and location: 30S/11E-18L2 (LA15)
Site and wellhead conditions: Sunny and clear, well running since 6:40 am

Static water depth (feet): 88.5
Well depth (feet): 394
Water column (feet): 306
Casing diameter (inches): 12
Minimum purge volume (gal) flush line
Purge rate (gpm): --
Pumping water level (feet): --
Pump setting (feet): --
Minimum purge time (min): flush line
Time begin purge: 11:17

Time	Gallons	EC (µS/cm)	pH	Temp. (°C)	Comments*
11:13	flush line	769.1	7.95	20.7	Clear, colorless, odorless
11:15	flush line	767.4	7.78	20.7	Clear, colorless, odorless
11:17	flush line	767.3	7.77	20.7	Clear, colorless, odorless
11:18	flush line	767.4	7.67	20.7	Clear, colorless, odorless
					Sampled @ 11:22

*Turbidity, color, odor, sheen, debris, etc.

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 10/10/2022
Operator: AB/IP
Well number and location: 30S/11E-18K8 (LA18)
Site and wellhead conditions: Overcast and drizzly, site secure, monument and cap in place

Static water depth (feet):	135.14
Well depth (feet):	650
Water column (feet):	515
Casing diameter (inches):	2
Minimum purge volume (gal)	255
Purge rate (gpm):	1.4
Pumping water level (feet):	141.81
Pump setting (feet):	160
Minimum purge time (min):	185
Time begin purge:	10:24

Time	Gallons	EC (µS/cm)	pH	Temp. (°C)	Comments*
10:24	1	434.1	9.14	19.7	Slight odor, clear
10:27	5	416.1	8.77	20.9	Clear, colorless, odorless
10:31	10	418.5	8.38	21.1	Clear, colorless, odorless
10:38	20	419.8	8.07	21	Clear, colorless, odorless
10:46	30	480.5	7.66	21.3	Clear, colorless, odorless
11:01	50	532.8	7.88	21.8	Clear, colorless, odorless
11:22	80	551.1	7.88	22.3	Clear, colorless, odorless
11:47	120	552.8	8.26	22.4	Clear, colorless, odorless
12:24	170	556.8	7.58	22.8	Clear, colorless, odorless
13:02	220	558.6	8.14	22.8	Clear, colorless, odorless
13:17	240	558.0	7.60	22.8	Clear, colorless, odorless
13:29	255	557.2	8.02	22.5	Clear, colorless, odorless
					Sampled @ 13:28

*Turbidity, color, odor, sheen, debris, etc.

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 10/17/2022
Operator: IP
Well number and location: 30S/11E-17E8 (LA22)
Site and wellhead conditions: Sunny and warm, site secure

Static water depth (feet): 147.2
Well depth (feet): 380
Water column (feet): 232.8
Casing diameter (inches): 2
Minimum purge volume (gal) 115
Purge rate (gpm): 1
Pumping water level (feet): 148.8
Pump setting (feet): 160
Minimum purge time (min): 118
Time begin purge: 10:17

Time	Gallons	EC (µS/cm)	pH	Temp. (°C)	Comments*
10:18	1	533.0	8.68	19.2	Clear, colorless, odorless
10:23	5	520.0	8.29	20.8	Clear, colorless, odorless
10:29	10	516	7.92	20.8	Clear, colorless, odorless
10:34	15	513	7.86	20.9	Clear, colorless, odorless
10:41	20	504.2	7.73	21	Clear, colorless, odorless
10:42	25	490.8	7.72	21.3	Clear, colorless, odorless
10:59	35	490.9	7.70	21.3	Clear, colorless, odorless
11:09	50	488.7	7.52	21.2	Clear, colorless, odorless
11:36	75	491.5	7.50	21.3	Clear, colorless, odorless
12:01	100	490.7	7.42	21.6	Clear, colorless, odorless
12:09	105	489.4	7.38	21.4	Clear, colorless, odorless
12:14	110	490.1	7.36	21.4	Clear, colorless, odorless
12:16	115	491.1	7.36	21.4	Clear, colorless, odorless
					Sampled @ 12:16

*Turbidity, color, odor, sheen, debris, etc.

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 10/6/2022
Operator: IP/AB
Well number and location: 30S/11E-20H1 (LA30)
Site and wellhead conditions: Sunny and hot; homeowner present

Static water depth (feet):	41.36
Well depth (feet):	140
Water column (feet):	98.64
Casing diameter (inches):	6
Minimum purge volume (gal)	flush line
Purge rate (gpm):	--
Pumping water level (feet):	--
Pump setting (feet):	--
Minimum purge time (min):	flush line
Time begin purge:	13:55

Time	Gallons	EC (µS/cm)	pH	Temp. (°C)	Comments*
13:56	flush line	801.3	8.17	18.1	Clear, colorless, odorless
13:57	flush line	794.0	8.08	18.3	Clear, colorless, odorless
13:58	flush line	793.0	8.02	18.3	Clear, colorless, odorless
13:59	flush line	793.0	7.99	18.0	Clear, colorless, odorless
					Sampled @ 13:59

*Turbidity, color, odor, sheen, debris, etc.

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 10/6/2022
Operator: IP/AB
Well number and location: 30S/10E-13M2 (LA31)
Site and wellhead conditions: Cloudy and foggy, gate unlocked, site secure

Static water depth (feet): 35.88
Well depth (feet): 227
Water column (feet): 191.12
Casing diameter (inches): 8
Minimum purge volume (gal) flush line
Purge rate (gpm): 20gpm
Pumping water level (feet): --
Pump setting (feet): --
Minimum purge time (min): flush line
Time begin purge: 12:54

Time	Gallons	EC (µS/cm)	pH	Temp. (°C)	Comments*
12:54	flush line	3	8.40	18.8	Clear, colorless, odorless
12:55	flush line	2	8.61	19.3	Clear, colorless, odorless
12:56	flush line	2.52	7.93	18.9	Clear, colorless, odorless
12:58	flush line	2.42	8.47	18.8	Clear, colorless, odorless
13:00	flush line	2.36	8.25	18.9	Clear, colorless, odorless
					Sampled @ 13:00

*Turbidity, color, odor, sheen, debris, etc.

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 10/6/2022
Operator: IP
Well number and location: 30S/11E-18K9 (LA32)
Site and wellhead conditions: Sunny, hot, and slightly breezy, well has been running 3 hours

Static water depth (feet): 149.6
Well depth (feet): --
Water column (feet): --
Casing diameter (inches): --
Minimum purge volume (gal) flush line
Purge rate (gpm): --
Pumping water level (feet): --
Pump setting (feet): --
Minimum purge time (min): flush line
Time begin purge: 12:06

Time	Gallons	EC (µS/cm)	pH	Temp. (°C)	Comments*
12:07	flush line	429.4	7.85	20.5	Clear, colorless, odorless
12:09	flush line	433.1	7.71	20.6	Clear, colorless, odorless
12:11	flush line	431.5	7.71	20.6	Clear, colorless, odorless
12:13	flush line	431.7	7.66	20.7	Clear, colorless, odorless
					Sampled @ 12:14

*Turbidity, color, odor, sheen, debris, etc.

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 10/12/2022
Operator: IP
Well number and location: 30S/11E-13Ba (LA40)
Site and wellhead conditions: Cloudy and misty, monument and site secure

Static water depth (feet): 8.43
Well depth (feet): 410 (screen)
Water column (feet): 401.57
Casing diameter (inches): 2.26
Minimum purge volume (gal) 250
Purge rate (gpm): 0.8
Pumping water level (feet): 137.11
Pump setting (feet): 150
Minimum purge time (min): 315
Time begin purge: 9:31

Time	Gallons	EC (mS/cm)	pH	Temp. (°C)	Comments*
9:32	1	5.36	8.25	18.0	Clear, colorless, sulfur smell
9:34	5	5.37	7.95	18.5	Clear, colorless, earthy smell
9:36	10	30.99	7.83	17.3	Clear, colorless, earthy smell
9:42	20	5.38	7.87	18.8	Clear, colorless, earthy smell
9:49	30	5.35	7.59	19.4	Clear, colorless, earthy smell
10:06	50	5.29	7.42	20.4	Clear, colorless, earthy smell
10:39	70	4.87	7.44	21.2	Clear, colorless, earthy smell
11:14	100	5.91	7.34	21.6	Clear, colorless, earthy smell
11:49	130	6.21	7.31	21.5	Clear, colorless, earthy smell
13:05	170	6.39	7.72	20.6	Clear, colorless, earthy smell
13:31	200	6.23	7.36	23.0	Clear, colorless, earthy smell
14:13	230	6.18	7.34	22.0	Clear, colorless, earthy smell
14:38	250	6.24	7.77	22.0	Clear, colorless, earthy smell
14:51	260	6.22	7.60	21.9	Clear, colorless, earthy smell
15:03	270	6.18	7.44	21.9	Clear, colorless, earthy smell
15:08	275	6.19	7.47	21.7	Clear, colorless, earthy smell
					Sampled @ 15:08

*Turbidity, color, odor, sheen, debris, etc.

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 10/11/2022
Operator: IP/AB
Well number and location: 30S/11E-13Bb (LA41)
Site and wellhead conditions: Cloudy and cool, monument and site secure
Static water depth (feet): 6.73
Well depth (feet): 350.00
Water column (feet): 343.27
Casing diameter (inches): 2.26
Minimum purge volume (gal) 215
Purge rate (gpm): 0.86
Pumping water level (feet): --
Pump setting (feet): 150
Minimum purge time (min): 251
Time begin purge: 10:20

Time	Gallons	EC (µS/cm)	pH	Temp. (°C)	Comments*
10:21	1	703.6	8.51	18.0	Clear, colorless, sulfur smell
10:25	5	698.5	8.03	18.3	Clear, colorless, earthy odor
10:32	10	697.6	7.57	18.5	Clear, colorless, sulfur smell
10:47	20	695.9	7.38	19.0	Clear, colorless, sulfur smell
11:07	30	696.1	7.50	19.2	Clear, colorless, sulfur smell
11:30	50	696.4	7.36	20.1	Clear, colorless, sulfur smell
11:54	70	694.1	7.45	20.8	Clear, colorless, sulfur smell
12:18	90	694.3	7.44	21.0	Clear, colorless, earthy smell
12:42	110	693.2	7.82	21.0	Clear, colorless, earthy smell
13:04	130	692.1	8.05	21.1	Clear, colorless, earthy smell
13:31	150	693.1	7.45	21.2	Clear, colorless, earthy smell
13:51	170	690.1	7.45	20.9	Clear, colorless, earthy smell
14:12	190	691.7	7.42	20.8	Clear, colorless, earthy smell
14:19	200	689.7	7.71	21.0	Clear, colorless, earthy smell
14:23	205	692.2	7.65	20.9	Clear, colorless, earthy smell
14:27	210	691.4	7.64	21.0	Clear, colorless, earthy smell
14:32	215	696.5	7.56	21.1	Clear, colorless, earthy smell
					Sampled @ 14:31

*Turbidity, color, odor, sheen, debris, etc.

ENVIRONMENTAL FGL AGRICULTURAL
Analytical Chemists

October 26, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

Description : 20 M2 (FW28) FW 28
Project : Los Osos BMC Monitoring

Lab No. : CC 2283818-001
Customer No. : 8000514

Sampled On : October 5, 2022 at 11:05
Sampled By : Iason P
Received On : October 5, 2022 at 14:57
Matrix : Ground Water

Sample Results - Inorganic

Constituent	Result	RL	Units	Note	Dil.	DQF	Sample Preparation			Sample Analysis			
General Mineral							Date	Time	Who	Method	Date	Time	Who
Total Hardness as CaCO3	398	2.5	mg/L		1	h	10/13/2022	07:00	ac	EPA 200.7	10/14/2022	07:36	ac
Calcium	72	1	mg/L		1		10/13/2022	07:00	ac	EPA 200.7	10/14/2022	07:36	ac
Magnesium	53	1	mg/L		1	h	10/13/2022	07:00	ac	EPA 200.7	10/14/2022	07:36	ac
Potassium	2	1	mg/L		1		10/13/2022	07:00	ac	EPA 200.7	10/14/2022	07:36	ac
Sodium	43	1	mg/L		1		10/13/2022	07:00	ac	EPA 200.7	10/14/2022	07:36	ac
Total Cations	9.9	---	meq/L		1	h	10/13/2022	07:00	ac	EPA 200.7	10/14/2022	07:36	ac
Boron	0.1	0.1	mg/L		1		10/13/2022	07:00	ac	EPA 200.7	10/14/2022	07:36	ac
Copper	20	10	ug/L		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	13:15	ac
Iron	210	30	ug/L		1		10/13/2022	07:00	ac	EPA 200.7	10/14/2022	07:36	ac
Manganese	430	10	ug/L		1		10/13/2022	07:00	ac	EPA 200.7	10/14/2022	07:36	ac
Zinc	30	20	ug/L		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	13:15	ac
SAR	0.9	0.1	--		1	h	10/13/2022	07:00	ac	EPA 200.7	10/14/2022	07:36	ac
Total Alkalinity (as CaCO3)	360	10	mg/L		1		10/09/2022	17:14	amm	SM 4500-H+B	10/09/2022	19:16	amm
Hydroxide as OH	ND	10	mg/L		1	U	10/09/2022	17:14	amm	SM 4500-H+B	10/09/2022	19:16	amm
Carbonate as CO3	ND	10	mg/L		1	U	10/09/2022	17:14	amm	SM 4500-H+B	10/09/2022	19:16	amm
Bicarbonate as HCO3	440	10	mg/L		1		10/09/2022	17:14	amm	SM 4500-H+B	10/09/2022	19:16	amm
Sulfate	77.1	0.5	mg/L		1		10/25/2022	10:39	ldm	EPA 300.0	10/25/2022	22:14	ldm
Chloride	62	1	mg/L		1		10/25/2022	10:39	ldm	EPA 300.0	10/25/2022	22:14	ldm
Nitrate as NO3	0.4	0.2	mg/L		1	J	10/06/2022	13:00	lfs	SM 4500-NO3 F	10/06/2022	18:06	lfs
Nitrite as N	ND	0.2	mg/L		1	U	10/06/2022	13:00	lfs	SM 4500-NO3 F	10/06/2022	18:04	lfs
Nitrate + Nitrite as N	ND	0.2	mg/L		1	U	10/06/2022	13:00	lfs	SM 4500-NO3 F	10/06/2022	18:06	lfs
Fluoride	0.3	0.1	mg/L		1		10/25/2022	10:39	ldm	EPA 300.0	10/25/2022	22:14	ldm
Total Anions	10.6	---	meq/L		1	J	10/09/2022	17:14	amm	SM 4500-H+B	10/09/2022	19:16	amm
pH	7.6	--	units		1	T	10/09/2022	17:14	amm	SM 4500-H+B	10/09/2022	19:16	amm
Specific Conductance	948	1	umhos/cm		1		10/09/2022	17:14	amm	SM 4500-H+B	10/09/2022	19:16	amm
Total Dissolved Solids	600	20	mg/L		1		10/07/2022	10:32	ctl	SM 2540 C	10/10/2022	12:52	ctl
MBAS (foaming agents)	Negative	0.1	mg/L		1	U	10/06/2022	16:32	jba	SM 5540 C	10/06/2022	16:38	jba
Aggressiveness Index	12.4	1	--		1		10/09/2022	17:14	amm	SM 4500-H+B	10/09/2022	19:16	amm
Langelier Index (20°C)	0.5	1	--		1		10/09/2022	17:14	amm	SM 4500-H+B	10/09/2022	19:16	amm
Nitrate Nitrogen	ND	0.2	mg/L		1	U	10/06/2022	13:00	lfs	SM 4500-NO3 F	10/06/2022	18:06	lfs

DQF Flags Definition:
- h The MS/MSD did not meet QC criteria.
- U Constituent results were non-detect.
- J Reported value is estimated; detected at a concentration below the PQL and above the laboratory MDL.
- T Exceeded method/regulatory-specific holding time.

ND=Non-Detected, RL=Reporting Level , Dil.=Dilution

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CA ELAP Certification No. 2810

November 1, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

Description : 13F4 (UA3)-Skyline UA 3
Project : Los Osos BMC Monitoring

Lab No. : CC 2283977-004
Customer No. : 8000514

Sampled On : October 19, 2022 at 10:15
Sampled By : GSWC
Received On : October 19, 2022 at 13:29
Matrix : Ground Water

Sample Results - Inorganic

Constituent	Result	RL	Units	Note	Dil.	DQF	Sample Preparation			Sample Analysis			
General Mineral							Date	Time	Who	Method	Date	Time	Who
Total Hardness as CaCO3	131	2.5	mg/L		1	h	10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:37	ac
Calcium	21	1	mg/L		1		10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:37	ac
Magnesium	19	1	mg/L		1	h	10/20/2022	11:00	ac	EPA 200.7	10/24/2022	09:30	ac
Potassium	2	1	mg/L		1		10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:37	ac
Sodium	53	1	mg/L		1		10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:37	ac
Total Cations	5.0	---	meq/L		1	h	10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:37	ac
Boron	ND	0.1	mg/L		1	J	10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:37	ac
Copper	ND	10	ug/L		1	Jl	10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:37	ac
Iron	ND	30	ug/L		1	U	10/20/2022	11:00	ac	EPA 200.7	10/24/2022	09:30	ac
Manganese	ND	10	ug/L		1	U	10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:37	ac
Zinc	ND	20	ug/L		1	Jl	10/20/2022	11:00	ac	EPA 200.7	10/24/2022	09:30	ac
SAR	2.0	0.1	--		1	h	10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:37	ac
Total Alkalinity (as CaCO3)	60	10	mg/L		1		10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	17:08	amm
Hydroxide as OH	ND	10	mg/L		1	U	10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	17:08	amm
Carbonate as CO3	ND	10	mg/L		1	U	10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	17:08	amm
Bicarbonate as HCO3	70	10	mg/L		1		10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	17:08	amm
Sulfate	19.8	0.5	mg/L		1	l	10/20/2022	11:34	ldm	EPA 300.0	10/20/2022	20:38	ldm
Chloride	68	1	mg/L		1		10/20/2022	11:34	ldm	EPA 300.0	10/20/2022	20:38	ldm
Nitrate as NO3	74.8	0.4	mg/L		1		10/20/2022	11:34	ldm	EPA 300.0	10/20/2022	20:38	ldm
Nitrite as N	ND	0.1	mg/L		1	U	10/20/2022	11:34	ldm	EPA 300.0	10/20/2022	20:38	ldm
Nitrate + Nitrite as N	16.9	0.1	mg/L		1		10/20/2022	11:34	ldm	EPA 300.0	10/20/2022	20:38	ldm
Fluoride	ND	0.1	mg/L		1	J	10/20/2022	11:34	ldm	EPA 300.0	10/20/2022	20:38	ldm
Total Anions	4.7	---	meq/L		1	lJ	10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	17:08	amm
pH	7.1	--	units		1	T	10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	17:08	amm
Specific Conductance	514	1	umhos/cm		1		10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	17:08	amm
Total Dissolved Solids	320	20	mg/L		1		10/21/2022	09:29	ctl	SM 2540 C	10/24/2022	11:41	ctl
MBAS (foaming agents)	Negative	0.1	mg/L		1	U	10/20/2022	15:21	jba	SM 5540 C	10/20/2022	15:26	jba
Aggressiveness Index	10.6	1	--		1		10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	17:08	amm
Langelier Index (20°C)	-1.2	1	--		1		10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	17:08	amm
Nitrate Nitrogen	16.9	0.1	mg/L		1		10/20/2022	11:34	ldm	EPA 300.0	10/20/2022	20:38	ldm

DQF Flags Definition:
- h The MS/MSD did not meet QC criteria.
- J Reported value is estimated; detected at a concentration below the PQL and above the laboratory MDL.
- l The MS/MSD did not meet QC criteria.
- U Constituent results were non-detect.
- T Exceeded method/regulatory-specific holding time.

ND=Non-Detected, RL=Reporting Level , Dil.=Dilution

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ENVIRONMENTAL AGRICULTURAL
Analytical Chemists

November 1, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

Description : 13F4 (UA3)-Skyline UA 3
Project : Los Osos BMC Monitoring

Lab No. : CC 2283977-004
Customer No. : 8000514

Sampled On : October 19, 2022 at 10:15
Sampled By : GSWC
Received On : October 19, 2022 at 13:29
Matrix : Ground Water

Sample Results - Field Test

Constituent	Result	RL	Units	Note	Sample Preparation	Sample Analysis	
Field Test					Date	Method	Date
Temperature	68		°C		10/19/2022 10:15	2550B	10/19/2022 10:15
Conductivity	0.57		umhos/cm		10/19/2022 10:15	2510B	10/19/2022 10:15
pH (Field)	7.15		units		10/19/2022 10:15	4500HB	10/19/2022 10:15

ND=Non-Detected, RL=Reporting Level.

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November 1, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

UA 9

Description : 18K3 (UA9)-Los Olives #3
Project : Los Osos BMC Monitoring

Lab No. : CC 2283977-001
Customer No. : 8000514

Sampled On : October 19, 2022 at 09:10
Sampled By : GSWC
Received On : October 19, 2022 at 13:29
Matrix : Ground Water

Sample Results - Inorganic

Constituent	Result	RL	Units	Note	Dil.	DQF	Sample Preparation			Sample Analysis			
General Mineral							Date	Time	Who	Method	Date	Time	Who
Total Hardness as CaCO3	93.4	2.5	mg/L		1	h	10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:15	ac
Calcium	16	1	mg/L		1		10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:15	ac
Magnesium	13	1	mg/L		1	h	10/20/2022	11:00	ac	EPA 200.7	10/24/2022	09:11	ac
Potassium	1	1	mg/L		1		10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:15	ac
Sodium	29	1	mg/L		1		10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:15	ac
Total Cations	3.2	---	meq/L		1	h	10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:15	ac
Boron	ND	0.1	mg/L		1	U	10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:15	ac
Copper	ND	10	ug/L		1	Ul	10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:15	ac
Iron	ND	30	ug/L		1	J	10/20/2022	11:00	ac	EPA 200.7	10/24/2022	09:11	ac
Manganese	ND	10	ug/L		1	U	10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:15	ac
Zinc	ND	20	ug/L		1	Ul	10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:15	ac
SAR	1.3	0.1	--		1	h	10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:15	ac
Total Alkalinity (as CaCO3)	50	10	mg/L		1		10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	16:38	amm
Hydroxide as OH	ND	10	mg/L		1	U	10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	16:38	amm
Carbonate as CO3	ND	10	mg/L		1	U	10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	16:38	amm
Bicarbonate as HCO3	60	10	mg/L		1		10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	16:38	amm
Sulfate	8.2	0.5	mg/L		1	l	10/20/2022	11:34	ldm	EPA 300.0	10/20/2022	20:59	ldm
Chloride	45	1	mg/L		1		10/20/2022	11:34	ldm	EPA 300.0	10/20/2022	20:59	ldm
Nitrate as NO3	42.1	0.4	mg/L		1		10/20/2022	11:34	ldm	EPA 300.0	10/20/2022	20:59	ldm
Nitrite as N	ND	0.1	mg/L		1	U	10/20/2022	11:34	ldm	EPA 300.0	10/20/2022	20:59	ldm
Nitrate + Nitrite as N	9.5	0.1	mg/L		1		10/20/2022	11:34	ldm	EPA 300.0	10/20/2022	20:59	ldm
Fluoride	ND	0.1	mg/L		1	J	10/20/2022	11:34	ldm	EPA 300.0	10/20/2022	20:59	ldm
Total Anions	3.1	---	meq/L		1	lJ	10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	16:38	amm
pH	7.3	--	units		1	T	10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	16:38	amm
Specific Conductance	338	1	umhos/cm		1		10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	16:38	amm
Total Dissolved Solids	200	20	mg/L		1		10/21/2022	09:29	ctl	SM 2540 C	10/24/2022	11:39	ctl
MBAS (foaming agents)	Negative	0.1	mg/L		1	U	10/20/2022	15:21	jba	SM 5540 C	10/20/2022	15:26	jba
Aggressiveness Index	10.6	1	--		1		10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	16:38	amm
Langelier Index (20°C)	-1.2	1	--		1		10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	16:38	amm
Nitrate Nitrogen	9.5	0.1	mg/L		1		10/20/2022	11:34	ldm	EPA 300.0	10/20/2022	20:59	ldm

DQF Flags Definition:
- h The MS/MSD did not meet QC criteria.
- U Constituent results were non-detect.
- l The MS/MSD did not meet QC criteria.
- J Reported value is estimated; detected at a concentration below the PQL and above the laboratory MDL.
- T Exceeded method/regulatory-specific holding time.

ND=Non-Detected, RL=Reporting Level , Dil.=Dilution

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November 1, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

UA 9

Lab No. : CC 2283977-001
Customer No. : 8000514

Sampled On : October 19, 2022 at 09:10
Sampled By : GSWC
Received On : October 19, 2022 at 13:29
Matrix : Ground Water

Description : 18K3 (UA9)-Los Olives #3
Project : Los Osos BMC Monitoring

Sample Results - Field Test

Constituent	Result	RL	Units	Note	Sample Preparation	Sample Analysis	
Field Test					Date	Method	Date
Temperature	68		°C		10/19/2022 09:10	2550B	10/19/2022 09:10
Conductivity	0.48		umhos/cm		10/19/2022 09:10	2510B	10/19/2022 09:10
pH (Field)	7.46		units		10/19/2022 09:10	4500HB	10/19/2022 09:10

ND=Non-Detected, RL=Reporting Level.

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October 27, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

Description : 17E10 (UA13) UA 13
Project : Los Osos BMC Monitoring

Lab No. : CC 2283842-005
Customer No. : 8000514

Sampled On : October 6, 2022 at 11:50
Sampled By : Ianson Pitsillides
Received On : October 6, 2022 at 14:38
Matrix : Ground Water

Sample Results - Inorganic

Constituent	Result	RL	Units	Note	Dil.	DQF	Sample Preparation			Sample Analysis			
General Mineral							Date	Time	Who	Method	Date	Time	Who
Total Hardness as CaCO3	216	2.5	mg/L		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	11:16	ac
Calcium	32	1	mg/L		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	11:16	ac
Magnesium	33	1	mg/L		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	11:16	ac
Potassium	2	1	mg/L		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	11:16	ac
Sodium	51	1	mg/L		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	11:16	ac
Total Cations	6.6	---	meq/L		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	11:16	ac
Boron	ND	0.1	mg/L		1	J	10/13/2022	07:00	ac	EPA 200.7	10/13/2022	11:16	ac
Copper	ND	10	ug/L		1	J	10/13/2022	07:00	ac	EPA 200.7	10/13/2022	11:16	ac
Iron	100	30	ug/L		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	11:16	ac
Manganese	ND	10	ug/L		1	J	10/13/2022	07:00	ac	EPA 200.7	10/13/2022	11:16	ac
Zinc	ND	20	ug/L		1	J	10/13/2022	07:00	ac	EPA 200.7	10/13/2022	11:16	ac
SAR	1.5	0.1	--		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	11:16	ac
Total Alkalinity (as CaCO3)	80	10	mg/L		1	I	10/10/2022	18:44	amm	SM 4500-H+B	10/10/2022	19:57	amm
Hydroxide as OH	ND	10	mg/L		1	U	10/10/2022	18:44	amm	SM 4500-H+B	10/10/2022	19:57	amm
Carbonate as CO3	ND	10	mg/L		1	U	10/10/2022	18:44	amm	SM 4500-H+B	10/10/2022	19:57	amm
Bicarbonate as HCO3	100	10	mg/L		1	I	10/10/2022	18:44	amm	SM 4500-H+B	10/10/2022	19:57	amm
Sulfate	27.5	0.5	mg/L		1		10/07/2022	16:11	ldm	EPA 300.0	10/08/2022	08:17	ldm
Chloride	63	1	mg/L		1	l	10/07/2022	16:11	ldm	EPA 300.0	10/08/2022	08:17	ldm
Nitrate as NO3	69.1	0.4	mg/L		1	l	10/07/2022	16:11	ldm	EPA 300.0	10/08/2022	08:17	ldm
Nitrite as N	ND	0.1	mg/L		1	U	10/07/2022	16:11	ldm	EPA 300.0	10/08/2022	08:17	ldm
Nitrate + Nitrite as N	15.6	0.1	mg/L		1	l	10/07/2022	16:11	ldm	EPA 300.0	10/08/2022	08:17	ldm
Fluoride	ND	0.1	mg/L		1	J	10/07/2022	16:11	ldm	EPA 300.0	10/08/2022	08:17	ldm
Total Anions	5.1	---	meq/L		1	IlJ	10/10/2022	18:44	amm	SM 4500-H+B	10/10/2022	19:57	amm
pH	7.97	---	units		1		10/06/2022	11:50	ip	SM 4500-H+B	10/06/2022	11:50	ip
Specific Conductance	522	1	umhos/cm		1		10/10/2022	18:44	amm	SM 4500-H+B	10/10/2022	19:57	amm
Total Dissolved Solids	380	20	mg/L		1		10/10/2022	11:11	ctl	SM 2540 C	10/11/2022	11:07	ctl
MBAS (foaming agents)	Negative	0.1	mg/L		1	U	10/07/2022	15:13	jba	SM 5540 C	10/07/2022	15:25	jba
Aggressiveness Index	11.8	1	--		1		10/06/2022	11:50	ip	SM 4500-H+B	10/06/2022	11:50	ip
Langelier Index (20°C)	-0.08	1	--		1	I	10/06/2022	11:50	ip	SM 4500-H+B	10/06/2022	11:50	ip
Nitrate Nitrogen	15.6	0.1	mg/L		1	l	10/07/2022	16:11	ldm	EPA 300.0	10/08/2022	08:17	ldm

DQF Flags Definition:
- J Reported value is estimated; detected at a concentration below the PQL and above the laboratory MDL.
- I The RPD for the laboratory duplicate exceeded laboratory criteria.
- U Constituent results were non-detect.
- l The MS/MSD did not meet QC criteria.

ND=Non-Detected, RL=Reporting Level * RL adusted for dilution, Dil.=Dilution

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October 27, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

Description : 17E10 (UA13) UA 13
Project : Los Osos BMC Monitoring

Lab No. : CC 2283842-005
Customer No. : 8000514

Sampled On : October 6, 2022 at 11:50
Sampled By : Ianson Pitsillides
Received On : October 6, 2022 at 14:38
Matrix : Ground Water

Sample Results - Field Test

Constituent	Result	RL	Units	Note	Sample Preparation	Sample Analysis	
Field Test					Date	Method	Date
pH (Field)	7.97		units		10/06/2022 11:50	4500HB	10/06/2022 11:50

ND=Non-Detected, RL=Reporting Level. * RL adusted for dilution

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November 10, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

Lab No. : CC 2283723-003
Customer No. : 8000514

Sampled On : October 4, 2022 at 14:13
Sampled By : Iason Pitsillides
Received On : October 4, 2022 at 14:55
Matrix : Ground Water

Description : 13N (LA8) LA 8
Project : Los Osos BMC Monitoring

Sample Results - Inorganic

Constituent	Result	RL	Units	Note	Dil.	DQF	Sample Preparation			Sample Analysis			
General Mineral							Date	Time	Who	Method	Date	Time	Who
Total Hardness as CaCO3	108	2.5	mg/L		1	l	10/05/2022	14:00	ac	EPA 200.7	10/10/2022	12:51	ac
Calcium	17	1	mg/L		1		10/05/2022	14:00	ac	EPA 200.7	10/10/2022	12:51	ac
Magnesium	16	1	mg/L		1	l	10/05/2022	14:00	ac	EPA 200.7	10/10/2022	12:51	ac
Potassium	2	1	mg/L		1		10/05/2022	14:00	ac	EPA 200.7	10/10/2022	12:51	ac
Sodium	38	1	mg/L		1		10/05/2022	14:00	ac	EPA 200.7	10/10/2022	12:51	ac
Total Cations	3.9	---	meq/L		1	l	10/05/2022	14:00	ac	EPA 200.7	10/10/2022	12:51	ac
Boron	ND	0.1	mg/L		1	U	10/05/2022	14:00	ac	EPA 200.7	10/10/2022	12:51	ac
Copper	10	10	ug/L		1		10/05/2022	14:00	ac	EPA 200.7	10/10/2022	12:51	ac
Iron	ND	30	ug/L		1	U	10/05/2022	14:00	ac	EPA 200.7	10/11/2022	12:07	ac
Manganese	10	10	ug/L		1		10/05/2022	14:00	ac	EPA 200.7	10/10/2022	12:51	ac
Zinc	ND	20	ug/L		1	J	10/05/2022	14:00	ac	EPA 200.7	10/10/2022	12:51	ac
SAR	1.6	0.1	--		1	l	10/05/2022	14:00	ac	EPA 200.7	10/10/2022	12:51	ac
Total Alkalinity (as CaCO3)	50	10	mg/L		1		10/07/2022	14:17	sta	SM 4500-H+B	10/07/2022	15:10	sta
Hydroxide as OH	ND	10	mg/L		1	U	10/07/2022	14:17	sta	SM 4500-H+B	10/07/2022	15:10	sta
Carbonate as CO3	ND	10	mg/L		1	U	10/07/2022	14:17	sta	SM 4500-H+B	10/07/2022	15:10	sta
Bicarbonate as HCO3	60	10	mg/L		1		10/07/2022	14:17	sta	SM 4500-H+B	10/07/2022	15:10	sta
Sulfate	13.1	0.5	mg/L		1		10/31/2022	11:56	ldm	EPA 300.0	11/01/2022	00:33	ldm
Chloride	77	1	mg/L		1	l	10/31/2022	11:56	ldm	EPA 300.0	11/01/2022	00:33	ldm
Nitrate as NO3	29.3	0.2	mg/L		1		10/06/2022	14:30	lfs	SM 4500-NO3 F	10/06/2022	19:33	lfs
Nitrite as N	ND	0.1	mg/L		1	U	10/31/2022	11:56	ldm	EPA 300.0	11/01/2022	00:33	ldm
Nitrate + Nitrite as N	6.6	0.2	mg/L		1		10/06/2022	14:30	lfs	SM 4500-NO3 F	10/06/2022	19:33	lfs
Fluoride	ND	0.1	mg/L		1	J	10/31/2022	11:56	ldm	EPA 300.0	11/01/2022	00:33	ldm
Total Anions	3.9	---	meq/L		1	lJ	10/07/2022	14:17	sta	SM 4500-H+B	10/07/2022	15:10	sta
pH	7.4	--	units		1	T	10/07/2022	14:17	sta	SM 4500-H+B	10/07/2022	15:10	sta
Specific Conductance	432	1	umhos/cm		1		10/07/2022	14:17	sta	SM 4500-H+B	10/07/2022	15:10	sta
Total Dissolved Solids	280	20	mg/L		1		10/06/2022	10:01	ctl	SM 2540 C	10/07/2022	12:06	ctl
MBAS (foaming agents)	Negative	0.1	mg/L		1	U	10/05/2022	16:23	jba	SM 5540 C	10/05/2022	16:30	jba
Aggressiveness Index	10.7	1	--		1		10/07/2022	14:17	sta	SM 4500-H+B	10/07/2022	15:10	sta
Langelier Index (20°C)	-1.1	1	--		1		10/07/2022	14:17	sta	SM 4500-H+B	10/07/2022	15:10	sta
Nitrate Nitrogen	6.6	0.2	mg/L		1		10/06/2022	14:30	lfs	SM 4500-NO3 F	10/06/2022	19:33	lfs

DQF Flags Definition:
- l The MS/MSD did not meet QC criteria.
- U Constituent results were non-detect.
- J Reported value is estimated; detected at a concentration below the PQL and above the laboratory MDL.
- T Exceeded method/regulatory-specific holding time.

ND=Non-Detected, RL=Reporting Level * RL adusted for dilution, Dil.=Dilution

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November 10, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

Description : 13N (LA8) LA 8
Project : Los Osos BMC Monitoring

Lab No. : CC 2283723-003
Customer No. : 8000514

Sampled On : October 4, 2022 at 14:13
Sampled By : Iason Pitsillides
Received On : October 4, 2022 at 14:55
Matrix : Ground Water

Sample Results - Field Test

Constituent	Result	RL	Units	Note	Sample Preparation	Sample Analysis	
Field Test					Date	Method	Date
pH (Field)	8.01		units		10/04/2022 14:13	4500HB	10/04/2022 14:13

ND=Non-Detected, RL=Reporting Level. * RL adusted for dilution

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ENVIRONMENTAL FGL AGRICULTURAL
Analytical Chemists

November 1, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

Description : 24C1 (LA9)-Calarillo LA 9
Project : Los Osos BMC Monitoring

Lab No. : CC 2283977-005
Customer No. : 8000514

Sampled On : October 19, 2022 at 10:35
Sampled By : GSWC
Received On : October 19, 2022 at 13:29
Matrix : Ground Water

Sample Results - Inorganic

Constituent	Result	RL	Units	Note	Dil.	DQF	Sample Preparation			Sample Analysis			
General Mineral							Date	Time	Who	Method	Date	Time	Who
Total Hardness as CaCO3	126	2.5	mg/L		1	h	10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:44	ac
Calcium	19	1	mg/L		1		10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:44	ac
Magnesium	19	1	mg/L		1	h	10/20/2022	11:00	ac	EPA 200.7	10/24/2022	09:37	ac
Potassium	2	1	mg/L		1		10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:44	ac
Sodium	48	1	mg/L		1		10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:44	ac
Total Cations	4.7	---	meq/L		1	h	10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:44	ac
Boron	ND	0.1	mg/L		1	U	10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:44	ac
Copper	ND	10	ug/L		1	Ul	10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:44	ac
Iron	ND	30	ug/L		1	J	10/20/2022	11:00	ac	EPA 200.7	10/24/2022	09:37	ac
Manganese	ND	10	ug/L		1	U	10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:44	ac
Zinc	ND	20	ug/L		1	Ul	10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:44	ac
SAR	1.9	0.1	--		1	h	10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:44	ac
Total Alkalinity (as CaCO3)	60	10	mg/L		1		10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	17:17	amm
Hydroxide as OH	ND	10	mg/L		1	U	10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	17:17	amm
Carbonate as CO3	ND	10	mg/L		1	U	10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	17:17	amm
Bicarbonate as HCO3	70	10	mg/L		1		10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	17:17	amm
Sulfate	15.6	0.5	mg/L		1	l	10/20/2022	11:34	ldm	EPA 300.0	10/20/2022	21:41	ldm
Chloride	93	1	mg/L		1		10/20/2022	11:34	ldm	EPA 300.0	10/20/2022	21:41	ldm
Nitrate as NO3	28.8	0.4	mg/L		1		10/20/2022	11:34	ldm	EPA 300.0	10/20/2022	21:41	ldm
Nitrite as N	ND	0.1	mg/L		1	U	10/20/2022	11:34	ldm	EPA 300.0	10/20/2022	21:41	ldm
Nitrate + Nitrite as N	6.5	0.1	mg/L		1		10/20/2022	11:34	ldm	EPA 300.0	10/20/2022	21:41	ldm
Fluoride	ND	0.1	mg/L		1	J	10/20/2022	11:34	ldm	EPA 300.0	10/20/2022	21:41	ldm
Total Anions	4.6	---	meq/L		1	lJ	10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	17:17	amm
pH	7.4	--	units		1	T	10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	17:17	amm
Specific Conductance	502	1	umhos/cm		1		10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	17:17	amm
Total Dissolved Solids	310	20	mg/L		1		10/21/2022	09:29	ctl	SM 2540 C	10/24/2022	12:07	ctl
MBAS (foaming agents)	Negative	0.1	mg/L		1	U	10/20/2022	15:21	jba	SM 5540 C	10/20/2022	15:26	jba
Aggressiveness Index	10.9	1	--		1		10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	17:17	amm
Langelier Index (20°C)	-1.0	1	--		1		10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	17:17	amm
Nitrate Nitrogen	6.5	0.1	mg/L		1		10/20/2022	11:34	ldm	EPA 300.0	10/20/2022	21:41	ldm

DQF Flags Definition:
- h The MS/MSD did not meet QC criteria.
- U Constituent results were non-detect.
- l The MS/MSD did not meet QC criteria.
- J Reported value is estimated; detected at a concentration below the PQL and above the laboratory MDL.
- T Exceeded method/regulatory-specific holding time.

ND=Non-Detected, RL=Reporting Level , Dil.=Dilution

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November 1, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

Description : 24C1 (LA9)-Calarillo LA 9
Project : Los Osos BMC Monitoring

Lab No. : CC 2283977-005
Customer No. : 8000514

Sampled On : October 19, 2022 at 10:35
Sampled By : GSWC
Received On : October 19, 2022 at 13:29
Matrix : Ground Water

Sample Results - Field Test

Constituent	Result	RL	Units	Note	Sample Preparation	Sample Analysis	
Field Test					Date	Method	Date
Temperature	66		°C		10/19/2022 10:35	2550B	10/19/2022 10:35
Conductivity	0.55		umhos/cm		10/19/2022 10:35	2510B	10/19/2022 10:35
pH (Field)	7.33		units		10/19/2022 10:35	4500HB	10/19/2022 10:35

ND=Non-Detected, RL=Reporting Level.

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December 29, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

Lab No. : CC 2284549-001
Customer No. : 8000514

Sampled On : December 5, 2022 at 13:45
Sampled By : Jerome D
Received On : December 5, 2022 at 13:45
Matrix : Ground Water

Description : 13J1 (LA10) Rosina LA 10
Project : Los Osos BMC Monitoring

Sample Results - Inorganic

Constituent	Result	RL	Units	Note	Dil.	DQF	Sample Preparation			Sample Analysis			
General Mineral							Date	Time	Who	Method	Date	Time	Who
Total Hardness as CaCO3	327	2.5	mg/L		1		12/07/2022	15:00	ac	EPA 200.7	12/08/2022	15:26	ac
Calcium	52	1	mg/L		1		12/07/2022	15:00	ac	EPA 200.7	12/08/2022	15:26	ac
Magnesium	48	1	mg/L		1		12/07/2022	15:00	ac	EPA 200.7	12/08/2022	15:26	ac
Potassium	2	1	mg/L		1		12/07/2022	15:00	ac	EPA 200.7	12/08/2022	15:26	ac
Sodium	33	1	mg/L		1		12/07/2022	15:00	ac	EPA 200.7	12/08/2022	15:26	ac
Total Cations	8.0	---	meq/L		1		12/07/2022	15:00	ac	EPA 200.7	12/08/2022	15:26	ac
Boron	ND	0.1	mg/L		1	J	12/07/2022	15:00	ac	EPA 200.7	12/08/2022	15:26	ac
Copper	ND	10	ug/L		1	U	12/07/2022	15:00	ac	EPA 200.7	12/08/2022	15:26	ac
Iron	150	30	ug/L		1		12/07/2022	15:00	ac	EPA 200.7	12/08/2022	15:26	ac
Manganese	ND	10	ug/L		1	J	12/07/2022	15:00	ac	EPA 200.7	12/08/2022	15:26	ac
Zinc	ND	20	ug/L		1	J	12/07/2022	15:00	ac	EPA 200.7	12/08/2022	15:26	ac
SAR	0.8	0.1	--		1		12/07/2022	15:00	ac	EPA 200.7	12/08/2022	15:26	ac
Total Alkalinity (as CaCO3)	70	10	mg/L		1		12/11/2022	16:24	amm	SM 4500-H+B	12/12/2022	01:00	amm
Hydroxide as OH	ND	10	mg/L		1	U	12/11/2022	16:24	amm	SM 4500-H+B	12/12/2022	01:00	amm
Carbonate as CO3	ND	10	mg/L		1	U	12/11/2022	16:24	amm	SM 4500-H+B	12/12/2022	01:00	amm
Bicarbonate as HCO3	90	10	mg/L		1		12/11/2022	16:24	amm	SM 4500-H+B	12/12/2022	01:00	amm
Sulfate	13.4	0.5	mg/L		1		12/22/2022	10:38	ldm	EPA 300.0	12/22/2022	20:52	ldm
Chloride	235	5*	mg/L		5	l	12/22/2022	10:38	ldm	EPA 300.0	12/23/2022	06:09	ldm
Nitrate as NO3	8.8	0.4	mg/L		1	l	12/06/2022	17:00	lfs	SM 4500-NO3 F	12/06/2022	19:10	lfs
Nitrite as N	ND	0.2	mg/L		1	U	12/06/2022	17:00	lfs	SM 4500-NO3 F	12/06/2022	19:08	lfs
Nitrate + Nitrite as N	2.0	0.4	mg/L		1	l	12/06/2022	17:00	lfs	SM 4500-NO3 F	12/06/2022	19:10	lfs
Fluoride	ND	0.1	mg/L		1	J	12/22/2022	10:38	ldm	EPA 300.0	12/22/2022	20:52	ldm
Total Anions	8.5	---	meq/L		1	lJ	12/11/2022	16:24	amm	SM 4500-H+B	12/12/2022	01:00	amm
pH	7.7	--	units		1		12/05/2022	13:45	jd		12/05/2022	13:45	jd
Specific Conductance	911	1	umhos/cm		1		12/11/2022	16:24	amm	SM 4500-H+B	12/12/2022	01:00	amm
Total Dissolved Solids	690	20	mg/L		1		12/07/2022	11:20	ctl	SM 2540 C	12/08/2022	10:46	ctl
MBAS (foaming agents)	Negative	0.1	mg/L		1	U	12/06/2022	16:52	jba	SM 5540 C	12/06/2022	17:03	jba
Aggressiveness Index	11.7	1	--		1		12/05/2022	13:45	jd		12/05/2022	13:45	jd
Langelier Index (20°C)	-0.2	1	--		1		12/05/2022	13:45	jd		12/05/2022	13:45	jd
Nitrate Nitrogen	2.0	0.4	mg/L		1	l	12/06/2022	17:00	lfs	SM 4500-NO3 F	12/06/2022	19:10	lfs

DQF Flags Definition:
- J Reported value is estimated; detected at a concentration below the RL and above the laboratory MDL.
- U Constituent results were non-detect.
- l The MS/MSD did not meet QC criteria.

