LOS OSOS GROUNDWATER BASIN, BASIN MANAGEMENT COMMITTEE

NOTICE OF MEETING

NOTICE IS HEREBY GIVEN that the Los Osos Groundwater Basin, Basin Management Committee Board of Directors will hold a **Regular Board Meeting** at **1:30 P.M.** on **Wednesday, June 17, 2020.** Based on the threat of COVID-19 as reflected in the Proclamations of Emergency issued by both the Governor of the State of California and the San Luis Obispo County Emergency Services Director, as well as the Governor's Executive Order N-29-20 issued on March 17, 2020 relating to the convening of public meetings in response to the COVID-19 pandemic, this meeting will be conducted as a phone-in/web-based meeting only. There will be no physical meeting location for this BMC Meeting. Members of the public can participate via phone or by logging into the web-based meeting.

For quick access, go to https://us04web.zoom.us/j/778762508
(This link will help connect both your browser and telephone to the call)
If not using a computer, dial 1 (669) 900-6833 or 1 (346) 248-779 and enter **778 762 508**

All persons desiring to speak during any Public Comment can submit a comment by:

- Email at dheimel@wsc-inc.com by 5:00 PM on the day prior to the Committee meeting.
- Teleconference by phone at 1 (669) 900-6833 and enter **778 762 508**
- Teleconference by phone at 1 (346) 248-7799 and enter **778 762 508**
- Teleconference meeting at https://us04web.zoom.us/j/778762508
- Mail by 5:00 PM on the day prior to the Committee meeting to:
  Attn: Dan Heimel (Basin Management Committee)
  2122 9th St.
  Suite 110
  Los Osos, CA 93402

Additional information on how to submit Public Comment is provided on page 3 of this Agenda

Directors: Agenda items are numbered for identification purposes only and may not necessarily be considered in numerical order.

NOTE: The Basin Management Committee reserves the right to limit each speaker to three (3) minutes per subject or topic. In compliance with the Americans with Disabilities Act and Executive Order N 29-20, all possible accommodations will be made for individuals with disabilities, so they may participate in the meeting. Persons who require accommodation for any audio, visual or other disability in order to participate in the meeting of the BMC are encouraged to request such accommodation 48 hours in advance of the meeting from Dan Heimel at dheimel@wsc-inc.com.

BASIN MANAGEMENT COMMITTEE BOARD OF DIRECTORS AGENDA

1. **CALL TO ORDER**

2. **ROLL CALL**

3. **BOARD MEMBER COMMENTS**

   Board members may make brief comments, provide project status updates, or communicate with other directors, staff, or the public regarding non-agenda topics.

4. **CONSENT AGENDA**

   The following routine items listed below are scheduled for consideration as a group. Each item is recommended for approval unless noted and may be approved in their entirety by one motion. Any member of the public who wishes to comment on any Consent Agenda item may do so at this time.

Consent items generally require no discussion. However, any Director may request that any item be withdrawn from the Consent Agenda and moved to the "Action Items" portion of the Agenda to permit discussion or to change the recommended course of action. The Board may approve the remainder of the Consent Agenda on one motion.

a. **Approval of Minutes from May 20, 2020 meeting**
b. **Approval of Warrants, Budget Update and Invoice Register through June 2020**

5. EXECUTIVE DIRECTOR'S REPORT

6. ACTION ITEMS

a. Draft Land Use Planning Documents Presentation

Recommendation: Receive a presentation from County Planning Staff on the Draft 2016-18 Resources Summary Report, Growth Management Ordinance and Los Osos Community Plan, review the Draft Program U and C Sustainable Yield Update Technical Memorandum and provide direction to staff.

b. Implementation Plan Approach

Recommendation: Review and provide direction on the proposed approach for preparing an Implementation Plan for the BMC and provide authorization for staff to initiate the Implementation Plan development; or provide alternate direction to staff.

c. Final 2019 Annual Report

Recommendation: Receive the Final 2019 Annual Report, authorize submission to the Court, and provide direction to Staff on future Annual Report review and approval procedures; or provide alternate direction to staff.

d. Update on Status of Basin Plan Infrastructure Projects

Recommendation: Receive report and provide input to staff on future direction.