ND=Non-Detected, RL=Reporting Level * RL adusted for dilution, Dil.=Dilution

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December 29, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

Lab No. : CC 2284549-001
Customer No. : 8000514

Sampled On : December 5, 2022 at 13:45
Sampled By : Jerome D
Received On : December 5, 2022 at 13:45
Matrix : Ground Water

Description : 13J1 (LA10) Rosina LA 10
Project : Los Osos BMC Monitoring

Sample Results - Field Test

Constituent	Result	RL	Units	Note	Sample Preparation	Sample Analysis	
Field Test					Date	Method	Date
pH (Field)	7.67		units		12/05/2022 13:45	4500HB	12/05/2022 13:45
Temperature	65		°F		12/05/2022 13:45	2550B	12/05/2022 13:45
Conductivity	920		umhos/cm		12/05/2022 13:45	2510B	12/05/2022 13:45

ND=Non-Detected, RL=Reporting Level. * RL adusted for dilution

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October 27, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

Lab No. : CC 2283842-004
Customer No. : 8000514

Sampled On : October 6, 2022 at 11:20
Sampled By : Ianson Pitsillides
Received On : October 6, 2022 at 14:38
Matrix : Ground Water

Description : 12JI (LA11) LA 11
Project : Los Osos BMC Monitoring

Sample Results - Inorganic

Constituent	Result	RL	Units	Note	Dil.	DQF	Sample Preparation			Sample Analysis			
General Mineral							Date	Time	Who	Method	Date	Time	Who
Total Hardness as CaCO3	633	2.5	mg/L		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	11:10	ac
Calcium	89	1	mg/L		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	11:10	ac
Magnesium	100	1	mg/L		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	11:10	ac
Potassium	5	1	mg/L		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	11:10	ac
Sodium	93	1	mg/L		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	11:10	ac
Total Cations	16.8	---	meq/L		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	11:10	ac
Boron	0.2	0.1	mg/L		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	11:10	ac
Copper	ND	10	ug/L		1	J	10/13/2022	07:00	ac	EPA 200.7	10/13/2022	11:10	ac
Iron	1030	30	ug/L		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	11:10	ac
Manganese	60	10	ug/L		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	11:10	ac
Zinc	ND	20	ug/L		1	J	10/13/2022	07:00	ac	EPA 200.7	10/13/2022	11:10	ac
SAR	1.6	0.1	--		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	11:10	ac
Total Alkalinity (as CaCO3)	290	10	mg/L		1	I	10/10/2022	18:44	amm	SM 4500-H+B	10/10/2022	20:54	amm
Hydroxide as OH	ND	10	mg/L		1	U	10/10/2022	18:44	amm	SM 4500-H+B	10/10/2022	20:54	amm
Carbonate as CO3	ND	10	mg/L		1	U	10/10/2022	18:44	amm	SM 4500-H+B	10/10/2022	20:54	amm
Bicarbonate as HCO3	350	10	mg/L		1	I	10/10/2022	18:44	amm	SM 4500-H+B	10/10/2022	20:54	amm
Sulfate	195	0.5	mg/L		1		10/07/2022	11:33	ldm	EPA 300.0	10/07/2022	23:38	ldm
Chloride	279	7*	mg/L		7	l	10/07/2022	11:33	ldm	EPA 300.0	10/08/2022	18:14	ldm
Nitrate as NO3	ND	0.4	mg/L		1	J	10/07/2022	11:33	ldm	EPA 300.0	10/07/2022	23:38	ldm
Nitrite as N	ND	0.1	mg/L		1	U	10/07/2022	11:33	ldm	EPA 300.0	10/07/2022	23:38	ldm
Nitrate + Nitrite as N	ND	0.1	mg/L		1	J	10/07/2022	11:33	ldm	EPA 300.0	10/07/2022	23:38	ldm
Fluoride	0.1	0.1	mg/L		1		10/07/2022	11:33	ldm	EPA 300.0	10/07/2022	23:38	ldm
Total Anions	17.7	---	meq/L		1	IlJ	10/10/2022	18:44	amm	SM 4500-H+B	10/10/2022	20:54	amm
pH	7.65	---	units		1		10/06/2022	11:20	ip	SM 4500-H+B	10/06/2022	11:20	ip
Specific Conductance	1720	1	umhos/cm		1		10/10/2022	18:44	amm	SM 4500-H+B	10/10/2022	20:54	amm
Total Dissolved Solids	1220	20	mg/L		1		10/10/2022	11:19	ctl	SM 2540 C	10/11/2022	10:30	ctl
MBAS (foaming agents)	Negative	0.1	mg/L		1	U	10/07/2022	15:13	jba	SM 5540 C	10/07/2022	15:25	jba
Aggressiveness Index	12.5	1	--		1		10/06/2022	11:20	ip	SM 4500-H+B	10/06/2022	11:20	ip
Langelier Index (20°C)	0.5	1	--		1	I	10/06/2022	11:20	ip	SM 4500-H+B	10/06/2022	11:20	ip
Nitrate Nitrogen	ND	0.1	mg/L		1	J	10/07/2022	11:33	ldm	EPA 300.0	10/07/2022	23:38	ldm

DQF Flags Definition:
J Reported value is estimated; detected at a concentration below the PQL and above the laboratory MDL.
I The RPD for the laboratory duplicate exceeded laboratory criteria.
U Constituent results were non-detect.
l The MS/MSD did not meet QC criteria.

ND=Non-Detected, RL=Reporting Level * RL adusted for dilution, Dil.=Dilution

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CA ELAP Certification No. 2810

October 27, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

Description : 12JI (LA11) LA 11
Project : Los Osos BMC Monitoring

Lab No. : CC 2283842-004
Customer No. : 8000514

Sampled On : October 6, 2022 at 11:20
Sampled By : Ianson Pitsillides
Received On : October 6, 2022 at 14:38
Matrix : Ground Water

Sample Results - Field Test

Constituent	Result	RL	Units	Note	Sample Preparation	Sample Analysis	
Field Test					Date	Method	Date
pH (Field)	7.65		units		10/06/2022 11:20	4500HB	10/06/2022 11:20

ND=Non-Detected, RL=Reporting Level. * RL adusted for dilution

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November 10, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

Lab No. : CC 2283723-001
Customer No. : 8000514

Sampled On : October 4, 2022 at 10:47
Sampled By : Iason Pitsillides
Received On : October 4, 2022 at 14:55
Matrix : Ground Water

Description : 7Q3 (LA12) LA 12
Project : Los Osos BMC Monitoring

Sample Results - Inorganic

Constituent	Result	RL	Units	Note	Dil.	DQF	Sample Preparation			Sample Analysis			
General Mineral							Date	Time	Who	Method	Date	Time	Who
Total Hardness as CaCO3	285	2.5	mg/L		1	l	10/05/2022	14:00	ac	EPA 200.7	10/10/2022	12:38	ac
Calcium	45	1	mg/L		1		10/05/2022	14:00	ac	EPA 200.7	10/10/2022	12:38	ac
Magnesium	42	1	mg/L		1	l	10/05/2022	14:00	ac	EPA 200.7	10/10/2022	12:38	ac
Potassium	2	1	mg/L		1		10/05/2022	14:00	ac	EPA 200.7	10/10/2022	12:38	ac
Sodium	52	1	mg/L		1		10/05/2022	14:00	ac	EPA 200.7	10/10/2022	12:38	ac
Total Cations	8.0	---	meq/L		1	l	10/05/2022	14:00	ac	EPA 200.7	10/10/2022	12:38	ac
Boron	0.1	0.1	mg/L		1		10/05/2022	14:00	ac	EPA 200.7	10/10/2022	12:38	ac
Copper	10	10	ug/L		1		10/05/2022	14:00	ac	EPA 200.7	10/10/2022	12:38	ac
Iron	240	30	ug/L		1		10/05/2022	14:00	ac	EPA 200.7	10/11/2022	11:54	ac
Manganese	60	10	ug/L		1		10/05/2022	14:00	ac	EPA 200.7	10/10/2022	12:38	ac
Zinc	ND	20	ug/L		1	J	10/05/2022	14:00	ac	EPA 200.7	10/10/2022	12:38	ac
SAR	1.3	0.1	--		1	l	10/05/2022	14:00	ac	EPA 200.7	10/10/2022	12:38	ac
Total Alkalinity (as CaCO3)	260	10	mg/L		1		10/07/2022	14:17	sta	SM 4500-H+B	10/07/2022	14:49	sta
Hydroxide as OH	ND	10	mg/L		1	U	10/07/2022	14:17	sta	SM 4500-H+B	10/07/2022	14:49	sta
Carbonate as CO3	ND	10	mg/L		1	U	10/07/2022	14:17	sta	SM 4500-H+B	10/07/2022	14:49	sta
Bicarbonate as HCO3	310	10	mg/L		1		10/07/2022	14:17	sta	SM 4500-H+B	10/07/2022	14:49	sta
Sulfate	51.5	0.5	mg/L		1		10/31/2022	11:56	ldm	EPA 300.0	10/31/2022	23:51	ldm
Chloride	94	1	mg/L		1	l	10/31/2022	11:56	ldm	EPA 300.0	10/31/2022	23:51	ldm
Nitrate as NO3	0.6	0.2	mg/L		1	J	10/06/2022	17:00	lfs	SM 4500-NO3 F	10/06/2022	19:58	lfs
Nitrite as N	ND	0.1	mg/L		1	J	10/31/2022	11:56	ldm	EPA 300.0	10/31/2022	23:51	ldm
Nitrate + Nitrite as N	ND	0.2	mg/L		1	U	10/06/2022	17:00	lfs	SM 4500-NO3 F	10/06/2022	19:58	lfs
Fluoride	ND	0.1	mg/L		1	J	10/31/2022	11:56	ldm	EPA 300.0	10/31/2022	23:51	ldm
Total Anions	8.8	---	meq/L		1	lJ	10/07/2022	14:17	sta	SM 4500-H+B	10/07/2022	14:49	sta
pH	7.9	--	units		1	T	10/07/2022	14:17	sta	SM 4500-H+B	10/07/2022	14:49	sta
Specific Conductance	839	1	umhos/cm		1		10/07/2022	14:17	sta	SM 4500-H+B	10/07/2022	14:49	sta
Total Dissolved Solids	500	20	mg/L		1		10/06/2022	10:01	ctl	SM 2540 C	10/07/2022	11:51	ctl
MBAS (foaming agents)	Negative	0.1	mg/L		1	U	10/05/2022	16:23	jba	SM 5540 C	10/05/2022	16:30	jba
Aggressiveness Index	12.4	1	--		1		10/07/2022	14:17	sta	SM 4500-H+B	10/07/2022	14:49	sta
Langelier Index (20°C)	0.5	1	--		1		10/07/2022	14:17	sta	SM 4500-H+B	10/07/2022	14:49	sta
Nitrate Nitrogen	ND	0.2	mg/L		1	U	10/06/2022	17:00	lfs	SM 4500-NO3 F	10/06/2022	19:58	lfs

DQF Flags Definition:
- l The MS/MSD did not meet QC criteria.
- J Reported value is estimated; detected at a concentration below the PQL and above the laboratory MDL.
- U Constituent results were non-detect.
- T Exceeded method/regulatory-specific holding time.

ND=Non-Detected, RL=Reporting Level , Dil.=Dilution

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November 10, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

Description : 7Q3 (LA12) LA 12
Project : Los Osos BMC Monitoring

Lab No. : CC 2283723-001
Customer No. : 8000514

Sampled On : October 4, 2022 at 10:47
Sampled By : Iason Pitsillides
Received On : October 4, 2022 at 14:55
Matrix : Ground Water

Sample Results - Field Test

Constituent	Result	RL	Units	Note	Sample Preparation	Sample Analysis	
Field Test					Date	Method	Date
pH (Field)	7.67		units		10/04/2022 10:47	4500HB	10/04/2022 10:47

ND=Non-Detected, RL=Reporting Level.

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November 10, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

Lab No. : CC 2283723-002
Customer No. : 8000514

Sampled On : October 4, 2022 at 11:22
Sampled By : Iason Pitsillides
Received On : October 4, 2022 at 14:55
Matrix : Ground Water

Description : 18L2 (LA15) LA 15
Project : Los Osos BMC Monitoring

Sample Results - Inorganic

Constituent	Result	RL	Units	Note	Dil.	DQF	Sample Preparation			Sample Analysis			
General Mineral							Date	Time	Who	Method	Date	Time	Who
Total Hardness as CaCO3	326	2.5	mg/L		1	l	10/05/2022	14:00	ac	EPA 200.7	10/10/2022	12:45	ac
Calcium	53	1	mg/L		1		10/05/2022	14:00	ac	EPA 200.7	10/10/2022	12:45	ac
Magnesium	47	1	mg/L		1	l	10/05/2022	14:00	ac	EPA 200.7	10/10/2022	12:45	ac
Potassium	2	1	mg/L		1		10/05/2022	14:00	ac	EPA 200.7	10/10/2022	12:45	ac
Sodium	40	1	mg/L		1		10/05/2022	14:00	ac	EPA 200.7	10/10/2022	12:45	ac
Total Cations	8.3	---	meq/L		1	l	10/05/2022	14:00	ac	EPA 200.7	10/10/2022	12:45	ac
Boron	ND	0.1	mg/L		1	U	10/05/2022	14:00	ac	EPA 200.7	10/10/2022	12:45	ac
Copper	ND	10	ug/L		1	J	10/05/2022	14:00	ac	EPA 200.7	10/10/2022	12:45	ac
Iron	ND	30	ug/L		1	J	10/05/2022	14:00	ac	EPA 200.7	10/11/2022	12:00	ac
Manganese	ND	10	ug/L		1	J	10/05/2022	14:00	ac	EPA 200.7	10/10/2022	12:45	ac
Zinc	ND	20	ug/L		1	J	10/05/2022	14:00	ac	EPA 200.7	10/10/2022	12:45	ac
SAR	1.0	0.1	--		1	l	10/05/2022	14:00	ac	EPA 200.7	10/10/2022	12:45	ac
Total Alkalinity (as CaCO3)	210	10	mg/L		1		10/07/2022	14:17	sta	SM 4500-H+B	10/07/2022	15:00	sta
Hydroxide as OH	ND	10	mg/L		1	U	10/07/2022	14:17	sta	SM 4500-H+B	10/07/2022	15:00	sta
Carbonate as CO3	ND	10	mg/L		1	U	10/07/2022	14:17	sta	SM 4500-H+B	10/07/2022	15:00	sta
Bicarbonate as HCO3	250	10	mg/L		1		10/07/2022	14:17	sta	SM 4500-H+B	10/07/2022	15:00	sta
Sulfate	31.2	0.5	mg/L		1		10/31/2022	11:56	ldm	EPA 300.0	11/01/2022	00:12	ldm
Chloride	138	3*	mg/L		3	l	10/31/2022	11:56	ldm	EPA 300.0	11/01/2022	14:25	ldm
Nitrate as NO3	3.4	0.2	mg/L		1		10/06/2022	14:30	lfs	SM 4500-NO3 F	10/06/2022	19:11	lfs
Nitrite as N	ND	0.1	mg/L		1	J	10/31/2022	11:56	ldm	EPA 300.0	11/01/2022	00:12	ldm
Nitrate + Nitrite as N	0.8	0.2	mg/L		1		10/06/2022	14:30	lfs	SM 4500-NO3 F	10/06/2022	19:11	lfs
Fluoride	ND	0.1	mg/L		1	J	10/31/2022	11:56	ldm	EPA 300.0	11/01/2022	00:12	ldm
Total Anions	8.7	---	meq/L		1	lJ	10/07/2022	14:17	sta	SM 4500-H+B	10/07/2022	15:00	sta
pH	7.7	--	units		1	T	10/07/2022	14:17	sta	SM 4500-H+B	10/07/2022	15:00	sta
Specific Conductance	885	1	umhos/cm		1		10/07/2022	14:17	sta	SM 4500-H+B	10/07/2022	15:00	sta
Total Dissolved Solids	610	20	mg/L		1		10/06/2022	10:01	ctl	SM 2540 C	10/07/2022	12:13	ctl
MBAS (foaming agents)	Negative	0.1	mg/L		1	U	10/05/2022	16:23	jba	SM 5540 C	10/05/2022	16:30	jba
Aggressiveness Index	12.1	1	--		1		10/07/2022	14:17	sta	SM 4500-H+B	10/07/2022	15:00	sta
Langelier Index (20°C)	0.3	1	--		1		10/07/2022	14:17	sta	SM 4500-H+B	10/07/2022	15:00	sta
Nitrate Nitrogen	0.8	0.2	mg/L		1		10/06/2022	14:30	lfs	SM 4500-NO3 F	10/06/2022	19:11	lfs

DQF Flags Definition:
- l The MS/MSD did not meet QC criteria.
- U Constituent results were non-detect.
- J Reported value is estimated; detected at a concentration below the PQL and above the laboratory MDL.
- T Exceeded method/regulatory-specific holding time.

ND=Non-Detected, RL=Reporting Level * RL adusted for dilution, Dil.=Dilution

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November 10, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

Description : 18L2 (LA15) LA 15
Project : Los Osos BMC Monitoring

Lab No. : CC 2283723-002
Customer No. : 8000514

Sampled On : October 4, 2022 at 11:22
Sampled By : Iason Pitsillides
Received On : October 4, 2022 at 14:55
Matrix : Ground Water

Sample Results - Field Test

Constituent	Result	RL	Units	Note	Sample Preparation	Sample Analysis	
Field Test					Date	Method	Date
pH (Field)	7.67		units		10/04/2022 11:22	4500HB	10/04/2022 11:22

ND=Non-Detected, RL=Reporting Level. * RL adusted for dilution

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October 27, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

Description : 18K8 (LA18) LA 18
Project : Los Osos BMC Monitoring

Lab No. : CC 2283855-001
Customer No. : 8000514

Sampled On : October 10, 2022 at 13:28
Sampled By : Jason Pitsillides
Received On : October 10, 2022 at 14:53
Matrix : Ground Water

Sample Results - Inorganic

Constituent	Result	RL	Units	Note	Dil.	DQF	Sample Preparation			Sample Analysis			
General Mineral							Date	Time	Who	Method	Date	Time	Who
Total Hardness as CaCO3	278	2.5	mg/L		1	h	10/13/2022	07:00	ac	EPA 200.7	10/14/2022	08:05	ac
Calcium	57	1	mg/L		1		10/13/2022	07:00	ac	EPA 200.7	10/14/2022	08:05	ac
Magnesium	33	1	mg/L		1	h	10/13/2022	07:00	ac	EPA 200.7	10/14/2022	08:05	ac
Potassium	2	1	mg/L		1		10/13/2022	07:00	ac	EPA 200.7	10/14/2022	08:05	ac
Sodium	29	1	mg/L		1		10/13/2022	07:00	ac	EPA 200.7	10/14/2022	08:05	ac
Total Cations	6.9	---	meq/L		1	h	10/13/2022	07:00	ac	EPA 200.7	10/14/2022	08:05	ac
Boron	ND	0.1	mg/L		1	J	10/13/2022	07:00	ac	EPA 200.7	10/14/2022	08:05	ac
Copper	ND	10	ug/L		1	U	10/13/2022	07:00	ac	EPA 200.7	10/14/2022	08:05	ac
Iron	50	30	ug/L		1		10/13/2022	07:00	ac	EPA 200.7	10/14/2022	08:05	ac
Manganese	110	10	ug/L		1		10/13/2022	07:00	ac	EPA 200.7	10/14/2022	08:05	ac
Zinc	ND	20	ug/L		1	J	10/13/2022	07:00	ac	EPA 200.7	10/14/2022	08:05	ac
SAR	0.8	0.1	--		1	h	10/13/2022	07:00	ac	EPA 200.7	10/14/2022	08:05	ac
Total Alkalinity (as CaCO3)	250	10	mg/L		1		10/18/2022	14:50	amm	SM 4500-H+B	10/19/2022	01:11	amm
Hydroxide as OH	ND	10	mg/L		1	U	10/18/2022	14:50	amm	SM 4500-H+B	10/19/2022	01:11	amm
Carbonate as CO3	ND	10	mg/L		1	U	10/18/2022	14:50	amm	SM 4500-H+B	10/19/2022	01:11	amm
Bicarbonate as HCO3	310	10	mg/L		1		10/18/2022	14:50	amm	SM 4500-H+B	10/19/2022	01:11	amm
Sulfate	39.3	0.5	mg/L		1		10/11/2022	11:30	ldm	EPA 300.0	10/11/2022	21:19	ldm
Chloride	33	1	mg/L		1		10/11/2022	11:30	ldm	EPA 300.0	10/11/2022	21:19	ldm
Nitrate as NO3	ND	0.4	mg/L		1	J	10/11/2022	11:30	ldm	EPA 300.0	10/11/2022	21:19	ldm
Nitrite as N	ND	0.1	mg/L		1	U	10/11/2022	11:30	ldm	EPA 300.0	10/11/2022	21:19	ldm
Nitrate + Nitrite as N	ND	0.1	mg/L		1	J	10/11/2022	11:30	ldm	EPA 300.0	10/11/2022	21:19	ldm
Fluoride	0.3	0.1	mg/L		1		10/11/2022	11:30	ldm	EPA 300.0	10/11/2022	21:19	ldm
Total Anions	6.8	---	meq/L		1	J	10/18/2022	14:50	amm	SM 4500-H+B	10/19/2022	01:11	amm
pH	8.02	---	units		1		10/10/2022	13:28	jp		10/10/2022	13:28	jp
Specific Conductance	613	1	umhos/cm		1		10/18/2022	14:50	amm	SM 4500-H+B	10/19/2022	01:11	amm
Total Dissolved Solids	400	20	mg/L		1		10/12/2022	09:05	ctl	SM 2540 C	10/13/2022	12:15	ctl
MBAS (foaming agents)	Negative	0.1	mg/L		1	U	10/11/2022	15:31	jba	SM 5540 C	10/11/2022	15:35	jba
Aggressiveness Index	12.6	1	--		1		10/10/2022	13:28	jp		10/10/2022	13:28	jp
Langelier Index (20°C)	0.7	1	--		1		10/10/2022	13:28	jp		10/10/2022	13:28	jp
Nitrate Nitrogen	ND	0.1	mg/L		1	J	10/11/2022	11:30	ldm	EPA 300.0	10/11/2022	21:19	ldm

DQF Flags Definition:
- h The MS/MSD did not meet QC criteria.
- J Reported value is estimated; detected at a concentration below the PQL and above the laboratory MDL.
- U Constituent results were non-detect.

ND=Non-Detected, RL=Reporting Level , Dil.=Dilution

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October 27, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

Description : 18K8 (LA18) LA 18
Project : Los Osos BMC Monitoring

Lab No. : CC 2283855-001
Customer No. : 8000514

Sampled On : October 10, 2022 at 13:28
Sampled By : Jason Pitsillides
Received On : October 10, 2022 at 14:53
Matrix : Ground Water

Sample Results - Field Test

Constituent	Result	RL	Units	Note	Sample Preparation	Sample Analysis	
Field Test					Date	Method	Date
pH (Field)	8.02		units		10/10/2022 13:28	4500HB	10/10/2022 13:28

ND=Non-Detected, RL=Reporting Level.

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ENVIRONMENTAL AGRICULTURAL
Analytical Chemists

November 1, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

LA 20

Description : 17N10 (LA20)- South Bay #1
Project : Los Osos BMC Monitoring

Lab No. : CC 2283977-003
Customer No. : 8000514

Sampled On : October 19, 2022 at 10:00
Sampled By : GSWC
Received On : October 19, 2022 at 13:29
Matrix : Ground Water

Sample Results - Inorganic

Constituent	Result	RL	Units	Note	Dil.	DQF	Sample Preparation			Sample Analysis			
General Mineral							Date	Time	Who	Method	Date	Time	Who
Total Hardness as CaCO3	245	2.5	mg/L		1	h	10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:31	ac
Calcium	37	1	mg/L		1		10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:31	ac
Magnesium	37	1	mg/L		1	h	10/20/2022	11:00	ac	EPA 200.7	10/24/2022	09:24	ac
Potassium	2	1	mg/L		1		10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:31	ac
Sodium	43	1	mg/L		1		10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:31	ac
Total Cations	6.8	---	meq/L		1	h	10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:31	ac
Boron	0.1	0.1	mg/L		1		10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:31	ac
Copper	ND	10	ug/L		1	Ul	10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:31	ac
Iron	ND	30	ug/L		1	U	10/20/2022	11:00	ac	EPA 200.7	10/24/2022	09:24	ac
Manganese	ND	10	ug/L		1	J	10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:31	ac
Zinc	ND	20	ug/L		1	Jl	10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:31	ac
SAR	1.2	0.1	--		1	h	10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:31	ac
Total Alkalinity (as CaCO3)	240	10	mg/L		1		10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	16:58	amm
Hydroxide as OH	ND	10	mg/L		1	U	10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	16:58	amm
Carbonate as CO3	ND	10	mg/L		1	U	10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	16:58	amm
Bicarbonate as HCO3	300	10	mg/L		1		10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	16:58	amm
Sulfate	26.4	0.5	mg/L		1	l	10/20/2022	11:34	ldm	EPA 300.0	10/20/2022	22:02	ldm
Chloride	40	1	mg/L		1		10/20/2022	11:34	ldm	EPA 300.0	10/20/2022	22:02	ldm
Nitrate as NO3	2.9	0.4	mg/L		1		10/20/2022	11:34	ldm	EPA 300.0	10/20/2022	22:02	ldm
Nitrite as N	ND	0.1	mg/L		1	U	10/20/2022	11:34	ldm	EPA 300.0	10/20/2022	22:02	ldm
Nitrate + Nitrite as N	0.7	0.1	mg/L		1		10/20/2022	11:34	ldm	EPA 300.0	10/20/2022	22:02	ldm
Fluoride	0.1	0.1	mg/L		1		10/20/2022	11:34	ldm	EPA 300.0	10/20/2022	22:02	ldm
Total Anions	6.6	---	meq/L		1	l	10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	16:58	amm
pH	7.6	--	units		1	T	10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	16:58	amm
Specific Conductance	616	1	umhos/cm		1		10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	16:58	amm
Total Dissolved Solids	330	20	mg/L		1		10/21/2022	09:29	ctl	SM 2540 C	10/24/2022	12:08	ctl
MBAS (foaming agents)	Negative	0.1	mg/L		1	U	10/20/2022	15:21	jba	SM 5540 C	10/20/2022	15:26	jba
Aggressiveness Index	11.9	1	--		1		10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	16:58	amm
Langelier Index (20°C)	0.1	1	--		1		10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	16:58	amm
Nitrate Nitrogen	0.7	0.1	mg/L		1		10/20/2022	11:34	ldm	EPA 300.0	10/20/2022	22:02	ldm

DQF Flags Definition:
- h The MS/MSD did not meet QC criteria.
- U Constituent results were non-detect.
- l The MS/MSD did not meet QC criteria.
- J Reported value is estimated; detected at a concentration below the PQL and above the laboratory MDL.
- T Exceeded method/regulatory-specific holding time.

ND=Non-Detected, RL=Reporting Level , Dil.=Dilution

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November 1, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

LA 20

Lab No. : CC 2283977-003
Customer No. : 8000514

Sampled On : October 19, 2022 at 10:00
Sampled By : GSWC
Received On : October 19, 2022 at 13:29
Matrix : Ground Water

Description : 17N10 (LA20)- South Bay #1
Project : Los Osos BMC Monitoring

Sample Results - Field Test

Constituent	Result	RL	Units	Note	Sample Preparation	Sample Analysis	
Field Test					Date	Method	Date
Temperature	68		°C		10/19/2022 10:00	2550B	10/19/2022 10:00
Conductivity	0.71		umhos/cm		10/19/2022 10:00	2510B	10/19/2022 10:00
pH (Field)	7.58		units		10/19/2022 10:00	4500HB	10/19/2022 10:00

ND=Non-Detected, RL=Reporting Level.

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FGL ENVIRONMENTAL AGRICULTURAL
Analytical Chemists

November 1, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

Description : 17E8 (LA22) LA 22
Project : Los Osos BMC Monitoring

Lab No. : CC 2283938-001
Customer No. : 8000514

Sampled On : October 17, 2022 at 12:16
Sampled By : Iason Pittsillides
Received On : October 17, 2022 at 13:56
Matrix : Ground Water

Sample Results - Inorganic

Constituent	Result	RL	Units	Note	Dil.	DQF	Sample Preparation			Sample Analysis			
General Mineral							Date	Time	Who	Method	Date	Time	Who
Total Hardness as CaCO3	213	2.5	mg/L		1		10/20/2022	11:00	ac	EPA 200.7	10/21/2022	11:50	ac
Calcium	31	1	mg/L		1		10/20/2022	11:00	ac	EPA 200.7	10/21/2022	11:50	ac
Magnesium	33	1	mg/L		1		10/20/2022	11:00	ac	EPA 200.7	10/21/2022	11:50	ac
Potassium	2	1	mg/L		1		10/20/2022	11:00	ac	EPA 200.7	10/21/2022	11:50	ac
Sodium	32	1	mg/L		1		10/20/2022	11:00	ac	EPA 200.7	10/21/2022	11:50	ac
Total Cations	5.7	---	meq/L		1		10/20/2022	11:00	ac	EPA 200.7	10/21/2022	11:50	ac
Boron	ND	0.1	mg/L		1	J	10/20/2022	11:00	ac	EPA 200.7	10/21/2022	11:50	ac
Copper	ND	10	ug/L		1	J	10/20/2022	11:00	ac	EPA 200.7	10/21/2022	11:50	ac
Iron	ND	30	ug/L		1	U	10/20/2022	11:00	ac	EPA 200.7	10/21/2022	11:50	ac
Manganese	ND	10	ug/L		1	U	10/20/2022	11:00	ac	EPA 200.7	10/21/2022	11:50	ac
Zinc	ND	20	ug/L		1	U	10/20/2022	11:00	ac	EPA 200.7	10/21/2022	11:50	ac
SAR	1.0	0.1	--		1		10/20/2022	11:00	ac	EPA 200.7	10/21/2022	11:50	ac
Total Alkalinity (as CaCO3)	150	10	mg/L		1		10/23/2022	15:05	amm	SM 4500-H+B	10/23/2022	23:58	amm
Hydroxide as OH	ND	10	mg/L		1	U	10/23/2022	15:05	amm	SM 4500-H+B	10/23/2022	23:58	amm
Carbonate as CO3	ND	10	mg/L		1	U	10/23/2022	15:05	amm	SM 4500-H+B	10/23/2022	23:58	amm
Bicarbonate as HCO3	180	10	mg/L		1		10/23/2022	15:05	amm	SM 4500-H+B	10/23/2022	23:58	amm
Sulfate	16.5	0.5	mg/L		1		10/18/2022	10:18	ldm	EPA 300.0	10/18/2022	23:12	kas
Chloride	45	1	mg/L		1		10/18/2022	10:18	ldm	EPA 300.0	10/18/2022	23:12	kas
Nitrate as NO3	31.0	0.4	mg/L		1		10/18/2022	10:18	ldm	EPA 300.0	10/18/2022	23:12	kas
Nitrite as N	ND	0.1	mg/L		1	U	10/18/2022	10:18	ldm	EPA 300.0	10/18/2022	23:12	kas
Nitrate + Nitrite as N	7.0	0.1	mg/L		1		10/18/2022	10:18	ldm	EPA 300.0	10/18/2022	23:12	kas
Fluoride	ND	0.1	mg/L		1	J	10/18/2022	10:18	ldm	EPA 300.0	10/18/2022	23:12	kas
Total Anions	5.1	---	meq/L		1	J	10/23/2022	15:05	amm	SM 4500-H+B	10/23/2022	23:58	amm
pH	7.36	---	units		1		10/17/2022	12:16	ip		10/17/2022	12:16	ip
Specific Conductance	485	1	umhos/cm		1		10/23/2022	15:05	amm	SM 4500-H+B	10/23/2022	23:58	amm
Total Dissolved Solids	300	20	mg/L		1		10/19/2022	11:28	ctl	SM 2540 C	10/20/2022	10:59	ctl
MBAS (foaming agents)	Negative	0.1	mg/L		1	U	10/18/2022	17:23	jba	SM 5540 C	10/18/2022	17:32	jba
Aggressiveness Index	11.4	1	--		1		10/17/2022	12:16	ip		10/17/2022	12:16	ip
Langelier Index (20°C)	-0.4	1	--		1		10/17/2022	12:16	ip		10/17/2022	12:16	ip
Nitrate Nitrogen	7.0	0.1	mg/L		1		10/18/2022	10:18	ldm	EPA 300.0	10/18/2022	23:12	kas

DQF Flags Definition:
J Reported value is estimated; detected at a concentration below the PQL and above the laboratory MDL.
U Constituent results were non-detect.

ND=Non-Detected, RL=Reporting Level , Dil.=Dilution

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November 1, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

Description : 17E8 (LA22) LA 22
Project : Los Osos BMC Monitoring

Lab No. : CC 2283938-001
Customer No. : 8000514

Sampled On : October 17, 2022 at 12:16
Sampled By : Iason Pittsillides
Received On : October 17, 2022 at 13:56
Matrix : Ground Water

Sample Results - Field Test

Constituent	Result	RL	Units	Note	Sample Preparation	Sample Analysis	
Field Test					Date	Method	Date
pH (Field)	7.36		units		10/17/2022 12:16	4500HB	10/17/2022 12:16

ND=Non-Detected, RL=Reporting Level.

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October 27, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

Lab No. : CC 2283842-001
Customer No. : 8000514

Sampled On : October 6, 2022 at 13:59
Sampled By : Ianson Pitsillides
Received On : October 6, 2022 at 14:38
Matrix : Ground Water

Description : 20 H1 (LA30) LA 30
Project : Los Osos BMC Monitoring

Sample Results - Inorganic

Constituent	Result	RL	Units	Note	Dil.	DQF	Sample Preparation			Sample Analysis			
General Mineral							Date	Time	Who	Method	Date	Time	Who
Total Hardness as CaCO3	430	2.5	mg/L		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	10:29	ac
Calcium	70	1	mg/L		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	10:29	ac
Magnesium	62	1	mg/L		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	10:29	ac
Potassium	1	1	mg/L		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	10:29	ac
Sodium	41	1	mg/L		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	10:29	ac
Total Cations	10.4	---	meq/L		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	10:29	ac
Boron	ND	0.1	mg/L		1	J	10/13/2022	07:00	ac	EPA 200.7	10/13/2022	10:29	ac
Copper	ND	10	ug/L		1	J	10/13/2022	07:00	ac	EPA 200.7	10/13/2022	10:29	ac
Iron	720	30	ug/L		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	10:29	ac
Manganese	190	10	ug/L		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	10:29	ac
Zinc	20	20	ug/L		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	10:29	ac
SAR	0.9	0.1	--		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	10:29	ac
Total Alkalinity (as CaCO3)	340	10	mg/L		1	I	10/10/2022	18:44	amm	SM 4500-H+B	10/10/2022	20:34	amm
Hydroxide as OH	ND	10	mg/L		1	U	10/10/2022	18:44	amm	SM 4500-H+B	10/10/2022	20:34	amm
Carbonate as CO3	ND	10	mg/L		1	U	10/10/2022	18:44	amm	SM 4500-H+B	10/10/2022	20:34	amm
Bicarbonate as HCO3	420	10	mg/L		1	I	10/10/2022	18:44	amm	SM 4500-H+B	10/10/2022	20:34	amm
Sulfate	101	0.5	mg/L		1		10/07/2022	11:33	ldm	EPA 300.0	10/07/2022	20:58	ldm
Chloride	60	1	mg/L		1	l	10/07/2022	11:33	ldm	EPA 300.0	10/07/2022	20:58	ldm
Nitrate as NO3	ND	0.4	mg/L		1	J	10/07/2022	11:33	ldm	EPA 300.0	10/07/2022	20:58	ldm
Nitrite as N	ND	0.1	mg/L		1	U	10/07/2022	11:33	ldm	EPA 300.0	10/07/2022	20:58	ldm
Nitrate + Nitrite as N	ND	0.1	mg/L		1	J	10/07/2022	11:33	ldm	EPA 300.0	10/07/2022	20:58	ldm
Fluoride	0.3	0.1	mg/L		1		10/18/2022	10:18	ldm	EPA 300.0	10/18/2022	19:53	kas
Total Anions	10.7	---	meq/L		1	IlJ	10/10/2022	18:44	amm	SM 4500-H+B	10/10/2022	20:34	amm
pH	7.99	---	units		1		10/06/2022	13:59	ip	SM 4500-H+B	10/06/2022	13:59	ip
Specific Conductance	919	1	umhos/cm		1		10/10/2022	18:44	amm	SM 4500-H+B	10/10/2022	20:34	amm
Total Dissolved Solids	640	20	mg/L		1		10/10/2022	11:19	ctl	SM 2540 C	10/11/2022	10:25	ctl
MBAS (foaming agents)	Negative	0.1	mg/L		1	U	10/07/2022	15:13	jba	SM 5540 C	10/07/2022	15:25	jba
Aggressiveness Index	12.8	1	--		1		10/06/2022	13:59	ip	SM 4500-H+B	10/06/2022	13:59	ip
Langelier Index (20°C)	0.9	1	--		1	I	10/06/2022	13:59	ip	SM 4500-H+B	10/06/2022	13:59	ip
Nitrate Nitrogen	ND	0.1	mg/L		1	J	10/07/2022	11:33	ldm	EPA 300.0	10/07/2022	20:58	ldm

DQF Flags Definition:
- J Reported value is estimated; detected at a concentration below the PQL and above the laboratory MDL.
- I The RPD for the laboratory duplicate exceeded laboratory criteria.
- U Constituent results were non-detect.
- l The MS/MSD did not meet QC criteria.

ND=Non-Detected, RL=Reporting Level , Dil.=Dilution

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October 27, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

Description : 20 H1 (LA30) LA 30
Project : Los Osos BMC Monitoring

Lab No. : CC 2283842-001
Customer No. : 8000514

Sampled On : October 6, 2022 at 13:59
Sampled By : Ianson Pitsillides
Received On : October 6, 2022 at 14:38
Matrix : Ground Water

Sample Results - Field Test

Constituent	Result	RL	Units	Note	Sample Preparation	Sample Analysis	
Field Test					Date	Method	Date
pH (Field)	7.99		units		10/06/2022 13:59	4500HB	10/06/2022 13:59

ND=Non-Detected, RL=Reporting Level.

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October 27, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

Lab No. : CC 2283842-002
Customer No. : 8000514

Sampled On : October 6, 2022 at 13:00
Sampled By : Ianson Pitsillides
Received On : October 6, 2022 at 14:38
Matrix : Ground Water

Description : 13M2 (LA31) LA 31
Project : Los Osos BMC Monitoring

Sample Results - Inorganic

Constituent	Result	RL	Units	Note	Dil.	DQF	Sample Preparation			Sample Analysis			
General Mineral							Date	Time	Who	Method	Date	Time	Who
Total Hardness as CaCO3	506	2.5	mg/L		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	10:57	ac
Calcium	79	1	mg/L		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	10:57	ac
Magnesium	75	1	mg/L		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	10:57	ac
Potassium	4	1	mg/L		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	10:57	ac
Sodium	268	1	mg/L		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	10:57	ac
Total Cations	21.9	---	meq/L		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	10:57	ac
Boron	0.1	0.1	mg/L		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	10:57	ac
Copper	ND	10	ug/L		1	J	10/13/2022	07:00	ac	EPA 200.7	10/13/2022	10:57	ac
Iron	60	30	ug/L		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	10:57	ac
Manganese	ND	10	ug/L		1	J	10/13/2022	07:00	ac	EPA 200.7	10/13/2022	10:57	ac
Zinc	ND	20	ug/L		1	J	10/13/2022	07:00	ac	EPA 200.7	10/13/2022	10:57	ac
SAR	5.2	0.1	--		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	10:57	ac
Total Alkalinity (as CaCO3)	60	10	mg/L		1	I	10/10/2022	18:44	amm	SM 4500-H+B	10/10/2022	20:25	amm
Hydroxide as OH	ND	10	mg/L		1	U	10/10/2022	18:44	amm	SM 4500-H+B	10/10/2022	20:25	amm
Carbonate as CO3	ND	10	mg/L		1	U	10/10/2022	18:44	amm	SM 4500-H+B	10/10/2022	20:25	amm
Bicarbonate as HCO3	70	10	mg/L		1	I	10/10/2022	18:44	amm	SM 4500-H+B	10/10/2022	20:25	amm
Sulfate	145	0.5	mg/L		1		10/07/2022	16:11	ldm	EPA 300.0	10/08/2022	05:37	ldm
Chloride	636	15*	mg/L		20	l	10/07/2022	16:11	ldm	EPA 300.0	10/08/2022	22:11	ldm
Nitrate as NO3	3.0	0.4	mg/L		1	l	10/07/2022	16:11	ldm	EPA 300.0	10/08/2022	05:37	ldm
Nitrite as N	ND	0.1	mg/L		1	U	10/07/2022	16:11	ldm	EPA 300.0	10/08/2022	05:37	ldm
Nitrate + Nitrite as N	0.7	0.1	mg/L		1	l	10/07/2022	16:11	ldm	EPA 300.0	10/08/2022	05:37	ldm
Fluoride	ND	0.1	mg/L		1	J	10/07/2022	16:11	ldm	EPA 300.0	10/08/2022	05:37	ldm
Total Anions	22.2	---	meq/L		1	IlJ	10/10/2022	18:44	amm	SM 4500-H+B	10/10/2022	20:25	amm
pH	8.25	---	units		1		10/06/2022	13:00	ip	SM 4500-H+B	10/06/2022	13:00	ip
Specific Conductance	2520	1	umhos/cm		1		10/10/2022	18:44	amm	SM 4500-H+B	10/10/2022	20:25	amm
Total Dissolved Solids	1840	20	mg/L		1		10/10/2022	11:19	ctl	SM 2540 C	10/11/2022	10:41	ctl
MBAS (foaming agents)	Negative	0.1	mg/L		1	U	10/07/2022	15:13	jba	SM 5540 C	10/07/2022	15:25	jba
Aggressiveness Index	12.3	1	--		1		10/06/2022	13:00	ip	SM 4500-H+B	10/06/2022	13:00	ip
Langelier Index (20°C)	0.4	1	--		1	I	10/06/2022	13:00	ip	SM 4500-H+B	10/06/2022	13:00	ip
Nitrate Nitrogen	0.7	0.1	mg/L		1	l	10/07/2022	16:11	ldm	EPA 300.0	10/08/2022	05:37	ldm

DQF Flags Definition:
- J Reported value is estimated; detected at a concentration below the PQL and above the laboratory MDL.
- I The RPD for the laboratory duplicate exceeded laboratory criteria.
- U Constituent results were non-detect.
- l The MS/MSD did not meet QC criteria.

ND=Non-Detected, RL=Reporting Level * RL adusted for dilution, Dil.=Dilution

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October 27, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

Description : 13M2 (LA31) LA 31
Project : Los Osos BMC Monitoring

Lab No. : CC 2283842-002
Customer No. : 8000514

Sampled On : October 6, 2022 at 13:00
Sampled By : Ianson Pitsillides
Received On : October 6, 2022 at 14:38
Matrix : Ground Water

Sample Results - Field Test

Constituent	Result	RL	Units	Note	Sample Preparation	Sample Analysis	
Field Test					Date	Method	Date
pH (Field)	8.25		units		10/06/2022 13:00	4500HB	10/06/2022 13:00

ND=Non-Detected, RL=Reporting Level. * RL adusted for dilution

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October 27, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

Description : 18K9 (LA32) LA 32
Project : Los Osos BMC Monitoring

Lab No. : CC 2283842-003
Customer No. : 8000514

Sampled On : October 6, 2022 at 12:14
Sampled By : Ianson Pitsillides
Received On : October 6, 2022 at 14:38
Matrix : Ground Water

Sample Results - Inorganic

Constituent	Result	RL	Units	Note	Dil.	DQF	Sample Preparation			Sample Analysis			
General Mineral							Date	Time	Who	Method	Date	Time	Who
Total Hardness as CaCO3	211	2.5	mg/L		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	11:03	ac
Calcium	32	1	mg/L		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	11:03	ac
Magnesium	32	1	mg/L		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	11:03	ac
Potassium	2	1	mg/L		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	11:03	ac
Sodium	58	1	mg/L		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	11:03	ac
Total Cations	6.8	---	meq/L		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	11:03	ac
Boron	ND	0.1	mg/L		1	U	10/13/2022	07:00	ac	EPA 200.7	10/13/2022	11:03	ac
Copper	ND	10	ug/L		1	J	10/13/2022	07:00	ac	EPA 200.7	10/13/2022	11:03	ac
Iron	ND	30	ug/L		1	U	10/13/2022	07:00	ac	EPA 200.7	10/13/2022	11:03	ac
Manganese	ND	10	ug/L		1	U	10/13/2022	07:00	ac	EPA 200.7	10/13/2022	11:03	ac
Zinc	30	20	ug/L		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	11:03	ac
SAR	1.7	0.1	--		1		10/13/2022	07:00	ac	EPA 200.7	10/13/2022	11:03	ac
Total Alkalinity (as CaCO3)	160	10	mg/L		1	I	10/10/2022	18:44	amm	SM 4500-H+B	10/10/2022	22:36	amm
Hydroxide as OH	ND	10	mg/L		1	U	10/10/2022	18:44	amm	SM 4500-H+B	10/10/2022	22:36	amm
Carbonate as CO3	ND	10	mg/L		1	U	10/10/2022	18:44	amm	SM 4500-H+B	10/10/2022	22:36	amm
Bicarbonate as HCO3	200	10	mg/L		1	I	10/10/2022	18:44	amm	SM 4500-H+B	10/10/2022	22:36	amm
Sulfate	23.5	0.5	mg/L		1		10/07/2022	16:11	ldm	EPA 300.0	10/08/2022	05:57	ldm
Chloride	38	1	mg/L		1	l	10/07/2022	16:11	ldm	EPA 300.0	10/08/2022	05:57	ldm
Nitrate as NO3	6.2	0.4	mg/L		1	l	10/07/2022	16:11	ldm	EPA 300.0	10/08/2022	05:57	ldm
Nitrite as N	ND	0.1	mg/L		1	U	10/07/2022	16:11	ldm	EPA 300.0	10/08/2022	05:57	ldm
Nitrate + Nitrite as N	1.4	0.1	mg/L		1	l	10/07/2022	16:11	ldm	EPA 300.0	10/08/2022	05:57	ldm
Fluoride	0.1	0.1	mg/L		1		10/07/2022	16:11	ldm	EPA 300.0	10/08/2022	05:57	ldm
Total Anions	4.9	---	meq/L		1	Il	10/10/2022	18:44	amm	SM 4500-H+B	10/10/2022	22:36	amm
pH	7.66	---	units		1		10/06/2022	12:14	ip	SM 4500-H+B	10/06/2022	12:14	ip
Specific Conductance	461	1	umhos/cm		1		10/10/2022	18:44	amm	SM 4500-H+B	10/10/2022	22:36	amm
Total Dissolved Solids	260	20	mg/L		1		10/10/2022	11:19	ctl	SM 2540 C	10/11/2022	10:38	ctl
MBAS (foaming agents)	Negative	0.1	mg/L		1	U	10/07/2022	15:13	jba	SM 5540 C	10/07/2022	15:25	jba
Aggressiveness Index	11.8	1	--		1		10/06/2022	12:14	ip	SM 4500-H+B	10/06/2022	12:14	ip
Langelier Index (20°C)	-0.07	1	--		1	I	10/06/2022	12:14	ip	SM 4500-H+B	10/06/2022	12:14	ip
Nitrate Nitrogen	1.4	0.1	mg/L		1	l	10/07/2022	16:11	ldm	EPA 300.0	10/08/2022	05:57	ldm

DQF Flags Definition:
- U Constituent results were non-detect.
- J Reported value is estimated; detected at a concentration below the PQL and above the laboratory MDL.
- I The RPD for the laboratory duplicate exceeded laboratory criteria.
- l The MS/MSD did not meet QC criteria.