7. PUBLIC COMMENTS ON ITEMS NOT APPEARING ON THE AGENDA

The Basin Management Committee will consider public comments on items not appearing on the agenda and within the subject matter jurisdiction of the Basin Management Committee. The Basin Management Committee cannot enter into a detailed discussion or take any action on any items presented during public comments at this time. Such items may only be referred to the Executive Director or other staff for administrative action or scheduled on a subsequent agenda for discussion. Persons wishing to speak on specific agenda items should do so at the time specified for those items. The presiding Chair shall limit public comments to three minutes.

8. ADJOURNMENT

Notice of Meeting

LOS OSOS GROUNDWATER BASIN, BASIN MANAGEMENT COMMITTEE

****CONFERENCE CALL/WEBINAR ONLY****

Wednesday, June 17, 2020 at 1:30 PM

Important Notice Regarding COVID-19: Based on guidance from the California Department of Public Health and the California Governor's Office, in order to minimize the spread of the COVID-19 virus, please note the following:

1. The meeting will only be held telephonically and via internet via the number and website link information provided on the agenda. After each item is presented, Committee Members will have the opportunity to ask questions. Participants on the phone or on the computer will then be provided an opportunity to speak for 3 minutes as public comment prior to Committee deliberations and/or actions or moving on to the next item. If a participant wants to provide public comment on an item they should select the "Raise Hand" icon on the Zoom Online Meeting platform or press *9 if on the phone. The meeting host will then unmute the participant when it is their turn to speak and allow them to provide public comment.

2. The Committee's agenda and staff reports are available at the following website: https://www.slocounty.ca.gov/Departments/Public-Works/Committees-Programs/Los-Osos-Basin-Management-Committee-(BMC).aspx

3. If you choose not to participate in the meeting and wish to make a written comment on any matter within the Committee's subject matter jurisdiction, regardless of whether it is on the agenda for the Committee's consideration or action, please submit your comment via email or U.S. Mail by 5:00 p.m. on the day prior to the Committee meeting. Please submit your comment to Dan Heimel at dheimel@wsc-inc.com. Your comment will be placed into the administrative record of the meeting.

4. If you choose not to participate in the meeting and wish to submit verbal comment, please call (805) 457-8833 x104 and ask for Dan Heimel. If leaving a message, state and spell your name, mention the agenda item number you are calling about and leave your comment. The verbal comments must be received by no later than 9:00 a.m. on the morning of the noticed meeting and will be limited to 3 minutes. Every effort will be made to include your comment into the record, but some comments may not be included due to time limitations.

Mailing Address:
Attn: Dan Heimel
Basin Management Committee
2122 9th St.
Suite 110
Los Osos, CA 93402

All Americans with Disabilities Act (ADA) accommodations shall be promptly reviewed and resolved. Persons who require accommodations for any audio, visual or other disability in order to review an agenda, or to participate in the meeting of the Basin Management Committee per the ADA, are encouraged to request such accommodation 48 hours in advance of the meeting from Dan Heimel at (805) 457-8833 x104.

BASIN MANAGEMENT COMMITTEE BOARD OF DIRECTORS

Agenda Item 4a: Minutes of the Meeting of May 20th, 2020

Agenda Item	Discussion or Action
1. **CALL TO ORDER** **2. ROLL CALL**	Chairperson Ochylski called the meeting to order at 1:30 pm. Mr. Heimel, acting Clerk, called roll to begin the meeting. Chairperson Ochylski, Director Gibson, Director Cote, and Vice Chairperson Zimmer were all present.
3. BOARD MEMBER COMMENTS	**Board Comments** None
4. CONSENT AGENDA	
4a. Minutes of the Meeting of April 15th, 2020	Review of minutes from April 15, 2020 Meeting **Public Comment** None
4b. Approval of Budget update and Invoice Register through May 2020	**Board Action** The Board of Directors approved Item 4a and 4b. **Ayes: Chairperson Ochylski, Director Gibson, Director Cote, and Vice Chairperson Zimmer** **Nays: None** **Abstain: None** **Absent: None**
5. EXECUTIVE DIRECTOR'S REPORT	Staff recommends that the Committee receive and file the report and provide staff with any direction for future discussions. **Public Comment** Jeff Edwards Linde Owen **Board Direction** None
6. ACTION ITEMS	
6a. Update on Status of Basin Plan Infrastructure Projects	Receive report and provide input to staff for future action. **Public Comment** Jeff Edwards **Board Direction** None
6b. Basin Management Committee CY 2020 Budget Items	Review potential additional CY 2020 BMC Budget items, provide input to staff on 2020 BMC Budget and authorize initiation of Strategic Planning initiative to help guide future BMC budget development.