ND=Non-Detected, RL=Reporting Level * RL adusted for dilution, Dil.=Dilution

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October 27, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

Description : 18K9 (LA32) LA 32
Project : Los Osos BMC Monitoring

Lab No. : CC 2283842-003
Customer No. : 8000514

Sampled On : October 6, 2022 at 12:14
Sampled By : Ianson Pitsillides
Received On : October 6, 2022 at 14:38
Matrix : Ground Water

Sample Results - Field Test

Constituent	Result	RL	Units	Note	Sample Preparation	Sample Analysis	
Field Test					Date	Method	Date
pH (Field)	7.66		units		10/06/2022 12:14	4500HB	10/06/2022 12:14

ND=Non-Detected, RL=Reporting Level. * RL adusted for dilution

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November 1, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

LA 39

Lab No. : CC 2283977-002
Customer No. : 8000514

Sampled On : October 19, 2022 at 09:20
Sampled By : GSWC
Received On : October 19, 2022 at 13:29
Matrix : Ground Water

Description : 18K (LA39)-Los Olives #5
Project : Los Osos BMC Monitoring

Sample Results - Inorganic

Constituent	Result	RL	Units	Note	Dil.	DQF	Sample Preparation			Sample Analysis			
General Mineral							Date	Time	Who	Method	Date	Time	Who
Total Hardness as CaCO3	236	2.5	mg/L		1	h	10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:24	ac
Calcium	37	1	mg/L		1		10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:24	ac
Magnesium	35	1	mg/L		1	h	10/20/2022	11:00	ac	EPA 200.7	10/24/2022	09:17	ac
Potassium	2	1	mg/L		1		10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:24	ac
Sodium	44	1	mg/L		1		10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:24	ac
Total Cations	6.7	---	meq/L		1	h	10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:24	ac
Boron	ND	0.1	mg/L		1	J	10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:24	ac
Copper	ND	10	ug/L		1	Ul	10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:24	ac
Iron	ND	30	ug/L		1	U	10/20/2022	11:00	ac	EPA 200.7	10/24/2022	09:17	ac
Manganese	ND	10	ug/L		1	U	10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:24	ac
Zinc	ND	20	ug/L		1	Jl	10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:24	ac
SAR	1.2	0.1	--		1	h	10/20/2022	11:00	ac	EPA 200.7	10/21/2022	14:24	ac
Total Alkalinity (as CaCO3)	250	10	mg/L		1		10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	16:47	amm
Hydroxide as OH	ND	10	mg/L		1	U	10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	16:47	amm
Carbonate as CO3	ND	10	mg/L		1	U	10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	16:47	amm
Bicarbonate as HCO3	310	10	mg/L		1		10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	16:47	amm
Sulfate	28.0	0.5	mg/L		1	l	10/20/2022	11:34	ldm	EPA 300.0	10/20/2022	22:23	ldm
Chloride	37	1	mg/L		1		10/20/2022	11:34	ldm	EPA 300.0	10/20/2022	22:23	ldm
Nitrate as NO3	ND	0.4	mg/L		1	U	10/20/2022	11:34	ldm	EPA 300.0	10/20/2022	22:23	ldm
Nitrite as N	ND	0.1	mg/L		1	U	10/20/2022	11:34	ldm	EPA 300.0	10/20/2022	22:23	ldm
Nitrate + Nitrite as N	ND	0.1	mg/L		1	U	10/20/2022	11:34	ldm	EPA 300.0	10/20/2022	22:23	ldm
Fluoride	0.1	0.1	mg/L		1		10/20/2022	11:34	ldm	EPA 300.0	10/20/2022	22:23	ldm
Total Anions	6.7	---	meq/L		1	l	10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	16:47	amm
pH	7.6	--	units		1	T	10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	16:47	amm
Specific Conductance	617	1	umhos/cm		1		10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	16:47	amm
Total Dissolved Solids	330	20	mg/L		1		10/21/2022	09:29	ctl	SM 2540 C	10/24/2022	11:43	ctl
MBAS (foaming agents)	Negative	0.1	mg/L		1	U	10/20/2022	15:21	jba	SM 5540 C	10/20/2022	15:26	jba
Aggressiveness Index	12.0	1	--		1		10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	16:47	amm
Langelier Index (20°C)	0.1	1	--		1		10/21/2022	14:30	sta	SM 4500-H+B	10/21/2022	16:47	amm
Nitrate Nitrogen	ND	0.1	mg/L		1	U	10/20/2022	11:34	ldm	EPA 300.0	10/20/2022	22:23	ldm

DQF Flags Definition:
- h The MS/MSD did not meet QC criteria.
- J Reported value is estimated; detected at a concentration below the PQL and above the laboratory MDL.
- U Constituent results were non-detect.
- l The MS/MSD did not meet QC criteria.
- T Exceeded method/regulatory-specific holding time.

ND=Non-Detected, RL=Reporting Level , Dil.=Dilution

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9415 W. Goshen Avenue
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TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

November 1, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

LA 39

Description : 18K (LA39)-Los Olives #5
Project : Los Osos BMC Monitoring

Lab No. : CC 2283977-002
Customer No. : 8000514

Sampled On : October 19, 2022 at 09:20
Sampled By : GSWC
Received On : October 19, 2022 at 13:29
Matrix : Ground Water

Sample Results - Field Test

Constituent	Result	RL	Units	Note	Sample Preparation	Sample Analysis	
Field Test					Date	Method	Date
Temperature	70		°C		10/19/2022 09:20	2550B	10/19/2022 09:20
Conductivity	0.70		umhos/cm		10/19/2022 09:20	2510B	10/19/2022 09:20
pH (Field)	7.56		units		10/19/2022 09:20	4500HB	10/19/2022 09:20

ND=Non-Detected, RL=Reporting Level.

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November 10, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

Description : 13Ba (LA40) LA 40
Project : Los Osos BMC Monitoring

Lab No. : CC 2283916-001
Customer No. : 8000514

Sampled On : October 12, 2022 at 15:08
Sampled By : Iason Pitsillides
Received On : October 13, 2022 at 13:22
Matrix : Ground Water

Sample Results - Inorganic

Constituent	Result	RL	Units	Note	Dil.	DQF	Sample Preparation			Sample Analysis			
General Mineral							Date	Time	Who	Method	Date	Time	Who
Total Hardness as CaCO3	3860	2.5	mg/L		1		10/14/2022	13:00	ac	EPA 200.7	10/15/2022	11:02	ac
Calcium	569	1	mg/L		1		10/14/2022	13:00	ac	EPA 200.7	10/15/2022	11:02	ac
Magnesium	594	5*	mg/L		5		10/14/2022	13:00	ac	EPA 200.7	10/18/2022	10:24	ac
Potassium	7	1	mg/L		1		10/14/2022	13:00	ac	EPA 200.7	10/15/2022	11:02	ac
Sodium	186	1	mg/L		1		10/14/2022	13:00	ac	EPA 200.7	10/15/2022	11:02	ac
Total Cations	85.5	---	meq/L		1		10/14/2022	13:00	ac	EPA 200.7	10/15/2022	11:02	ac
Boron	ND	0.1	mg/L		1	U	10/14/2022	13:00	ac	EPA 200.7	10/15/2022	11:02	ac
Copper	ND	10	ug/L		1	J	10/14/2022	13:00	ac	EPA 200.7	10/15/2022	11:02	ac
Iron	40	30	ug/L		1		10/14/2022	13:00	ac	EPA 200.7	10/15/2022	11:02	ac
Manganese	610	10	ug/L		1		10/14/2022	13:00	ac	EPA 200.7	10/15/2022	11:02	ac
Zinc	ND	20	ug/L		1	J	10/14/2022	13:00	ac	EPA 200.7	10/15/2022	11:02	ac
SAR	1.3	0.1	--		1		10/14/2022	13:00	ac	EPA 200.7	10/15/2022	11:02	ac
Total Alkalinity (as CaCO3)	230	10	mg/L		1		10/22/2022	20:26	amm	SM 4500-H+B	10/22/2022	23:09	amm
Hydroxide as OH	ND	10	mg/L		1	U	10/22/2022	20:26	amm	SM 4500-H+B	10/22/2022	23:09	amm
Carbonate as CO3	ND	10	mg/L		1	U	10/22/2022	20:26	amm	SM 4500-H+B	10/22/2022	23:09	amm
Bicarbonate as HCO3	280	10	mg/L		1		10/22/2022	20:26	amm	SM 4500-H+B	10/22/2022	23:09	amm
Sulfate	221	1*	mg/L		2		10/28/2022	15:50	ldm	EPA 300.0	10/29/2022	03:03	ldm
Chloride	2900	200*	mg/L		200	l	10/31/2022	11:56	ldm	EPA 300.0	10/31/2022	23:09	ldm
Nitrate as NO3	0.5	0.2	mg/L		1	J	10/14/2022	13:00	lfs	SM 4500-NO3 F	10/14/2022	14:38	lfs
Nitrite as N	ND	0.2	mg/L		1	J	10/14/2022	13:00	lfs	SM 4500-NO3 F	10/14/2022	14:35	lfs
Nitrate + Nitrite as N	ND	0.2	mg/L		1	U	10/14/2022	13:00	lfs	SM 4500-NO3 F	10/14/2022	14:38	lfs
Fluoride	ND	0.2*	mg/L		2	J	10/28/2022	15:50	ldm	EPA 300.0	10/29/2022	03:03	ldm
Total Anions	91.0	---	meq/L		1	lJ	10/22/2022	20:26	amm	SM 4500-H+B	10/22/2022	23:09	amm
pH	7.47	---	units		1		10/12/2022	15:08	ip		10/12/2022	15:08	ip
Specific Conductance	8860	1	umhos/cm		1		10/22/2022	20:26	amm	SM 4500-H+B	10/22/2022	23:09	amm
Total Dissolved Solids	8340	20*	mg/L		3		10/17/2022	11:09	ctl	SM 2540 C	10/18/2022	11:48	ctl
MBAS (foaming agents)	Negative	0.1	mg/L		1	UT	10/14/2022	16:53	jba	SM 5540 C	10/14/2022	17:01	jba
Aggressiveness Index	13.0	1	--		1		10/12/2022	15:08	ip		10/12/2022	15:08	ip
Langelier Index (20°C)	1.0	1	--		1		10/12/2022	15:08	ip		10/12/2022	15:08	ip
Nitrate Nitrogen	ND	0.2	mg/L		1	U	10/14/2022	13:00	lfs	SM 4500-NO3 F	10/14/2022	14:38	lfs

DQF Flags Definition:
- U Constituent results were non-detect.
- J Reported value is estimated; detected at a concentration below the PQL and above the laboratory MDL.
- l The MS/MSD did not meet QC criteria.
- T Exceeded method/regulatory-specific holding time.

ND=Non-Detected, RL=Reporting Level * RL adusted for dilution, Dil.=Dilution

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November 10, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

Description : 13Ba (LA40) LA 40
Project : Los Osos BMC Monitoring

Lab No. : CC 2283916-001
Customer No. : 8000514

Sampled On : October 12, 2022 at 15:08
Sampled By : Iason Pitsillides
Received On : October 13, 2022 at 13:22
Matrix : Ground Water

Sample Results - Field Test

Constituent	Result	RL	Units	Note	Sample Preparation	Sample Analysis	
Field Test					Date	Method	Date
pH (Field)	7.47		units		10/12/2022 15:08	4500HB	10/12/2022 15:08

ND=Non-Detected, RL=Reporting Level. * RL adusted for dilution

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November 3, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

Description : 13 Bb (LA 41) LA 41
Project : Los Osos BMC Monitoring

Lab No. : CC 2283887-001
Customer No. : 8000514

Sampled On : October 11, 2022 at 14:31
Sampled By : Iason Pitsillides
Received On : October 11, 2022 at 15:15
Matrix : Ground Water

Sample Results - Inorganic

Constituent	Result	RL	Units	Note	Dil.	DQF	Sample Preparation			Sample Analysis			
General Mineral							Date	Time	Who	Method	Date	Time	Who
Total Hardness as CaCO3	315	2.5	mg/L		1	h	10/13/2022	07:00	ac	EPA 200.7	10/14/2022	07:30	ac
Calcium	62	1	mg/L		1		10/13/2022	07:00	ac	EPA 200.7	10/14/2022	07:30	ac
Magnesium	39	1	mg/L		1	h	10/13/2022	07:00	ac	EPA 200.7	10/14/2022	07:30	ac
Potassium	2	1	mg/L		1		10/13/2022	07:00	ac	EPA 200.7	10/14/2022	07:30	ac
Sodium	57	1	mg/L		1		10/13/2022	07:00	ac	EPA 200.7	10/14/2022	07:30	ac
Total Cations	8.8	---	meq/L		1	h	10/13/2022	07:00	ac	EPA 200.7	10/14/2022	07:30	ac
Boron	0.1	0.1	mg/L		1		10/13/2022	07:00	ac	EPA 200.7	10/14/2022	07:30	ac
Copper	ND	10	ug/L		1	J	10/13/2022	07:00	ac	EPA 200.7	10/13/2022	13:09	ac
Iron	90	30	ug/L		1		10/13/2022	07:00	ac	EPA 200.7	10/14/2022	07:30	ac
Manganese	90	10	ug/L		1		10/13/2022	07:00	ac	EPA 200.7	10/14/2022	07:30	ac
Zinc	ND	20	ug/L		1	J	10/13/2022	07:00	ac	EPA 200.7	10/13/2022	13:09	ac
SAR	1.4	0.1	--		1	h	10/13/2022	07:00	ac	EPA 200.7	10/14/2022	07:30	ac
Total Alkalinity (as CaCO3)	280	10	mg/L		1		10/18/2022	14:50	amm	SM 4500-H+B	10/19/2022	01:40	amm
Hydroxide as OH	ND	10	mg/L		1	U	10/18/2022	14:50	amm	SM 4500-H+B	10/19/2022	01:40	amm
Carbonate as CO3	ND	10	mg/L		1	U	10/18/2022	14:50	amm	SM 4500-H+B	10/19/2022	01:40	amm
Bicarbonate as HCO3	340	10	mg/L		1		10/18/2022	14:50	amm	SM 4500-H+B	10/19/2022	01:40	amm
Sulfate	71.1	0.5	mg/L		1		11/01/2022	16:09	ldm	EPA 300.0	11/01/2022	21:26	ldm
Chloride	48	1	mg/L		1		11/01/2022	16:09	ldm	EPA 300.0	11/01/2022	21:26	ldm
Nitrate as NO3	0.6	0.2	mg/L		1	J	10/12/2022	13:30	lfs	SM 4500-NO3 F	10/12/2022	14:39	lfs
Nitrite as N	ND	0.2	mg/L		1	U	10/12/2022	13:30	lfs	SM 4500-NO3 F	10/12/2022	14:37	lfs
Nitrate + Nitrite as N	ND	0.2	mg/L		1	U	10/12/2022	13:30	lfs	SM 4500-NO3 F	10/12/2022	14:39	lfs
Fluoride	0.3	0.1	mg/L		1		11/01/2022	16:09	ldm	EPA 300.0	11/01/2022	21:26	ldm
Total Anions	8.4	---	meq/L		1	J	10/18/2022	14:50	amm	SM 4500-H+B	10/19/2022	01:40	amm
pH	7.56	---	units		1		10/11/2022	14:31	ip		10/11/2022	14:31	ip
Specific Conductance	766	1	umhos/cm		1		10/18/2022	14:50	amm	SM 4500-H+B	10/19/2022	01:40	amm
Total Dissolved Solids	470	20	mg/L		1		10/13/2022	10:19	ctl	SM 2540 C	10/14/2022	11:16	ctl
MBAS (foaming agents)	Negative	0.1	mg/L		1	U	10/12/2022	15:45	jba	SM 5540 C	10/12/2022	15:45	jba
Aggressiveness Index	12.2	1	--		1		10/11/2022	14:31	ip		10/11/2022	14:31	ip
Langelier Index (20°C)	0.3	1	--		1		10/11/2022	14:31	ip		10/11/2022	14:31	ip
Nitrate Nitrogen	ND	0.2	mg/L		1	U	10/12/2022	13:30	lfs	SM 4500-NO3 F	10/12/2022	14:39	lfs

DQF Flags Definition:
h The MS/MSD did not meet QC criteria.
J Reported value is estimated; detected at a concentration below the PQL and above the laboratory MDL.
U Constituent results were non-detect.

ND=Non-Detected, RL=Reporting Level , Dil.=Dilution

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November 3, 2022

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401

Description : 13 Bb (LA 41) LA 41
Project : Los Osos BMC Monitoring

Lab No. : CC 2283887-001
Customer No. : 8000514

Sampled On : October 11, 2022 at 14:31
Sampled By : Iason Pitsillides
Received On : October 11, 2022 at 15:15
Matrix : Ground Water

Sample Results - Field Test

Constituent	Result	RL	Units	Note	Sample Preparation	Sample Analysis	
Field Test					Date	Method	Date
pH (Field)	7.56		units		10/11/2022 14:31	4500HB	10/11/2022 14:31

ND=Non-Detected, RL=Reporting Level.

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CEC Testing

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 10/31/2022
Operator: AB/IP
Well number and location: 30S/11E-13Q2 (FW5)
Site and wellhead conditions: Slight overcast and breezy.

Static water depth (feet):	81.19
Well depth (feet):	105
Water column (feet):	23.81
Casing diameter (inches):	2
Minimum purge volume (gal)	35
Purge rate (gpm):	1.1
Pumping water level (feet):	--
Pump setting (feet):	~100
Minimum purge time (min):	--
Time begin purge:	9:40

Time	Gallons	EC (µS/cm)	pH	Temp. (°C)	Comments*
9:40	1	863.8	8.11	18.0	Orange, cloudy
9:47	5	851.6	7.53	18.1	Cloudy, whitish, no odor
9:51	10	853.8	7.22	18.3	Slightly cloudy, odorless
9:54	15	854.1	7.15	18.1	Slightly cloudy, odorless
9:59	20	854.1	7.09	18.1	Clear, colorless, odorless
10:03	25	853.4	6.94	18.2	Clear, colorless, odorless
10:08	30	856.0	6.80	18.3	Clear, colorless, odorless
10:13	35	854.3	6.69	18.4	Clear, colorless, odorless
					Sampled @ 10:15

*Turbidity, color, odor, sheen, debris, etc.

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 10/31/2022
Operator: AB/IP
Well number and location: 30S/10E-24A (FW6)
Site and wellhead conditions: Overcast and cool

Static water depth (feet): 140.79
Well depth (feet): 165.93
Water column (feet): 25.14
Casing diameter (inches): 2
Minimum purge volume (gal) 15
Purge rate (gpm): 0.7
Pumping water level (feet): --
Pump setting (feet): ~150
Minimum purge time (min): --
Time begin purge: 11:13 AM

Time	Gallons	EC (µS/cm)	pH	Temp. (°C)	Comments*
11:13	1	927.6	7.21	19.1	Clear, colorless, odorless
11:20	5	929.2	7.09	20.3	Clear, colorless, odorless
11:28	10	927.7	6.93	20.2	Clear, colorless, odorless
11:36	15	925.5	7.08	20	Clear, colorless, odorless
					Sampled @ 11:36

*Turbidity, color, odor, sheen, debris, etc.

WECK LABORATORIES, INC.

Certificate of Analysis

FINAL REPORT

Work Orders:	2K01012	**Report Date:**	12/20/2022
		Received Date:	11/1/2022
Project:	Los Osos CEC Monitoring	**Turnaround Time:**	Normal
		Phones:	(805) 543-1413
		Fax:	
Attn:	Spencer Harris	**P.O. #:**	
Client:	Cleath-Harris Geologists, Inc. 75 Zaca Lane, Suite 110 San Luis Obispo, CA 93401	**Billing Code:**	

DoD-ELAP ANAB #ADE-2882 • DoD-ISO ANAB # • ELAP-CA #1132 • EPA-UCMR #CA00211 • HW-DOH #4047 • ISO17025 ANAB #L2457.01 • LACSD #10143 • NELAP-OR #4047

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. This analytical report must be reproduced in its entirety.

Dear Spencer Harris,

Enclosed are the results of analyses for samples received 11/01/22 with the Chain-of-Custody document. The samples were received in good condition, at 4.4 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

Reviewed by:

Brandon Gee
Operations Manager/Senior PM

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Certificate of Analysis

FINAL REPORT

Cleath-Harris Geologists, Inc.
75 Zaca Lane, Suite 110
San Luis Obispo, CA 93401

Project Number: Los Osos CEC Monitoring

Project Manager: Spencer Harris

Reported: 12/20/2022 20:01

Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
FW5 (13Q2)	A.Berge	2K01012-01	Water	10/31/22 10:15	
FW6 (24A)	A.Berge	2K01012-02	Water	10/31/22 10:15	

Analyses Accreditation Summary

Analyte	CAS #	Not By NELAP	ANAB ISO 17025
SM 5910B in Water			
UV 254		✓	

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FINAL REPORT

WECK LABORATORIES, INC.

Cleath-Harris Geologists, Inc.
75 Zaca Lane, Suite 110
San Luis Obispo, CA 93401

Project Number: Los Osos CEC Monitoring

Project Manager: Spencer Harris

Reported: 12/20/2022 20:01

Sample Results

Sample: FW5 (13Q2) — Sampled: 10/31/22 10:15 by A.Berge

2K01012-01 (Water)

Analyte	Result		MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: EPA 350.1			**Instr:** AA06				
Batch ID: W2K0442 — **Preparation:** _NONE (WETCHEM)			**Prepared:** 11/06/22 08:16				**Analyst:** YMT
Ammonia as N	ND		0.10	mg/l	1	11/08/22	
Method: EPA 353.2			**Instr:** AA01				
Batch ID: W2K0106 — **Preparation:** _NONE (WETCHEM)			**Prepared:** 11/01/22 17:19				**Analyst:** ISM
Nitrate as N	**15**		0.80	mg/l	4	11/01/22 18:29	
Method: SM 2510B			**Instr:** AA02				
Batch ID: W2K0863 — **Preparation:** _NONE (WETCHEM)			**Prepared:** 11/10/22 10:13				**Analyst:** vat
Specific Conductance (EC)	**870**		2.0	umhos/cm	1	11/16/22	
Method: SM 5310B			**Instr:** TOC02				
Batch ID: W2K0269 — **Preparation:** _NONE (TOC/TOX)			**Prepared:** 11/03/22 08:23				**Analyst:** ajc
Total Organic Carbon (TOC)	**0.60**		0.30	mg/l	1	11/04/22	
Method: SM 5910B			**Instr:** UVVIS04				
Batch ID: W2K0104 — **Preparation:** _NONE (WETCHEM)			**Prepared:** 11/01/22 16:53				**Analyst:** ymt
UV 254	**0.017**		0.009	1/cm	1	11/01/22 18:20	
Nitrosamines by isotopic dilution GC/MS CI Mode							
Method: EPA 1625B			**Instr:** GCMS09				
Batch ID: W2K0452 — **Preparation:** EPA 3535/SPE			**Prepared:** 11/07/22 09:01				**Analyst:** mld
N-Nitrosodimethylamine	ND		2.0	ng/l	1	11/07/22	
PPCPs - Isotope Dilution LCMSMS							
Method: EPA 1694M			**Instr:** LCMS03				
Batch ID: W2K0163 — **Preparation:** _NONE (LC)			**Prepared:** 11/02/22 10:09				**Analyst:** jna
Caffeine	**18**		4.0	ng/l	1	11/02/22	
DEET	**7.0**		4.0	ng/l	1	11/02/22	
Surrogate(s)							
Caffeine-13C3	*81%*	*Conc: 162*	*20-500*			*11/02/22*	
DEET-d7	*98%*	*Conc: 19.7*	*20-500*			*11/02/22*	
Method: EPA 1694M			**Instr:** LCMS03				
Batch ID: W2K0164 — **Preparation:** _NONE (LC)			**Prepared:** 11/02/22 10:13				**Analyst:** jna
Gemfibrozil	ND		4.0	ng/l	1	11/04/22	
Iopromide	ND		4.0	ng/l	1	11/04/22	
Triclosan	ND		8.0	ng/l	1	11/04/22	
Surrogate(s)							
Gemfibrozil-d6	*96%*	*Conc: 95.7*	*20-500*			*11/04/22*	
Salicylic Acid-d4	*86%*	*Conc: 430*	*20-500*			*11/04/22*	
Triclosan-d3	*71%*	*Conc: 286*	*20-500*			*11/04/22*	
Method: EPA 1694M			**Instr:** LCMS03				
Batch ID: W2K0165 — **Preparation:** _NONE (LC)			**Prepared:** 11/02/22 10:14				**Analyst:** jna

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Project Number: Los Osos CEC Monitoring

Project Manager: Spencer Harris

Reported: 12/20/2022 20:01

Sample Results

(Continued)

Sample: FW5 (13Q2) — Sampled: 10/31/22 10:15 by A.Berge

2K01012-01 (Water) (Continued)

Analyte	Result		MRL	Units	Dil	Analyzed	Qualifier
PPCPs - Isotope Dilution LCMSMS (Continued)							
Method: EPA 1694M			**Instr:** LCMS03				
Batch ID: W2K0165 **Preparation:** _NONE (LC)			**Prepared:** 11/02/22 10:14				**Analyst:** jna
17-b-Estradiol	ND		4.0	ng/l	1	11/03/22	
Surrogate(s)							
17-b-Estradiol-d3	*106%*	*Conc: 212*	*20-500*			*11/03/22*	

Sample Results

(Continued)

Sample: FW5 (13Q2) — Sampled: 10/31/22 10:15 by A.Berge

2K01012-01RE1 (Water)

Analyte	Result		MRL	Units	Dil	Analyzed	Qualifier
PPCPs - Isotope Dilution LCMSMS							
Method: EPA 1694M			**Instr:** LCMS03				
Batch ID: W2K0165 **Preparation:** _NONE (LC)			**Prepared:** 11/02/22 10:14				**Analyst:** jna
Sucralose	**14000**		200	ng/l	10	11/03/22	M-06
Surrogate(s)							
Sucralose-d6	*110%*	*Conc: 1100*	*20-500*			*11/03/22*	

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Project Number: Los Osos CEC Monitoring

Project Manager: Spencer Harris

Reported: 12/20/2022 20:01

Sample Results

(Continued)

Sample: FW6 (24A) — Sampled: 10/31/22 10:15 by A.Berge

2K01012-02 (Water)

Analyte	Result		MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: EPA 350.1			**Instr:** AA06				
Batch ID: W2K0442 — **Preparation:** _NONE (WETCHEM)			**Prepared:** 11/06/22 08:16				**Analyst:** YMT
Ammonia as N	ND		0.10	mg/l	1	11/08/22	
Method: EPA 353.2			**Instr:** AA01				
Batch ID: W2K0106 — **Preparation:** _NONE (WETCHEM)			**Prepared:** 11/01/22 17:19				**Analyst:** ISM
Nitrate as N	**2.2**		0.20	mg/l	1	11/01/22 17:57	
Method: SM 2510B			**Instr:** AA02				
Batch ID: W2K0863 — **Preparation:** _NONE (WETCHEM)			**Prepared:** 11/10/22 10:13				**Analyst:** vat
Specific Conductance (EC)	**930**		2.0	umhos/cm	1	11/16/22	
Method: SM 5310B			**Instr:** TOC02				
Batch ID: W2K0269 — **Preparation:** _NONE (TOC/TOX)			**Prepared:** 11/03/22 08:23				**Analyst:** ajc
Total Organic Carbon (TOC)	**0.98**		0.30	mg/l	1	11/04/22	
Method: SM 5910B			**Instr:** UVVIS04				
Batch ID: W2K0104 — **Preparation:** _NONE (WETCHEM)			**Prepared:** 11/01/22 16:53				**Analyst:** ymt
UV 254	**0.023**		0.009	1/cm	1	11/01/22 18:20	
Nitrosamines by isotopic dilution GC/MS CI Mode							
Method: EPA 1625B			**Instr:** GCMS09				
Batch ID: W2K0452 — **Preparation:** EPA 3535/SPE			**Prepared:** 11/07/22 09:01				**Analyst:** mld
N-Nitrosodimethylamine	ND		2.0	ng/l	1	11/08/22	
PPCPs - Isotope Dilution LCMSMS							
Method: EPA 1694M			**Instr:** LCMS03				
Batch ID: W2K0163 — **Preparation:** _NONE (LC)			**Prepared:** 11/02/22 10:09				**Analyst:** jna
Caffeine	**12**		4.0	ng/l	1	11/02/22	
DEET	**8.9**		4.0	ng/l	1	11/02/22	
Surrogate(s)							
Caffeine-13C3	*78%*	*Conc: 155*	*20-500*			*11/02/22*	
DEET-d7	*64%*	*Conc: 12.9*	*20-500*			*11/02/22*	
Method: EPA 1694M			**Instr:** LCMS03				
Batch ID: W2K0164 — **Preparation:** _NONE (LC)			**Prepared:** 11/02/22 10:13				**Analyst:** jna
Gemfibrozil	ND		4.0	ng/l	1	11/04/22	
Iopromide	ND		4.0	ng/l	1	11/04/22	
Triclosan	ND		8.0	ng/l	1	11/04/22	
Surrogate(s)							
Gemfibrozil-d6	*104%*	*Conc: 104*	*20-500*			*11/04/22*	
Salicylic Acid-d4	*70%*	*Conc: 351*	*20-500*			*11/04/22*	
Triclosan-d3	*74%*	*Conc: 295*	*20-500*			*11/04/22*	
Method: EPA 1694M			**Instr:** LCMS03				
Batch ID: W2K0165 — **Preparation:** _NONE (LC)			**Prepared:** 11/02/22 10:14				**Analyst:** jna

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Project Number: Los Osos CEC Monitoring

Project Manager: Spencer Harris

Reported: 12/20/2022 20:01

Sample Results

(Continued)

Sample: FW6 (24A) — Sampled: 10/31/22 10:15 by A.Berge

2K01012-02 (Water) (Continued)

Analyte	Result		MRL	Units	Dil	Analyzed	Qualifier
PPCPs - Isotope Dilution LCMSMS (Continued)							
Method: EPA 1694M			**Instr:** LCMS03				
Batch ID: W2K0165 — **Preparation:** _NONE (LC)			**Prepared:** 11/02/22 10:14				**Analyst:** jna
17-b-Estradiol	ND		4.0	ng/l	1	11/03/22	
Surrogate(s)							
17-b-Estradiol-d3	*108%*	*Conc: 217*	*20-500*			*11/03/22*	

Sample Results

(Continued)

Sample: FW6 (24A) — Sampled: 10/31/22 10:15 by A.Berge

2K01012-02RE1 (Water)

Analyte	Result		MRL	Units	Dil	Analyzed	Qualifier
PPCPs - Isotope Dilution LCMSMS							
Method: EPA 1694M			**Instr:** LCMS03				
Batch ID: W2K0165 — **Preparation:** _NONE (LC)			**Prepared:** 11/02/22 10:14				**Analyst:** jna
Sucralose	**43000**		1000	ng/l	50	11/03/22	M-06
Surrogate(s)							
Sucralose-d6	*114%*	*Conc: 1140*	*20-500*			*11/03/22*	

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Project Manager: Spencer Harris

Reported: 12/20/2022 20:01

Quality Control Results

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2K0104 - SM 5910B										
Blank (W2K0104-BLK1)				**Prepared & Analyzed: 11/01/22**						
UV 254	ND	0.009	1/cm							
LCS (W2K0104-BS1)				**Prepared & Analyzed: 11/01/22**						
UV 254	0.081	0.009	1/cm	0.0880		92	90-110			
Duplicate (W2K0104-DUP1)	**Source: 2K01012-01**			**Prepared & Analyzed: 11/01/22**						
UV 254	0.017	0.009	1/cm		0.017			0	10	
Batch: W2K0106 - EPA 353.2										
Blank (W2K0106-BLK1)				**Prepared & Analyzed: 11/01/22**						
Nitrate as N	ND	0.20	mg/l							
LCS (W2K0106-BS1)				**Prepared & Analyzed: 11/01/22**						
Nitrate as N	0.986	0.20	mg/l	1.00		99	90-110			
Matrix Spike (W2K0106-MS1)	**Source: 2J28007-02**			**Prepared & Analyzed: 11/01/22**						
Nitrate as N	9.12	0.20	mg/l	2.00	7.20	96	90-110			
Matrix Spike (W2K0106-MS2)	**Source: 2J24006-01**			**Prepared & Analyzed: 11/01/22**						
Nitrate as N	11.5	0.20	mg/l	2.00	9.76	87	90-110			MS-01
Matrix Spike Dup (W2K0106-MSD1)	**Source: 2J28007-02**			**Prepared & Analyzed: 11/01/22**						
Nitrate as N	9.11	0.20	mg/l	2.00	7.20	95	90-110	0.1	20	
Matrix Spike Dup (W2K0106-MSD2)	**Source: 2J24006-01**			**Prepared & Analyzed: 11/01/22**						
Nitrate as N	11.6	0.20	mg/l	2.00	9.76	92	90-110	0.9	20	
Batch: W2K0269 - SM 5310B										
Blank (W2K0269-BLK1)				**Prepared: 11/03/22 Analyzed: 11/04/22**						
Total Organic Carbon (TOC)	ND	0.30	mg/l							
LCS (W2K0269-BS1)				**Prepared: 11/03/22 Analyzed: 11/04/22**						
Total Organic Carbon (TOC)	0.989	0.30	mg/l	1.00		99	85-115			
Matrix Spike (W2K0269-MS1)	**Source: 2K01012-01**			**Prepared: 11/03/22 Analyzed: 11/04/22**						
Total Organic Carbon (TOC)	5.02	0.30	mg/l	5.00	0.600	88	76-115			
Matrix Spike Dup (W2K0269-MSD1)	**Source: 2K01012-01**			**Prepared: 11/03/22 Analyzed: 11/04/22**						
Total Organic Carbon (TOC)	4.96	0.30	mg/l	5.00	0.600	87	76-115	1	20	
Batch: W2K0442 - EPA 350.1										
Blank (W2K0442-BLK1)				**Prepared: 11/06/22 Analyzed: 11/08/22**						
Ammonia as N	ND	0.10	mg/l							
Blank (W2K0442-BLK2)				**Prepared: 11/06/22 Analyzed: 11/08/22**						
Ammonia as N	ND	0.10	mg/l							
LCS (W2K0442-BS1)				**Prepared: 11/06/22 Analyzed: 11/08/22**						
Ammonia as N	0.261	0.10	mg/l	0.250		104	90-110			
LCS (W2K0442-BS2)				**Prepared: 11/06/22 Analyzed: 11/08/22**						
Ammonia as N	0.257	0.10	mg/l	0.250		103	90-110			
Matrix Spike (W2K0442-MS1)	**Source: 2J31076-01**			**Prepared: 11/06/22 Analyzed: 11/08/22**						

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Cleath-Harris Geologists, Inc.
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Project Number: Los Osos CEC Monitoring

Project Manager: Spencer Harris

Reported: 12/20/2022 20:01

Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2K0442 - EPA 350.1 (Continued)										
Matrix Spike (W2K0442-MS1)	**Source: 2J31076-01**			**Prepared: 11/06/22**	**Analyzed: 11/08/22**					
Ammonia as N	0.278	0.10	mg/l	0.250	0.0215	103	90-110			
Matrix Spike (W2K0442-MS2)	**Source: 2K04119-01**			**Prepared: 11/06/22**	**Analyzed: 11/08/22**					
Ammonia as N	0.274	0.10	mg/l	0.250	0.0239	100	90-110			
Matrix Spike Dup (W2K0442-MSD1)	**Source: 2J31076-01**			**Prepared: 11/06/22**	**Analyzed: 11/08/22**					
Ammonia as N	0.274	0.10	mg/l	0.250	0.0215	101	90-110	1	15	
Matrix Spike Dup (W2K0442-MSD2)	**Source: 2K04119-01**			**Prepared: 11/06/22**	**Analyzed: 11/08/22**					
Ammonia as N	0.275	0.10	mg/l	0.250	0.0239	100	90-110	0.4	15	
Batch: W2K0863 - SM 2510B										
Blank (W2K0863-BLK1)				**Prepared: 11/10/22**	**Analyzed: 11/16/22**					
Specific Conductance (EC)	ND	2.0	umhos/cm							
LCS (W2K0863-BS1)				**Prepared: 11/10/22**	**Analyzed: 11/16/22**					
Specific Conductance (EC)	454	2.0	umhos/cm	445		102	95-105			
Duplicate (W2K0863-DUP1)	**Source: 2K01155-01**			**Prepared: 11/10/22**	**Analyzed: 11/16/22**					
Specific Conductance (EC)	3500	8.0	umhos/cm		3400			3	5	

Quality Control Results

(Continued)

Nitrosamines by isotopic dilution GC/MS CI Mode

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2K0452 - EPA 1625B										
Blank (W2K0452-BLK1)				**Prepared: 11/07/22**	**Analyzed: 11/08/22**					
N-Nitrosodimethylamine	ND	2.0	ng/l							
LCS (W2K0452-BS1)				**Prepared & Analyzed: 11/07/22**						
N-Nitrosodimethylamine	2.12	2.0	ng/l	2.00		106	50-150			
LCS Dup (W2K0452-BSD1)				**Prepared & Analyzed: 11/07/22**						
N-Nitrosodimethylamine	2.61	2.0	ng/l	2.00		131	50-150	21	50	

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Quality Control Results

(Continued)

PPCPs - Isotope Dilution LCMSMS

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2K0163 - EPA 1694M										
Blank (W2K0163-BLK1)				**Prepared & Analyzed: 11/02/22**						
Acesulfame K (as Acesulfame)	ND	20	ng/l							
Acetaminophen	ND	5.0	ng/l							
Albuterol	ND	5.0	ng/l							
Amoxicillin	ND	20	ng/l							
Atenolol	ND	4.0	ng/l							
Atorvastatin	ND	4.0	ng/l							
Azithromycin	ND	20	ng/l							
Caffeine	ND	4.0	ng/l							
Carbadox	ND	10	ng/l							
Carbamazepine	ND	4.0	ng/l							
Ciprofloxacin	ND	20	ng/l							
Codeine	ND	80	ng/l							
Cotinine	ND	8.0	ng/l							
DEET	ND	4.0	ng/l							
Diazepam	ND	4.0	ng/l							
Erythromycin	ND	5.0	ng/l							
Fluoxetine	ND	4.0	ng/l							
Hydrocodone	ND	80	ng/l							
Meprobamate	ND	4.0	ng/l							
Methadone	ND	4.0	ng/l							
Morphine	ND	8.0	ng/l							
Oxybenzone	ND	4.0	ng/l							
Praziquantel	ND	4.0	ng/l							
Propranolol	ND	4.0	ng/l							
Quinoline	ND	4.0	ng/l							
Sulfamethoxazole	ND	4.0	ng/l							
TCEP	ND	10	ng/l							
TCPP	ND	50	ng/l							
Trimethoprim	ND	4.0	ng/l							
Surrogate(s)										
Acetaminophen-d4	*2880*		*ng/l*	*3000*		*96*	*20-500*			
Amoxicillin-d4	*50600*		*ng/l*	*62500*		*81*	*20-500*			
Atenolol-d7	*417*		*ng/l*	*400*		*104*	*20-500*			
Azithromycin-d3	*1760*		*ng/l*	*2000*		*88*	*20-500*			
Caffeine-13C3	*201*		*ng/l*	*200*		*100*	*20-500*			
Carbamazepine- 13C2, d2	*39.7*		*ng/l*	*40.0*		*99*	*20-500*			
Ciprofloxacin-d8	*762*		*ng/l*	*1000*		*76*	*20-500*			
Codeine-d3	*297*		*ng/l*	*300*		*99*	*20-500*			
Cotinine-d3	*209*		*ng/l*	*200*		*105*	*20-500*			

Quality Control Results

(Continued)

PPCPs - Isotope Dilution LCMSMS (Continued)

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2K0163 - EPA 1694M (Continued)										
Blank (W2K0163-BLK1)				**Prepared & Analyzed: 11/02/22**						
Surrogate(s)										
DEET-d7	*18.4*		*ng/l*	*20.0*		*92*	*20-500*			
Diazepam-d5	*2150*		*ng/l*	*2000*		*107*	*20-500*			
Erythromycin-13C-d3	*213*		*ng/l*	*200*		*107*	*20-500*			
Fluoxetine-d5	*186*		*ng/l*	*200*		*93*	*20-500*			
Hydrocodone-d3	*295*		*ng/l*	*300*		*98*	*20-500*			
Methadone-d3	*37.2*		*ng/l*	*40.0*		*93*	*20-500*			
Morphine-d6	*3120*		*ng/l*	*3000*		*104*	*20-500*			
Propranolol-D7	*217*		*ng/l*	*200*		*109*	*20-500*			
Sulfamethoxazole-d4	*206*		*ng/l*	*200*		*103*	*20-500*			
Trimethoprim-d9	*203*		*ng/l*	*200*		*102*	*20-500*			
LCS (W2K0163-BS1)				**Prepared & Analyzed: 11/02/22**						
Acesulfame K (as Acesulfame)	218	20	ng/l	200		109	50-150			
Acetaminophen	55.0	5.0	ng/l	50.0		110	50-150			
Albuterol	54.4	5.0	ng/l	50.0		109	50-150			
Amoxicillin	235	20	ng/l	200		118	50-150			
Atenolol	40.7	4.0	ng/l	40.0		102	50-150			
Atorvastatin	45.3	4.0	ng/l	40.0		113	50-150			
Azithromycin	243	20	ng/l	200		122	50-150			
Caffeine	44.2	4.0	ng/l	40.0		110	50-150			
Carbadox	107	10	ng/l	100		107	50-150			
Carbamazepine	37.0	4.0	ng/l	40.0		92	50-150			
Ciprofloxacin	221	20	ng/l	200		110	50-150			
Codeine	1080	80	ng/l	800		135	50-150			
Cotinine	89.8	8.0	ng/l	80.0		112	50-150			
DEET	40.6	4.0	ng/l	40.0		101	50-150			
Diazepam	39.5	4.0	ng/l	40.0		99	50-150			
Erythromycin	48.0	5.0	ng/l	50.0		96	50-150			
Fluoxetine	46.1	4.0	ng/l	40.0		115	50-150			
Hydrocodone	766	80	ng/l	800		96	50-150			
Meprobamate	41.1	4.0	ng/l	40.0		103	50-150			
Methadone	45.4	4.0	ng/l	40.0		114	50-150			
Morphine	83.8	8.0	ng/l	80.0		105	50-150			
Oxybenzone	38.0	4.0	ng/l	40.0		95	50-150			
Praziquantel	38.9	4.0	ng/l	40.0		97	50-150			
Propranolol	44.7	4.0	ng/l	40.0		112	50-150			
Quinoline	43.0	4.0	ng/l	40.0		108	50-150			
Sulfamethoxazole	47.8	4.0	ng/l	40.0		119	50-150			
TCEP	109	10	ng/l	100		109	50-150			

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Project Number: Los Osos CEC Monitoring

Project Manager: Spencer Harris

Reported: 12/20/2022 20:01

Quality Control Results

(Continued)

PPCPs - Isotope Dilution LCMSMS (Continued)

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2K0163 - EPA 1694M (Continued)										
LCS (W2K0163-BS1)				**Prepared & Analyzed: 11/02/22**						
TCPP	488	50	ng/l	500		98	50-150			
Trimethoprim	48.4	4.0	ng/l	40.0		121	50-150			
Surrogate(s)										
Acetaminophen-d4	*2820*		*ng/l*	*3000*		*94*	*20-500*			
Amoxicillin-d4	*48200*		*ng/l*	*62500*		*77*	*20-500*			
Atenolol-d7	*425*		*ng/l*	*400*		*106*	*20-500*			
Azithromycin-d3	*1880*		*ng/l*	*2000*		*94*	*20-500*			
Caffeine-13C3	*189*		*ng/l*	*200*		*95*	*20-500*			
Carbamazepine- 13C2, d2	*40.8*		*ng/l*	*40.0*		*102*	*20-500*			
Ciprofloxacin-d8	*784*		*ng/l*	*1000*		*78*	*20-500*			
Codeine-d3	*250*		*ng/l*	*300*		*83*	*20-500*			
Cotinine-d3	*205*		*ng/l*	*200*		*102*	*20-500*			
DEET-d7	*21.1*		*ng/l*	*20.0*		*105*	*20-500*			
Diazepam-d5	*2140*		*ng/l*	*2000*		*107*	*20-500*			
Erythromycin-13C-d3	*229*		*ng/l*	*200*		*114*	*20-500*			
Fluoxetine-d5	*195*		*ng/l*	*200*		*97*	*20-500*			
Hydrocodone-d3	*314*		*ng/l*	*300*		*105*	*20-500*			
Methadone-d3	*37.4*		*ng/l*	*40.0*		*93*	*20-500*			
Morphine-d6	*3130*		*ng/l*	*3000*		*104*	*20-500*			
Propranolol-D7	*189*		*ng/l*	*200*		*95*	*20-500*			
Sulfamethoxazole-d4	*175*		*ng/l*	*200*		*88*	*20-500*			
Trimethoprim-d9	*191*		*ng/l*	*200*		*95*	*20-500*			
Matrix Spike (W2K0163-MS1)	**Source: 2J26108-01**			**Prepared & Analyzed: 11/02/22**						
Acesulfame K (as Acesulfame)	166	20	ng/l	200	ND	83	50-150			
Acetaminophen	49.4	5.0	ng/l	50.0	ND	99	50-150			
Albuterol	47.8	5.0	ng/l	50.0	ND	96	50-150			
Amoxicillin	190	20	ng/l	200	ND	95	50-150			
Atenolol	41.2	4.0	ng/l	40.0	ND	103	50-150			
Atorvastatin	34.5	4.0	ng/l	40.0	ND	86	50-150			
Azithromycin	197	20	ng/l	200	ND	98	50-150			
Caffeine	40.9	4.0	ng/l	40.0	ND	102	50-150			
Carbadox	100	10	ng/l	100	ND	100	50-150			
Carbamazepine	39.1	4.0	ng/l	40.0	ND	98	50-150			
Ciprofloxacin	241	20	ng/l	200	ND	121	50-150			
Codeine	806	80	ng/l	800	ND	101	50-150			
Cotinine	76.7	8.0	ng/l	80.0	ND	96	50-150			
DEET	39.4	4.0	ng/l	40.0	ND	99	50-150			
Diazepam	38.0	4.0	ng/l	40.0	ND	95	50-150			
Erythromycin	57.9	5.0	ng/l	50.0	ND	116	50-150			

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Project Number: Los Osos CEC Monitoring

Project Manager: Spencer Harris

Reported: 12/20/2022 20:01

Quality Control Results

(Continued)

PPCPs - Isotope Dilution LCMSMS (Continued)

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2K0163 - EPA 1694M (Continued)										
Matrix Spike (W2K0163-MS1)	**Source: 2J26108-01**			**Prepared & Analyzed: 11/02/22**						
Fluoxetine	39.8	4.0	ng/l	40.0	ND	99	50-150			
Hydrocodone	696	80	ng/l	800	ND	87	50-150			
Meprobamate	34.7	4.0	ng/l	40.0	ND	87	50-150			
Methadone	38.3	4.0	ng/l	40.0	ND	96	50-150			
Morphine	78.0	8.0	ng/l	80.0	ND	97	50-150			
Oxybenzone	40.0	4.0	ng/l	40.0	ND	100	50-150			
Praziquantel	35.0	4.0	ng/l	40.0	ND	87	50-150			
Propranolol	35.2	4.0	ng/l	40.0	ND	88	50-150			
Quinoline	36.9	4.0	ng/l	40.0	ND	92	50-150			
Sulfamethoxazole	36.0	4.0	ng/l	40.0	ND	90	50-150			
TCEP	97.9	10	ng/l	100	ND	98	50-150			
TCPP	480	50	ng/l	500	ND	96	50-150			
Trimethoprim	43.6	4.0	ng/l	40.0	4.05	99	50-150			
Surrogate(s)										
Acetaminophen-d4	*2480*		*ng/l*	*3000*		*83*	*20-500*			
Amoxicillin-d4	*50600*		*ng/l*	*62500*		*81*	*20-500*			
Atenolol-d7	*484*		*ng/l*	*400*		*121*	*20-500*			
Azithromycin-d3	*2420*		*ng/l*	*2000*		*121*	*20-500*			
Caffeine-13C3	*177*		*ng/l*	*200*		*88*	*20-500*			
Carbamazepine- 13C2, d2	*35.2*		*ng/l*	*40.0*		*88*	*20-500*			
Ciprofloxacin-d8	*2630*		*ng/l*	*1000*		*263*	*20-500*			
Codeine-d3	*275*		*ng/l*	*300*		*92*	*20-500*			
Cotinine-d3	*237*		*ng/l*	*200*		*118*	*20-500*			
DEET-d7	*18.6*		*ng/l*	*20.0*		*93*	*20-500*			
Diazepam-d5	*1920*		*ng/l*	*2000*		*96*	*20-500*			
Erythromycin-13C-d3	*192*		*ng/l*	*200*		*96*	*20-500*			
Fluoxetine-d5	*211*		*ng/l*	*200*		*105*	*20-500*			
Hydrocodone-d3	*307*		*ng/l*	*300*		*102*	*20-500*			
Methadone-d3	*41.5*		*ng/l*	*40.0*		*104*	*20-500*			
Morphine-d6	*3360*		*ng/l*	*3000*		*112*	*20-500*			
Propranolol-D7	*214*		*ng/l*	*200*		*107*	*20-500*			
Sulfamethoxazole-d4	*179*		*ng/l*	*200*		*90*	*20-500*			
Trimethoprim-d9	*195*		*ng/l*	*200*		*98*	*20-500*			
Matrix Spike Dup (W2K0163-MSD1)	**Source: 2J26108-01**			**Prepared & Analyzed: 11/02/22**						
Acesulfame K (as Acesulfame)	177	20	ng/l	200	ND	89	50-150	7	30	
Acetaminophen	48.2	5.0	ng/l	50.0	ND	96	50-150	2	30	
Albuterol	49.4	5.0	ng/l	50.0	ND	99	50-150	3	30	
Amoxicillin	178	20	ng/l	200	ND	89	50-150	7	30	
Atenolol	40.7	4.0	ng/l	40.0	ND	102	50-150	1	30	