	<u>Public Comment</u> Jeff Edwards **<u>Board Action</u>** The Board of Directors authorized inclusion of the Wellhead Survey and 10% contingency in the CY 2020 BMC Budget. **<u>Board Direction</u>** Compile input from BMC leaders and staff to develop Strategic Plan approach outline for presentation at the next BMC Meeting, including engineering and policy justification. **Ayes: Chairperson Ochylski, Director Gibson, Director Cote, and Vice Chairperson Zimmer** **Nays: None** **Abstain: None** **Absent: None**
6c. Presentation of Draft 2019 Annual Report	Receive a presentation from BMC staff regarding the draft 2019 Annual Report; confirm June date for BMC meeting to approve final 2019 Annual Report for submission to the Court and authorize use of Contingency Funds to cover CHG attendance at BMC Meetings. **<u>Public Comment</u>** Jeff Edwards **<u>Board Direction</u>** Find the most efficient legal way possible to finalize the Annual Report. **<u>Board Action</u>** The Board of Directors authorized approval of use of Contingency funds for CHG's attendance at BMC Meetings to support review and approval of the 2019 Annual Report.
6d Invoice Procedure Modification	Review BMC invoice approval procedures and provide authorization for staff to modify procedures to allow Executive Director to approve invoices for payment by Brownstein Hyatt Farber Schreck for previously approved BMC budget items. **<u>Public Comment</u>** None **<u>Board Action</u>** The Board of Directors authorized Executive Director to approve invoices for payment by Brownstein Hyatt Farber Schreck for previously approved BMC budget items and, if necessary, consult with BMC Treasurer. **Ayes: Director Cote, Chairperson Ochylski, Director Gibson, and Director Zimmer** **Nays: None** **Abstain: None** **Absent: None**
7. PUBLIC COMMENTS ON ITEMS NOT APPEARING ON THE AGENDA	**<u>Public Comment</u>** Jeff Edwards Lindy Owen

	<u>Board Comments</u> None
9. ADJOURNMENT	Meeting was adjourned at approximately 3:15 PM. The next meeting will be held online on June 17th, 2020.

Attachment 1: Cost Summary (January 2020 to Current Date) for Calendar Year 2020 Preliminary Budget

Item	Description	Budget Amount	Costs Incurred	Percent Incurred	Remaining Budget
1	Monthly meeting administration, including preparation, staff notes, and attendance	$70,000	$23,355.00	33.4%	$46,645
2	Meeting expenses - facility rent (if SBCC needed for larger venue)	$1,500	$120.00	8.0%	$1,380
3	Meeting expenses - audio and video services	$6,000	$875.00	14.6%	$5,125
4	Adaptive Management - Groundwater Modeling & Well Head Surveying	$15,000	$0.00	0.0%	$15,000
5	Semi annual seawater intrusion monitoring	$40,000	$19,368.19	48.4%	$20,632
6	2020 Annual Report	$38,000	$39,187.50	103.1%	-$1,188
7	Grant writing (outside consultant)	$5,000	$0.00	0.0%	$5,000
	Subtotal	$175,500	$82,906		$92,594
	10% Contingency (rounded to nearest $100)	$17,600			
	Total	**$193,100**	**$82,906**	**42.9%**	**$110,194**
	LOCSD (38%)	$73,378			
	GSWC (38%)	$73,378			
	County of SLO/SLOCFC&WCD (20%)	$38,620			
	S&T Mutual (4%)	$7,724			

Attachment 2: Invoice Register for Los Osos BMC for Calendar Year 2020 (through June 2020)

Vendor	Invoice No.	Amount	Month of Service	Description	Budget Item	Date Executive Director Approved	Date BMC. Approved
MKN	110519	$4,377.13	Oct-19	Soil Aquifer Treatment	8		Jan-2020
MKN	123119	$92.50	Dec-19	Soil Aquifer Treatment	8		Jan-2020
LOCSD	32018	$86,393.00	Oct-19	Cuesta by the Sea Monitoring well	9		Apr-2020
WSC	4380	$4,900.00	Nov/Dec-19	Monthly meeting administration	1		Apr-2020
SBCC	101	$120.00	Sep-19	Basin Management Meeting	2		Apr-2020
AGP	8001	$725.00	Dec-19	Video Production Services	3		Apr-2020
AGP	7893	$775.00	Sep-19	Video Production Services	3		Apr-2020
AGP	7568	$800.00	Nov-18	Video Production Services	3		Apr-2020
CHG	20200109	$9,292.50	Jan-20	Annual Report Preparation	6		Apr-2020
CHG	20200208	$15,495.00	Feb-20	Annual Report Preparation	6		Apr-2020
SBCC	104	$120.00	Jan-20	Basin Management Meeting	2		Apr-2020
AGP	8073	$725.00	Jan-20	Video Production	3		Apr-2020
CHG	20200304	$11,760.00	Mar-20	Annual Report Preparation	6		Apr-2020
CHG	20200305	$2,115.00	Mar-20	2020 Semi-annual Groundwater Monitoring	5		Apr-2020
CHG	20200403-REV	$1,440.00	May-20	Annual Report Preparation	6		May-2020
CHG	20200404-REV	$12,624.67	Apr-20	2020 Semi-annual Groundwater Monitoring	5		May-2020
WSC	4524	$9,802.50	Jan/Feb 2020	Monthly meeting administration	1		May-2020
WSC	4654	$13,552.50	Mar/Apr 2020	Monthly meeting administration	1		May-2020
CHG	20200502	$1,200.00	May-20	Annual Report Preparation	6	Jun-2020	
CHG	20200503	$4,628.92	May-20	2020 Semi-annual Groundwater Monitoring	5	Jun-2020	
AGP	8150	$150.00	May-20	Video Production Services	3	Jun-2020	
	Total	**$181,088.72**					
	2020 Total	**$82,906.09**		not included in total- applied to 2019			To be approved

ATTACHMENT 3

Current Invoices Subject to Approval for Payment (Warrant List as of June 2020):

Vendor	Invoice #	Amount of Inv.	Date of Services
CHG	20200503	$4,628.92	May-20
CHG	20200502	$1,200.00	May-20
AGP	8150	$150.00	May-20

TO: **Los Osos Basin Management Committee**

FROM: **Dan Heimel, Executive Director**

DATE: **June 17, 2020**

SUBJECT: **Item 5 – Executive Director's Report**

Recommendations

Staff recommends that the Committee receive and file the report and provide staff with any direction for future discussions. Sections of the Executive Director's Report that have been updated or significantly changed from the previous meeting's version are <u>underlined.</u>

Discussion

This report was prepared to summarize administrative matters not covered in other agenda items and to provide a general update on staff activities.

Funding and Financing Programs to Support Basin Plan Implementation

Prop 1 GWGP: As indicated in the January 2018 meeting, the State Board confirmed that sea water intrusion mitigation projects under Program C are eligible for low interest loans but are not currently eligible for grants under the Proposition 1 Groundwater Grant Program (GWGP). New wells in the upper and lower aquifer are viewed as aquifer management, not aquifer clean-up as defined by the State, therefore we will need to look for future funding rounds and other opportunities.

<u>IRWM</u>: The Program A upper aquifer well at 8th Street was submitted by Los Osos CSD to the local IRWM process in 2019 and was subsequently selected to be a part of the application for the current funding opportunity. The application for this grant was submitted in December 2019 and the Project was included in the Department of Water Resource's May 7th, 2020 Draft Recommended Funding List for the full grant request. The project received a draft award of $238,000 in May 2020. Final awards are expected to be announced in July 2020. Reimbursement eligibility begins with the Final Award announcement date

Prop 1 SWGP: The concept of urban storm water recovery at 8th and El Moro was ranked in the County Stormwater Resource Plan, and a grant opportunity may be available through the Prop 1 Storm Water Grant Program (SWGP). Round 2 of SWGP funding is now open and accepting applications until July 2nd. The Stormwater Resource Plan can be found here:
https://www.slocounty.ca.gov/Departments/Public-Works/Committees-Programs/Stormwater-Resource-Plan.aspx
And information about the Storm Water Grant Program can be found here:
https://www.waterboards.ca.gov/water_issues/programs/grants_loans/swgp/prop1/

WRFP: The State Water Resource Control Board (SWRCB) recently increased the amount for Water Recycled Program Planning (WRFP) grants from $75k to $150k. This could provide a grant funding opportunity to advance Basin Plan initiatives with a reduced cost to the community of Los Osos. Potential scope items for the RWFPS could include:

- Transient Groundwater Model Development
- Soil Aquifer Treatment (SAT) Assessment
- Broderson/Creek Discharge Scenario Analysis
- Stormwater and Perched Water Recovery Project – Feasibility Study
- Adaptive Management Groundwater Modeling
- RWFPS Report Development