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Project Number: Los Osos CEC Monitoring

Project Manager: Spencer Harris

Reported: 12/20/2022 20:01

Quality Control Results

(Continued)

PPCPs - Isotope Dilution LCMSMS (Continued)

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2K0163 - EPA 1694M (Continued)										
Matrix Spike Dup (W2K0163-MSD1)	**Source: 2J26108-01**			**Prepared & Analyzed: 11/02/22**						
Atorvastatin	36.6	4.0	ng/l	40.0	ND	91	50-150	6	30	
Azithromycin	258	20	ng/l	200	ND	129	50-150	27	30	
Caffeine	37.9	4.0	ng/l	40.0	ND	95	50-150	8	30	
Carbadox	91.7	10	ng/l	100	ND	92	50-150	9	30	
Carbamazepine	33.0	4.0	ng/l	40.0	ND	83	50-150	17	30	
Ciprofloxacin	217	20	ng/l	200	ND	108	50-150	11	30	
Codeine	931	80	ng/l	800	ND	116	50-150	14	30	
Cotinine	78.7	8.0	ng/l	80.0	ND	98	50-150	3	30	
DEET	42.0	4.0	ng/l	40.0	ND	105	50-150	6	30	
Diazepam	35.9	4.0	ng/l	40.0	ND	90	50-150	6	30	
Erythromycin	64.6	5.0	ng/l	50.0	ND	129	50-150	11	30	
Fluoxetine	41.6	4.0	ng/l	40.0	ND	104	50-150	4	30	
Hydrocodone	675	80	ng/l	800	ND	84	50-150	3	30	
Meprobamate	36.5	4.0	ng/l	40.0	ND	91	50-150	5	30	
Methadone	38.6	4.0	ng/l	40.0	ND	97	50-150	0.9	30	
Morphine	78.2	8.0	ng/l	80.0	ND	98	50-150	0.2	30	
Oxybenzone	39.7	4.0	ng/l	40.0	ND	99	50-150	0.7	30	
Praziquantel	36.2	4.0	ng/l	40.0	ND	90	50-150	3	30	
Propranolol	36.9	4.0	ng/l	40.0	ND	92	50-150	5	30	
Quinoline	34.7	4.0	ng/l	40.0	ND	87	50-150	6	30	
Sulfamethoxazole	45.4	4.0	ng/l	40.0	ND	113	50-150	23	30	
TCEP	95.0	10	ng/l	100	ND	95	50-150	3	30	
TCPP	461	50	ng/l	500	ND	92	50-150	4	30	
Trimethoprim	42.6	4.0	ng/l	40.0	4.05	96	50-150	2	30	
Surrogate(s)										
Acetaminophen-d4	*2440*		*ng/l*	*3000*		*81*	*20-500*			
Amoxicillin-d4	*52200*		*ng/l*	*62500*		*84*	*20-500*			
Atenolol-d7	*492*		*ng/l*	*400*		*123*	*20-500*			
Azithromycin-d3	*2150*		*ng/l*	*2000*		*108*	*20-500*			
Caffeine-13C3	*184*		*ng/l*	*200*		*92*	*20-500*			
Carbamazepine- 13C2, d2	*39.6*		*ng/l*	*40.0*		*99*	*20-500*			
Ciprofloxacin-d8	*2470*		*ng/l*	*1000*		*247*	*20-500*			
Codeine-d3	*261*		*ng/l*	*300*		*87*	*20-500*			
Cotinine-d3	*239*		*ng/l*	*200*		*120*	*20-500*			
DEET-d7	*19.0*		*ng/l*	*20.0*		*95*	*20-500*			
Diazepam-d5	*1960*		*ng/l*	*2000*		*98*	*20-500*			
Erythromycin-13C-d3	*181*		*ng/l*	*200*		*90*	*20-500*			
Fluoxetine-d5	*206*		*ng/l*	*200*		*103*	*20-500*			
Hydrocodone-d3	*298*		*ng/l*	*300*		*99*	*20-500*			

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Project Number: Los Osos CEC Monitoring

Project Manager: Spencer Harris

Reported: 12/20/2022 20:01

Quality Control Results

(Continued)

PPCPs - Isotope Dilution LCMSMS (Continued)

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2K0163 - EPA 1694M (Continued)										
Matrix Spike Dup (W2K0163-MSD1)	**Source: 2J26108-01**			**Prepared & Analyzed: 11/02/22**						
Surrogate(s)										
Methadone-d3	*40.8*		*ng/l*	*40.0*		*102*	*20-500*			
Morphine-d6	*3490*		*ng/l*	*3000*		*116*	*20-500*			
Propranolol-D7	*210*		*ng/l*	*200*		*105*	*20-500*			
Sulfamethoxazole-d4	*160*		*ng/l*	*200*		*80*	*20-500*			
Trimethoprim-d9	*201*		*ng/l*	*200*		*101*	*20-500*			
Batch: W2K0164 - EPA 1694M										
Blank (W2K0164-BLK1)				**Prepared: 11/02/22 Analyzed: 11/04/22**						
17-a-Ethynylestradiol	ND	4.0	ng/l							
Diclofenac	ND	4.0	ng/l							
Diethylstilbestrol	ND	4.0	ng/l							
Epitestosterone	ND	4.0	ng/l							
Estriol	ND	4.0	ng/l							
Estrone	ND	4.0	ng/l							
Galaxolide (HHCB)	ND	40	ng/l							
Gemfibrozil	ND	4.0	ng/l							
Hydrochlorothiazide	ND	20	ng/l							
Iopromide	ND	4.0	ng/l							
Naproxen	ND	4.0	ng/l							
Phenytoin (Dilantin)	ND	4.0	ng/l							
Primidone	ND	4.0	ng/l							
Progesterone	ND	4.0	ng/l							
Salicylic Acid	ND	100	ng/l							
TDCPP	ND	50	ng/l							
Testosterone	ND	4.0	ng/l							
Triclosan	ND	8.0	ng/l							
Surrogate(s)										
17-a-Ethynylestradiol-d4	*189*		*ng/l*	*200*		*94*	*20-500*			
Bisphenol A-d16	*182*		*ng/l*	*200*		*91*	*20-500*			
Estriol-d2	*191*		*ng/l*	*200*		*95*	*20-500*			
Gemfibrozil-d6	*95.5*		*ng/l*	*100*		*96*	*20-500*			
Naproxen-d3	*218*		*ng/l*	*200*		*109*	*20-500*			
Phenytoin-d10	*210*		*ng/l*	*200*		*105*	*20-500*			
Primidone-d5	*215*		*ng/l*	*200*		*107*	*20-500*			
Progesterone-d9	*188*		*ng/l*	*200*		*94*	*20-500*			
Salicylic Acid-d4	*526*		*ng/l*	*500*		*105*	*20-500*			
Testosterone-d3	*211*		*ng/l*	*200*		*106*	*20-500*			
Triclosan-d3	*287*		*ng/l*	*400*		*72*	*20-500*			
Blank (W2K0164-BLK2)				**Prepared: 11/02/22 Analyzed: 11/04/22**						

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Project Number: Los Osos CEC Monitoring

Project Manager: Spencer Harris

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Quality Control Results

(Continued)

PPCPs - Isotope Dilution LCMSMS (Continued)

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2K0164 - EPA 1694M (Continued)										
Blank (W2K0164-BLK2)				**Prepared: 11/02/22 Analyzed: 11/04/22**						
Bisphenol A	18.2	4.0	ng/l							B, QC-2
Diclofenac	ND	4.0	ng/l							QC-2
Surrogate(s)										
17-a-Ethynylestradiol-d4	*180*		*ng/l*	*200*		*90*	*20-500*			QC-2
Bisphenol A-d16	*177*		*ng/l*	*200*		*88*	*20-500*			QC-2
LCS (W2K0164-BS1)				**Prepared: 11/02/22 Analyzed: 11/04/22**						
17-a-Ethynylestradiol	41.3	4.0	ng/l	40.0		103	50-150			
Diclofenac	42.0	4.0	ng/l	40.0		105	50-150			
Diethylstilbestrol	46.2	4.0	ng/l	40.0		116	50-150			
Epitestosterone	43.6	4.0	ng/l	40.0		109	50-150			
Estriol	44.5	4.0	ng/l	40.0		111	50-150			
Estrone	41.2	4.0	ng/l	40.0		103	50-150			
Galaxolide (HHCB)	494	40	ng/l	400		123	50-150			
Gemfibrozil	42.4	4.0	ng/l	40.0		106	50-150			
Hydrochlorothiazide	226	20	ng/l	200		113	50-150			
Iopromide	43.9	4.0	ng/l	40.0		110	50-150			
Naproxen	47.1	4.0	ng/l	40.0		118	50-150			
Phenytoin (Dilantin)	43.9	4.0	ng/l	40.0		110	50-150			
Primidone	42.0	4.0	ng/l	40.0		105	50-150			
Progesterone	40.1	4.0	ng/l	40.0		100	50-150			
Salicylic Acid	1130	100	ng/l	1000		113	50-150			
TDCPP	515	50	ng/l	500		103	50-150			
Testosterone	43.8	4.0	ng/l	40.0		109	50-150			
Triclosan	80.4	8.0	ng/l	80.0		100	50-150			
Surrogate(s)										
17-a-Ethynylestradiol-d4	*192*		*ng/l*	*200*		*96*	*20-500*			
Bisphenol A-d16	*184*		*ng/l*	*200*		*92*	*20-500*			
Estriol-d2	*206*		*ng/l*	*200*		*103*	*20-500*			
Gemfibrozil-d6	*93.9*		*ng/l*	*100*		*94*	*20-500*			
Naproxen-d3	*190*		*ng/l*	*200*		*95*	*20-500*			
Phenytoin-d10	*194*		*ng/l*	*200*		*97*	*20-500*			
Primidone-d5	*202*		*ng/l*	*200*		*101*	*20-500*			
Progesterone-d9	*210*		*ng/l*	*200*		*105*	*20-500*			
Salicylic Acid-d4	*484*		*ng/l*	*500*		*97*	*20-500*			
Testosterone-d3	*189*		*ng/l*	*200*		*95*	*20-500*			
Triclosan-d3	*393*		*ng/l*	*400*		*98*	*20-500*			
LCS (W2K0164-BS2)				**Prepared: 11/02/22 Analyzed: 11/04/22**						
Bisphenol A	58.9	4.0	ng/l	40.0		147	50-150			QC-2
Diclofenac	43.2	4.0	ng/l	40.0		108	50-150			QC-2
Surrogate(s)										

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Project Number: Los Osos CEC Monitoring
Project Manager: Spencer Harris

Reported: 12/20/2022 20:01

Quality Control Results

(Continued)

PPCPs - Isotope Dilution LCMSMS (Continued)

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2K0164 - EPA 1694M (Continued)										
LCS (W2K0164-BS2)			**Prepared: 11/02/22 Analyzed: 11/04/22**							
Surrogate(s)										
17-a-Ethynylestradiol-d4	*167*		*ng/l*	*200*		*83*	*20-500*			QC-2
Bisphenol A-d16	*170*		*ng/l*	*200*		*85*	*20-500*			QC-2
Matrix Spike (W2K0164-MS1)	**Source: 2J26108-01**		**Prepared: 11/02/22 Analyzed: 11/04/22**							
17-a-Ethynylestradiol	37.4	4.0	ng/l	40.0	ND	94	50-150			
Diclofenac	35.4	4.0	ng/l	40.0	ND	88	50-150			
Diethylstilbestrol	38.4	4.0	ng/l	40.0	ND	96	50-150			
Epitestosterone	36.4	4.0	ng/l	40.0	ND	91	50-150			
Estriol	38.9	4.0	ng/l	40.0	ND	97	50-150			
Estrone	36.0	4.0	ng/l	40.0	ND	90	50-150			
Galaxolide (HHCB)	671	40	ng/l	400	222	112	50-150			
Gemfibrozil	37.8	4.0	ng/l	40.0	ND	94	50-150			
Hydrochlorothiazide	178	20	ng/l	200	ND	89	50-150			
Iopromide	35.2	4.0	ng/l	40.0	ND	88	50-150			
Naproxen	43.8	4.0	ng/l	40.0	ND	109	50-150			
Phenytoin (Dilantin)	35.8	4.0	ng/l	40.0	ND	90	50-150			
Primidone	36.0	4.0	ng/l	40.0	ND	90	50-150			
Progesterone	37.2	4.0	ng/l	40.0	ND	93	50-150			
Salicylic Acid	942	100	ng/l	1000	ND	94	50-150			
TDCPP	475	50	ng/l	500	ND	95	50-150			
Testosterone	36.2	4.0	ng/l	40.0	ND	90	50-150			
Triclosan	85.4	8.0	ng/l	80.0	ND	107	50-150			
Surrogate(s)										
17-a-Ethynylestradiol-d4	*191*		*ng/l*	*200*		*96*	*20-500*			
Bisphenol A-d16	*187*		*ng/l*	*200*		*94*	*20-500*			
Estriol-d2	*189*		*ng/l*	*200*		*95*	*20-500*			
Gemfibrozil-d6	*96.8*		*ng/l*	*100*		*97*	*20-500*			
Naproxen-d3	*218*		*ng/l*	*200*		*109*	*20-500*			
Phenytoin-d10	*212*		*ng/l*	*200*		*106*	*20-500*			
Primidone-d5	*191*		*ng/l*	*200*		*96*	*20-500*			
Progesterone-d9	*197*		*ng/l*	*200*		*98*	*20-500*			
Salicylic Acid-d4	*436*		*ng/l*	*500*		*87*	*20-500*			
Testosterone-d3	*202*		*ng/l*	*200*		*101*	*20-500*			
Triclosan-d3	*328*		*ng/l*	*400*		*82*	*20-500*			
Matrix Spike (W2K0164-MS2)	**Source: 2J26108-01**		**Prepared: 11/02/22 Analyzed: 11/04/22**							
Bisphenol A	52.7	4.0	ng/l	40.0	ND	132	50-150			QC-2
Diclofenac	36.7	4.0	ng/l	40.0	ND	92	50-150			QC-2
Surrogate(s)										
17-a-Ethynylestradiol-d4	*195*		*ng/l*	*200*		*98*	*20-500*			QC-2
Bisphenol A-d16	*195*		*ng/l*	*200*		*98*	*20-500*			QC-2

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Project Number: Los Osos CEC Monitoring
Project Manager: Spencer Harris
Reported: 12/20/2022 20:01

Quality Control Results

(Continued)

PPCPs - Isotope Dilution LCMSMS (Continued)

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2K0164 - EPA 1694M (Continued)										
Matrix Spike Dup (W2K0164-MSD1)	**Source: 2J26108-01**			**Prepared: 11/02/22**	**Analyzed: 11/04/22**					
17-a-Ethynylestradiol	32.2	4.0	ng/l	40.0	ND	80	50-150	15	30	
Diclofenac	33.8	4.0	ng/l	40.0	ND	85	50-150	5	30	
Diethylstilbestrol	37.0	4.0	ng/l	40.0	ND	93	50-150	4	30	
Epitestosterone	38.2	4.0	ng/l	40.0	ND	96	50-150	5	30	
Estriol	41.0	4.0	ng/l	40.0	ND	102	50-150	5	30	
Estrone	34.3	4.0	ng/l	40.0	ND	86	50-150	5	30	
Galaxolide (HHCB)	669	40	ng/l	400	222	112	50-150	0.4	30	
Gemfibrozil	40.8	4.0	ng/l	40.0	ND	102	50-150	8	30	
Hydrochlorothiazide	182	20	ng/l	200	ND	91	50-150	2	30	
Iopromide	36.7	4.0	ng/l	40.0	ND	92	50-150	4	30	
Naproxen	45.7	4.0	ng/l	40.0	ND	114	50-150	4	30	
Phenytoin (Dilantin)	34.5	4.0	ng/l	40.0	ND	86	50-150	4	30	
Primidone	37.8	4.0	ng/l	40.0	ND	95	50-150	5	30	
Progesterone	39.1	4.0	ng/l	40.0	ND	98	50-150	5	30	
Salicylic Acid	972	100	ng/l	1000	ND	97	50-150	3	30	
TDCPP	492	50	ng/l	500	ND	98	50-150	3	30	
Testosterone	35.0	4.0	ng/l	40.0	ND	87	50-150	3	30	
Triclosan	77.3	8.0	ng/l	80.0	ND	97	50-150	10	30	
Surrogate(s)										
17-a-Ethynylestradiol-d4	*199*		*ng/l*	*200*		*99*	*20-500*			
Bisphenol A-d16	*172*		*ng/l*	*200*		*86*	*20-500*			
Estriol-d2	*162*		*ng/l*	*200*		*81*	*20-500*			
Gemfibrozil-d6	*89.6*		*ng/l*	*100*		*90*	*20-500*			
Naproxen-d3	*225*		*ng/l*	*200*		*113*	*20-500*			
Phenytoin-d10	*243*		*ng/l*	*200*		*122*	*20-500*			
Primidone-d5	*202*		*ng/l*	*200*		*101*	*20-500*			
Progesterone-d9	*188*		*ng/l*	*200*		*94*	*20-500*			
Salicylic Acid-d4	*456*		*ng/l*	*500*		*91*	*20-500*			
Testosterone-d3	*212*		*ng/l*	*200*		*106*	*20-500*			
Triclosan-d3	*354*		*ng/l*	*400*		*88*	*20-500*			
Matrix Spike Dup (W2K0164-MSD2)	**Source: 2J26108-01**			**Prepared: 11/02/22**	**Analyzed: 11/04/22**					
Bisphenol A	43.4	4.0	ng/l	40.0	ND	109	50-150	19	30	QC-2
Diclofenac	36.6	4.0	ng/l	40.0	ND	91	50-150	0.2	30	QC-2
Surrogate(s)										
17-a-Ethynylestradiol-d4	*199*		*ng/l*	*200*		*100*	*20-500*			QC-2
Bisphenol A-d16	*192*		*ng/l*	*200*		*96*	*20-500*			QC-2
Batch: W2K0165 - EPA 1694M										
Blank (W2K0165-BLK1)				**Prepared: 11/02/22**	**Analyzed: 11/03/22**					
17-a-Estradiol	ND	4.0	ng/l							

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Quality Control Results

(Continued)

PPCPs - Isotope Dilution LCMSMS (Continued)

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2K0165 - EPA 1694M (Continued)										
Blank (W2K0165-BLK1)				**Prepared: 11/02/22 Analyzed: 11/03/22**						
17-b-Estradiol	ND	4.0	ng/l							
Ibuprofen	ND	4.0	ng/l							
Iohexol	ND	5.0	ng/l							
Sucralose	ND	20	ng/l							
Surrogate(s)										
17-b-Estradiol-d3	*215*		*ng/l*	*200*		*107*	*20-500*			
Ibuprofen-d3	*186*		*ng/l*	*200*		*93*	*20-500*			
Iohexol-d5	*472*		*ng/l*	*500*		*94*	*20-500*			
Sucralose-d6	*1130*		*ng/l*	*1000*		*113*	*20-500*			
LCS (W2K0165-BS1)				**Prepared: 11/02/22 Analyzed: 11/03/22**						
17-a-Estradiol	40.6	4.0	ng/l	40.0		102	50-150			
17-b-Estradiol	44.1	4.0	ng/l	40.0		110	50-150			
Ibuprofen	44.1	4.0	ng/l	40.0		110	50-150			
Iohexol	49.4	5.0	ng/l	50.0		99	50-150			
Sucralose	219	20	ng/l	200		109	50-150			
Surrogate(s)										
17-b-Estradiol-d3	*216*		*ng/l*	*200*		*108*	*20-500*			
Ibuprofen-d3	*185*		*ng/l*	*200*		*92*	*20-500*			
Iohexol-d5	*423*		*ng/l*	*500*		*85*	*20-500*			
Sucralose-d6	*1060*		*ng/l*	*1000*		*106*	*20-500*			
Matrix Spike (W2K0165-MS1)	**Source: 2J26108-01**			**Prepared: 11/02/22 Analyzed: 11/03/22**						
17-a-Estradiol	38.7	4.0	ng/l	40.0	ND	97	50-150			
17-b-Estradiol	38.9	4.0	ng/l	40.0	ND	97	50-150			
Ibuprofen	40.0	4.0	ng/l	40.0	ND	100	50-150			
Iohexol	50.6	5.0	ng/l	50.0	ND	101	50-150			
Sucralose	304	20	ng/l	200	117	93	50-150			
Surrogate(s)										
17-b-Estradiol-d3	*211*		*ng/l*	*200*		*106*	*20-500*			
Ibuprofen-d3	*189*		*ng/l*	*200*		*94*	*20-500*			
Iohexol-d5	*279*		*ng/l*	*500*		*56*	*20-500*			
Sucralose-d6	*711*		*ng/l*	*1000*		*71*	*20-500*			
Matrix Spike Dup (W2K0165-MSD1)	**Source: 2J26108-01**			**Prepared: 11/02/22 Analyzed: 11/03/22**						
17-a-Estradiol	36.8	4.0	ng/l	40.0	ND	92	50-150	5	30	
17-b-Estradiol	40.0	4.0	ng/l	40.0	ND	100	50-150	3	30	
Ibuprofen	40.1	4.0	ng/l	40.0	ND	100	50-150	0.3	30	
Iohexol	49.6	5.0	ng/l	50.0	ND	99	50-150	2	30	
Sucralose	310	20	ng/l	200	117	96	50-150	2	30	
Surrogate(s)										
17-b-Estradiol-d3	*221*		*ng/l*	*200*		*110*	*20-500*			
Iohexol-d5	*262*		*ng/l*	*500*		*52*	*20-500*			

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Reported: 12/20/2022 20:01

Quality Control Results

(Continued)

PPCPs - Isotope Dilution LCMSMS (Continued)

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2K0165 - EPA 1694M (Continued)										
Matrix Spike Dup (W2K0165-MSD1)	**Source: 2J26108-01**			**Prepared: 11/02/22 Analyzed: 11/03/22**						
Surrogate(s)										
Sucralose-d6	*633*		*ng/l*	*1000*		*63*	*20-500*			

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Notes and Definitions

Item	Definition
B	Blank contamination. The analyte was found in the associated blank as well as in the sample.
M-06	Due to the high concentration of analyte inherent in the sample, sample was diluted prior to preparation and/or analysis. The MDL and MRL were raised due to this dilution.
MS-01	The spike recovery for this QC sample is outside of established control limits possibly due to sample matrix interference.
QC-2	This QC sample was reanalyzed to complement samples that require re-analysis on different date. See analysis date.
%REC	Percent Recovery
Dil	Dilution
MRL	The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ)
ND	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then ND means not detected at or above the MDL.
RPD	Relative Percent Difference
Source	Sample that was matrix spiked or duplicated.

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

All results are expressed on wet weight basis unless otherwise specified.

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

APPENDIX D

Field Methods

Groundwater Level Measurement Procedures for the Los Osos Basin Plan Groundwater Monitoring Program

Introduction

This document establishes procedures for measuring and recording groundwater levels for the Los Osos Basin Plan (LOBP) Groundwater Monitoring Program, and describes various methods used for collecting meaningful groundwater data.

Static groundwater levels obtained for the LOBP Groundwater Monitoring Program are determined by measuring the distance to water in a non-pumping well from a reference point that has been referenced to sea level. Subtracting the distance to water from the elevation of the reference point determines groundwater surface elevations above or below sea level. This is represented by the following equation:

$$E_{GW} = E_{RP} - D$$

Where:

E_{GW}	=	Elevation of groundwater above mean sea level (feet)
E_{RP}	=	Elevation above sea level at reference point (feet)
D	=	Depth to water (feet)

References

Procedures for obtaining and reporting water level data for the LOBP Groundwater Monitoring Program are based on a review of the following documents.

- State of California, Department of Water Resources, 2010, *Groundwater Elevation Monitoring Guidelines*, prepared for use in the California Statewide Groundwater Elevation Monitoring (CASGEM) program, December. https://water.ca.gov/Programs/Groundwater-Management/Groundwater-Elevation-Monitoring--CASGEM
- State of California, Department of Water Resources, 2014, *Addendum to December 2010 Groundwater Elevation Monitoring Guidelines for the Department of Water Resources' California Statewide Groundwater Elevation Monitoring (CASGEM) Program,* October 2. https://water.ca.gov/Programs/Groundwater-Management/Groundwater-Elevation-Monitoring--CASGEM
- U.S. Geological Survey, 1977, *National Handbook of Recommended Methods for Water-Data Acquisition*, a Unites States contribution to the International Hydrological Program. https://pubs.usgs.gov/chapter11/
- U.S. Geological Survey, Office of Ground Water, 1997, *Ground Water Procedure Document 1, Water-level measurement using graduated steel tape, draft stand-alone procedure document.* http://pubs.usgs.gov/tm/1a1/pdf/GWPD1.pdf

- U.S. Geological Survey, Office of Ground Water, 1997, *Ground Water Procedure Document 4, Water-level measurement using an electric tape, draft stand-alone procedure document.* http://pubs.usgs.gov/tm/1a1/pdf/GWPD4.pdf
- U.S. Geological Survey, Office of Ground Water, 1997, *Ground Water Procedure Document 13, Water-level measurement using an air line, draft stand-alone procedure document.* http://pubs.usgs.gov/tm/1a1/pdf/GWPD13.pdf
- U.S. Geological Survey, 2001, *Introduction to Field Methods for Hydrologic and Environmental Studies*, Open-File Report 2001-50, 241 p. https://pubs.er.usgs.gov/publication/ofr0150

Well Information

Table 1 below lists important well information to be maintained in a well file or in a field notebook. Additional information that should be available to the person collecting water level data include a description of access to the property and the well, the presence and depth of cascading water, or downhole obstructions that could interfere with a sounding cable.

Table 1
Well File Information

Well Completion Report	Hydrologic Information	Additional Information to be Recorded
Well name	Map showing basin boundaries and wells	Township, Range, and ¼ ¼ Section
Well Owner	Name of groundwater basin	Latitude and Longitude (Decimal degrees)
Drilling Company	Description of aquifer	Assessor's Parcel Number
Location map or sketch	Confined, unconfined, or mixed aquifers	Description of well head and sounding access
Total depth	Pumping test data	Reference point elevations
Perforation interval	Hydrographs	Well use and pumping schedule if known
Casing diameter	Water quality data	Date monitoring began
Date of well completion	Property access instructions/codes	Land use

Reference Points and Reference Marks

Reference point (RP) elevations are the basis for determining groundwater elevations relative to sea level. The RP is generally that point on the well head that is the most convenient place to measure the water level in a well. In selecting an RP, an additional consideration is the ease of surveying either by Global Positioning System (GPS) or by leveling.

The RP must be clearly defined, well marked, and easily located. A description, sketch, and photograph of the point should be included in the well file. Additional Reference Marks (RMs) may be established near the wellhead on a permanent object. These additional RMs can serve as a benchmark by which the wellhead RP can be checked or re-surveyed if necessary. All RMs should be marked, sketched, photographed, and described in the well file.

All RPs for Groundwater Monitoring Program wells should be reported based on the same horizontal and vertical datum by a California licensed surveyor to the nearest tenth of one foot vertically, and the nearest one foot horizontally. The surveyor's report should be maintained in the project file.

In addition to the RP survey, the elevation of the ground surface adjacent to the well should also be measured and recorded in the well file. Because the ground surface adjacent to a well is rarely uniform, the average surface level should be estimated. This average ground surface elevation is referred to in the U.S.G.S. Procedural Document (GWPD-1, 1997) and DWR guidelines as the Land Surface Datum (LSD).

Water Level Data Collection

Prior to beginning the field work, the field technician should review each well file to determine which well owners require notification of the upcoming site visit, or which well pumps need to be turned off to allow for sufficient water level recovery. Because groundwater elevations are used to construct groundwater contour maps and to determine hydraulic gradients, the field technician should coordinate water level measurements to be collected within as short a period of time as practical. Any significant changes in groundwater conditions during monitoring events should be noted in the Annual Monitoring Report. For an individual well, the same measuring method and the same equipment should be used during each sampling event where practical.

A static water level should represent stable, non-pumping conditions at the well. When there is doubt about whether water levels in a well are continuing to recover following a pumping cycle, repeated measurements should be made. If an electric sounder is being used, it is possible to hold the sounder level at one point slightly above the known water level and wait for a signal that would indicate rising water. If applicable, the general schedule of pump operation should be determined and noted for active wells. If the well is capped but not vented, remove the cap and wait several minutes before measurement to allow water levels to equilibrate to atmospheric pressure.

When lowering a graduated steel tape (chalked tape) or electric tape in a well without a sounding tube in an equipped well, the tape should be played out slowly by hand to minimize the chance of the tape end becoming caught in a downhole obstruction. The tape should be held in such a way that any change in tension will be felt. When withdrawing a sounding tape, it should also be brought up slowly so that if an obstruction is encountered, tension can be relaxed so that the tape can be lowered again before attempting to withdraw it around the obstruction.

Despite all precautions, there is a small risk of measuring tapes becoming stuck in equipped wells without dedicated sounding tubes. If a tape becomes stuck, the equipment should be left on-site and re-checked after the well has gone through a few cycles of pumping, which can free the tape due to movement/vibration of the pump column. If the tape remains stuck, a pumping contractor will be needed to retrieve the equipment. A dedicated sounding tube may be installed by the pumping contractor at that time.

All water level measurements should be made to an accuracy of 0.01 feet. The field technician should make at least two measurements. If measurements of static levels do not agree to within 0.02 feet of each other, the technician should continue measurements until the reason for the disparity is determined, or the measurements are within 0.02 feet.

Record Keeping in the Field

The information recorded in the field is typically the only available reference for the conditions at the time of the monitoring event. During each monitoring event it is important to record any conditions at a well site and its vicinity that may affect groundwater levels, or the field technician's ability to obtain groundwater levels. Table 2 lists important information to record, however, additional information should be included when appropriate.

Table 2
Information Recorded at Each Well Site

Well name	Changes in land use	Presence of pump lubricating oil in well
Name and organization of field technician	Changes in RP	Cascading water
Date & time	Nearby wells in use	Equipment problems
Measurement method used	Weather conditions	Physical changes in wellhead
Sounder used	Recent pumping info	Comments
Reference Point Description	Measurement correction(s)	Well status

Measurement Techniques

Four standard methods of obtaining water levels are discussed below. The chosen method depends on site and downhole conditions, and the equipment limitations. In all monitoring situations, the procedures and equipment used should be documented in the field notes and in final reporting. Additional detail on methods of water level measurement is included in the reference documents.

<u>Graduated Steel Tape</u>
This method uses a graduated steel tape with a brass or stainless-steel weight attached to its end. The tape is graduated in feet. The approximate depth to water should be known prior to measurement.

- Estimate the anticipated static water level in the well from field conditions and historical information;
- Chalk the lower few feet of the tape by applying blue carpenter's chalk.
- Lower the tape to just below the estimated depth to water so that a few feet of the chalked portion of the tape is submerged. Be careful not to lower the tape beyond its chalked length.
- Hold the tape at the RP and record the tape position (this is the "hold" position and should be at an even foot);
- Withdraw the tape rapidly to the surface;

- Record the length of the wetted chalk mark on the graduated tape;
- Subtract the wetted chalk number from the "hold" position number and record this number in the "Depth to Water below RP" column;
- Perform a check by repeating the measurement using a different RP hold value;
- All data should be recorded to the nearest 0.01 foot;
- Disinfect the tape by wiping down the submerged portion of the tape with single-use, unscented disinfectant wipe, or let stand for one minute in a dilute chlorine bleach solution and dry with clean cloth.

The graduated steel tape is generally considered to be the most accurate method for measuring static water levels. Measuring water levels in wells with cascading water or with condensing water on the well casing causes potential errors, or can be impossible with a steel tape.

<u>Electric Tape</u>
An electric tape operates on the principle that an electric circuit is completed when two electrodes are submerged in water. Most electric tapes are mounted on a hand-cranked reel equipped with batteries and an ammeter, buzzer or light to indicate when the circuit is completed. Tapes are graduated in either one-foot intervals or in hundredths of feet depending on the manufacturer. Like graduated steel tapes, electric tapes are affixed with brass or stainless-steel weights.

- Check the circuitry of the tape before lowering the probe into the well by dipping the probe into water and observe if the ammeter needle or buzzer/light signals that the circuit is completed;
- Lower the probe slowly and carefully into the well until the signal indicates that the water surface has been reached;
- Place a finger or thumb on the tape at the RP when the water surface is reached;
- If the tape is graduated in one-foot intervals, partially withdraw the tape and measure the distance from the RP mark to the nearest one-foot mark to obtain the depth to water below the RP. If the tape is graduated in hundredths of a foot, simply record the depth at the RP mark as the depth to water below the RP;
- Make all readings using the same needle deflection point on the ammeter scale (if equipped) so that water levels will be consistent between measurements;
- Make check measurements until agreement shows the results to be reliable;
- All data should be recorded to the nearest 0.01 foot;
- Disinfect the tape by wiping down the submerged portion of the tape with single-use, unscented disinfectant wipe, or let stand for one minute in a dilute chlorine bleach solution and dry with clean cloth;
- Periodically check the tape for breaks in the insulation. Breaks can allow water to enter into the insulation creating electrical shorts that could result in false depth readings.

The electric tape may give slightly less accurate results than the graduated steel tape. Errors can result from signal "noise" in cascading water, breaks in the tape insulation, tape stretch, or missing tape at the location of a splice. All electric tapes should be calibrated semi-annually against a steel tape that is maintained in the office and used only for calibration.

Air Line

The air line method is usually used only in wells equipped with pumps. This method typically uses a 1/8 or 1/4-inch diameter, seamless copper tubing, brass tubing, stainless steel tubing, or galvanized pipe with a suitable pipe tee for connecting an altitude or pressure gage. Plastic (i.e. polyethylene) tubing may also be used, but is considered less desirable because it can develop leaks as it degrades. An air line must extend far enough below the water level that the lower end remains submerged during pumping of the well. The air line is connected to an altitude gage that reads directly in feet of water, or to a pressure gage that reads pressure in pounds per square inch (psi). The gage reading indicates the length of the submerged air line.

The formula for determining the depth to water below the RP is: **d = k – h** where d = depth to water; k = constant; and h = height of the water displaced from the air line. In wells where a pressure gage is used, h is equal to 2.31 ft/psi multiplied by the gage reading. The constant value for k is approximately equivalent to the length of the air line.

- Calibrate the air line by measuring an initial depth to water (d) below the RP with a graduated steel tape. Use a tire pump, air tank, or air compressor to pump compressed air into the air line until all the water is expelled from the line. When all the water is displaced from the line, record the stabilized gage reading (h). Add d to h to determine the constant value for k.
- To measure subsequent depths to water with the air line, expel all the water from the air line, subtract the gage reading (h) from the constant k, and record the result as depth to water (d) below the RP.

The air line method is not as accurate as a graduated steel tape or electric and is typically accurate to the nearest one foot at best. Errors can occur from leaky air lines, or when tubing becomes clogged with mineral deposits or bacterial growth. The air line method is not desirable for use in the Groundwater Monitoring Program.

Pressure Transducer

Electrical pressure transducers make it possible to collect frequent and long-term water level or pressure data from wells. These pressure-sensing devices, installed at a fixed depth in a well, sense the change in pressure against a membrane. The pressure changes occur in response to changes in the height of the water column in the well above the transducer membrane. To compensate for atmospheric changes, transducers may have vented cables or they can be used in conjunction with a barometric transducer that is installed in the same well or a nearby observation well above the water level.

Transducers are selected on the basis of expected water level fluctuation. The smallest range in water levels provides the greatest measurement resolution. Accuracy is generally 0.01 to 0.1 percent of the full-scale range.

Retrieving data in the field is typically accomplished by downloading data through a USB connection to a portable computer or data logger. A site visit to retrieve data should involve several steps designed to safeguard the stored data and the continued useful operation of the transducer:

- Inspect the wellhead and check that the transducer cable has not moved or slipped (the cable can be marked with a reference point that can be used to identify movement);
- Ensure that the instrument is operating properly;
- Measure and record the depth to water with a graduated steel or electric tape;
- Document the site visit, including all measurements and any problems;
- Retrieve the data and document the process;
- Review the retrieved data by viewing the file or plotting the original data;
- Recheck the operation of the transducer prior to disconnecting from the computer.

A field notebook with a checklist of steps and measurements should be used to record all field observations and the current data from the transducer. It provides a historical record of field activities. In the office, maintain a binder with field information similar to that recorded in the field notebook so that a general historical record is available and can be referred to before and after a field trip.

Quality Control

The field technician should compare water level measurements collected at each well with the available historical information to identify and resolve anomalous and potentially erroneous measurements prior to moving to the next well location. Pertinent information, such as insufficient recovery of a pumping well, proximity to a pumping well, falling water in the casing, and changes in the measurement method, sounding equipment, reference point, or groundwater conditions should be noted. Office review of field notes and measurements should also be performed by a second staff member.

Groundwater Sampling Procedures for the Los Osos Basin Plan Groundwater Monitoring Program

Introduction

This document establishes groundwater sampling procedures for the Los Osos Basin Plan (LOBP) Groundwater Monitoring Program. Groundwater sampling procedures facilitate obtaining a representative groundwater sample from an aquifer for water quality analysis. The water sampling procedures for general mineral and dissolved nitrogen sampling are presented below, along with special procedures for collecting samples for analyzing Constituents of Emerging Concern (CECs).

References

The procedures used for the LOBP Groundwater Monitoring Program have been developed through consideration of the constituents of analysis, well construction and type, and a review of the following references:

- U.S. Environmental Protection Agency, 1999, *Compendium of ERT Groundwater Sampling Procedures*, EPA/540/P-91/007, January 1999.
- Wilde, F. D., 2004, *Cleaning of Equipment for Water Sampling* (ver 2.0): U.S. Geological Survey Techniques of Water-Resources Investigations, Book 9, Chapter A3, revised April 2004.
  http://water.usgs.gov/owq/FieldManual/chapter3/Ch3_contents.html
- Wilde, F. D., 2008, *Guidelines for Field-Measured Water Quality Properties* (ver. 2.0): U.S. Geological Survey Techniques of Water-Resources Investigations, Book 9, Chapter A6, Section 6, October 2008.
  http://water.usgs.gov/owq/FieldManual/Chapter6/6.0_contents.html

Well Information

Table 1 below lists important well information to be maintained in a well file or in a field notebook. Additional information that should be available to the person collecting groundwater samples include a description of access to the property and the well, the presence and depth of cascading water, or downhole obstructions that could interfere with sampling equipment.

Table 1
Well File Information

Well Completion Report	Hydrologic Information	Additional Information to be Recorded
Well name	Map showing basin boundaries and wells	Township, Range, and ¼ ¼ Section
Well Owner	Name of groundwater basin	Latitude and Longitude (Decimal degrees)
Drilling Company	Description of aquifer	Assessor's Parcel Number
Location map or sketch	Confined, unconfined, or mixed aquifers	Description of well head and sounding access
Total depth	Pumping test data	Reference point elevations
Perforation interval	Hydrographs	Well use and pumping schedule if known
Casing diameter	Water quality data	Date monitoring began
Date of well completion	Property access instructions/codes	Land use

Groundwater Sampling Procedures

Non-equipped wells

1) Calibrate field monitoring instruments each day prior to sampling;
2) Inspect wellhead condition and note any maintenance required (perform at earliest convenience);
3) Measure depth to static water (record to 0.01 inches) from surveyed reference point;
4) Install temporary purge pump to at least three feet below the water surface (deeper setting may be needed if water level draw down is too great);
5) Begin well purge, record flow rate;
6) Measure discharge water EC (measured to 10 µmhos/cm), pH (measured to 0.01 units), and temperature (measured to 0.1 degrees C) at regular intervals during well purging. Record time and gallons purged. Note discharge water color, odor, and turbidity (visual);
7) A minimum of three casing volumes of water should be removed during purging, or one borehole volume opposite perforated interval, whichever is greater*. In addition, a set of at least three consecutive field monitoring measurements with stable values should be recorded. For EC, stability within 5 percent of the first value in the set is sufficient (typically within 20-50 µmhos/cm). For pH, stability within 0.3 units is sufficient. For temperature, stability within 0.2 degrees C is sufficient;
8) Collect sample directly from discharge tube, note sample color, odor, turbidity (visual). Use only laboratory-provided containers. Wear powder-free nitrile gloves when collecting groundwater samples;
9) Place samples on-ice for transport to the laboratory;
10) Remove temporary pump and rinse with clean water;
11) Close well and secure well box lid;

*note: If well is pumped dry at the minimum pumping rate, the well may be allowed to recover and then sampled by bailer within 24 hours.

Equipped wells

The sampling port for an equipped well must be upstream of any water filtration or chemical feeds. Sample from the discharge line as close to the wellhead as possible. Sampling procedures for equipped wells will vary. For active wells (i.e. wells used daily), the need for purging three casing volumes is unnecessary. Flush supply line from well or holding tank to sampling port, and record one set of EC, pH, and temperature readings prior to sampling. For inactive wells, a field monitoring procedure similar to that described for non-equipped wells above is appropriate. Static water level measurements should also be taken before sampling. Water samples should always be transported on-ice to the laboratory.

Chain-of-Custody

The chain-of-custody and associated sample bottle labels are used to document sample identification, specify the analyses to be performed, and trace possession and handling of a sample from the time of collection through delivery to the analytical laboratory. The sampler should fill out the sample identification labels and affix them to the sample bottles prior to, or upon, sample collection. A chain-of-custody form should be filled out by the sampler and a signature and date/time of sample transfers are required for each relinquishing and receiving party between sample collection and laboratory delivery.

Groundwater Sampling Equipment Decontamination

Field equipment should be cleaned prior to the sampling event and between sampling locations. Sampling pumps and hand bailers should be brushed with a nylon-bristle brush using a solution of 0.1 to 0.2-percent (volume/volume) non-phosphate soap in municipal-source tap water. The equipment should then be triple-rinsed with deionized water. Purge the pump hose of well water between sampling locations by pumping deionized through the hose. Groundwater sampling equipment should be protected from contact with the ground, or other potentially contaminating materials, at all times.

Special procedures for sampling for CEC compounds from unequipped well:

1) A new, teflon-lined polyethylene discharge hose or bailer will be used at each unequipped well sampling location;
2) The sampling pump will be decontaminated prior to each well sampled: Decontamination will consist of brushing pump body, inlet screen, and submerged portion of power cable in a phosphate-free cleaning solution, followed by rinsing, pumping distilled water, and final rinse;

3) Personnel collecting the sample will use powder-free nitrile gloves and observe special precautions for testing as directed by the laboratory (such as no caffeinated drink consumption on day of sampling, standing downwind of sampling port during sample collection, double-bag sample bottles, etc.);
4) Equipment blanks of distilled water pumped through the sampling pump are recommended;
5) A clean water/travel blank of distilled water (from the same source used for pump decontamination) is recommended.

APPENDIX E

Land Use and Water Use Areas
(from LOBP)

Figure 5. Land Uses in the Plan Area

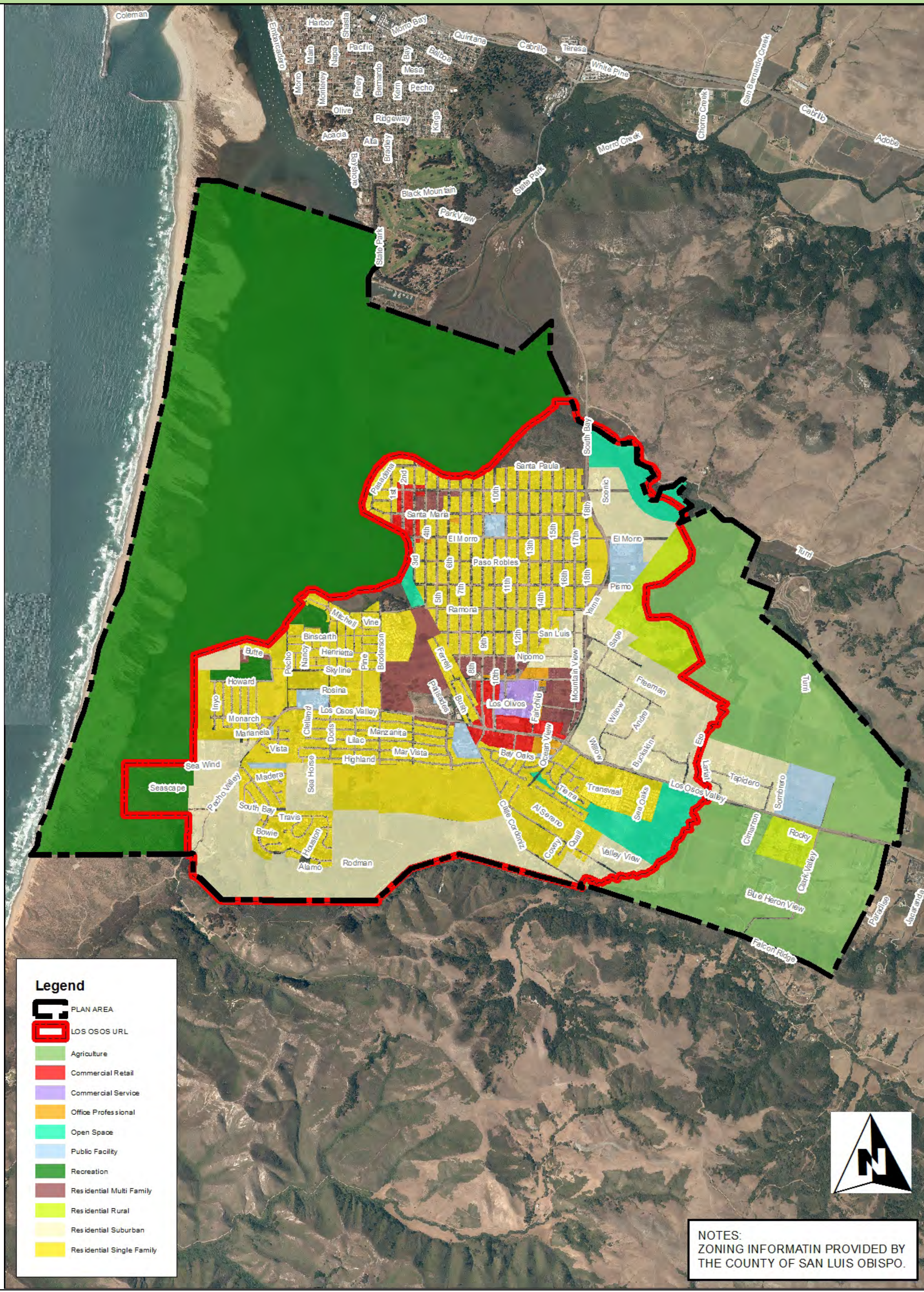
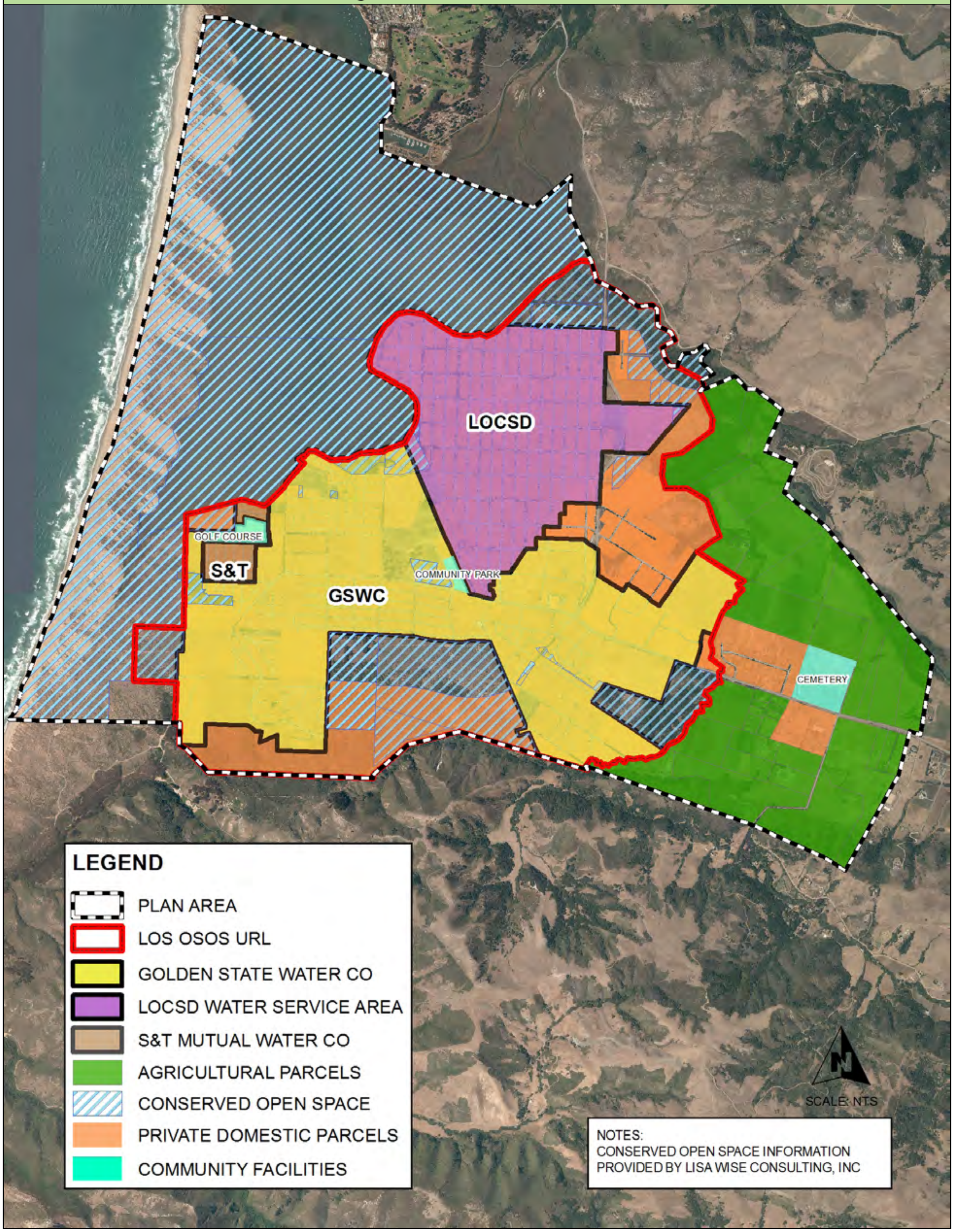


Figure 10. Water Use Areas



APPENDIX F

2022 Agricultural and Community Turf Water Use Estimates

CHG

Agriculture and Community Turf Applied Irrigation Water Estimate - 2022

Groundwater production estimates for agriculture and turf irrigation were developed using a daily soil-moisture budget with local data input. Sources of data included:

- Land use/cropping data sets from LandIQ for estimating irrigated acreages (2022).
- Daily rainfall from County rain gage 727 (former Los Osos Landfill).
- Daily reference evapotranspiration from the California Irrigated Management Information System (CIMIS) Station 160 (San Luis Obispo West - Chorro Valley) located in DWR Climate Zone 6, which is the same climate zone as the Los Osos Valley.
- Water holding capacity and rooting depths from UC Davis Cooperative Extension at http://UCManageDrought.ucdavis.edu
- Crop Coefficients (Kc) from prior work in the Los Osos basin.

The soil-moisture budget methodology used accounts for soil holding capacity, crop rooting depth, leaching fraction, irrigation efficiency, local precipitation, and local reference evapotranspiration. The following equation, modified from a general formula for irrigation water requirements, was used for the soil-moisture budget (Carollo, 2012, modified from Burt et al., 2002):

Applied Irrigation Water = (ETc - ER) / (EF)

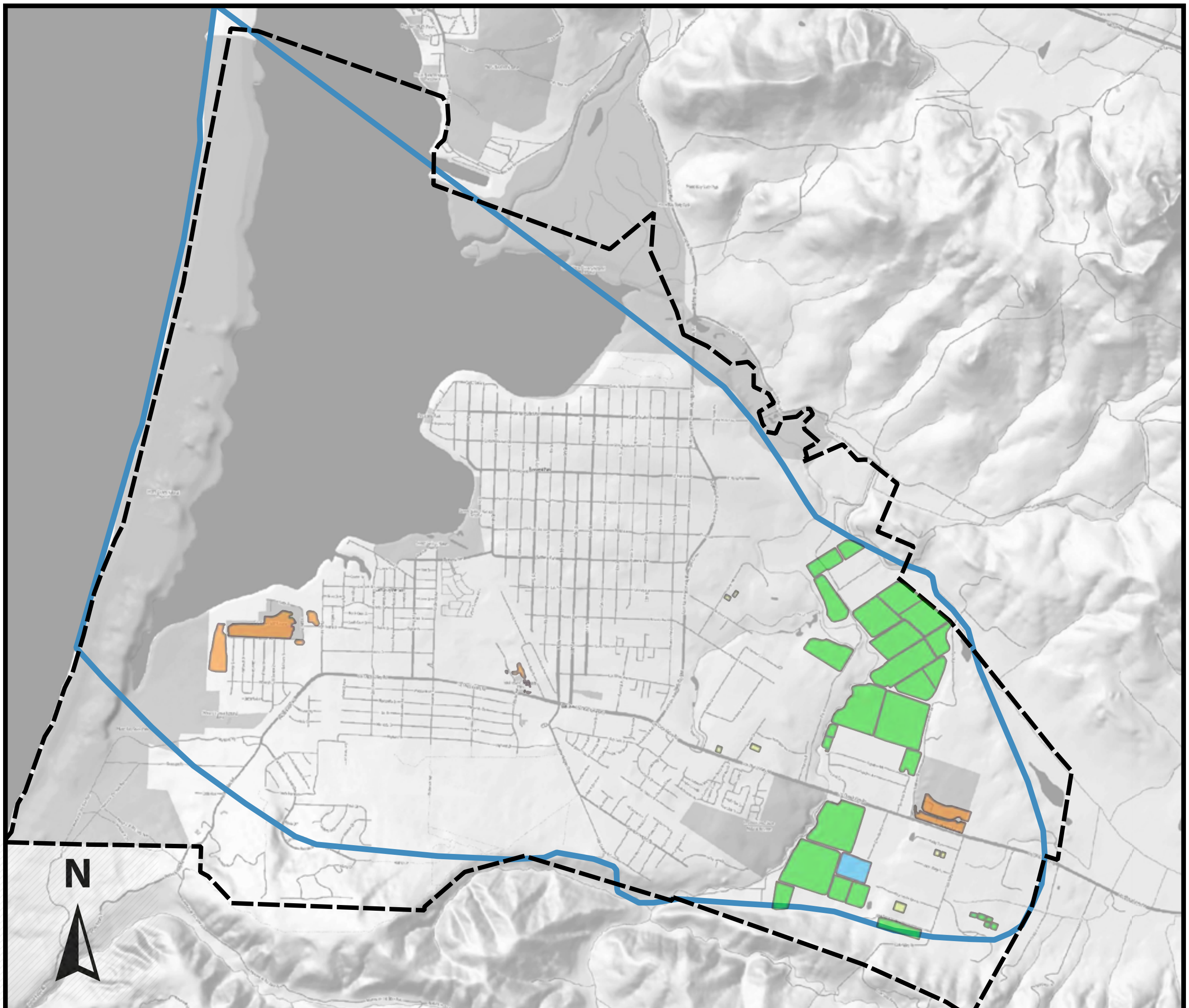
Where:

ETc [Crop evapotranspiration] = ETo [reference evapotranspiration] x Kc [crop coefficient]
ER [effective rainfall] = rainfall stored in soil and available to crop
EF [efficiency factor] = (1-LF[leaching fraction]) x IE [irrigation efficiency]
Assumes no frost protection for crops in the Los Osos Creek Valley.

Irrigated Acreage

Crop data used in this annual report comes from a GIS geodatabase provided by LandIQ. This agricultural land-use dataset is sourced from remotely sensed imagery and includes fields by crop type within the Basin and is separated into 13 categories, including some non-irrigated types such as urban, grain and hay, and fallow. The categories were then merged into the five main irrigated-crop categories used in previous reports: nursery, pasture, vegetable, vineyard and turf. No fields were identified as vineyard in 2022. Fields that were shown in the LandIQ dataset but were identified as likely being irrigated from bedrock wells outside the Basin were not included in the final crop acreages. 2022 crop acreages were then estimated using this updated dataset for use in soil moisture budget modeling. After review and comparison to crop datasets used in previous years from the County of San Luis Obispo, it was determined that the LandIQ dataset is accurate and can be directly compared with previous crop acreage estimates.

A land use survey map for 2022 is shown in Figure F-1. Tabulation of the irrigated acreages is presented in Table F-1.



Base Image: Stamen Terrain in Greyscale

0 2,000 4,000 6,000 8,000 ft

Scale: 1 inch ≈ 4,000 feet

Explanation

Crop Type

- Nursery
- Pasture
- Vegetables

- LOBP Basin Boundary
- Adjudicated Plan Area

- Community Facilities with Turf Areas

Figure F1

2022 Crop Types
Los Osos Groundwater Basin

2022 Annual Report

Cleath-Harris Geologists

Table F-1
2022 County Crop Survey
Eastern Area

Crop Type	Acres
Nursery	3.3
Pasture[1]	8.6
Vegetables	253
Total	265

[1]Sod farm listed as nursery in survey

Crop acreages listed in Table F-1 are in the Eastern Area (Los Osos Creek Valley and Cemetery Mesa). In addition, the turf areas for community facilities were calculated from areal images. Table F-2 presents these areas below.

Table F-2
Community Irrigated Turf Areas

Location	Acres
Memorial Park	12.5
Community Park	1.1
Sea Pines	24

Turf areas for schools, parks, cemeteries, and golf courses are generally classified in land use surveys as urban landscape, rather than given an agricultural designation. Turf grown for sod farms falls under an agricultural classification (pasture). For the purposes of the soil-moisture budget, the turf for community facilities and sod farms are considered as pasture.

Soil-Moisture Budget

The soil-moisture budget was constructed as a spreadsheet. Irrigation was applied as needed to offset soil moisture deficits after accounting for crop evapotranspiration, rainfall, rooting depths, and soil holding capacities.

As noted above:

Applied Irrigation Water = (**ETc - ER**) / (**EF**)

Where:

ETc [Crop evapotranspiration] = ETo [reference evapotranspiration] x Kc [crop coefficient]

> ETo: Reference evapotranspiration is imported from CIMIS Station 160 (San Luis Obispo West - Chorro Valley available on-line at: https://cimis.water.ca.gov/

<u>Kc</u>: The crop coefficient for turfgrass (Memorial Park, Golf Course, Community Park and the sod farm) is by definition 1, since the reference ETo crop is turfgrass. The crop coefficient for vegetables/row crops are based on prior investigations and summarized in Table F-3 below.

Table F-3
Crop Coefficients - Vegetables

Month	Kc
JAN	0.41
FEB	0.41
MAR	0.53
APR	0.51
MAY	0.73
JUN	0.86
JUL	0.83
AUG	0.76
SEP	0.71
OCT	0.56
NOV	0.46
DEC	0.34

Source: Yates & Williams (2003)

ER [effective rainfall] = rainfall stored in soil and available to crop

ER is accounted for in the daily soil moisture budget. An example of the moisture budget is presented at the end of this appendix.

The water holding capacity was estimated based on the typical soils present in the Los Osos Creek valley: Marimel silty clay loam, Marimel sandy clay loam, and Salinas silty clay loam. Using NRCS Soil Survey accessible here: https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm, and assuming a typical rooting depth of 2 feet, the resulting water holding capacity for the soil moisture budget calculations was estimated at 4 inches.

EF [efficiency factor] = (1-LF[leaching fraction]) x IE [irrigation efficiency]

The efficiency factor was substituted with a calibration factor of 92 percent. The purpose of the substitution was to reconcile the average annual irrigation requirement from a daily soil-moisture budget, prepared for 2006-2008, to the irrigation estimate from prior work, which was also based on the 2006-2008 period but used a different methodology (CHG, 2009b). The intent was to develop a methodology that provided variation in irrigation estimates from year to year based on both rainfall and acreages, but that was also consistent with historical estimates. Calibration factor development is shown in Table F-4.

Table F-4
Calibration of Soil Moisture Methodology to Prior 2006-2008 Estimate

Description	Units	Average 2006-2008	2017
Irrigation demand vegetables	inches	22.53	24.92[1]
Irrigation demand pasture	inches	37.24	41.27[2]
Calibration Factor[3]	factor	**0.92**	0.92
Applied irrigation vegetables	feet	2.04	2.26
Applied irrigation pasture	feet	3.37	3.74
Vegetables acreage[4]	acres	339	282.2
Vegetables applied water	acre-feet	692	637.8
Pasture acreage[4]	acres	18.3	8.7
Pasture applied water	acre-feet	61.7	32.5
TOTAL applied ag irrigation	acre-feet	**754**	670
TOTAL from CHG (2009b)	acre-feet	**750**	--

[1]From 2017 Annual Report Table F-3;
[2]From 2017 Annual Report Table F-4;
[3]Efficiency factor used to calibrate 2006-2008 total
[4]2006-2008 acreage from CHG, 2009b (excludes memorial park);
"--" = no value for this cell
2017 acreage from County GIS 2016 (1 vineyard and 1.8 nursery acres counted as 2.2 acres in vegetables, based on equivalent water demand conversion using 2012 County Master Water Plan Table A1 [Carollo, 2012]).

There is a reduction in irrigation water demand between 2006-2008 (750 AFY) and 2017 (670 AF) shown in Table F-4 due to a reduction in irrigated acreage. This reduction may have occurred between 2006-2008 and 2017, although it may also have been from changing the source for irrigated acreage estimates from aerial images (2006-2008 and subsequent years through 2016) to the County agricultural database (beginning in 2017). The County database is field checked with growers and is the appropriate data source.

Results of the soil-moisture budget method for estimating applied irrigation for agriculture and community facilities are included in tables below, and an example of the soil moisture is attached to the end of this appendix.

Tables F-5 and F-6 present irrigation demand as crop evapotranspiration for calendar years 2019 through 2022. The soil-moisture budget results show irrigation demand for vegetables was greater in 2022, compared to 2021. This can be explained by the decrease in rainfall during the year. Irrigation demand for turfgrass also increased slightly between 2021 and 2022, likely also due to the drop in rainfall.

Table F-5
Soil-Moisture Budget Results (Vegetables)

Year	Irrigation demand	ETo	ETc	Precip*
	(inches)			
2020	24.19	52.88	34.03	9.76
2021	25.13	52.89	34.18	23.12
2022	27.78	56.17	36.62	13.60

*calendar year

Table F-6
Soil-Moisture Budget Results (Pasture/Turf)

Year	Irrigation Demand (ETaw)	ETo	ETc	Precip*
	(inches)			
2020	42.30	52.88	52.88	9.76
2021	42.45	52.89	52.89	23.12
2022	46.24	56.17	56.17	13.60

*calendar year

Table F-7 summarizes the estimated applied irrigation for the various agricultural land uses. Due to the relatively minor acreage involved, nursery acres were converted to equivalent acres in vegetables based on water demand estimates from the County Water Master Plan table A1 (Carollo, 2012). The estimated applied irrigation for calendar year 2022 is 680 acre-feet (an increase of 60 acre-feet from 2021).

Table F-7
Applied Irrigation for Agriculture

Description	Units	2019	2020	2021	2022
Irrigation demand vegetables	inches	23.71[1]	24.19[1]	25.13[1]	27.78[1]
Irrigation demand pasture	inches	36.79[2]	42.3[2]	42.45[2]	46.24[2]
Irrigation Calibration Factor[3]	factor	0.92	0.92	0.92	0.92
Applied irrigation vegetables	feet	2.15	2.19	2.28	2.52
Applied irrigation pasture	feet	3.33	3.83	3.85	4.19
Vegetables acreage[4]	acres	281.6	282.6	255.3	256.9
Vegetables applied water	acre-feet	605.4	618.9	582.1	647.4
Pasture acreage[5]	acres	8.7	8.7	8.7	8.6
Pasture applied water	acre-feet	29.1	33.5	33.5	36
TOTAL applied agricultural irrigation (closest 10 acre-feet)	acre-feet	630	650	620	680

[1]From Table F-5;
[2]From Table F-6;
[3] From 2006-2009 calibration (Table F-4)
[4]2022 acreage from LandIQ 2022 (nursery acres counted as 3.8 acres in vegetables, based on equivalent water demand conversion using 2012 County Master Water Plan Table A1 [Carollo, 2012]).
[5]From Table F-1

Table F-8 summarizes the estimated applied irrigation for community facilities. The total estimated water demand for community facilities in the 2022 calendar year was 158 acre-feet, which was met with 66 acre-feet of recycled water use and 92 acre-feet of groundwater production.

Table F-8
2022 Applied Irrigation for Community Facilities

Description	Units	Memorial Park	Sea Pines Golf*	Community Park	Total
Turf Area (from Table H-2)	acres	12.5	24	1.1	37.6
Applied Irrigation (from Table H-6)	feet	4.19	4.19	4.19	4.19
TOTAL Applied Irrigation	acre-feet	52.4	100.6	4.6	158

*includes an estimated 66 acre-feet of recycled water (92 acre-feet net production)

Sample Calculations: Daily Soil-Moisture Budget

NOTE: Wilting point (maximum allowable deficit), irrigation efficiencies, leaching fraction, and specific growing season dates are collectively approximated with the Efficiency Factor (EF), which calibrates the soil-moisture budget results to the prior estimates for 2006-2008 (CHG, 2009b). The soil-moisture budget is a tool developed to assist basin management and is not an irrigation schedule.

[A], [B]: Day and month used for sample calculation: September 8, 2022
[C]: ETo = 0.20 inches
[D]: Kc = 0.71
[E]: ETc = ETo*Kc = 0.14 inches
[F]: Precipitation + Irrigation = **[N]** + **[M]** = 0.0 inches + 0.14 inches = 0.14 inches
[G]: Water Available from Soil Profile = WHC of active root zone (4 inches) + soil moisture deficit on September 7 (-4.00 inches) = 0.0 inches
[H]: ETc Met by Precipitation + Irrigation = **[E]** *OR* **[F],** whichever is smaller. Both are equal, so **[H]** = 0.14 inches
[I]: ETc Met by Profile = **[G]** *OR* (**[E]** - **[H]**), whichever is smaller. Both are equal, so **[I]** = 0.0 inches
[J] Precip Available for Profile = **[F]** - **[H]** = 0.14 inches -0.14 inches = 0.0 inches
[K] Soil Moisture Deficit = whichever is greater between (a) -WHC (-4.0 inches) and (b) minimum of either (c) 0 inches or (d) September 7 Soil Moisture Deficit (-4.00 inches) - **[I] (**0 inches) + **[J]** (0.0 inches) = -4.00 inches. In this case (a) and (d) are the same and less than (c), therefore **[K]** = (a) = -4.00 inches
[L] Monthly Deep Percolation and Runoff = whichever is greater between (a) 0 inches and (b) Oct 22 Soil Moisture Deficit (-4.00 inches) + **[J]** (0.0 inches) = -4.00 inches, therefore **[L]** = 0 inches
[M] Irrigation Demand = **[E]** - **[N]** - **[G]** if greater than zero, otherwise 0 inches. In this case [M]= 0.14 inches
[N] Precipitation = 0.0 inches

[A], [B]: Day and month used for sample calculation: September 20, 2022
[C]: ETo = 0.17 inches
[D]: Kc = 0.71
[E]: ETc = ETo*Kc = 0.12 inches
[F]: Precipitation + Irrigation = **[N]** + **[M]** = 0.92 inches + 0.0 inches = 0.92 inches
[G]: Water Available from Soil Profile = WHC of active root zone (4 inches) + soil moisture deficit on September 19 (-4.00 inches) = 0 inches
[H]: ETc Met by Precipitation + Irrigation = **[E]** *OR* **[F],** whichever is smaller. In this case **[E]** is smaller, so **[H]** = 0.12 inches
[I]: ETc Met by Profile = **[G]** *OR* (**[E]** - **[H]**), whichever is smaller. In this case **[G]** = **[E]** - **[H]** = 0.0 inches
[J] Precip Available for Profile = **[F]** - **[H]** = 0.92 inches - 0.12 inches = 0.8 inches
[K] Soil Moisture Deficit = whichever is greater between (a) -WHC (-4.0 inches) and (b) minimum of either (c) 0 inches or (d) September 19 Soil Moisture Deficit (-4.00 inches) - **[I] (**0.0 inches) + **[J]** (0.8 inches) = -3.20 inches. In this case (d) is less than (c) and greater than (a), therefore **[K]** = (d) = -3.20 inches
[L] Monthly Deep Percolation and Runoff = whichever is greater between (a) 0 inches and (b) Sep 19 Soil Moisture Deficit (-4.00 inches) + **[J]** (0.8 inches) = -3.20 inches, therefore **[L]** = 0 inches
[M] Irrigation Demand = **[E]** (0.12 inches) - **[N]** (0.92 inches) - **[G]** (0 inches) if greater than zero, otherwise 0 inches. On this date **[M]** = 0.0 inches
[N] Precipitation = 0.92 inches

Water Holding Capacity (WHC) (in/ft)	2
Active Root Zone Depth (ft)	2.0
WHC of Active Root Zone (in)	4.0
Crop Coeficient (Kc)	**Variable**

Highlighted rows used for example calcuations

[A]	[B]	[C]	[D]	[E]	[F]	[G]	[H]	[I]	]J]	[K]	[L]	[M]	[N]
Day	Month	Refernce ET (ETo) CIMIS Sta. 160	Crop Coefficient (Kc)	Crop ET (ETc)	Precip. + Irrigation	Water Available from Soil Profile	ETc met by Precip + Irrig	ETc met by Profile	Precip Available for Profile	Soil Moisture Deficit	Monthly Deep Percolation and Runoff	Irrigation Demand	Precip Sta. 727
1	September	0.22	0.71	0.16	0.16	0.00	0.16	0.00	0.00	-4.00	0.00	0.16	0.00
2		0.21	0.71	0.15	0.15	0.00	0.15	0.00	0.00	-4.00	0.00	0.15	0.00
3		0.25	0.71	0.18	0.18	0.00	0.18	0.00	0.00	-4.00	0.00	0.18	0.00
4		0.23	0.71	0.16	0.16	0.00	0.16	0.00	0.00	-4.00	0.00	0.16	0.00
5		0.24	0.71	0.17	0.17	0.00	0.17	0.00	0.00	-4.00	0.00	0.17	0.00
6		0.24	0.71	0.17	0.17	0.00	0.17	0.00	0.00	-4.00	0.00	0.17	0.00
7		0.23	0.71	0.16	0.16	0.00	0.16	0.00	0.00	-4.00	0.00	0.16	0.00
8		0.20	0.71	0.14	0.14	0.00	0.14	0.00	0.00	-4.00	0.00	0.14	0.00
9		0.13	0.71	0.09	0.09	0.00	0.09	0.00	0.00	-4.00	0.00	0.09	0.00
10		0.17	0.71	0.12	0.12	0.00	0.12	0.00	0.00	-4.00	0.00	0.12	0.00
11		0.13	0.71	0.09	0.09	0.00	0.09	0.00	0.00	-4.00	0.00	0.09	0.00
12		0.17	0.71	0.12	0.12	0.00	0.12	0.00	0.00	-4.00	0.00	0.12	0.00
13		0.17	0.71	0.12	0.12	0.00	0.12	0.00	0.00	-4.00	0.00	0.12	0.00
14		0.18	0.71	0.13	0.13	0.00	0.13	0.00	0.00	-4.00	0.00	0.13	0.00
15		0.19	0.71	0.13	0.13	0.00	0.13	0.00	0.00	-4.00	0.00	0.13	0.00
16		0.18	0.71	0.13	0.13	0.00	0.13	0.00	0.00	-4.00	0.00	0.13	0.00
17		0.13	0.71	0.09	0.09	0.00	0.09	0.00	0.00	-4.00	0.00	0.09	0.00
18		0.10	0.71	0.07	0.07	0.00	0.07	0.00	0.00	-4.00	0.00	0.07	0.00
19		0.04	0.71	0.03	0.03	0.00	0.03	0.00	0.00	-4.00	0.00	0.03	0.00
20		0.17	0.71	0.12	0.92	0.00	0.12	0.00	0.80	-3.20	0.00	0.00	0.92
21		0.18	0.71	0.13	0.00	0.80	0.00	0.13	0.00	-3.33	0.00	0.00	0.00
22		0.21	0.71	0.15	0.00	0.67	0.00	0.15	0.00	-3.48	0.00	0.00	0.00
23		0.22	0.71	0.16	0.00	0.52	0.00	0.16	0.00	-3.63	0.00	0.00	0.00
24		0.14	0.71	0.10	0.00	0.37	0.00	0.10	0.00	-3.73	0.00	0.00	0.00
25		0.12	0.71	0.09	0.00	0.27	0.00	0.09	0.00	-3.82	0.00	0.00	0.00
26		0.13	0.71	0.09	0.00	0.18	0.00	0.09	0.00	-3.91	0.00	0.00	0.00
27		0.14	0.71	0.10	0.01	0.09	0.01	0.09	0.00	-4.00	0.00	0.01	0.00
28		0.16	0.71	0.11	0.11	0.00	0.11	0.00	0.00	-4.00	0.00	0.11	0.00
29		0.15	0.71	0.11	0.11	0.00	0.11	0.00	0.00	-4.00	0.00	0.11	0.00
30		0.13	0.71	0.09	0.09	0.00	0.09	0.00	0.00	-4.00	0.00	0.09	0.00

APPENDIX G

Precipitation and Streamflow Data

Note: Rainfall data for the end of 2022 was downloaded from the Station # 727 County Gage Site for report use, summary tables have not yet been published as of this report.

San Luis Obispo County Public Works

Recording Rain Station

MONTHLY PRECIPITATION REPORT

Station Name - Los Osos Landfill # 727

Station Location -

Latitude - 35° 19' 19"

Longitude - 120° 48' 03"

Description - Northeast Los Osos South of Turri Road

Water Years -

Beginning - 2005-2006

Ending - 2021-2022

Station Statistics -

Month	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
Minimum	0.00	0.00	0.00	0.00	0.04	0.12	0.00	0.00	0.00	0.00	0.00	0.00	6.81
Average	0.12	0.02	0.06	0.94	1.10	3.06	3.96	2.56	2.68	0.85	0.33	0.09	15.77
Maximum	1.93	0.20	0.63	6.22	3.74	11.46	10.47	7.65	8.03	3.70	2.64	1.10	31.77

Notes -

Earlier data may be available. Contact Public Works for more information.

San Luis Obispo County Public Works

Recording Rain Station

MONTHLY PRECIPITATION REPORT

Station Name and no. Los Osos Landfill # 727

*** All units are in inches ***

Water Year	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Total
2021-2022	0.00	0.00	0.00	2.64	0.31	8.39	0.04	0.00	1.84	0.36	0.00	0.00	13.58
2020-2021	0.00	0.04	0.00	0.00	0.47	2.01	9.92	0.20	1.26	0.00	0.04	0.00	13.94
2019-2020	0.00	0.08	0.00	0.00	2.03	4.41	0.24	0.04	4.80	1.89	0.12	0.00	13.60
2018-2019	0.00	0.00	0.00	0.43	3.74	1.14	6.14	6.89	3.94	0.08	1.46	0.00	23.82
2017-2018	0.00	0.00	0.16	0.16	0.47	0.12	3.78	0.16	7.99	0.79	0.00	0.00	13.63
2016-2017	0.00	0.00	0.00	1.65	2.76	3.39	9.02	7.65	1.34	0.55	0.27	0.00	26.63
2015-2016	1.93	0.00	0.08	0.08	1.26	1.85	5.04	0.86	4.85	0.20	0.00	0.00	16.15
2014-2015	0.00	0.00	0.00	0.00	0.28	5.20	0.08	0.91	0.43	0.67	0.12	0.00	7.68
2013-2014	0.00	0.00	0.00	0.24	0.28	0.12	0.00	4.06	1.42	0.71	0.00	0.00	6.81
2012-2013	0.00	0.00	0.00	1.18	1.69	2.64	1.02	0.67	0.43	0.31	0.12	0.04	8.11
2011-2012	0.00	0.08	0.04	1.06	2.17	0.16	2.28	0.35	2.68	2.24	0.00	0.00	11.06
2010-2011	0.00	0.00	0.12	1.54	1.85	11.46	3.03	3.78	8.03	0.28	0.59	1.10	31.77
2009-2010	0.00	0.00	0.04	6.22	0.04	2.87	9.76	4.13	1.14	1.93	0.04	0.00	26.18
2008-2009	0.00	0.00	0.00	0.04	0.04	0.75	0.71	4.61	1.06	0.20	0.20	0.35	7.95
2007-2008	0.00	0.00	0.00	0.43	0.12	2.68	10.47	2.99	0.00	0.24	0.00	0.00	16.93
2006-2007	0.00	0.00	0.00	0.12	0.43	2.28	1.26	2.56	0.43	0.35	0.04	0.00	7.48
2005-2006	0.04	0.20	0.63	0.24	0.75	2.52	4.45	3.70	3.90	3.70	2.64	0.00	22.76

NOTE: Raw Data Compiled from County Website (wr.slocountywater.org)

Daily Precipitation, Landfill # 727, 2022-2023

Day	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
1					0.08	1.31						
2						0.14						
3						1.31						
4					0.01	0.31						
5						0.01						
6				0.04	0.01	0.08						
7					0.24	0.01						
8					0.89							
9					0.07	0.13						
10						2.01						
11						0.40						
12						0.21						
13												
14												
15					0.01							
16												
17												
18						0.01						
19												
20			0.92			0.01						
21												
22												
23												
24												
25												
26												
27						1.73						
28												
29												
30						0.28						
31						1.14						
Total	***0.00***	***0.00***	***0.92***	***0.04***	***1.31***	***9.09***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
Cumu Total	***0.00***	***0.00***	***0.92***	***0.96***	***2.27***	***11.36***	***11.36***	***11.36***	***11.36***	***11.36***	***11.36***	***11.36***

NOT COMPILED

San Luis Obispo County Public Works

DAILY PRECIPITATION
(inches)

Station Name and no. **Los Osos Landfill # 727** Season **2021-2022**

Day	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Day
1							*						1
2													2
3					0.04								3
4									0.04				4
5													5
6													6
7						0.04							7
8													8
9					0.24	0.16							9
10					0.04								10
11													11
12													12
13						2.95							13
14						1.18							14
15													15
16						0.28							16
17													17
18									0.04				18
19									0.04				19
20									0.04				20
21										0.36			21
22						0.63							22
23						1.69							23
24				0.16		0.12							24
25				2.48		0.55	0.04						25
26						0.08							26
27						0.24							27
28									1.68				28
29						0.47							29
30													30
31													31

Total	0.00	0.00	0.00	2.64	0.31	8.39	0.04	0.00	1.84	0.36	0.00	0.00	
Cum. Total	0.00	0.00	0.00	2.64	2.95	11.34	11.38	11.38	13.22	13.58	13.58	13.58	

Season Total **13.58**

San Luis Obispo County Public Works

DAILY PRECIPITATION
(inches)

Station Name and no. **Los Osos Landfill # 727** Season **2020-2021**

Day	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Day
1													1
2													2
3													3
4													4
5							0.04						5
6													6
7													7
8													8
9									0.20				9
10									0.71				10
11									0.04				11
12						0.04		0.16	0.04				12
13		0.04			0.39	0.16							13
14													14
15								0.04	0.16				15
16													16
17						0.12					0.04		17
18					0.04								18
19					0.04				0.12				19
20													20
21													21
22							0.12						22
23							0.04						23
24							0.12						24
25													25
26						0.04	0.20						26
27						0.55	5.67						27
28						1.06	3.50						28
29							0.24						29
30													30
31						0.04							31
Total	0.00	0.04	0.00	0.00	0.47	2.01	9.92	0.20	1.26	0.00	0.04	0.00	
Cum. Total	0.00	0.04	0.04	0.04	0.51	2.52	12.44	12.64	13.90	13.90	13.94	13.94	

Season Total **13.94**

San Luis Obispo County Public Works

DAILY PRECIPITATION
(inches)

Station Name and no. **Los Osos Landfill # 727** Season **2019-2020**

Day	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Day
1						0.35							1
2													2
3						0.12							3
4						0.75							4
5										1.34			5
6						0.08			0.20	0.04			6
7						0.08			0.16	0.16			7
8						0.16	0.04			0.04			8
9							0.12			0.31			9
10									1.42				10
11		0.08							0.35				11
12													12
13						0.04							13
14								0.04					14
15									0.51				15
16							0.04		0.98				16
17									0.04		0.08		17
18						0.04					0.04		18
19									0.04				19
20													20
21													21
22						1.42			0.39				22
23									0.35				23
24									0.08				24
25						1.02			0.28				25
26						0.20	0.04						26
27					1.04								27
28					0.47								28
29					0.04	0.12							29
30					0.47	0.04							30
31													31

Total	0.00	0.08	0.00	0.00	2.03	4.41	0.24	0.04	4.80	1.89	0.12	0.00	
Cum. Total	0.00	0.08	0.08	0.08	2.11	6.51	6.75	6.79	11.59	13.48	13.60	13.60	

Season Total **13.60**

San Luis Obispo County Public Works

DAILY PRECIPITATION
(inches)

Station Name and no. **Los Osos Landfill # 727** Season **2018-2019**

Day	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Day
1								0.31	0.04				1
2								1.81	0.75				2
3				0.35				0.35	0.12				3
4				0.04		0.08		0.98					4
5						0.04	0.67	0.08	0.67				5
6						0.04	0.63		0.28		0.12		6
7									0.08				7
8								0.31					8
9							0.31	0.24	0.12				9
10								0.43	0.12				10
11							0.71						11
12							0.16						12
13								0.28					13
14							0.31	0.87					14
15							0.79	0.47					15
16						0.43	0.51	0.12		0.08	0.51		16
17						0.20	0.91	0.35					17
18											0.51		18
19							0.28		0.08		0.24		19
20									1.34				20
21					0.28			0.04	0.08		0.04		21
22													22
23					0.35				0.12				23
24					0.04	0.12							24
25					0.04	0.24							25
26											0.04		26
27								0.24	0.12				27
28				0.04	0.98				0.04				28
29					2.05								29
30													30
31							0.87						31

Total	0.00	0.00	0.00	0.43	3.74	1.14	6.14	6.89	3.94	0.08	1.46	0.00	
Cum. Total	0.00	0.00	0.00	0.43	4.17	5.31	11.46	18.35	22.28	22.36	23.82	23.82	

Season Total **23.82**

San Luis Obispo County Public Works

DAILY PRECIPITATION

(inches)

Station Name and no. **Los Osos Landfill # 727** Season **2017-2018**

Day	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Day
1									0.82				**1**
2									0.16				**2**
3					0.03				0.24				**3**
4							0.19						**4**
5													**5**
6													**6**
7										0.40			**7**
8					0.04		1.42						**8**
9					0.12		1.77						**9**
10			0.08						0.51				**10**
11			0.08										**11**
12									0.04	0.04			**12**
13									0.35				**13**
14									0.28				**14**
15										0.04			**15**
16					0.04				0.35	0.19			**16**
17									0.08				**17**
18							0.08						**18**
19							0.08			0.12			**19**
20				0.12		0.12			0.48				**20**
21									2.16				**21**
22									2.48				**22**
23													**23**
24													**24**
25							0.24						**25**
26					0.16			0.16					**26**
27					0.08								**27**
28													**28**
29													**29**
30													**30**
31				0.04					0.04				**31**

Total	0.00	0.00	0.16	0.16	0.47	0.12	3.78	0.16	7.99	0.79	0.00	0.00	
Cum. Total	0.00	0.00	0.16	0.32	0.79	0.91	4.69	4.85	12.84	13.63	13.63	13.63	

Season Total **13.63**

San Luis Obispo County Public Works

DAILY PRECIPITATION

(inches)

Station Name and no. **Los Osos Landfill # 727** Season **2016-2017**

Day	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Day
1													**1**
2								0.24					**2**
3								0.16					**3**
4							2.25						**4**
5							0.23	0.55	0.35				**5**
6								0.51					**6**
7							0.52	0.63		0.15	0.27		**7**
8						1.18	1.10	0.04		0.04			**8**
9						0.08	0.12	0.28					**9**
10						0.12	0.23	0.43					**10**
11							0.04	0.04					**11**
12							0.59						**12**
13										0.08			**13**
14										0.04			**14**
15				0.08		1.07							**15**
16				0.08		0.55		0.31					**16**
17				0.08				3.27		0.08			**17**
18							0.56	0.32		0.16			**18**
19							0.27	0.08					**19**
20					1.90		1.22	0.51					**20**
21					0.04		0.16	0.24	0.20				**21**
22							1.26		0.47				**22**
23						0.35	0.43						**23**
24							0.04		0.12				**24**
25									0.20				**25**
26					0.67			0.04					**26**
27				0.67	0.15								**27**
28				0.71									**28**
29													**29**
30				0.03		0.04							**30**
31													**31**

Total	0.00	0.00	0.00	1.65	2.76	3.39	9.02	7.65	1.34	0.55	0.27	0.00	
Cum. Total	0.00	0.00	0.00	1.65	4.41	7.80	16.82	24.47	25.81	26.36	26.63	26.63	

Season Total **26.63**

San Luis Obispo County Public Works

DAILY PRECIPITATION
(inches)

Station Name and no. **Los Osos Landfill # 727** Season **2015-2016**

Day	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Day
1													1
2					0.59								2
3						0.04							3
4				0.04									4
5							1.02		1.54				5
6							0.75		0.35				6
7							0.23		1.06				7
8					0.23					0.08			8
9					0.04		0.04						9
10					0.04	0.04	0.08		0.04				10
11						0.39			1.22				11
12													12
13						0.08	0.04		0.36				13
14			0.08						0.20				14
15				0.04	0.28		0.04						15
16							0.08						16
17								0.67					17
18							0.28	0.19					18
19	1.69					0.51	0.86						19
20	0.24								0.04				20
21						0.28			0.04				21
22						0.47	0.16			0.12			22
23							0.08						23
24						0.04							24
25					0.08								25
26													26
27													27
28													28
29													29
30							0.27						30
31							1.11						31

Total	1.93	0.00	0.08	0.08	1.26	1.85	5.04	0.86	4.85	0.20	0.00	0.00	
Cum. Total	1.93	1.93	2.01	2.09	3.35	5.20	10.24	11.10	15.95	16.15	16.15	16.15	

Season Total **16.15**

San Luis Obispo County Public Works

DAILY PRECIPITATION
(inches)

Station Name and no. **Los Osos Landfill # 727** Season **2014-2015**

Day	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Day
1									0.43				**1**
2						0.51							**2**
3													**3**
4						0.67							**4**
5						0.04							**5**
6								0.12					**6**
7								0.51					**7**
8					0.04			0.20					**8**
9													**9**
10								0.08					**10**
11					0.04	1.22							**11**
12						1.22							**12**
13					0.04								**13**
14											0.12		**14**
15						0.71				0.47			**15**
16						0.71							**16**
17						0.08							**17**
18						0.04							**18**
19					0.08								**19**
20													**20**
21													**21**
22					0.04								**22**
23													**23**
24													**24**
25										0.20			**25**
26													**26**
27							0.08						**27**
28													**28**
29					0.04								**29**
30													**30**
31													**31**

Total	0.00	0.00	0.00	0.00	0.28	5.20	0.08	0.91	0.43	0.67	0.12	0.00	
Cum. Total	0.00	0.00	0.00	0.00	0.28	5.47	5.55	6.46	6.89	7.56	7.68	7.68	

Season Total **7.68**

San Luis Obispo County Public Works

DAILY PRECIPITATION
(inches)

Station Name and no. **Los Osos Landfill # 727** Season **2013-2014**

Day	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Day
1									0.59	0.24			1
2								0.87	0.20	0.28			2
3								0.04					3
4													4
5													5
6								0.31					6
7						0.12							7
8								0.04					8
9								0.04					9
10								0.08					10
11													11
12													12
13													13
14								0.04					14
15													15
16													16
17													17
18													18
19													19
20					0.20								20
21					0.08								21
22													22
23													23
24													24
25										0.16			25
26								0.87	0.04	0.04			26
27								0.28					27
28				0.24				1.50					28
29									0.16				29
30									0.04				30
31									0.39				31
Total	0.00	0.00	0.00	0.24	0.28	0.12	0.00	4.06	1.42	0.71	0.00	0.00	
Cum. Total	0.00	0.00	0.00	0.24	0.51	0.63	0.63	4.69	6.10	6.81	6.81	6.81	

Season Total **6.81**

San Luis Obispo County Public Works

DAILY PRECIPITATION
(inches)

Station Name and no. **Los Osos Landfill # 727** Season **2012-2013**

Day	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Day
1						0.12				0.28			1
2						0.55							2
3													3
4										0.04			4
5							0.39						5
6							0.31				0.12		6
7									0.24				7
8								0.47	0.08				8
9					0.04								9
10				0.24									10
11				0.87									11
12						0.04							12
13													13
14									0.04				14
15						0.04							15
16					0.08	0.08							16
17					0.47	0.16							17
18					0.24								18
19								0.20					19
20													20
21				0.04									21
22						0.75							22
23						0.24							23
24							0.28					0.04	24
25						0.28	0.04						25
26						0.04							26
27													27
28					0.55								28
29					0.08	0.35							29
30				0.04	0.24				0.04				30
31									0.04				31

Total	0.00	0.00	0.00	1.18	1.69	2.64	1.02	0.67	0.43	0.31	0.12	0.04	
Cum. Total	0.00	0.00	0.00	1.18	2.87	5.51	6.54	7.20	7.64	7.95	8.07	8.11	

Season Total **8.11**

San Luis Obispo County Public Works

DAILY PRECIPITATION

(inches)

Station Name and no. **Los Osos Landfill # 727** Season **2011-2012**

Day	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Day
1													1
2													2
3				0.08	0.04								3
4				0.04	0.28								4
5				0.91									5
6					0.28								6
7								0.04					7
8													8
9													9
10				0.04				0.04		0.55			10
11					0.31					0.16			11
12						0.16				0.28			12
13								0.08		1.02			13
14													14
15								0.08					15
16									0.12				16
17									1.46				17
18									0.12				18
19													19
20					1.26		0.20						20
21							0.87						21
22													22
23							1.22						23
24													24
25									0.63	0.20			25
26		0.04								0.04			26
27													27
28									0.16				28
29								0.12					29
30		0.04	0.04										30
31									0.20				31

Total	0.00	0.08	0.04	1.06	2.17	0.16	2.28	0.35	2.68	2.24	0.00	0.00	
Cum. Total	0.00	0.08	0.12	1.18	3.35	3.50	5.79	6.14	8.82	11.06	11.06	11.06	

Season Total **11.06**

San Luis Obispo County Public Works

DAILY PRECIPITATION
(inches)

Station Name and no. **Los Osos Landfill # 727** Season **2010-2011**

Day	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Day
1							0.39						1
2							2.52		0.08				2
3													3
4			0.04			0.04			0.04			0.59	4
5				0.31		0.75						0.35	5
6				0.24	0.04				0.12			0.12	6
7					0.47								7
8													8
9						0.04							9
10					0.04								10
11									0.04				11
12													12
13						0.04							13
14								0.04					14
15						0.04					0.16		15
16								0.59	0.08		0.16		16
17			0.04	0.04		0.43		0.47			0.16		17
18				0.08		2.95		1.54	0.47		0.08		18
19					0.24	2.24		0.55	2.28				19
20			0.04		0.71	1.06		0.04	2.91				20
21				0.04	0.24	0.35			0.24	0.28			21
22				0.04		1.57			0.04				22
23				0.08	0.12				0.87				23
24				0.28					0.63				24
25						0.79		0.51	0.04				25
26								0.04	0.16				26
27													27
28						0.31			0.04				28
29				0.35		0.83					0.04	0.04	29
30				0.08									30
31							0.12						31

Total	0.00	0.00	0.12	1.54	1.85	11.46	3.03	3.78	8.03	0.28	0.59	1.10	
Cum. Total	0.00	0.00	0.12	1.65	3.50	14.96	17.99	21.77	29.80	30.08	30.67	31.77	

Season Total **31.77**

San Luis Obispo County Public Works

DAILY PRECIPITATION
(inches)

Station Name and no. **Los Osos Landfill # 727** Season **2009-2010**

Day	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Day
1										0.04			1
2									0.08				2
3									0.43				3
4								0.08	0.04				4
5								0.51		0.31			5
6								0.39	0.20				6
7						0.47							7
8									0.04				8
9								0.63					9
10						0.75			0.04				10
11										0.98			11
12						1.22	0.51		0.08	0.08			12
13				5.43		0.04	0.31	0.04					13
14				0.79		0.04							14
15													15
16													16
17							0.55				0.04		17
18							1.14						18
19							0.91						19
20					0.04		2.36	0.04		0.51			20
21						0.16	2.01	0.12					21
22							1.22		0.04				22
23			0.04				0.04	0.04					23
24								0.39					24
25													25
26							0.59	1.42					26
27						0.08		0.47					27
28													28
29							0.08		0.04				29
30						0.12	0.04		0.04				30
31									0.12				31

Total	0.00	0.00	0.04	6.22	0.04	2.87	9.76	4.13	1.14	1.93	0.04	0.00	
Cum. Total	0.00	0.00	0.04	6.26	6.30	9.17	18.94	23.07	24.21	26.14	26.18	26.18	

Season Total **26.18**

San Luis Obispo County Public Works

DAILY PRECIPITATION
(inches)

Station Name and no. **Los Osos Landfill # 727** Season **2008-2009**

Day	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Day
1					0.04						0.04		1
2							0.08		0.16		0.12		2
3									0.59				3
4				0.04					0.08				4
5											0.04	0.35	5
6								0.87					6
7										0.20			7
8													8
9								1.10					9
10													10
11								0.04					11
12								0.04					12
13								0.63					13
14								0.04					14
15													15
16						0.12							16
17								1.10					17
18													18
19													19
20													20
21						0.08							21
22						0.43		0.47	0.24				22
23							0.51	0.31					23
24							0.12						24
25						0.12							25
26													26
27													27
28													28
29													29
30													30
31													31

Total	0.00	0.00	0.00	0.04	0.04	0.75	0.71	4.61	1.06	0.20	0.20	0.35	
Cum. Total	0.00	0.00	0.00	0.04	0.08	0.83	1.54	6.14	7.20	7.40	7.60	7.95	

Season Total **7.95**

San Luis Obispo County Public Works

DAILY PRECIPITATION

(inches)

Station Name and no. **Los Osos Landfill # 727** Season **2007-2008**

Day	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Day
1								0.08					1
2					0.04			0.24		0.20			2
3								1.02		0.04			3
4							3.66						4
5							0.20						5
6						0.24	0.39						6
7						0.08							7
8							0.08						8
9							0.04						9
10													10
11					0.08								11
12													12
13													13
14													14
15													15
16				0.28									16
17				0.08									17
18						2.24							18
19								0.20					19
20						0.12		0.16					20
21							0.08	0.08					21
22							2.32	0.12					22
23							1.06	0.87					23
24							0.87	0.24					24
25							0.31						25
26							0.63						26
27				0.08			0.67						27
28							0.08						28
29							0.04						29
30							0.04						30
31													31