Status of Basin Plan Implementation and Funding Plans

The BMC has requested an integrated funding plan for project implementation and BMC monitoring and administration. Discussions are expected to continue into the coming months with the following goals:

- Funding plan for on-going BMC administration and monitoring, with options for funding in the absence of a community-wide special tax.
- Funding and execution plan for Basin Infrastructure Programs B and D, as appropriate. Note that funding already exists for Programs A and C.
- Additional progress for plans to supplement basin yield and provide for the community's needs consistent with the Los Osos Community Plan, including creek discharge, storm water recovery, or other supply augmentation projects.
- Clear governance structure to accomplish objectives, including detailed consideration of a JPA if needed as discussed in previous meetings.

Recent discussions with BMC Party Staff have identified that the BMC could benefit from a Strategic Planning initiative to establish a common baseline understanding for the roles and responsibilities and to guide future actions and investments.

JPA Formation: Staff level discussions focused on need for, and benefits of, forming a JPA, see table below, to assist with implementation of the Basin Plan.

Table 1. JPA Formation Considerations

Pros	**Cons**
• Common ownership of basin assets	• Complexity and community perception
• Ability to contract for services as an entity	• Potential for more difficulty in formal proceedings - less nimble
• GSWC can participate as a director	• More difficult to exit/change if needed
• Could cover entire limits of basin for funding	
• If carefully done, incremental costs could be limited to insurance and up-front legal expenses	
• Ability to carry-over funds from one budget year to another	

As indicated in previous meetings, it was determined that GSWC could serve as an appointed JPA director without forming a separate Mutual Water Company entity, which would simplify the process.

Recent discussions with BMC Party Staff indicate that the BMC Parties would like to execute the Strategic Planning initiative to first develop a roadmap for the BMC and then evaluate the potential formation of a JPA or other governance structure once there is a more defined plan for future BMC initiatives.

Program B Implementation Process and Funding: The existing nitrate removal facility owned by GSWC is intended to serve existing development, so it is likely that a Program B facility intended for future development would be jointly owned by either a JPA or by one of the public agencies.

- Likely next steps for the implementation of Program B projects include:
    - Technical Studies in 2020 to validate and update cost estimates
    - Siting Studies to identify project locations
    - AB 1600 analysis to evaluate funding options relative to future development in coordination with the Los Osos Community Plan
    - Environmental Review (CEQA)
    - Land Use Permitting (e.g. Coastal Development Permits, etc.)

BMC staff is continuing to investigate funding frameworks that would provide for equitable implementation of the Basin Plan. The Funding and Organization Studies Budget Item (Budget Item 10) in the proposed CY 2020 BMC Budget would provide the BMC with funds to coordinate with consultants to update basin plan project cost estimates, review different governance/funding alternatives and develop recommendations for the governance structures and funding mechanisms necessary to implement the Basin Plan.

Land Use Planning Process Update

Los Osos Community Plan: The Board authorized preparation of this update on December 11, 2012. A Public Review Draft Community Plan was released in January 2015. A series of community outreach meetings to unveil the Community Plan were conducted in the Spring of 2015. The plan was prepared to be consistent and coordinated with the draft groundwater basin management plan and the draft Habitat Conservation Plan. The plan may be reviewed at the Department of Planning and Building, the Los Osos Library and on the Department's website. The draft Environmental Impact Report was released on September 12, 2019, comments were due December 11, 2019. A Community Meeting on the Draft Environmental Impact Report for the Los Osos Community Plan and the Habitat Conservation Plan and associated Environmental Documents was held on October 28, 2019. Staff is currently finalizing the Environmental Impact Report and preparing a Public Hearing Draft. Planning Commission hearings are expected to begin this summer 2020.

Habitat Conservation Plan: The public review draft HCP and the associated Environmental Impact Report and Environmental Assessment was released on October 2, 2019 and the comment period ended on November 18, 2019. A Community Meeting on the HCP and associated Environmental Documents as well as the Draft Environmental Impact Report for the Los Osos Community Plan was held on October 28, 2019. Staff is currently working on finalizing the Environmental Documents and the Management Plan for the Preserve system.