Total	0.00	0.00	0.00	0.43	0.12	2.68	10.47	2.99	0.00	0.24	0.00	0.00	
Cum. Total	0.00	0.00	0.00	0.43	0.55	3.23	13.70	16.69	16.69	16.93	16.93	16.93	

Season Total **16.93**

San Luis Obispo County Public Works

DAILY PRECIPITATION
(inches)

Station Name and no. **Los Osos Landfill # 727** Season **2006-2007**

Day	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Day
1													1
2								0.04					2
3													3
4							0.12				0.04		4
5													5
6													6
7								0.20					7
8						0.39							8
9						0.94							9
10						0.31		0.71					10
11					0.08								11
12								0.04					12
13				0.08	0.20								13
14					0.08								14
15													15
16													16
17					0.04	0.04	0.04						17
18													18
19										0.04			19
20									0.28	0.24			20
21						0.04							21
22								0.87		0.08			22
23				0.04				0.12					23
24													24
25								0.08					25
26					0.04	0.43		0.16	0.08				26
27						0.12	0.83	0.20	0.08				27
28							0.20	0.16					28
29							0.08						29
30													30
31													31

Total	0.00	0.00	0.00	0.12	0.43	2.28	1.26	2.56	0.43	0.35	0.04	0.00	
Cum. Total	0.00	0.00	0.00	0.12	0.55	2.83	4.09	6.65	7.09	7.44	7.48	7.48	

Season Total **7.48**

San Luis Obispo County Public Works

DAILY PRECIPITATION

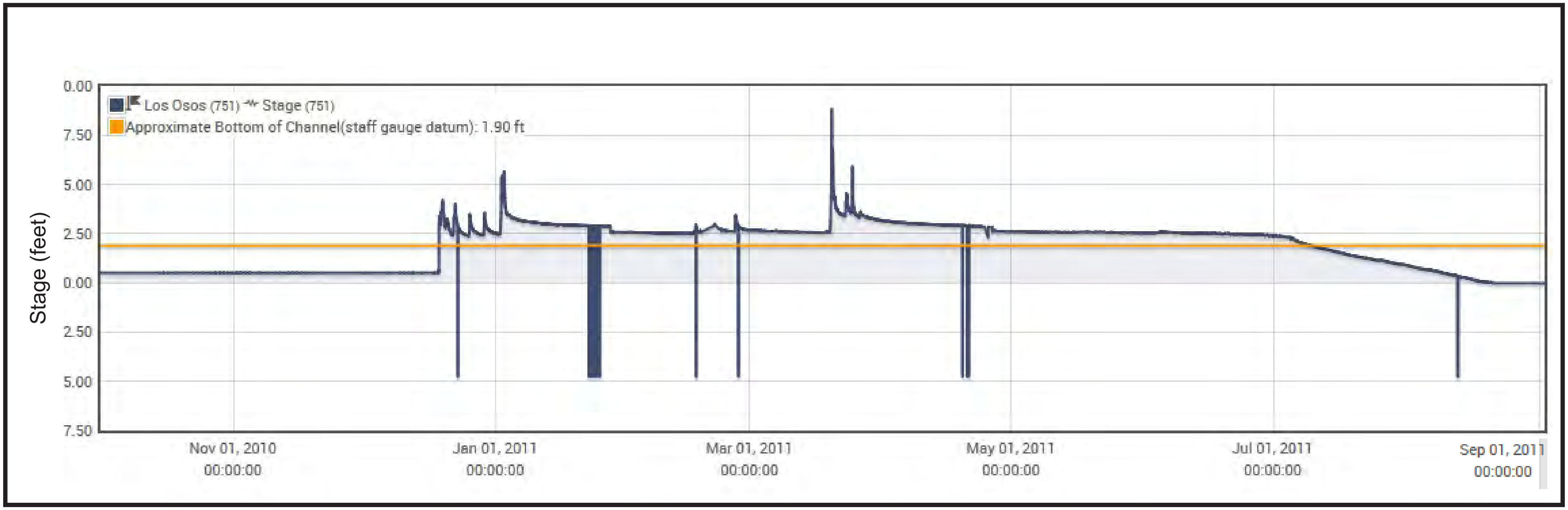
(inches)

Station Name and no. **Los Osos Landfill # 727** Season **2005-2006**

Day	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Day
1							1.61						**1**
2			0.63			0.55	2.32			0.24			**2**
3								0.04		1.18			**3**
4										0.59			**4**
5										0.39			**5**
6													**6**
7										0.08			**7**
8						0.47							**8**
9					0.59				0.04				**9**
10									0.28	0.43			**10**
11		0.16			0.04				0.12				**11**
12		0.04							0.28				**12**
13													**13**
14	0.04						0.24		0.04	0.04			**14**
15													**15**
16										0.08			**16**
17				0.12					0.24	0.04			**17**
18						0.16	0.16	3.66					**18**
19													**19**
20				0.04					0.35				**20**
21						0.04			0.04		2.60		**21**
22						0.04					0.04		**22**
23						0.04							**23**
24													**24**
25					0.08	0.12			0.12				**25**
26				0.08		0.04	0.08			0.63			**26**
27									0.43				**27**
28						0.12			1.38				**28**
29									0.16				**29**
30					0.04		0.04						**30**
31						0.94			0.43				**31**

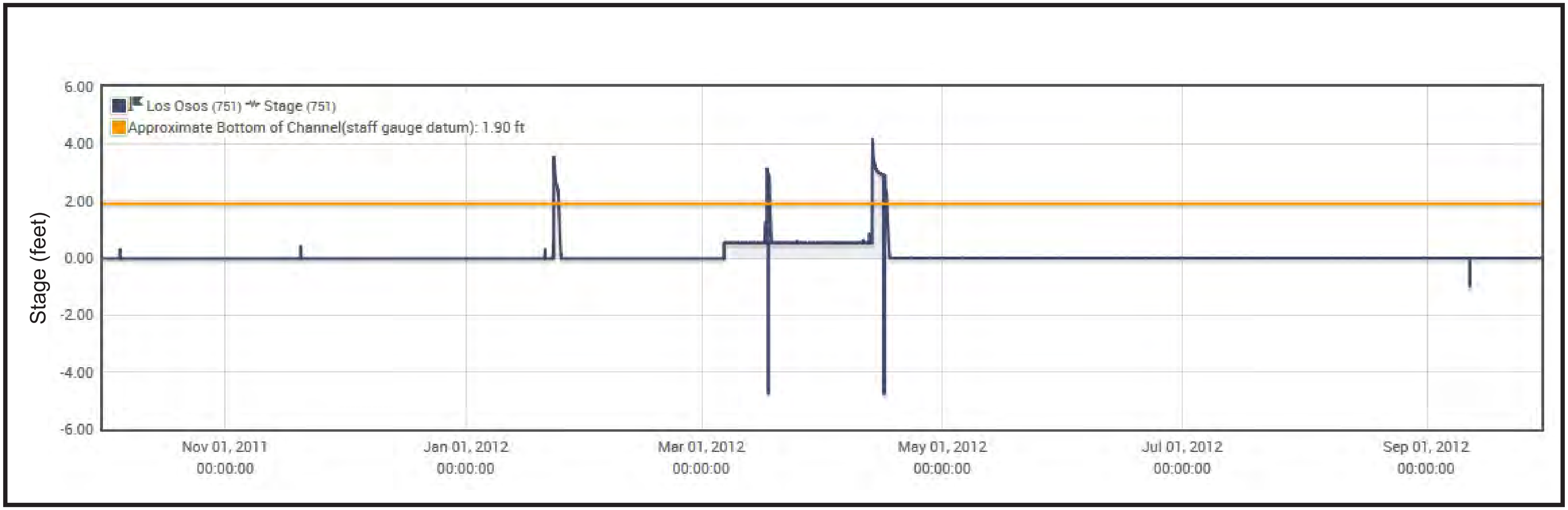
Total	0.04	0.20	0.63	0.24	0.75	2.52	4.45	3.70	3.90	3.70	2.64	0.00	
Cum. Total	0.04	0.24	0.87	1.10	1.85	4.37	8.82	12.52	16.42	20.12	22.76	22.76	

Season Total **22.76**



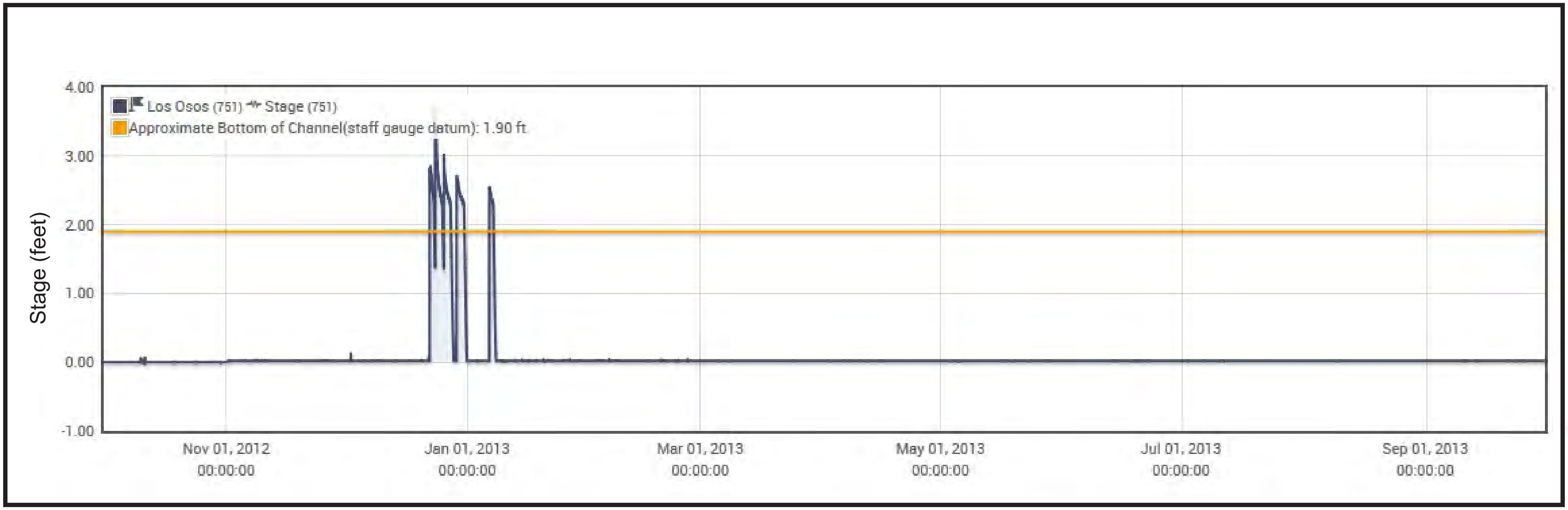
Source: County of San Luis Obispo Public Works Department, Stream Gage #751

Figure H1
Stream Stage for 2011 Water Year
Los Osos Creek, Gage #751



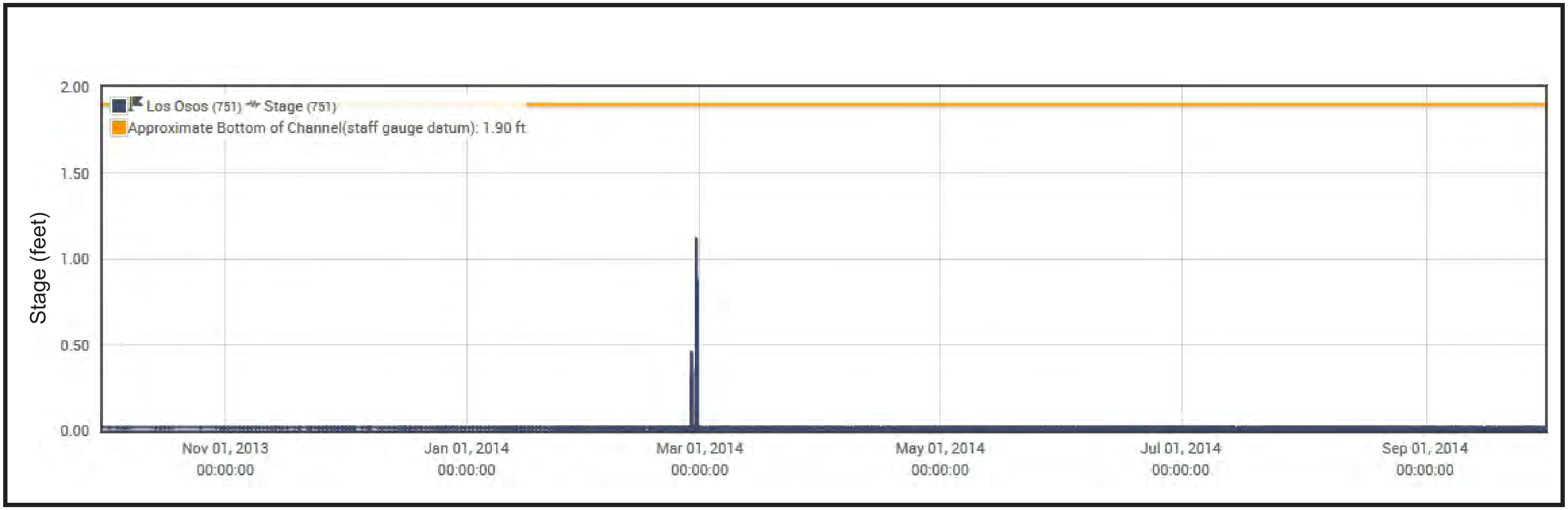
Source: County of San Luis Obispo Public Works Department, Stream Gage #751

Figure H2
Stream Stage for 2012 Water Year
Los Osos Creek, Gage #751



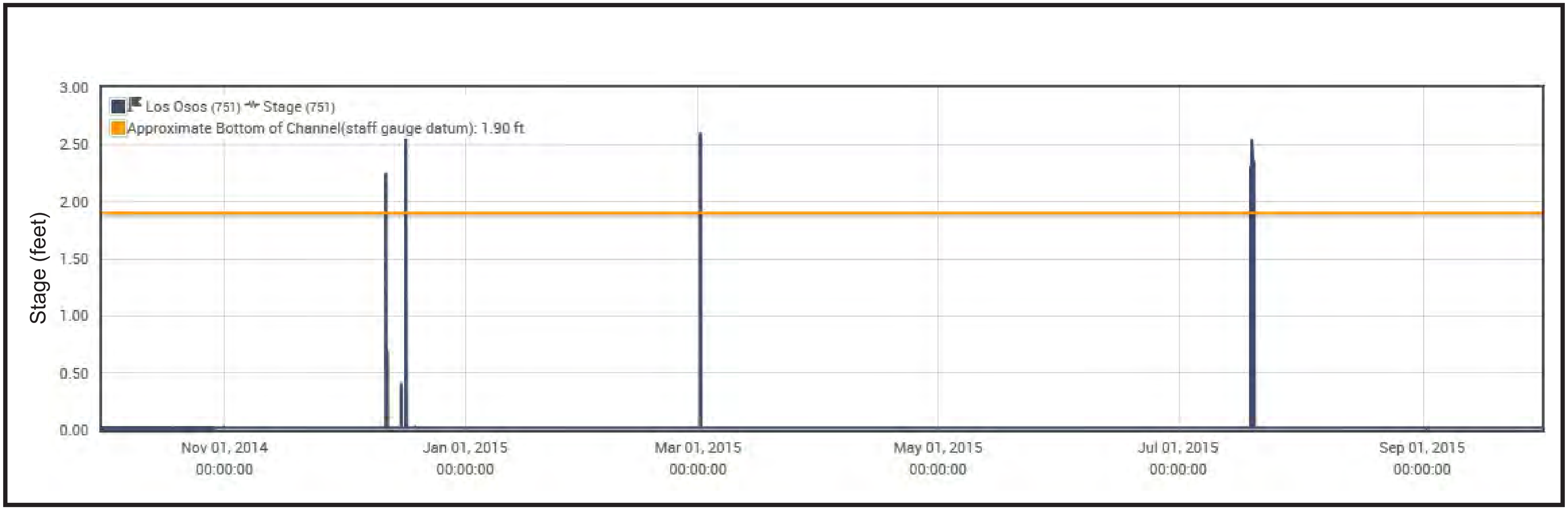
Source: County of San Luis Obispo Public Works Department, Stream Gage #751

Figure H3
Stream Stage for 2013 Water Year
Los Osos Creek, Gage #751



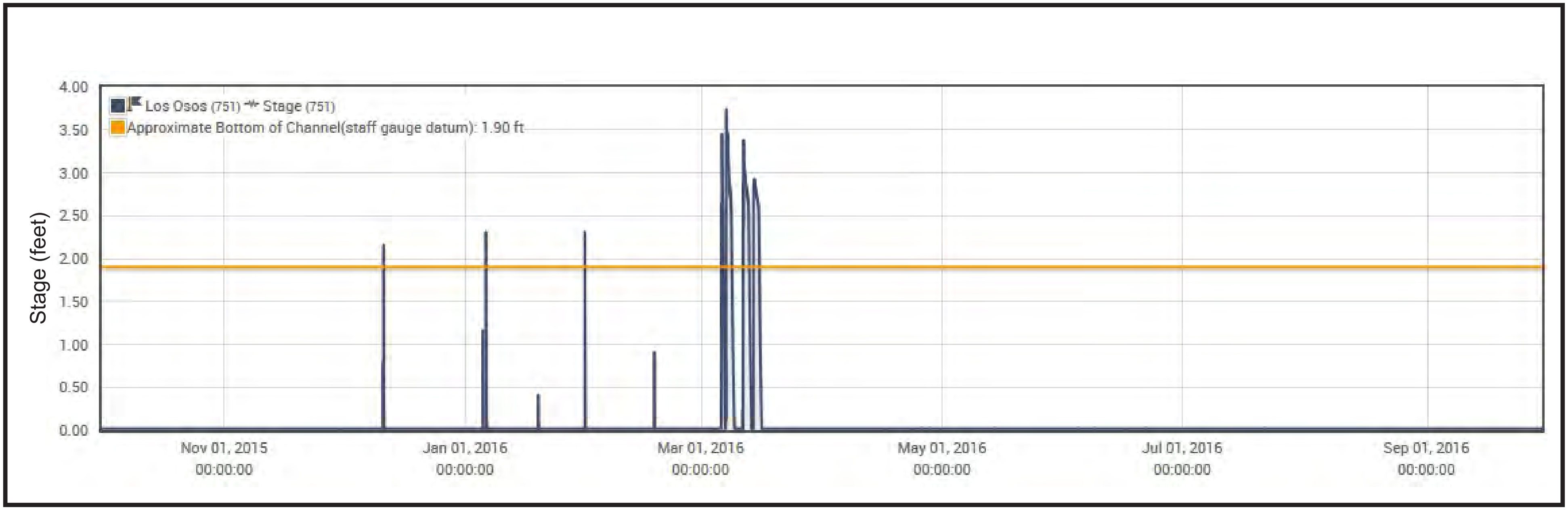
Source: County of San Luis Obispo Public Works Department, Stream Gage #751

Figure H4
Stream Stage for 2014 Water Year
Los Osos Creek, Gage #751



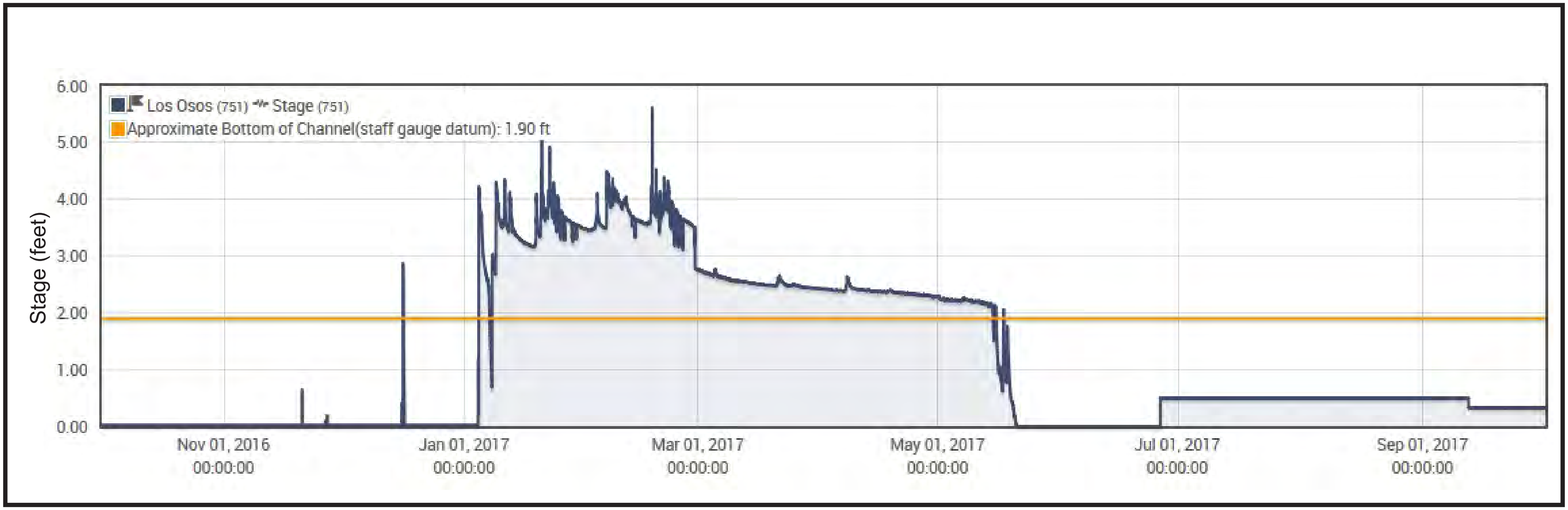
Source: County of San Luis Obispo Public Works Department, Stream Gage #751

Figure H5
Stream Stage for 2015 Water Year
Los Osos Creek, Gage #751



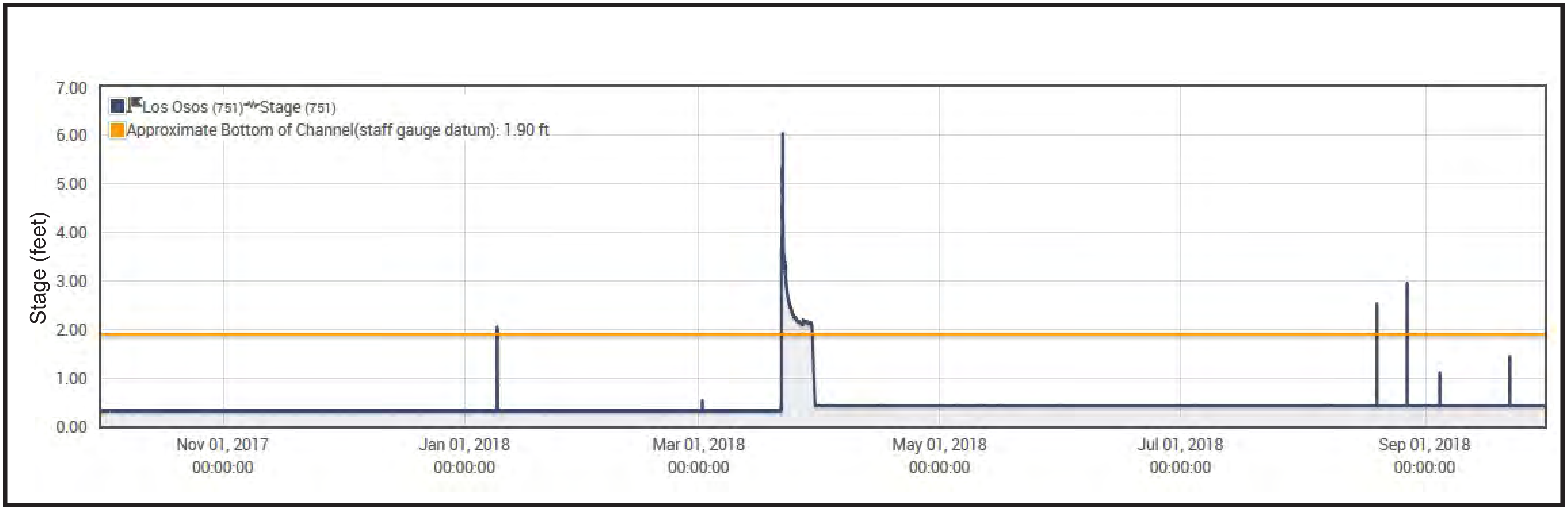
Source: County of San Luis Obispo Public Works Department, Stream Gage #751

Figure H6
Stream Stage for 2016 Water Year
Los Osos Creek, Gage #751



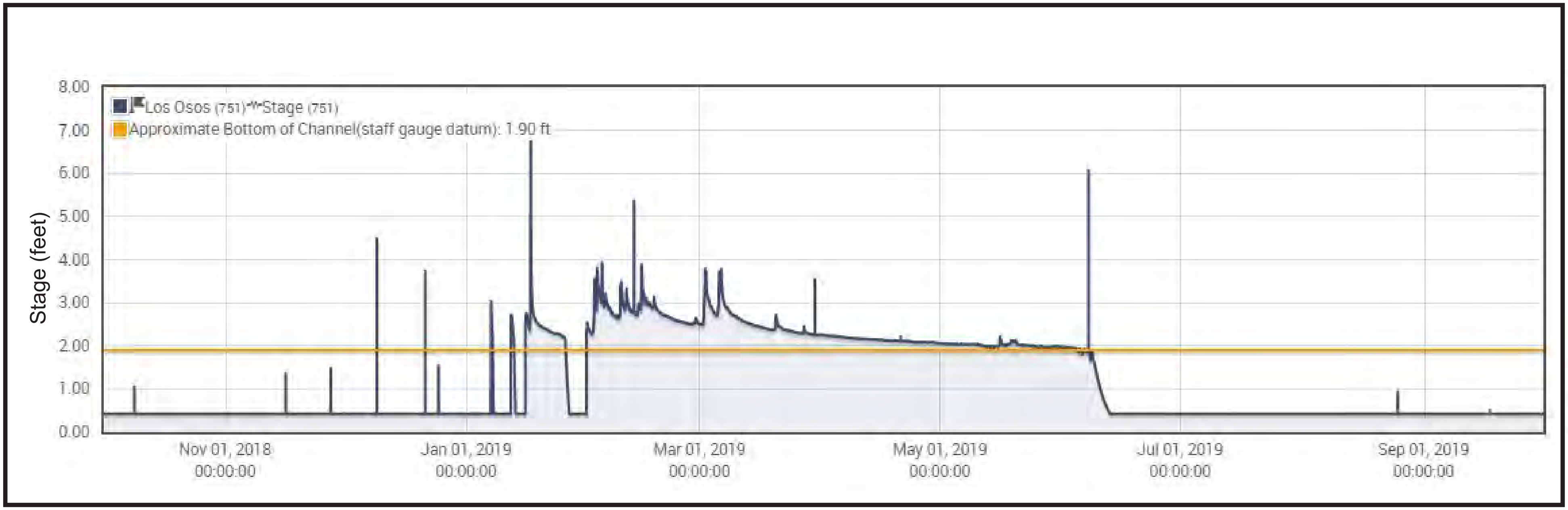
Source: County of San Luis Obispo Public Works Department, Stream Gage #751

Figure H7
Stream Stage for 2017 Water Year
Los Osos Creek, Gage #751



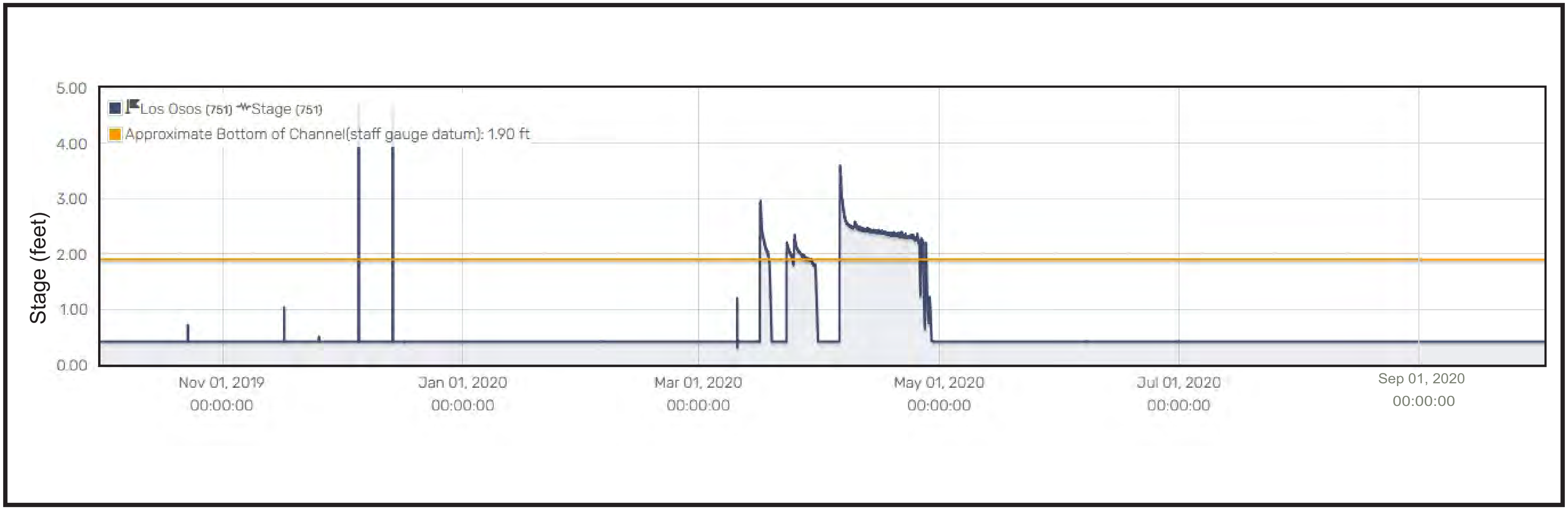
Source: County of San Luis Obispo Public Works Department, Stream Gage #751

Figure H8
Stream Stage for 2018 Water Year
Los Osos Creek, Gage #751



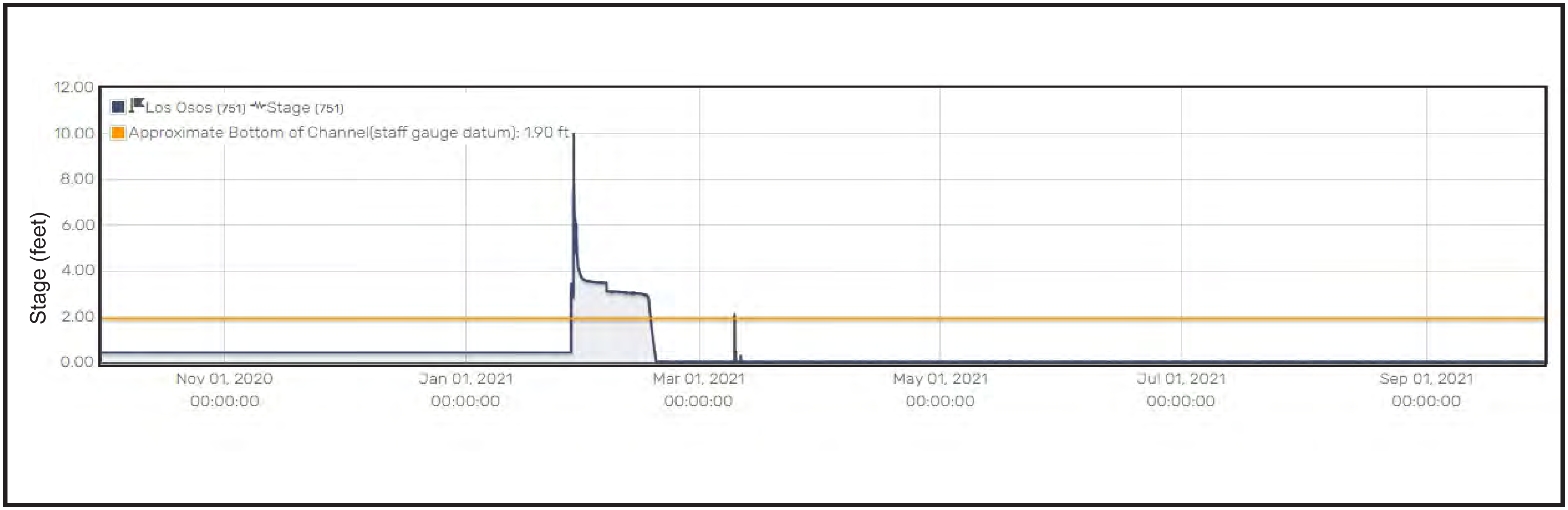
Source: County of San Luis Obispo Public Works Department, Stream Gage #751

Figure H9
Stream Stage for 2019 Water Year
Los Osos Creek, Gage #751



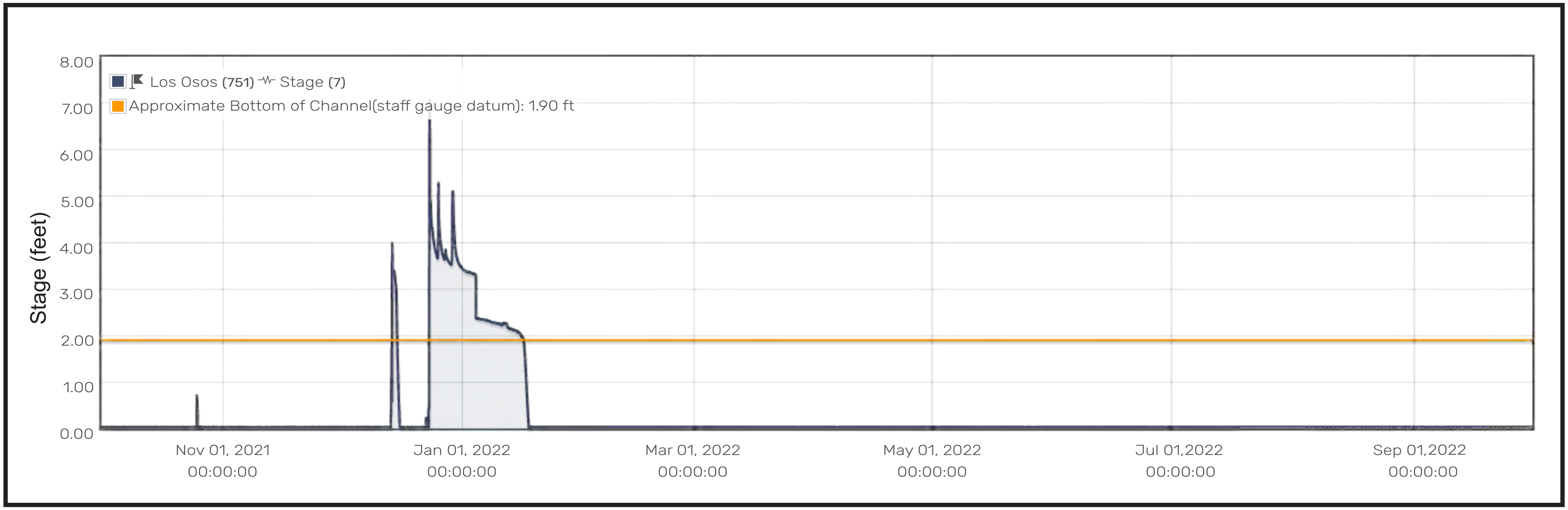
Source: County of San Luis Obispo Public Works Department, Stream Gage #751

Figure H10
Stream Stage for 2020 Water Year
Los Osos Creek, Gage #751



Source: County of San Luis Obispo Public Works Department, Stream Gage #751

Figure H11
Stream Stage for 2021 Water Year
Los Osos Creek, Gage #751



Source: County of San Luis Obispo Public Works Department, Stream Gage #751

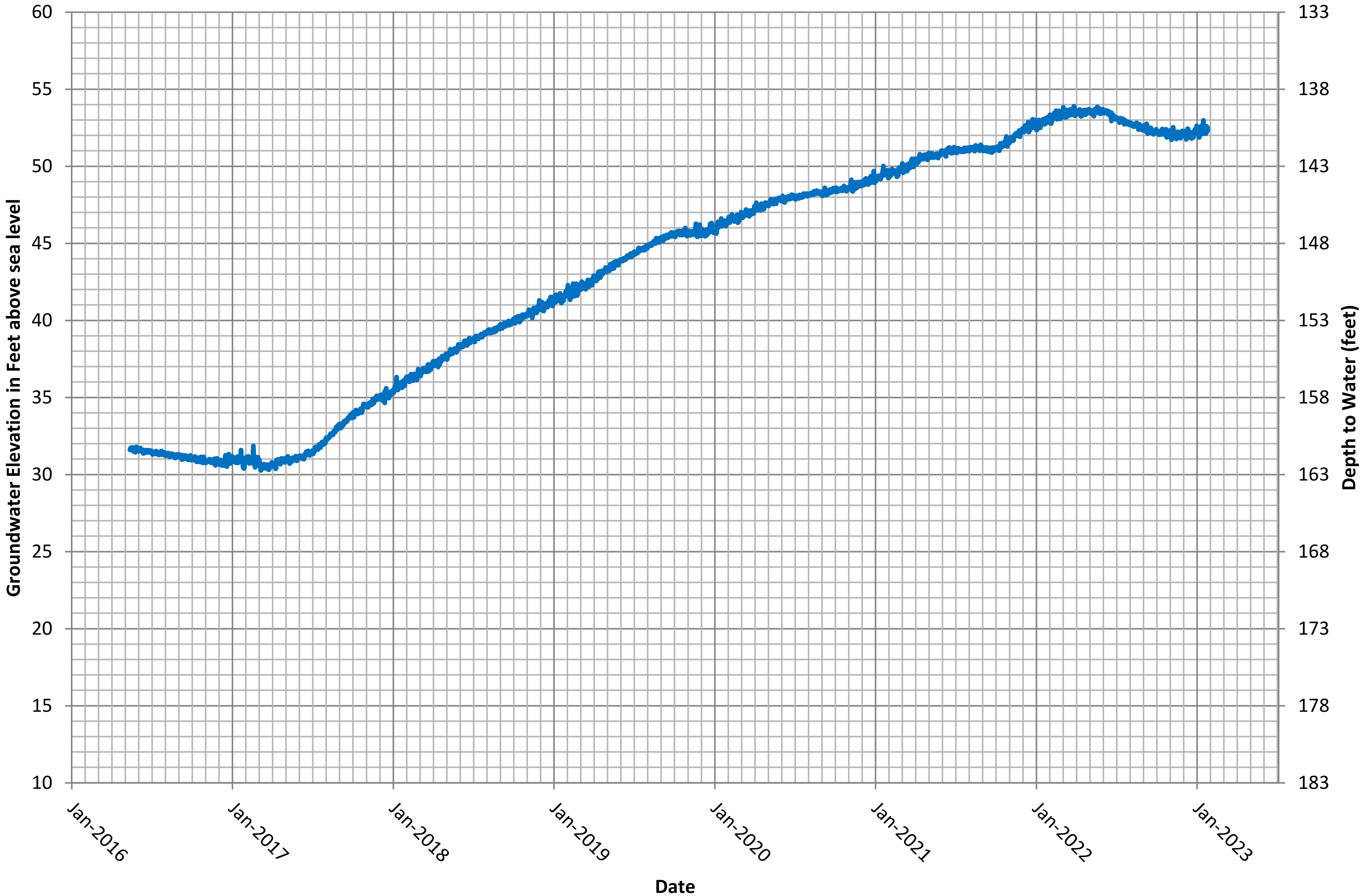
Figure H12
Stream Stage for 2022 Water Year
Los Osos Creek, Gage #751

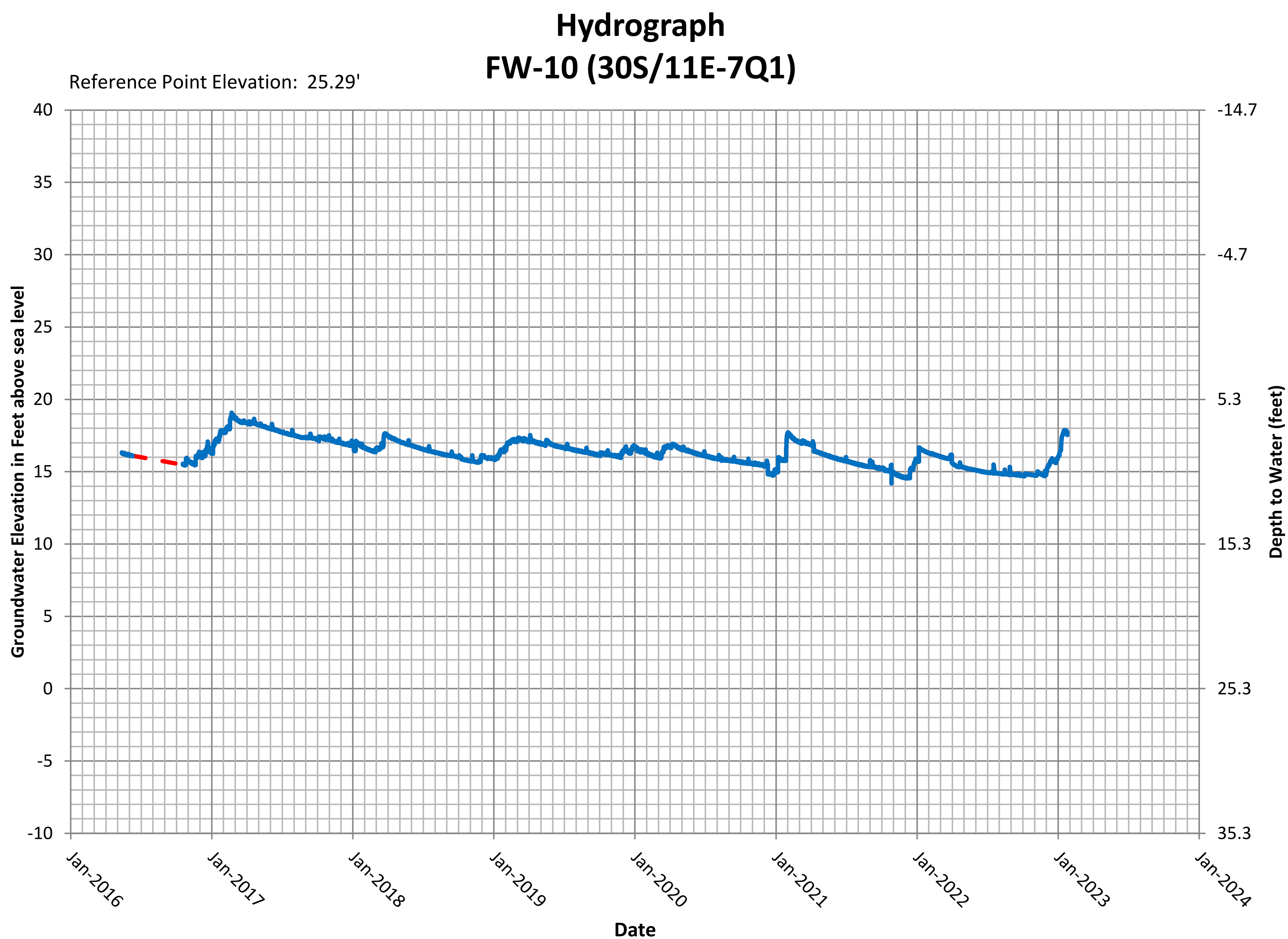
APPENDIX H

Transducer Hydrographs

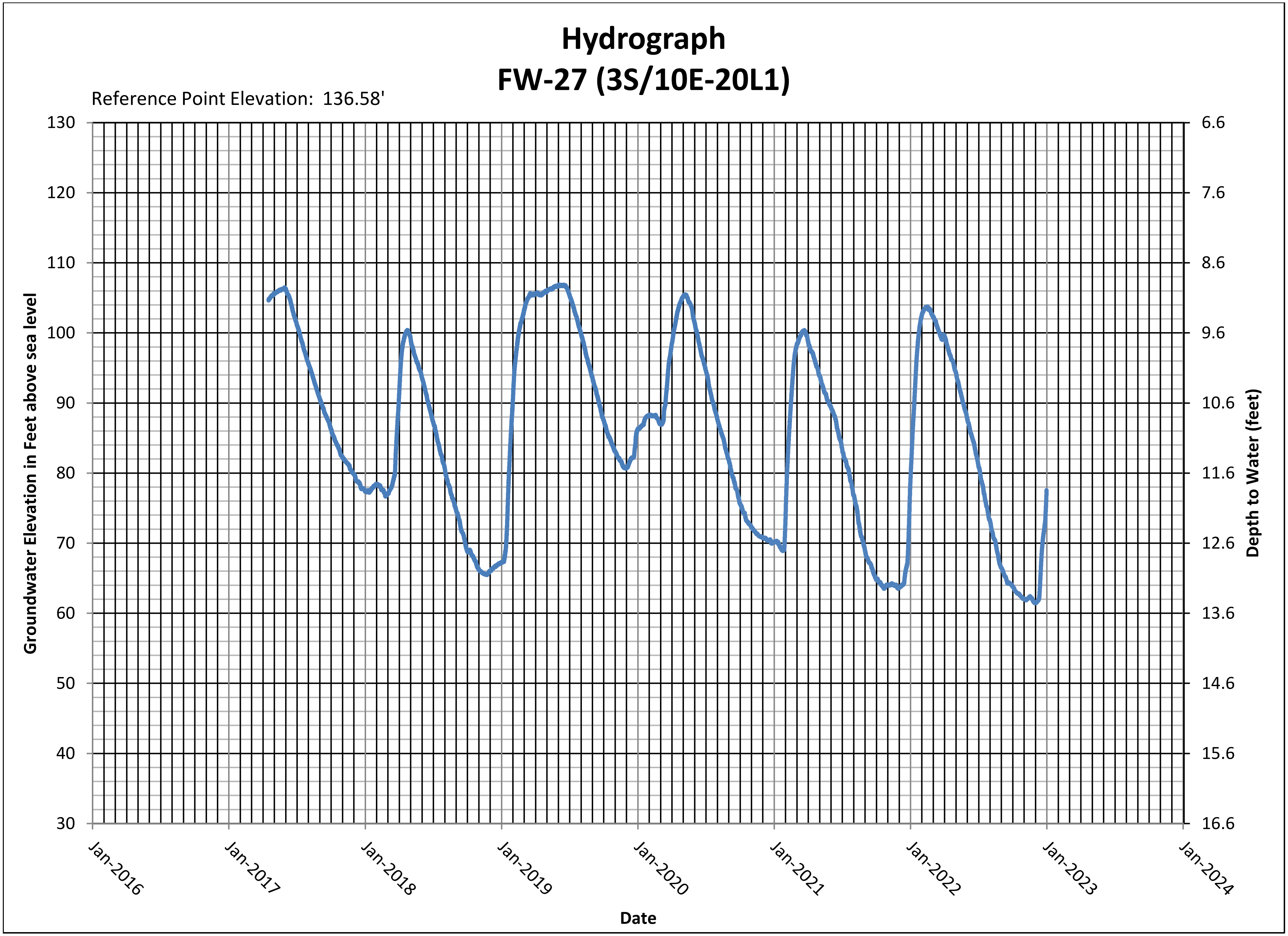
Hydrograph
FW-6 (30S/10E-24A)

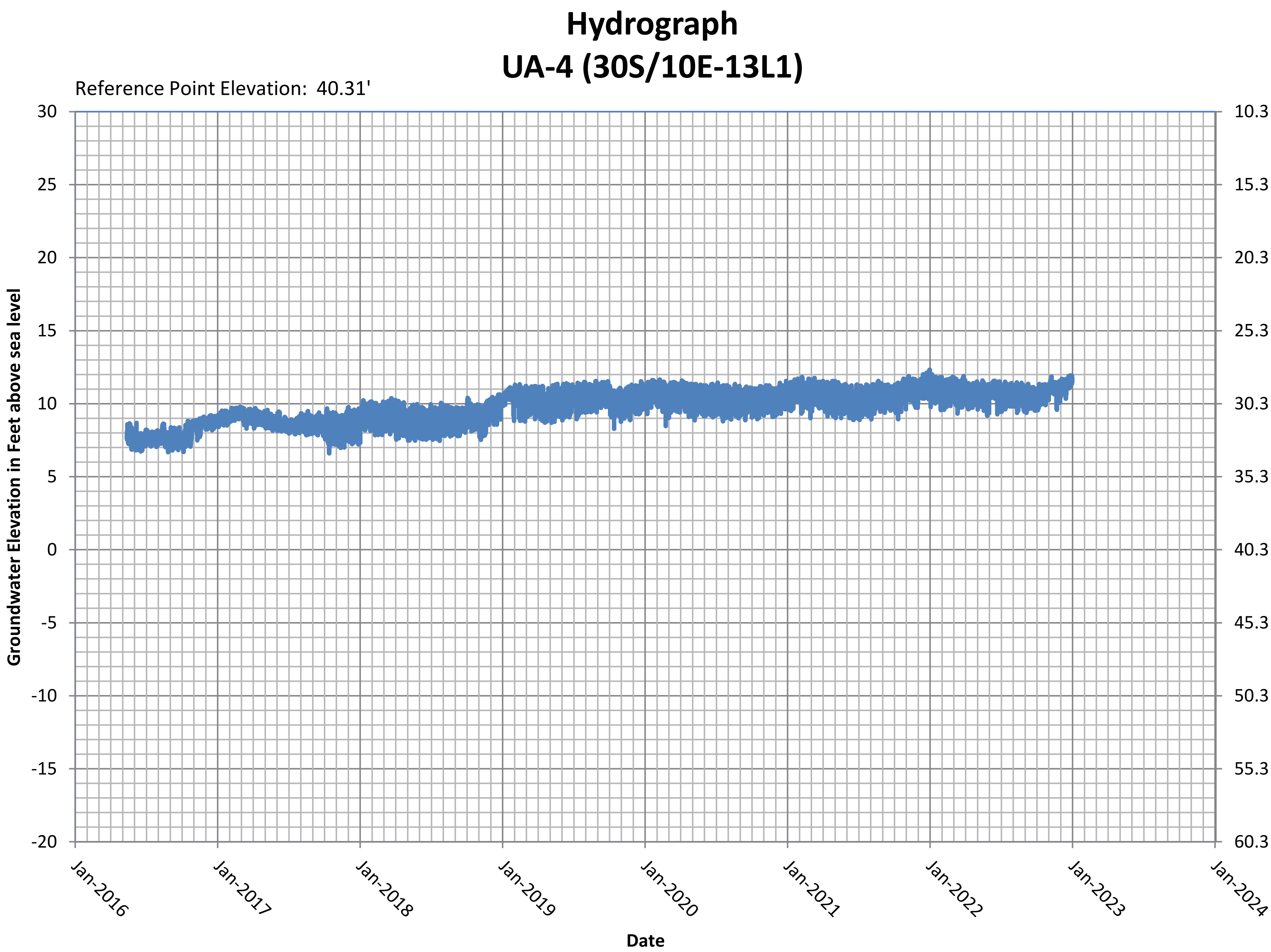
Reference Point Elevation: 193.04'



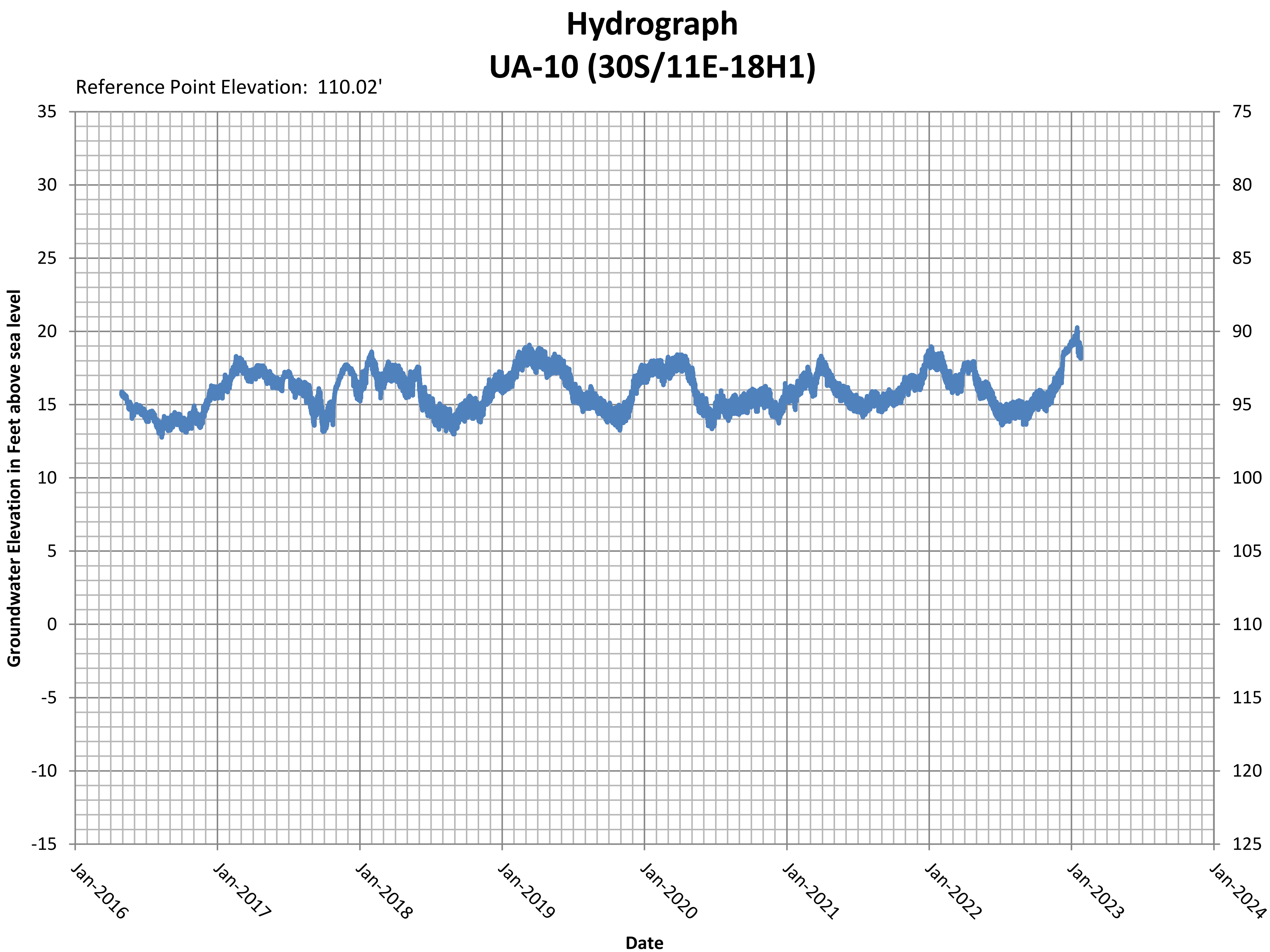


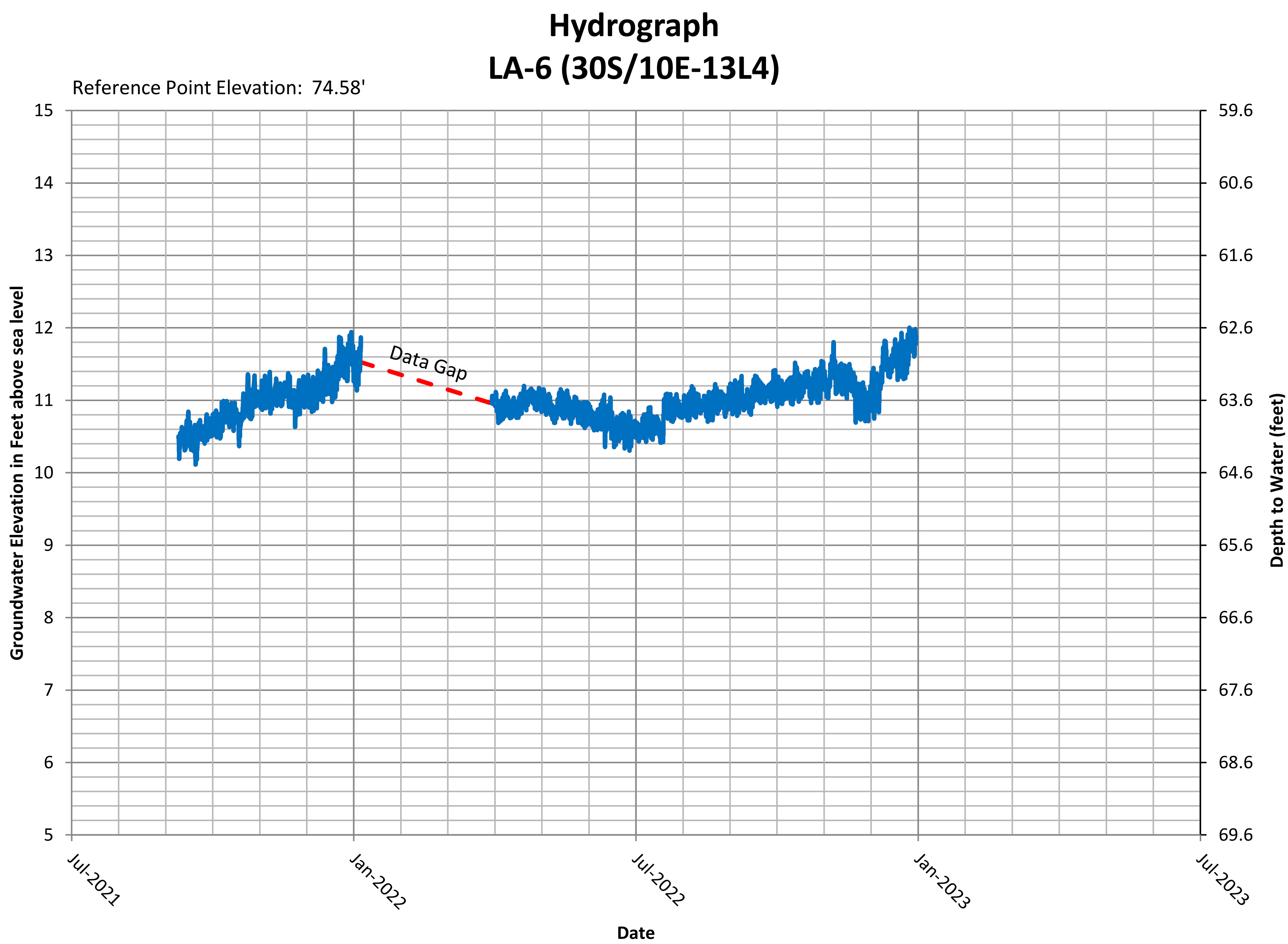
Hydrograph
FW-10 (30S/11E-7Q1)
Reference Point Elevation: 25.29'
Groundwater Elevation in Feet above sea level
Depth to Water (feet)
Date
40
35
30
25
20
15
10
5
0
-5
-10
-14.7
-4.7
5.3
15.3
25.3
35.3
Jan-2016
Jan-2017
Jan-2018
Jan-2019
Jan-2020
Jan-2021
Jan-2022
Jan-2023
Jan-2024


Hydrograph
FW-27 (3S/10E-20L1)
Reference Point Elevation: 136.58'
Groundwater Elevation in Feet above sea level
Depth to Water (feet)
Date
130
120
110
100
90
80
70
60
50
40
30
6.6
7.6
8.6
9.6
10.6
11.6
12.6
13.6
14.6
15.6
16.6
Jan-2016
Jan-2017
Jan-2018
Jan-2019
Jan-2020
Jan-2021
Jan-2022
Jan-2023
Jan-2024



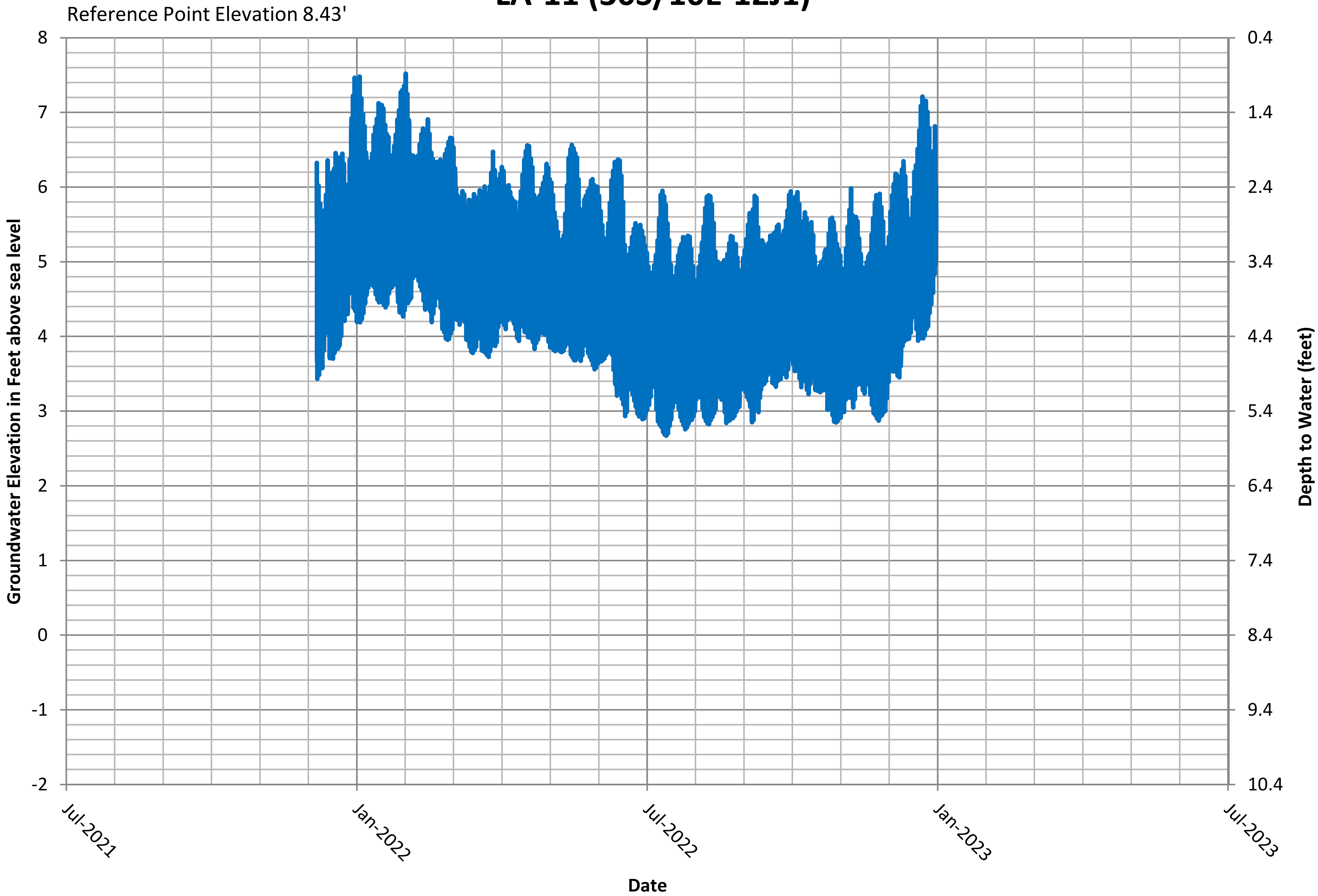
Hydrograph
UA-4 (30S/10E-13L1)
Reference Point Elevation: 40.31'
Groundwater Elevation in Feet above sea level
Depth to Water (feet)
Date
30
25
20
15
10
5
0
-5
-10
-15
-20
10.3
15.3
20.3
25.3
30.3
35.3
40.3
45.3
50.3
55.3
60.3
Jan-2016
Jan-2017
Jan-2018
Jan-2019
Jan-2020
Jan-2021
Jan-2022
Jan-2023
Jan-2024

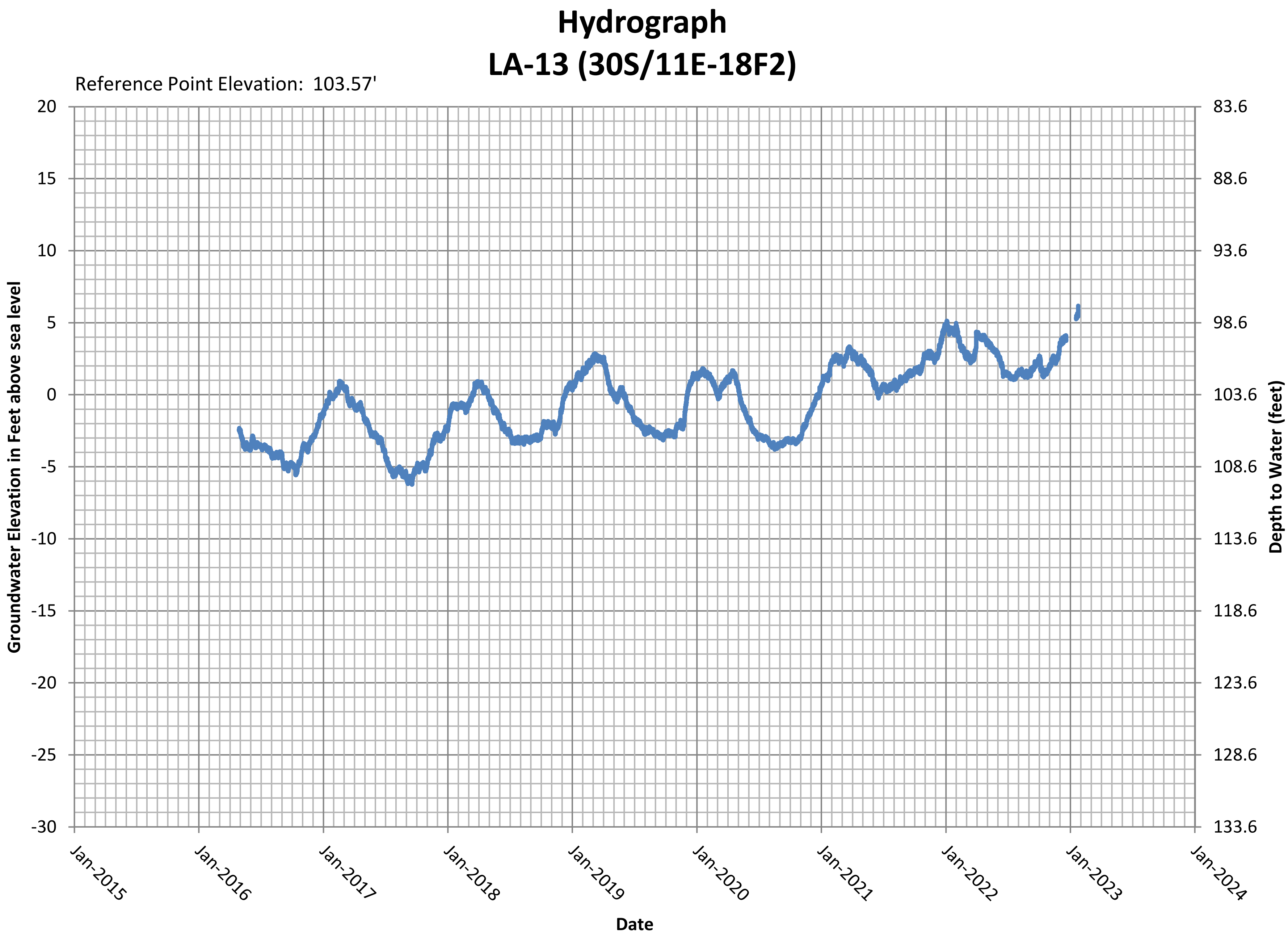

Hydrograph
UA-10 (30S/11E-18H1)
Reference Point Elevation: 110.02'
Groundwater Elevation in Feet above sea level
Depth to Water (feet)
Date
35
30
25
20
15
10
5
0
-5
-10
-15
75
80
85
90
95
100
105
110
115
120
125
Jan-2016
Jan-2017
Jan-2018
Jan-2019
Jan-2020
Jan-2021
Jan-2022
Jan-2023
Jan-2024



Hydrograph
LA-6 (30S/10E-13L4)
Reference Point Elevation: 74.58'
Groundwater Elevation in Feet above sea level
Depth to Water (feet)
Date
Data Gap
15
14
13
12
11
10
9
8
7
6
5
59.6
60.6
61.6
62.6
63.6
64.6
65.6
66.6
67.6
68.6
69.6
Jul-2021
Jan-2022
Jul-2022
Jan-2023
Jul-2023

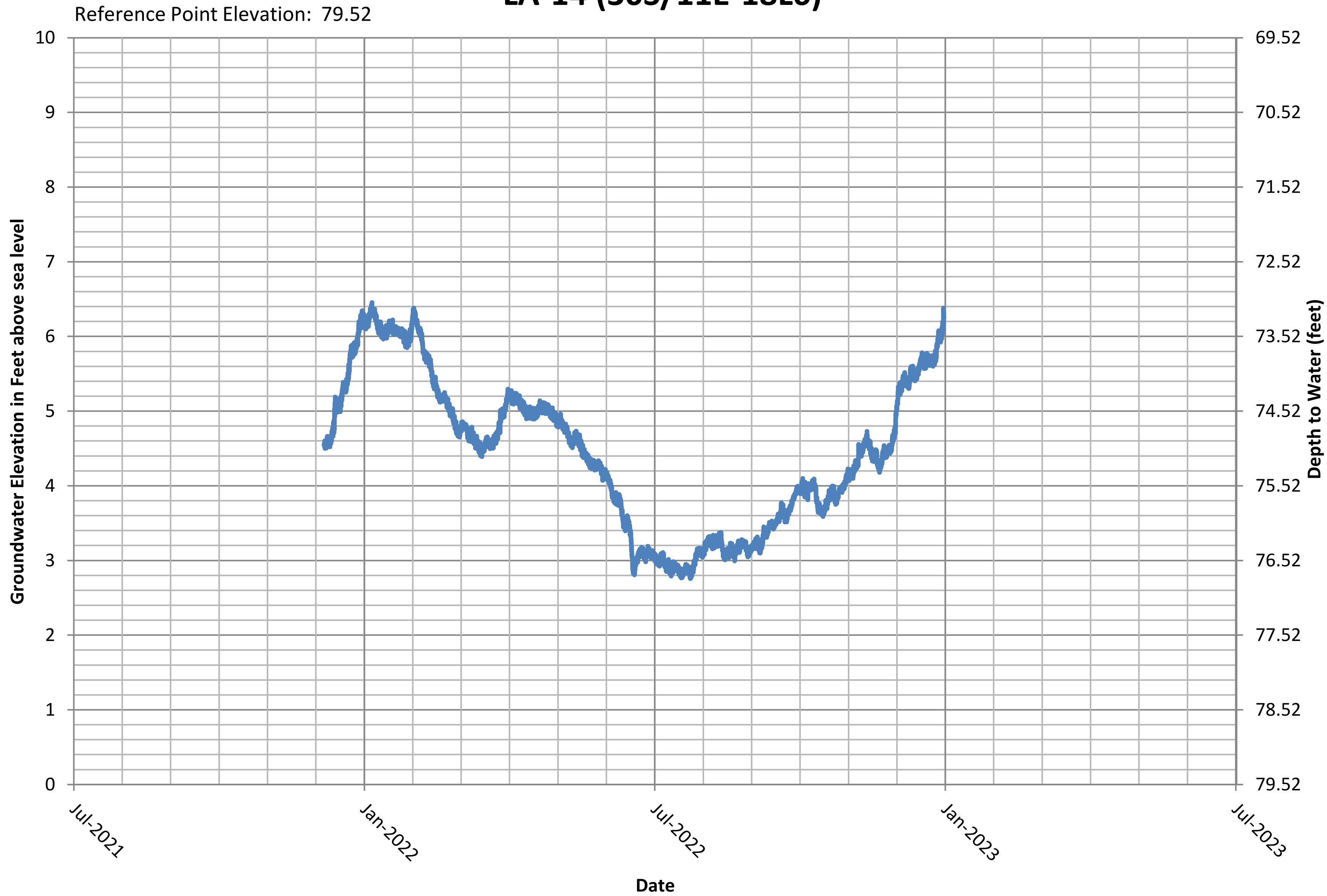
Hydrograph
LA-11 (30S/10E-12J1)

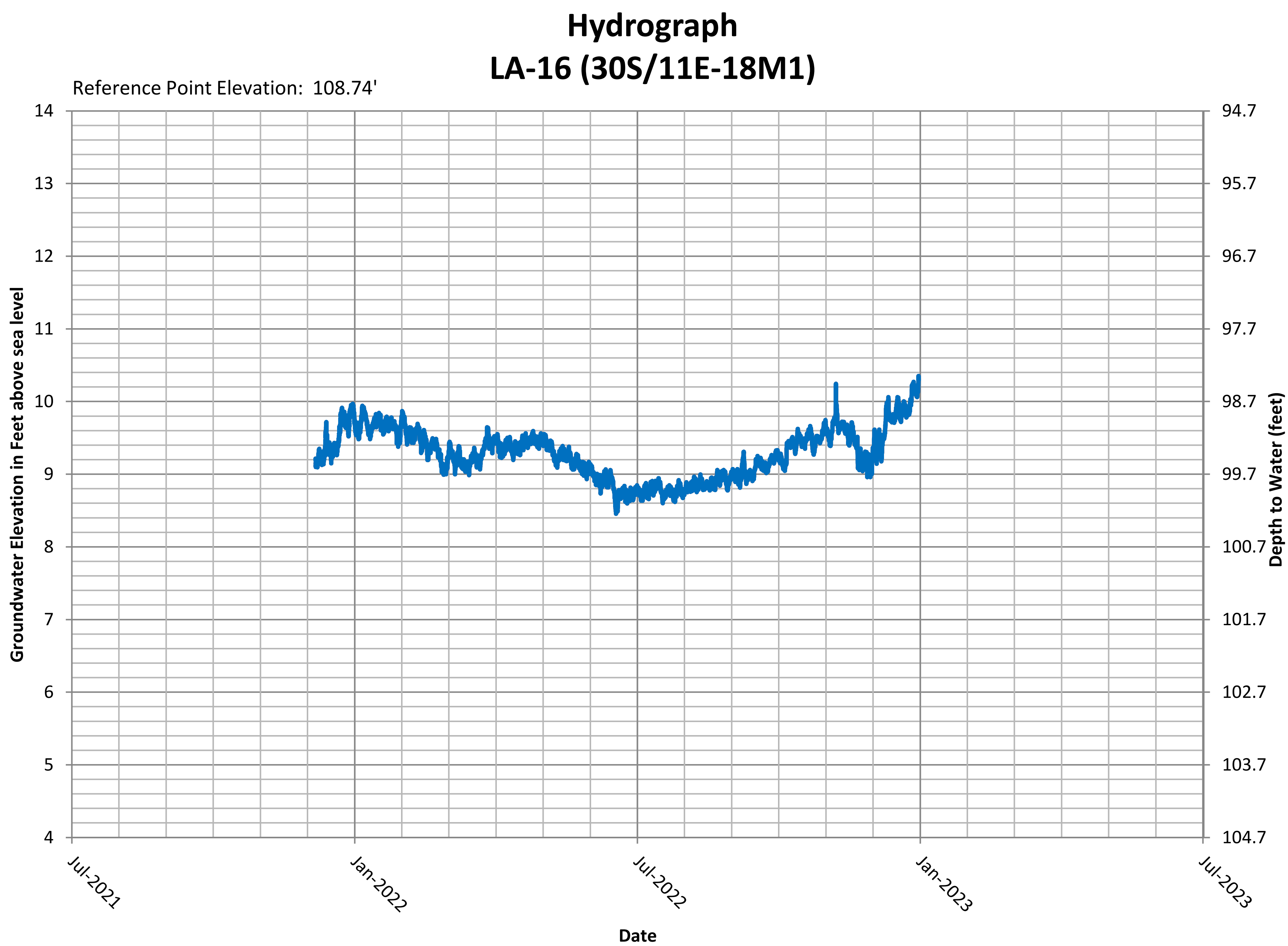


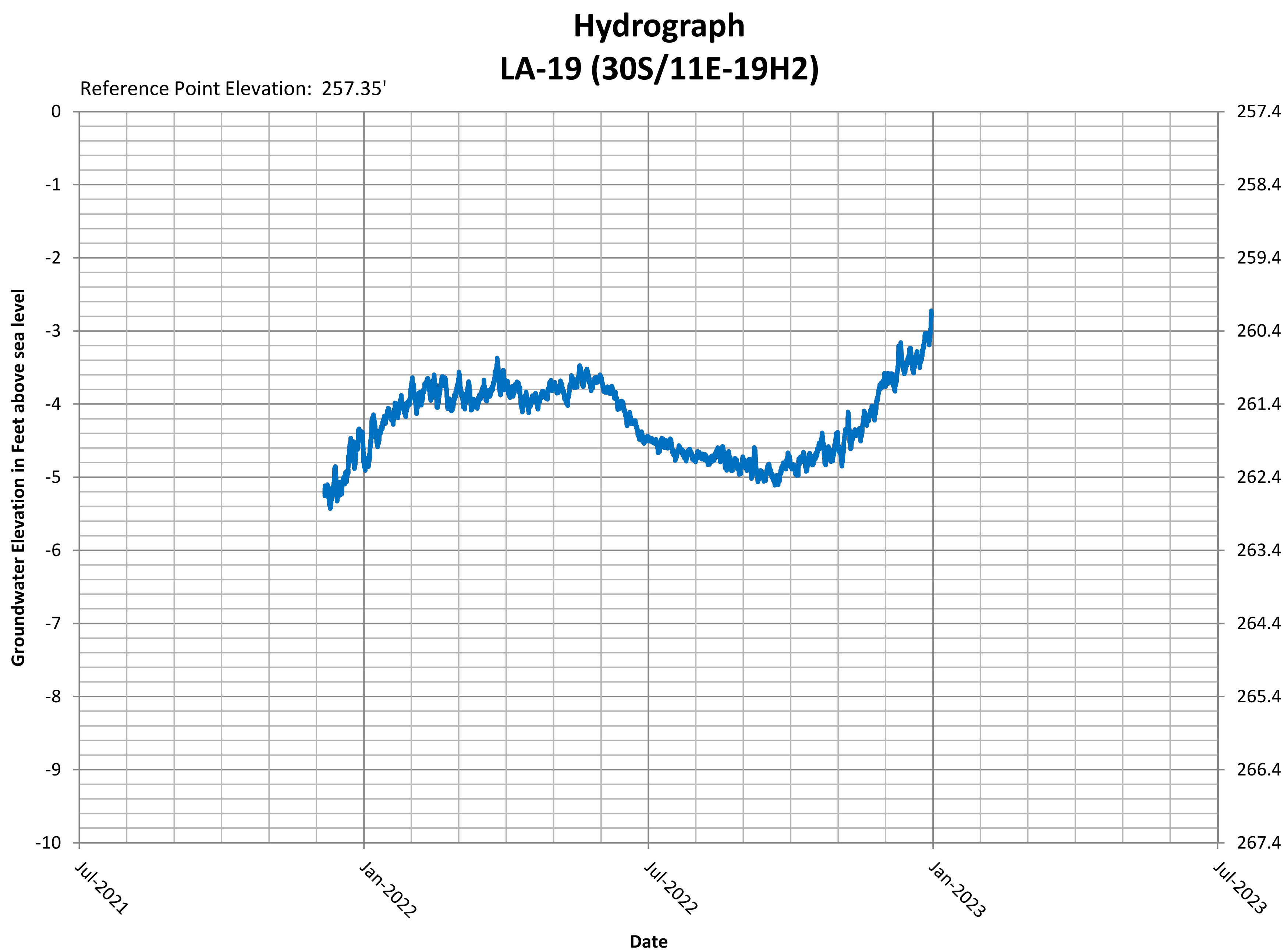


Hydrograph
LA-13 (30S/11E-18F2)
Reference Point Elevation: 103.57'
Groundwater Elevation in Feet above sea level
Depth to Water (feet)
20
15
10
5
0
-5
-10
-15
-20
-25
-30
83.6
88.6
93.6
98.6
103.6
108.6
113.6
118.6
123.6
128.6
133.6
Jan-2015
Jan-2016
Jan-2017
Jan-2018
Jan-2019
Jan-2020
Jan-2021
Jan-2022
Jan-2023
Jan-2024
Date

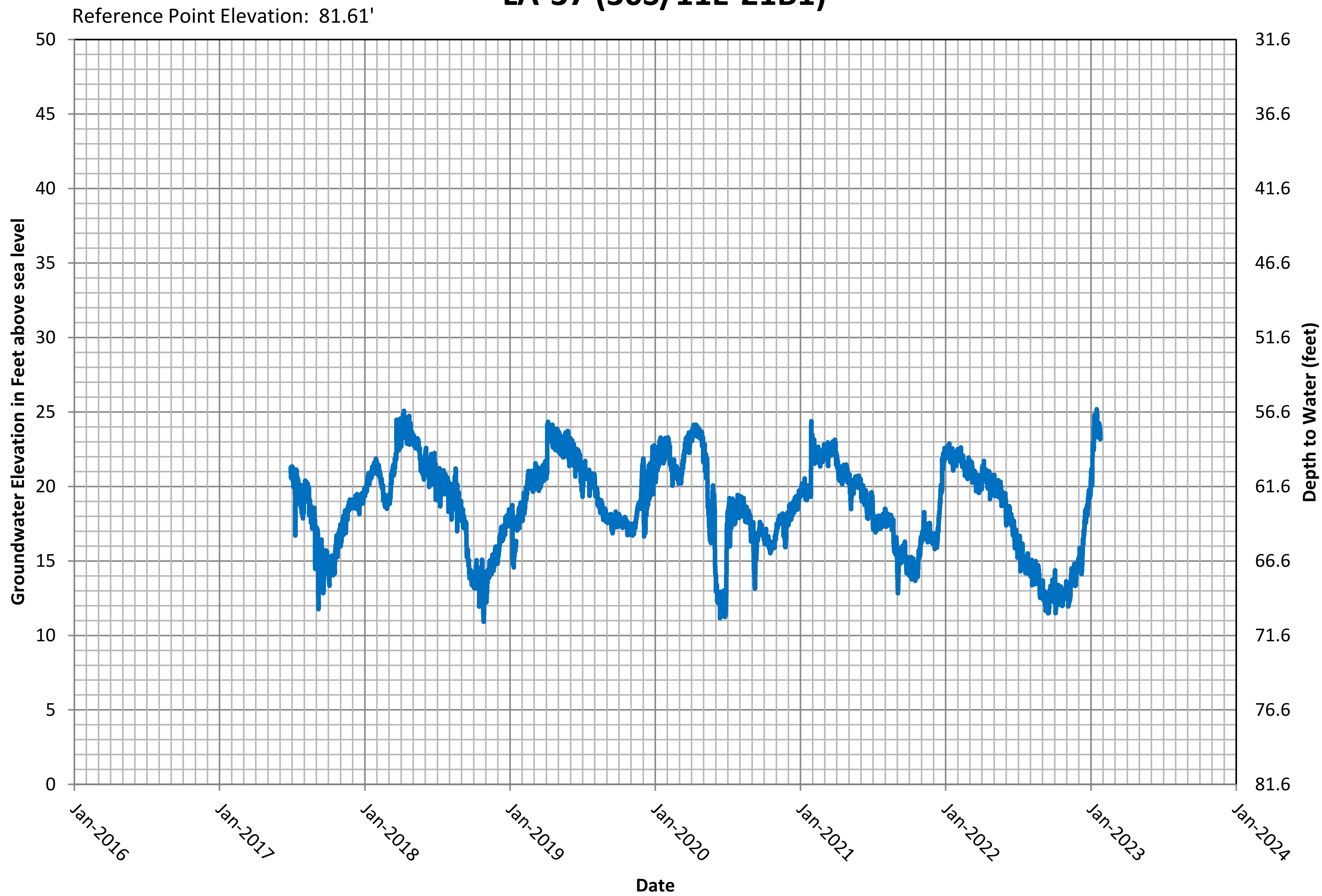
Hydrograph
LA-14 (30S/11E-18L6)



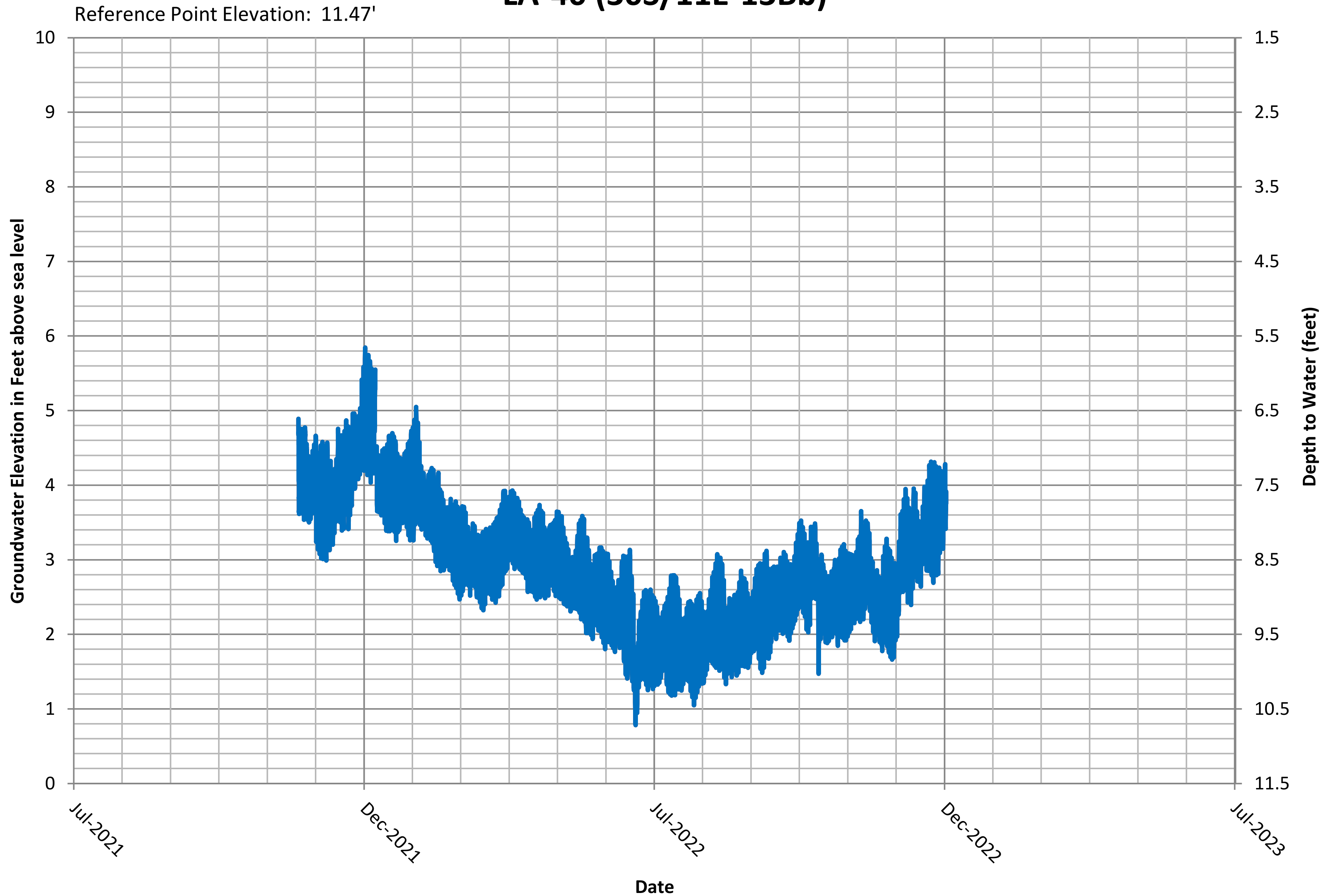

Hydrograph
LA-16 (30S/11E-18M1)
Reference Point Elevation: 108.74'
14
13
12
11
10
9
8
7
6
5
4
94.7
95.7
96.7
97.7
98.7
99.7
100.7
101.7
102.7
103.7
104.7
Groundwater Elevation in Feet above sea level
Depth to Water (feet)
Jul-2021
Jan-2022
Jul-2022
Jan-2023
Jul-2023
Date


Hydrograph
LA-19 (30S/11E-19H2)
Reference Point Elevation: 257.35'
Groundwater Elevation in Feet above sea level
0
-1
-2
-3
-4
-5
-6
-7
-8
-9
-10
257.4
258.4
259.4
260.4
261.4
262.4
263.4
264.4
265.4
266.4
267.4
Jul-2021
Jan-2022
Jul-2022
Jan-2023
Jul-2023
Date

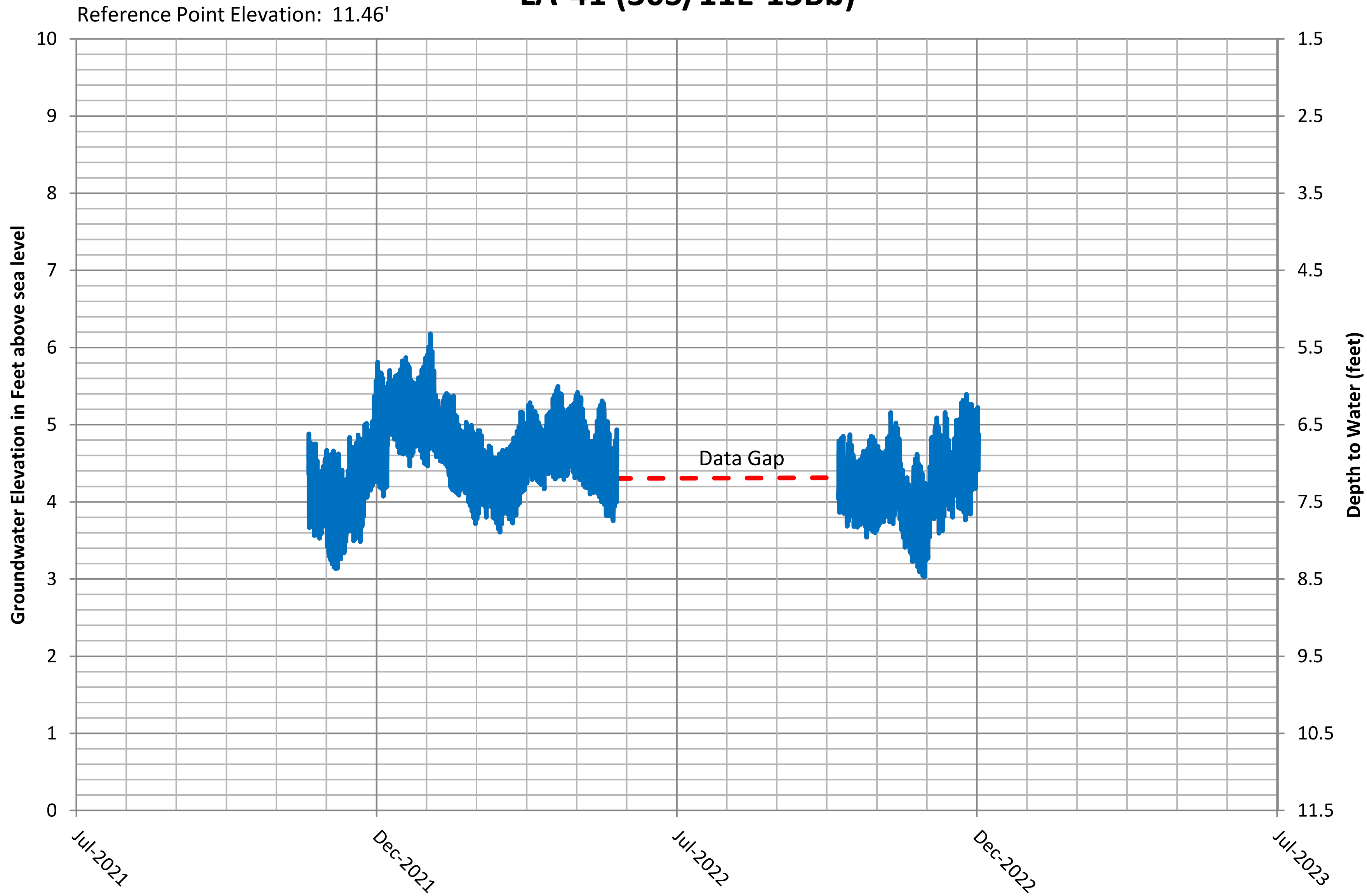
Hydrograph
LA-37 (30S/11E-21B1)



Hydrograph
LA-40 (30S/11E-13Bb)



Hydrograph
LA-41 (30S/11E-13Bb)



APPENDIX I

Conversion of (30S/11E-18F2) LA13 into a new Monitoring Well

SEP 30 1975 1/3

ORIGINAL WELL CONSTRUCTION

30S 11E 18

ORIGINAL File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do Not Fill In
Nº 77270
State Well No.
Other Well No.

(1) OWNER: Ferrel #2 well
Name SLO County Service Area 9A, Baywood Park
Address
San Luis Obispo, Ca. 93401

(2) LOCATION OF WELL:
County SLO Owner's number, if any
Township, Range, and Section
Distance from cities, roads, railroads, etc.

(3) TYPE OF WORK (check):
New Well XX Deepening ☐ Reconditioning ☐ Destroying ☐
If destruction, describe material and procedure in Item 11.

(4) PROPOSED USE (check):
Domestic ☐ Industrial ☐ Municipal XX
Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:
Rotary, Mud XX
Cable ☐
Other ☐

(6) CASING INSTALLED:
STEEL: XX OTHER:
SINGLE XX DOUBLE ☐
If gravel packed

From ft.	To ft.	Diam.	Gage or Wall	Diameter of Bore	From ft.	To ft.
0	625	12 3/4"	.250	22"	0	625

Size of shoe or well ring: welded bottom Size of gravel: according to specs.
Describe joint welded

(7) PERFORATIONS OR SCREEN:
Type of perforation or name of screen ø Louvers

From ft.	To ft.	Perf. per row	Rows per ft.	Size in. x in.
0	425	blank		
425	620	10	120	3/32
620	625	blank		

(8) CONSTRUCTION:
Was a surface sanitary seal provided? Yes XX No ☐ To what depth 55 ft.
Were any strata sealed against pollution? Yes ☐ No XX If yes, note depth of strata
From ft. to ft.
From ft. to ft.
Method of sealing $24\frac{1}{2}$"x$\frac{1}{4}$" well conductor cemented in a 32" hole

(9) WATER LEVELS:
Depth at which water was first found, if known 420 ft.
Standing level before perforating, if known 48 ft.
Standing level after perforating and developing 60 ft.

(10) WELL TESTS:
Was pump test made? Yes XX No ☐ If yes, by whom? McCoy Pump Co.
Yield: gal./min. with ft. drawdown after hrs.
Temperature of water Was a chemical analysis made? Yes ☐ No XX
Was electric log made of well? Yes XX No ☐ If yes, attach copy

(11) WELL LOG:
Total depth 645 ft. Depth of completed well 625 ft.
Formation: *Describe by color, character, size of material, and structure*

ft.	to ft.	
0	45	sand
45	65	brown clay
65	70	gravel & sand
70	80	brown clay
80	105	brown clay & gravel
105	117	blue clay
117	120	shale gravel
120	170	brown sandy clay
170	180	brown sand & gravel
180	245	brown clay
245	255	gravel & sand
255	270	brown clay
270	280	blue clay
280	285	sand, some gravel
285	300	blue clay
300	340	brown clay, some gravel & sand
340	420	brown sandy clay
420	455	lite brown sandy shale gravel
455	515	brown clay
515	537	lite clay
537	555	hard sandstone
555	600	sand & gravel (sandy)
600	610	gravel & sea shale (sandy)
610	645	brown shale

CONFIDENTIAL NOT FOR PUBLIC RELEASE

Work started 9/2/75 19 , Completed 9/11/75

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Miller Drilling Co.
(Person, firm, or corporation) (Typed or printed)
Address Rt. 1, Box 22
Paso Robles, Ca. 93446
[SIGNED] R. H. Miller
(Well Driller)
License No. 236900 Dated 9/22/75, 19

SKETCH LOCATION OF WELL ON REVERSE SIDE

OVER

WELL MODIFICATION

State of California

Well Completion Report

Form DWR 188 Submitted 1/11/2023

WCR2023-000386

Owner's Well Number	LA13	Date Work Began	12/21/2022	Date Work Ended	12/28/2022
Local Permit Agency	San Luis Obispo County Environmental Health Services				
Secondary Permit Agency		Permit Number	2022-090	Permit Date	12/15/2022

Well Owner (must remain confidential pursuant to Water Code 13752)

Name LOS OSOS CSD,

Mailing Address 2122 9TH ST

#102

City LOS OSOS State CA Zip 93402

Planned Use and Activity

Activity Other - MONITORING

Planned Use Monitoring

Well Location

Address 1927 7TH ST

City LOS OSOS Zip 93402 County San Luis Obispo

	Deg.	Min.	Sec.	
Latitude	35	18	57.2399	N
Longitude	-120	50	8.88	W

Dec. Lat. 35.3159 Dec. Long. -120.8358

Vertical Datum Horizontal Datum WGS84

Location Accuracy Location Determination Method

APN 074-251-006

Township 30 S

Range 11 E

Section 18

Baseline Meridian Mount Diablo

Ground Surface Elevation

Elevation Accuracy

Elevation Determination Method

Borehole Information

Orientation Vertical Specify

Drilling Method Direct Rotary Drilling Fluid

Total Depth of Boring 537 Feet

Total Depth of Completed Well 537 Feet

Water Level and Yield of Completed Well

Depth to first water (Feet below surface)

Depth to Static Water Level 99.3 (Feet) Date Measured 12/28/2022

Estimated Yield* (GPM) Test Type

Test Length (Hours) Total Drawdown (feet)

*May not be representative of a well's long term yield.

Casings

Casing #	Depth from Surface Feet to Feet		Casing Type	Material	Casings Specificatons	Wall Thickness (inches)	Outside Diameter (inches)	Screen Type	Slot Size if any (inches)	Description
1	0	510	Blank	PVC	OD: 2.875 in. | SDR: SCH 80 | Thickness: 0.276 in.					
1	510	530	Screen	PVC	OD: 2.875 in. | SDR: SCH 80 | Thickness: 0.276 in.			Saw Cut	0.02	

Annular Material

Depth from Surface Feet to Feet		Fill	Fill Type Details	Filter Pack Size	Description
0	3	Cement	Portland Cement/Neat Cement		
3	377	Filter Pack	8 x 20	SAND	
377	499	Bentonite	Other Bentonite		CHIPS
499	533	Filter Pack	8 x 20	SAND	
533	537	Bentonite	Other Bentonite		CHIPS

Other Observations:

Borehole Specifications

Depth from Surface Feet to Feet		Borehole Diameter (inches)
0	537	12

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name FILIPPONI-THOMPSON DRILLING INC
Person, Firm or Corporation

P O BOX 845	ATASCADERO	CA	93423
Address	City	State	Zip

Signed *electronic signature received* 01/11/2023 432680

C-57 Licensed Water Well Contractor	Date Signed	C-57 License Number
electronic signature received	01/11/2023	432680

DWR Use Only

CSG #	State Well Number	Site Code	Local Well Number

N

Latitude Deg/Min/Sec

W

Longitude Deg/Min/Sec

TRS:

APN:

RECEIVED
JAN 26 2023
BY: [signature]

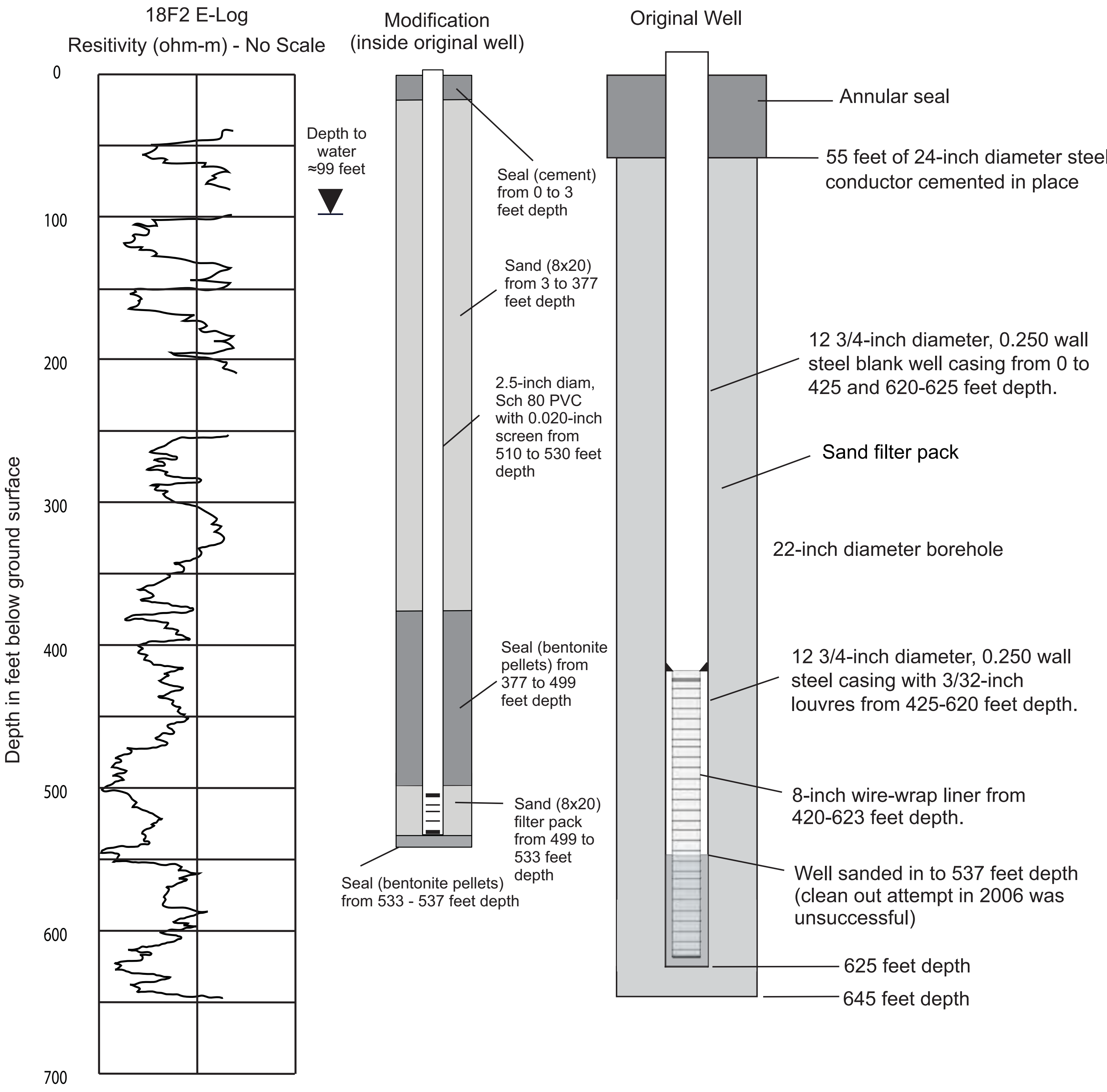


Figure 1
Well 18F2 (LA13)
Well Modification

Cleath-Harris Geologists

APPENDIX J

Historical Water Quality for Lower Aquifer Wells

Los Osos BMC Water Quality Results - Lower Aquifer Monitoring

Station ID	Well Name	Basin Plan Well ID	Aquifer Zone	Date	HCO3	Total Hardness	Cond	pH	TDS	Cl	NO3-N	SO4	Ca	Mg	K	Na
					mg/l	mg/l	µmhos/cm		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
30S/10E-11A2	Sand Spit #1 East	LA2	D	3/14/2005	180	4600	16000	7.3	8900	5400	ND	430	770	640	20	1300
				10/21/2015	150	6640	17700	7.4	13100	6300	ND	740	1030	990	31	1560
				11/5/2020	220	6700	18000	7.7	15300	5890	ND	777	1140	936	38	1560
30S/10E-12J1	MBO5 DWR Obs.	LA11	E	2/14/2005	350	370	1300	8.1	840	77	ND	190	51	58	6.1	110
				11/20/2009	300	360	1150	7.5	732	83	ND	190	51	58	4.4	95
				7/24/2014	360	489	1290	7.7	780	105	ND	212	69	77	5	88
				4/22/2015	360	475	1290	7.8	810	112	ND	189	65	76	5	88
				10/1/2015	250	486	1280	7.3	840	117	ND	188	68	77	4	85
				4/20/2016	330	524	1370	n/a	840	151	ND	193	73	40	5	83
				10/10/2016	350	497	1370	7.1	930	173	ND	189	69	79	4	81
				4/11/2017	350	541	1380	7.5	880	167	ND	186	75	86	4	81
				10/4/2017	300	543	1370	7	850	162	ND	191	76	86	5	90
				4/10/2018	350	595	1390	7.6	820	173	ND	192	85	93	5	97
				10/2/2018	350	497	1340	7.4	870	160	ND	160	69	79	3	87
				4/9/2019	350	539	1430	7.4	860	196	ND	189	76	85	4	85
				10/2/2019	250	290	1520	7.6	1000	187	ND	189	80	90	5	91
				4/14/2020	350	667	1580	7	950	222	ND	187	81	113	5	83
				10/1/2020	350	763	1650	7.1	1040	242	ND	183	85	134	5	88
				4/5/2021	345	612	1630	7.6	1050	256	ND	192	88	96	5	91
				10/6/2021	340	569	1710	7.3	1020	258	ND	176	83	88	5	82
				4/13/2022	330	620	1800	7.3	1020	287	ND	183	90	96	4	87
				10/6/2022	350	633	1720	7.7	1220	**279**	ND	195	89	100	5	93

Los Osos BMC Water Quality Results - Lower Aquifer Monitoring

Station ID	Well Name	Basin Plan Well ID	Aquifer Zone	Date	HCO3	Total Hardness	Cond	pH	TDS	Cl	NO3-N	SO4	Ca	Mg	K	Na
					mg/l	mg/l	µmhos/cm		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
30S/10E-13Bb	Lupine Zone D	LA41	D	11/7/2019	210	312	1310	7.7	760	136	3.1	188	69	34	4	140
				4/8/2020	310	204	943	7.1	560	68	0.3	109	44	23	2	101
				10/8/2020	340	263	920	7.1	490	52	0.1	89.4	51	33	2	72
				4/14/2021	333	289	855	7.9	505	66	ND	86	53	38	2	60
				10/11/2021	340	309	812	7.2	460	48	ND	80	58	40	2	64
				4/12/2022	330	309	818	8.3	500	47	ND	67	58	40	2	58
				10/11/2022	340	315	766	7.6	470	**48**	ND	71	62	39	2	57
30S/10E-13Ba	Lupine Zone E	LA40	E	11/6/2019	210	2090	5330	7	4750	1460	1.3	224	388	272	6	182
				4/7/2020	240	3300	7360	7.6	6340	2190	0.3	202	569	458	7	203
				10/7/2020	270	4100	8220	6.9	7930	2220	ND	192	720	560	8	217
				4/15/2021	274	3760	8590	7.4	6760	2510	ND	217	558	576	7	210
				10/13/2021	270	3540	8930	7.4	7430	2910	ND	201	544	530	6	190
				4/14/2022	270	3780	8790	7.3	6790	2410	ND	187	523	601	6	178
				10/12/2022	280	3860	8860	7.5	8340	**2900**	ND	221	569	594	7	186

Los Osos BMC Water Quality Results - Lower Aquifer Monitoring

Station ID	Well Name	Basin Plan Well ID	Aquifer Zone	Date	HCO3	Total Hardness	Cond	pH	TDS	Cl	NO3-N	SO4	Ca	Mg	K	Na
					mg/l	mg/l	µmhos/cm		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
30S/10E-13J1* Highlighted chloride values have been adjusted for wellbore leakage	GSWC Rosina	LA10	D,E	12/20/2004	72	230	720	7.1	410	150	1.6	14	38	33	1.4	29
				1/14/2010	35	260	778	6	435	200	1.6	13	41	38	1.5	33
				7/24/2014	80	418	1200	7.3	910	303	1.7	16	67	61	2	39
				4/22/2015	80	431	1230	7.1	750	331	1.9	20	69	63	2	39
				10/5/2015	70	460	1280	7	950	329	1.7	19	74	67	2	41
				4/26/2016	80	412	1170	7.1	840	299	1.8	18	66	60	2	37
				10/12/2016	60	509	1430	6.8	1100	389	1.8	26.7	82	74	2	44
				4/10/2017	80	327	957	6.9	720	300	2.6	14.7	52	48	2	35
				10/12/2017	80	245	702	6.9	510	220	3.4	12.5	39	36	2	33
				4/24/2018	70	188	620	7.4	400	190	4.3	12.3	29	28	1	29
				10/9/2018	70	265	730	7.1	450	210	3.2	12.7	42	39	2	34
				4/15/2019	80	251	744	7	600	174	1.9	10.4	38	38	2	31
				10/14/2019	80	332	961	7.1	830	229	2	12.7	54	48	1	33
				4/21/2020	80	353	1310	6.4	970	250	2.1	14.2	59	50	2	32
				10/7/2020	70	183	618	7.6	430	310	4.6	11.3	29	27	1	33
				4/6/2021	81	405	1110	7.6	815	258	2.1	16.1	66	58	2	36
				10/8/2021	80	413	1180	7.2	790	289	2.1	16.8	65	61	2	37
				4/18/2022	70	192	612	7.1	420	220	5.8	14.9	29	29	1	37
				12/5/2022	90	327	911	7.7	690	**235**	2	13.4	52	48	2	33
30S/10E-13M2 4/1/2021 sample results show Upper Aquifer influence due to reduced pumping	Howard East	LA31	C,D	11/22/2004	51	810	2900	7.3	1500	810	0.5	140	60	120	4.7	210
				12/9/2009	55	1100	3740	7.1	2170	1100	0.5	220	160	160	4.8	370
				8/4/2014	60	757	3340	7.1	2450	990	0.6	178	117	113	5	382
				4/21/2015	60	739	3430	7.3	1930	950	0.6	178	117	113	5	382
				10/6/2015	30	756	3370	7.1	2140	960	0.5	185	115	114	5	342
				4/20/2016	50	726	3520	7.2	2190	941	0.7	179	113	108	5	400
				10/19/2016	70	722	3420	7.4	2190	943	0.6	182	113	107	4	398
				4/17/2017	60	733	3380	6.8	2060	907	0.6	178	114	109	4	413
				10/5/2017	60	738	3350	7.5	2190	960	0.7	160	116	109	5	411
				4/24/2018	70	664	3370	7.2	2020	946	0.6	2.8	103	99	4	367
				10/17/2018	60	740	3400	7.3	2180	834	0.6	153	115	110	5	414
				4/3/2019	70	640	3290	7.8	2010	940	0.6	179	103	93	4	341
				10/3/2019	70	574	3120	7.4	2120	827	0.7	169	90	85	4	340
				4/9/2020	70	519	2970	7.8	1740	738	0.6	152	86	74	4	258
				10/1/2020	70	774	3330	8	2080	844	0.7	169	94	131	5	495
				4/1/2021	218	187	1010	8.3	581	161	2.9	47	31	27	20	113
				11/4/2021	70	509	2780	7.9	1700	629	0.6	124	77	77	4	305
				5/11/2022	70	388	2550	7.6	1540	578	0.6	134	60	58	3	303
				10/6/2022	70	506	2520	8.3	1840	**636**	0.7	145	79	75	4	268

Los Osos BMC Water Quality Results - Lower Aquifer Monitoring

Station ID	Well Name	Basin Plan Well ID	Aquifer Zone	Date	HCO3	Total Hardness	Cond	pH	TDS	Cl	NO3-N	SO4	Ca	Mg	K	Na
					mg/l	mg/l	µmhos/cm		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
30S/10E-13N	S&T #5	LA8	D	11/23/2004	42	80	390	6.9	200	67	5.9	9.2	13	12	1.7	38
				11/19/2009	41	89	386	6.8	267	73	6.1	11	15	13	1.4	38
				7/24/2014	50	100	438	7.4	270	76	7	10	17	14	2	38
				4/21/2015	50	98	445	6.9	280	77	7.7	11	16	14	2	38
				10/6/2015	40	98	422	7.2	310	75	6.8	10	16	14	1	38
				4/20/2016	20	97.5	446	7	320	76	7.2	12	16	14	1	38
				10/13/2016	50	104	470	8	320	79	7.2	12	17	15	1	40
				4/11/2017	50	100	434	7.4	270	77	7.3	12.4	17	14	1	38
				10/2/2017	30	95	438	7.2	290	78	7.6	13.2	15	14	1	36
				4/11/2018	60	104	440	7	260	79	7.9	13.5	17	15	1	39
				10/3/2018	60	107	430	6.5	340	66	6.7	12.9	18	15	2	40
				4/3/2019	50	100	434	6.3	250	75	7.3	12.7	17	14	1	36
				10/7/2019	60	95	446	7.6	250	77	7.7	14.4	15	14	1	37
				4/13/2020	60	104	443	8	300	75	7.4	14.5	17	15	2	37
				10/1/2020	60	108	464	7.9	300	76	7.5	14.4	17	16	1	40
				4/6/2021	63	103	438	7.4	302	78	7.8	13.1	17	15	1.4	38
				10/8/2021	60	108	443	7.8	290	77	7.5	13.3	17	16	2	41
				4/13/2022	60	106	449	8.1	270	76	7.3	12.8	16	16	1	40
				10/4/2022	60	108	432	7.4	280	**77**	6.6	13.1	17	16	2	38
30S/10E-14B2	Sand Spit #3 Deep	LA3	D	3/15/2005	100	3600	30000	8	17000	8500	ND	960	1200	130	34	4300
				10/21/2015	ND	7140	29500	11	24700	10000	ND	530	2830	20	80	4040
30S/10E-24C1	GSWC Cabrillo	LA9	D	12/20/2004	64	130	610	7	310	110	4.5	19	22	19	1.6	50
				11/20/2009	60	150	611	7.1	347	130	4.1	22	23	22	1.6	52
				7/24/2014	40	69	339	7.6	240	46	8.4	6	11	10	1	32
				4/22/2015	70	117	530	7.3	320	95	5.5	16	19	17	2	45
				10/5/2015	50	75	349	7.6	270	50	7.6	7	12	11	1	34
				4/26/2016	70	115	499	7	300	90	5.6	16	18	17	2	44
				10/12/2016	70	111	506	7.1	320	93	5.5	15.1	18	16	1	44
				4/10/2017	70	111	490	7	310	89	5.7	15.9	18	16	1	43
				10/12/2017	70	117	484	7	270	89	6	16.3	19	17	2	46
				4/24/2018	70	115	486	7.8	300	90	6.2	16.7	18	17	1	43
				10/9/2018	60	135	477	6.9	280	76	5.8	17.2	21	20	2	50
				4/15/2019	70	112	488	7.1	310	92	5.7	15.6	17	17	2	45
				10/14/2019	no sample (off-line)											
				4/21/2020	300	75.2	674	6.71	370	37	0.2	28.4	3	35	2	42
				10/7/2020	60	102	460	7.4	270	75	6.6	13.1	16	15	1	40
				4/6/2021	63	98.6	443	7.89	287	78	6.8	12.2	16	15	1	39
				10/8/2021	60	112	490	7.7	280	86	6.4	16	17	17	2	44
				4/18/2022	70	126	533	7.23	330	93	6.2	16.2	19	19	2	46
				10/19/2022	70	126	502	7.4	310	**93**	6.5	15.6	19	19	2	48

Los Osos BMC Water Quality Results - Lower Aquifer Monitoring

Station ID	Well Name	Basin Plan Well ID	Aquifer Zone	Date	HCO3	Total Hardness	Cond	pH	TDS	Cl	NO3-N	SO4	Ca	Mg	K	Na
					mg/l	mg/l	µmhos/cm		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
30S/11E-7Q3	LOCSD 8th St.	LA12	D	11/18/2004	250	270	790	7.5	410	73	ND	39	44	40	2.3	48
				11/19/2009	220	290	782	7.4	465	92	ND	46	46	42	1.9	53
				7/23/2014	290	303	876	7.6	460	91	ND	43	49	44	2	54
				4/21/2015	290	305	897	7.7	500	101	ND	55	48	45	2	59
				10/6/2015	280	298	828	7.4	490	91	ND	46	47	44	2	55
				4/20/2016	190	307	907	7.7	520	91	ND	49	49	45	2	54
				10/11/2016	280	278	827	4.9	490	93	ND	46.2	44	41	2	52
				4/10/2017	300	294	839	7.3	480	91	ND	49.5	47	43	2	54
				10/4/2017	220	305	826	6.5	470	92	ND	45	48	45	2	56
				4/10/2018	300	319	814	7.7	440	93	ND	46.2	52	46	2	56
				10/2/2018	290	283	822	7.3	470	78	ND	50.1	46	41	1	53
				4/9/2019	300	301	844	7.5	480	94	ND	49.7	48	44	2	53
				10/2/2019	290	312	877	8	530	91	ND	50.9	49	46	2	56
				4/16/2020	310	301	883	7.8	500	94	ND	54.7	48	44	2	52
				10/5/2020	300	321	891	7.9	510	89	ND	49.6	51	47	2	57
				4/5/2021	305	297	849	7.7	504	94	ND	54.1	48	43	2	54
				10/6/2021	300	283	874	7.5	510	95	ND	55	46	41	2	51
				4/13/2022	300	276	879	7.4	490	94	ND	51.5	43	41	2	50
				10/4/2022	310	285	839	7.9	500	**94**	ND	51.5	45	42	2	52
30S/11E-17E8	So. Bay Obs. Middle	LA22	D	1/14/2005	150	150	440	7.5	290	34	2.2	11	24	22	1.4	28
				11/20/2009	120	160	455	7.3	255	42	4.3	12	25	23	1.3	29
				7/23/2014	150	166	500	7.6	270	43	6.3	10	27	24	2	28
				4/21/2015	150	157	481	7.6	270	49	7.1	13	25	23	1	28
				10/1/2015	120	164	475	7.4	290	44	6.6	10	26	24	1	28
				4/19/2016	150	164	476	6.9	290	45	6.9	12	26	24	1	29
				10/13/2016	140	161	521	7.3	290	46	6.9	11.9	25	24	1	29
				4/13/2017	150	164	466	7.3	300	46	6.7	13.2	26	24	1	29
				10/11/2017	150	168	476	7.7	260	47	7.2	14	26	25	1	29
				4/16/2018	150	165	473	6.4	310	47	6.7	14.2	25	25	1	29
				10/10/2018	150	160	471	7.5	250	43	6.1	15	26	23	1	28
				4/10/2019	180	153	466	7.2	290	46	5.8	13.6	25	22	1	28
				10/9/2019	150	155	485	7.3	270	49	7	14.9	24	23	1	28
				4/14/2020	160	164	482	8	280	48	6.3	14.9	26	24	1	27
				10/6/2020	160	181	506	7.5	340	47	6.7	14.7	28	27	1	30
				4/8/2021	159	154	470	7.5	329	46	5.8	12.5	24	23	1	27
				10/19/2021	170	181	480	7.4	310	41	5.8	14.9	28	27	1	29
				4/20/2022	160	178	518	7.6	320	43	7.4	14.6	27	27	1	29
				10/17/2022	180	213	485	7.4	300	**45**	7	16.5	31	33	2	32

Los Osos BMC Water Quality Results - Lower Aquifer Monitoring

Station ID	Well Name	Basin Plan Well ID	Aquifer Zone	Date	HCO3	Total Hardness	Cond	pH	TDS	Cl	NO3-N	SO4	Ca	Mg	K	Na
					mg/l	mg/l	µmhos/cm		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
30S/11E-17N10	GSWC So. Bay #1	LA20	C,D,E	Jan 2003	250	--	510	7.1	290	37	ND	21	41	25	1.3	35
				11/20/2009	230	220	638	7.3	357	41	0.5	30	35	33	1.7	37
				7/24/2014	280	232	646	7.7	370	37	0.5	24	37	34	2	41
				4/22/2015	290	234	653	7.4	360	43	0.6	27	36	35	2	42
				10/5/2015	280	227	614	7.2	370	38	0.5	23	35	34	2	41
				4/26/2016	230	227	629	7.1	360	39	0.6	27	35	34	2	40
				10/12/2016	290	221	631	7	370	40	0.6	25.2	34	33	2	40
				4/10/2017	280	227	624	7.2	380	39	0.6	26.7	35	34	2	40
				10/12/2017	260	240	583	6.6	320	41	0.7	27.9	37	36	2	43
				4/24/2018	200	166	515	7.4	330	43	3.2	23.2	27	24	2	31
				10/9/2018	290	273	632	7.2	340	38	0.6	29.2	42	41	3	47
				4/15/2019	200	181	559	7.4	310	42	3.1	21.7	28	27	2	34
				10/14/2019	290	221	626	7.2	380	41	0.7	29	34	33	2	40
				4/21/2020	300	230	705	7	400	50	0.7	26.9	36	34	2	42
				10/7/2020	290	227	654	7.5	350	40	0.7	27	35	34	2	42
				4/6/2021	204	178	529	7.9	329	43	3	21.1	29	26	2	33
				10/7/2021	290	245	633	6.8	340	40	0.7	27.8	37	37	2	43
				4/18/2022	280	242	636	7.4	360	39	0.7	26.6	36	37	2	42
				10/19/2022	300	245	616	7.6	330	**40**	0.7	26.4	37	37	2	43
30S/11E-18K8	10th St. Obs. East (Deep)	LA18	E	1/19/2005	260	290	650	7.5	370	33	ND	38	62	33	2.5	28
				11/20/2009	230	220	620	7.5	378	32	ND	40	51	24	1.8	23
				7/24/2014	290	271	647	7.5	380	28	ND	34	56	32	2	27
				4/21/2015	290	265	634	7.7	400	33	ND	39	55	31	2	27
				10/19/2015	230	256	621	7.3	370	29	ND	33	53	30	2	26
				4/20/2016	190	265	700	7.5	390	31	ND	38	55	31	2	26
				10/18/2016	290	256	615	6.8	370	31	ND	35.9	53	30	2	26
				4/12/2017	290	274	616	7.5	450	31	ND	38	57	32	2	27
				10/10/2017	220	271	619	7.8	350	30	ND	35.5	56	32	2	27
				4/17/2018	290	260	625	7.3	390	33	ND	39.9	53	31	2	27
				10/10/2018	290	254	608	7.5	360	31	ND	39.8	54	29	2	26
				4/10/2019	290	245	620	7.6	380	32	ND	37.4	52	28	2	25
				10/9/2019	290	253	647	7.9	390	33	ND	40.5	52	30	2	26
				4/14/2020	290	269	629	7.5	400	33	ND	40.2	55	32	2	26
				10/22/2020	300	247	669	7.5	370	32	ND	38.2	51	29	3	26
				4/12/2021	298	267	621	7.6	389	32	ND	41.2	54	32	2	27
				10/19/2021	300	287	657	7.4	400	32	ND	38.4	59	34	2	28
				4/15/2022	290	257	638	8.3	420	31	ND	36.5	52	31	2	25
				10/10/2022	310	278	613	8.0	400	**33**	ND	39.3	57	33	2	29

Los Osos BMC Water Quality Results - Lower Aquifer Monitoring

Station ID	Well Name	Basin Plan Well ID	Aquifer Zone	Date	HCO3	Total Hardness	Cond	pH	TDS	Cl	NO3-N	SO4	Ca	Mg	K	Na
					mg/l	mg/l	µmhos/cm		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
30S/11E-18K9	LOCSD 10th St.	LA32	C,D	May 2002	250	--	550	6.9	320	37	0.2	26	31	32	--	39
				11/20/2009	180	160	539	7.2	307	36	1	27	27	24	1.3	32
				7/23/2014	220	190	546	7.7	300	32	1	20	30	28	1	35
				4/21/2015	190	108	504	7.6	270	38	1.6	20	17	16	1	27
				10/6/2015	50	62	248	7.2	190	31	5.9	3	10	9	ND	21
				4/20/2016	130	121	382	7.5	220	32	3.3	12	19	18	1	27
				10/11/2016	200	168	511	6.6	270	36	1.2	21.5	26	25	1	34
				4/10/2017	190	155	461	7.3	270	35	1.9	19.1	24	23	1	31
				10/9/2017	200	168	493	7.6	270	36	1.4	23.1	26	25	1	33
				4/10/2018	50	75.2	256	7.7	150	35	6.5	28.6	12	11	ND	23
				10/2/2018	210	168	492	7.3	270	36	1.3	22	26	25	ND	33
				4/9/2019	200	172	474	7.6	270	34	1.6	21.5	26	26	1	33
				10/2/2019	200	185	531	7.4	310	36	1.4	24.7	28	28	1	35
				4/16/2020	60	72.7	272	8.1	190	35	6	5.4	11	11	ND	20
				10/6/2020	60	68.6	246	8	180	30	4	4.9	11	10	ND	21
				4/5/2021	143	128	390	7.8	247	34	2.1	15.7	20	19	1	27
				10/6/2021	60	68.6	255	7.7	150	30	3.9	5.7	11	10	ND	20
				4/13/2022	70	66.1	262	7.6	150	30	3.8	5.2	10	10	ND	20
				10/6/2022	200	211	461	7.7	260	**38**	1.4	23.5	32	32	2	58
30S/11E-18K	GSWC Los Olivos #5	LA39	D	4/15/2019	290	230	619	8.1	350	38	ND	27.4	33	36	2	41
				10/14/2019	300	225	628	7.2	370	37	ND	28.6	34	34	1	41
				4/21/2020	300	236	674	6.9	370	37	0.2	28.4	37	35	2	42
				10/7/2020	300	227	657	7.4	360	37	ND	28.2	35	34	2	43
				4/6/2021	301	226	629	8.0	382	38	ND	25.8	34	34	2	40
				10/8/2021	300	253	638	7.4	360	37	ND	29.3	37	39	2	45
				4/18/2022	250	209	561	7.6	330	34	ND	17.8	31	32	2	34
				10/19/2022	310	236	617	7.6	330	**37**	ND	28	37	35	2	44

Los Osos BMC Water Quality Results - Lower Aquifer Monitoring

Station ID	Well Name	Basin Plan Well ID	Aquifer Zone	Date	HCO3	Total Hardness	Cond	pH	TDS	Cl	NO3-N	SO4	Ca	Mg	K	Na
					mg/l	mg/l	µmhos/cm		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
30S/11E-18L2**	LOCSD Palisades	LA15	D,E	11/18/2004	220	330	880	7.3	420	120	ND	31	54	48	2.2	40
				11/19/2009	200	590	1460	7.2	890	360	0.4	39	94	86	2	44
			D	7/23/2014	250	293	783	7.8	390	90	0.4	26	48	42	2	40
				4/29/2015	80	78	348	7.4	230	43	5	10	13	11	ND	30
				10/28/2015	230	288	782	7.4	420	104	0.6	29	46	42	ND	36
				4/27/2016	230	264	796	7.3	450	93	0.9	28	43	38	2	43
				10/11/2016	200	221	694	7	380	91	1.7	25.5	36	32	1	35
				10/5/2017	180	306	768	7.6	400	102	0.7	27	50	44	2	40
				4/10/2018	250	311	767	7.3	420	100	0.8	32.4	52	44	2	40
				10/23/2018	250	288	772	7.7	440	83	0.6	30.7	48	41	1	38
				4/9/2019	250	301	774	7.4	460	102	0.8	29.2	48	44	1	38
				11/14/2019	210	303	806	7.8	430	107	0.7	32.9	49	44	2	39
				4/16/2020	260	299	832	7.7	460	109	0.8	32.5	49	43	2	37
				10/5/2020	250	319	841	7.8	450	109	0.7	29.7	52	46	2	41
				4/6/2021	234	290	780	7.7	444	108	1	27.2	47	42	2	38
				10/6/2021	250	295	856	7.3	490	107	0.5	32.8	49	42	2	37
				4/13/2022	250	330	876	7.3	470	116	0.5	30.3	53	48	2	43
				10/4/2022	250	326	885	7.7	610	**138**	0.8	31.2	53	47	2	40

ND = Not Detected

Chloride Metric Wells in Green (13J1 weighted x2); current chloride concentrations in red

*Chloride concentrations at 13J1 can vary seasonally by 100+ mg/l and are affected by well production and borehole leakage, so fluctuations are expected.

**Water from 18L2 affected by wellbore leakage/upper aquifer influence when inactive

Legend and Detection Limits

Constituent	Description	Practical Quantitation Limit*
HCO3	Bicarbonate Alkalinity in mg/L CaCO3	10.0
Total Hardness	Total Hardness in mg/L CaCO3	--
Cond	Electrical Conductance in µmhos/cm	1.0
pH	pH in pH units	--
TDS	Total Dissolved Solids in mg/L	20.0
Cl	Chloride concentration in mg/L	1.0
NO3-N	Nitrate as Nitrogen concentration in mg/L	0.1
SO4	Sulfate concentration in mg/L	2.0
Ca	Calcium concentration in mg/L	1.0
Mg	Magnesium concentration in mg/L	1.0
K	Potassium concentration in mg/L	1.0
Na	Sodium concentration in mg/L	1.0

*where dilution not required

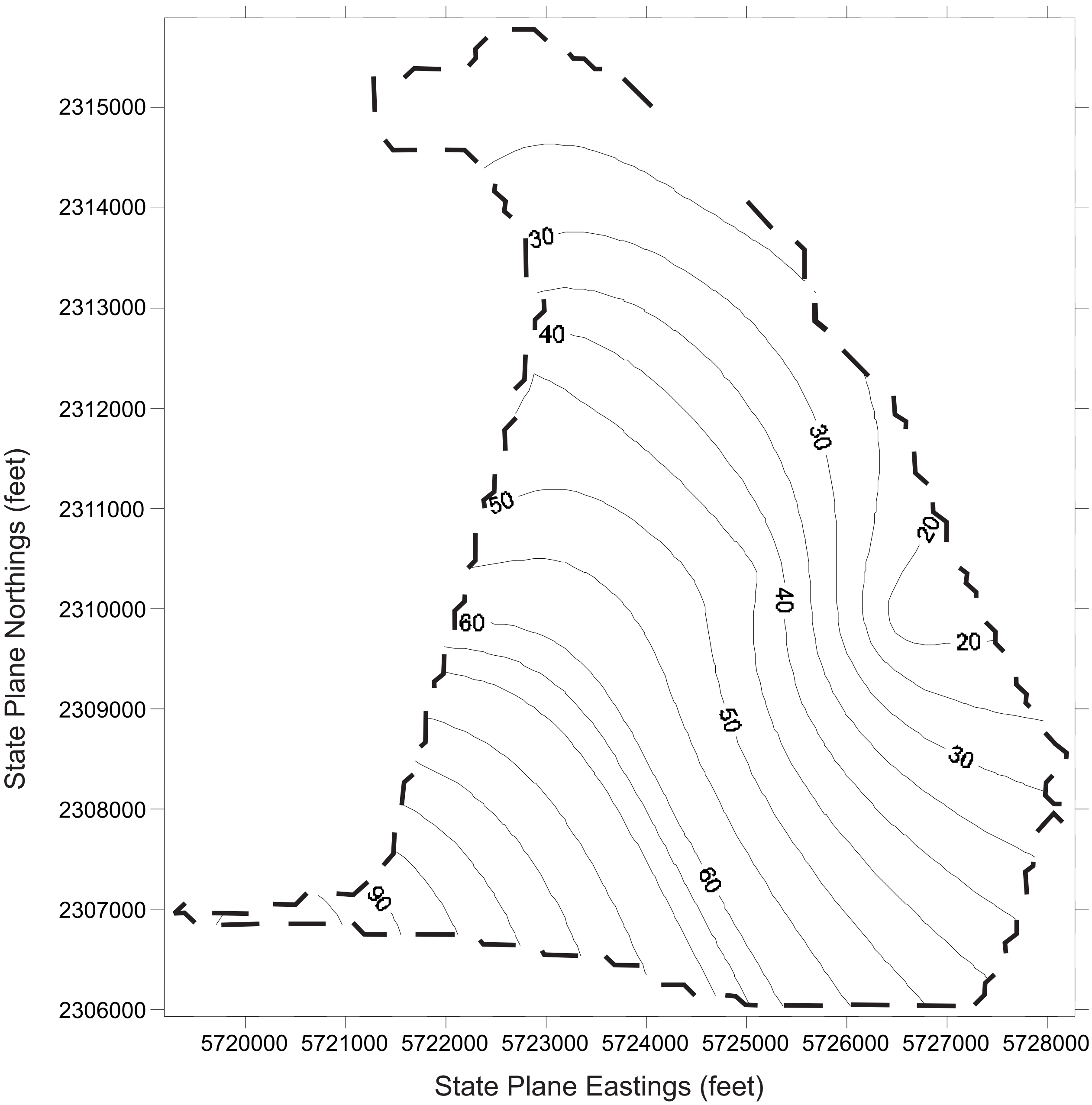
*where dilution not required

APPENDIX K

Groundwater Storage Calculation Example

EXAMPLE STORAGE CALCULATION FOR EASTERN AREA:

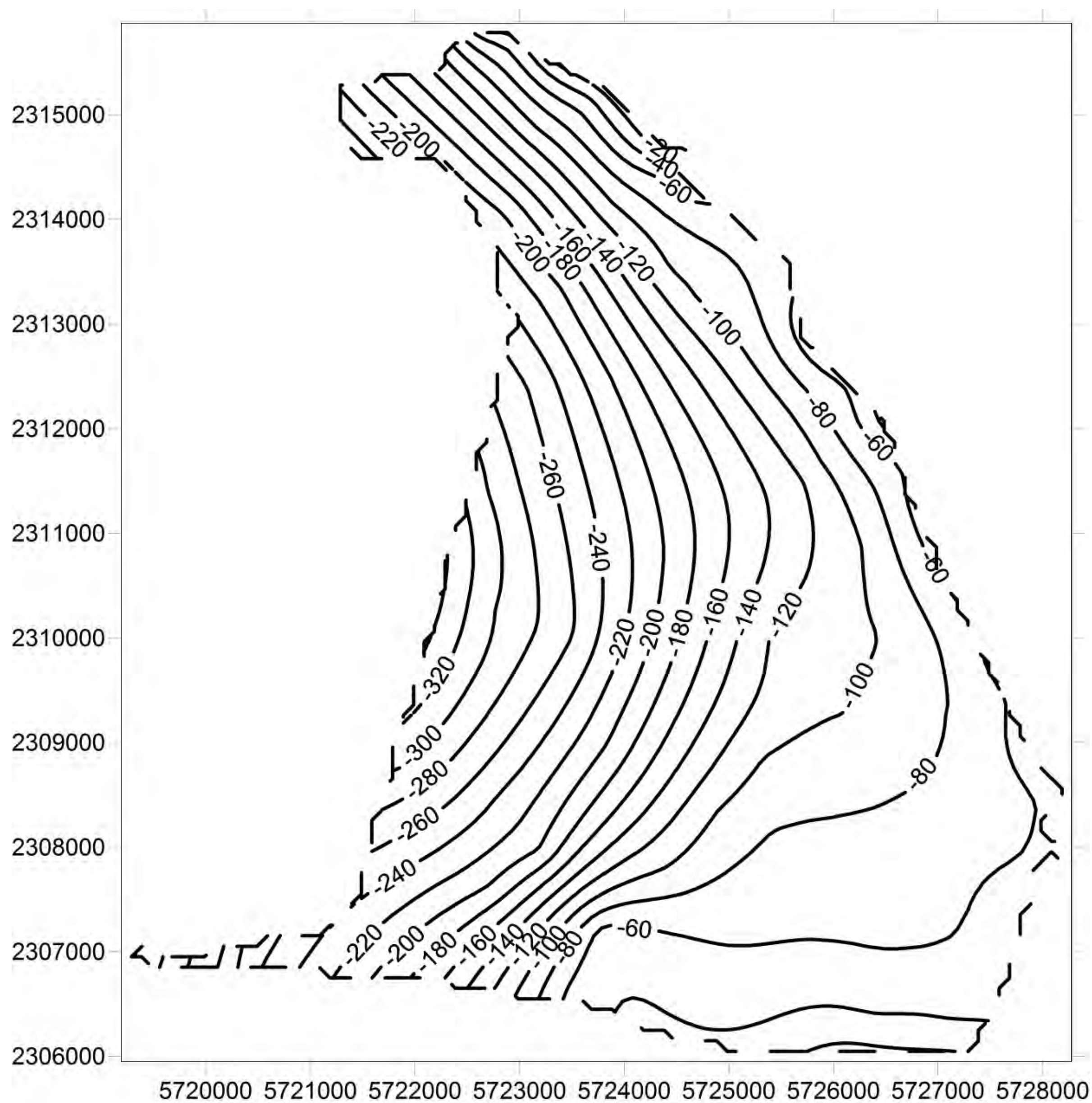
STEP 1: GRID AND TRIM WATER LEVEL CONTOURS



Spring 2022
Eastern Area Water Levels
Alluvial Aquifer and Lower Aquifer

EXAMPLE STORAGE CALCULATION FOR EASTERN AREA:

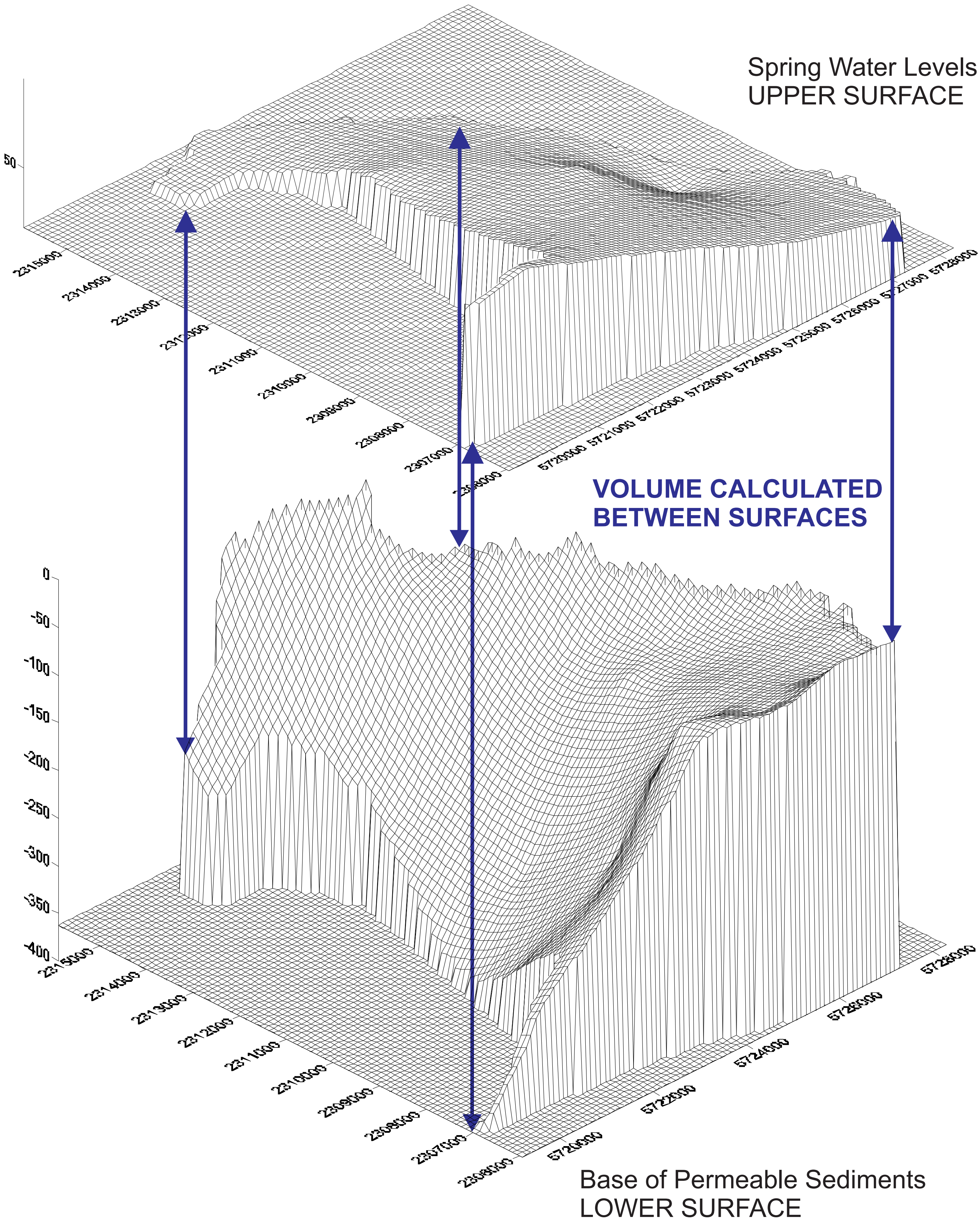
STEP 2: GRID AND TRIM BASE OF PERMEABLE SEDIMENTS



Eastern Area
Base of Permeable Sediments

EXAMPLE STORAGE CALCULATION FOR EASTERN AREA:

STEP 3: MATCH UPPER AND LOWER SURFACE GRIDS



EXAMPLE STORAGE CALCULATION FOR EASTERN AREA:

STEP 4: VOLUME COMPUTATION

Grid Volume Computations

Wed Mar 22 17:10:48 2023

Upper Surface

Grid File Name: C:\Users\andre\Desktop\Projects\Los Osos BMC\2022\BMC 2022 Annual Report\WORKING DATA\Contouring and Storage\BLANKED FILES\EASTERN\UpperEasternSpring2022_3.grd
Grid Size: 100 rows x 92 columns

X Minimum:	5719189
X Maximum:	5728284
X Spacing:	99.945054945055
Y Minimum:	2305947
Y Maximum:	2315886
Y Spacing:	100.39393939394
Z Minimum:	17.115016904613
Z Maximum:	99.527747019826

Lower Surface

Grid File Name: C:\Users\andre\Desktop\Projects\Los Osos BMC\2022\BMC 2022 Annual Report\WORKING DATA\Contouring and Storage\BASE GEOMETRY\EASTERN\BOP Eastern blanked.grd
Grid Size: 100 rows x 92 columns

X Minimum:	5719189
X Maximum:	5728284
X Spacing:	99.945054945055
Y Minimum:	2305947
Y Maximum:	2315886
Y Spacing:	100.39393939394
Z Minimum:	-362.32467224801
Z Maximum:	2.39586300134

EXAMPLE STORAGE CALCULATION FOR EASTERN AREA:

STEP 5: CALCULATE GROUNDWATER IN STORAGE

Volumes

Z Scale Factor:	1

Total Volumes by:

Trapezoidal Rule:	8173033133.5002
Simpson's Rule:	8168632836.4507
Simpson's 3/8 Rule:	8164900362.3734

Cut & Fill Volumes

Positive Volume [Cut]:	8173033133.5001
Negative Volume [Fill]:	0
Net Volume [Cut-Fill]:	8173033133.5001

Areas

Planar Areas

Positive Planar Area [Cut]:	41665677.518315
Negative Planar Area [Fill]:	0
Blanked Planar Area:	48729527.481685
Total Planar Area:	90395205

Surface Areas

Positive Surface Area [Cut]:	41785525.326704
Negative Surface Area [Fill]:	0

STORAGE CALCULATION

Positive Volume: 8,173,033,133.50 ft^3 * 0.101 specific yield ÷ 43,560 ft^3 per acre-foot = 19,000 acre-feet