Accessory Dwelling Units (ADU):

On January 28, 2020, the Board of Supervisors considered and adopted a resolution to amend Title 22 and 23 for the replacement of the Secondary Dwelling Ordinance with a new ordinance for Accessory Dwelling Units (ADUs). Final action on the amendments to Table "O" of the Coastal Framework for Planning was originally scheduled to be taken by the Board of Supervisors on April 7, 2020, but has been postponed due to the COVID-19 pandemic.

The adopted ordinance would allow ADUs to be established in the Community of Los Osos. It is anticipated that the amendments to Title 23 and Table "O" of the Coastal Framework for Planning will be going before the California Coastal Commission for approval later this year. Until such amendments are approved by the California Coastal Commission, the County will review ADU applications for consistency with State ADU law, which would allow for the construction of ADUs in the Coastal Zone.

Los Osos Wastewater Project Flow and Connection Update

Wastewater Flows: Influent flows to the treatment facility averaged 0.50 MGD for the month of April, and 0.49 MGD since January 1, 2020

Recycled Water: Sea Pines Golf Course received:

- 620,000 gallons of recycled water in January;
- 1,412,000 gallons in February; and
- 1,131,400 gallons in March
- 2,355,100 gallons in April
- 3,972,800 gallons in May

Effluent Disposal: Effluent disposal was:

- 40.80 AF to Broderson and 0.02 AF to Bayridge Leach Fields in January;
- 37.20 AF to Broderson and 0.00 AF to Bayridge Leach Fields in February;
- 45.68 AF to Broderson and 0.08 AF to Bayridge Leach Fields in March;
- 35.46 AF to Broderson and 0.99 AF to Bayridge Leach Field in April;
- 32.92 AF to Broderson and 1.07 AF to Bayridge Leach Field in May; and
- The cumulative effluent disposal for the calendar year as of 6/1/2020 was 194.22 AF.

Enforcement: A list of properties that were not connected were transferred to County Code Enforcement and Notice of Violations were issued last year in Feb. 2019. That list was about 70 properties. As of 4/2/2020, the sewer service area had a 99.2% connection status with a total of 44 properties not yet connected. Of those, one is not required to connect because there is no structure (demolished), 24 have expired building permits, and the rest have an open Code Enforcement case. Expired permits did not receive a Code Enforcement case because those properties have their own noticing process through the Building Department which, if not corrected, could result in a Notice of Violation.

The County has assigned new staff in code enforcement to Los Osos. They will be reviewing the status of cases that were issued earlier last year.

Water Conservation Update

Rebate Update: There has been an increase of 1 washing machine rebate since last report.

For this fiscal year, there have been rebates for six (6) toilets, one (1) showerhead, four (4) washing machines and (1) one hot water recirculatory. Average indoor water usage for 2019 was estimated to be 40 gpd per person.

Cannabis and Hemp Information

Hemp: According to the Ag Commissioners Office there is one Hemp grow located at APN 067-011-057 with approximately 5 acres planted outdoor and .1 acre indoor, total 5.1 acres. Hemp is not currently regulated under a land use permit, therefore no DRC tracking number has been assigned.

Cannabis: The County is processing DRC2018-00215 a Development Plan to establish a cannabis cultivation site. The County is requiring the applicant to offset the increased water use for the project, and the current proposal is to retrofit urban reverse osmosis systems to increase their efficiency. The total proposed offset volume is 3.5 acre feet per year. The Water Management Plan for the proposed Cannabis Cultivation Operation was shared with the BMC Board of Directors for reference.

Pending Task List for Executive Director

As requested at the January 2019 meeting, the following list of pending tasks has been created for BMC input and reference.

Task Description	Estimated Schedule	Budget Consideration
Seawater intrusion imaging in coordination with Cal Poly	Pending land owner approval	Minor – staff time only
8th/El Moro urban storm water recovery project	Proposal included January 2020 BMC agenda packet. This effort is being considered as part of WRFP grant and will be considered as part of CY 2020 BMC Budget	Included in proposed 2020 budget
Creek discharge project	SAT Consultant was authorized to proceed at the December 2019 BMC Meeting. However, NTP has not been issued pending the discussion regarding a potential WRFP Grant, see CY 2020 BMC Budget	Included in proposed 2020 budget

Sustainable Groundwater Management Act (SGMA)

SGMA Overview: The SGMA took effect on January 1, 2015.[1] SGMA provides new authorities to local agencies with water supply, water management or land use responsibilities and requires various actions be taken in order to achieve sustainable groundwater management in high and medium priority groundwater basins. Los Osos Valley Groundwater Basin (Los Osos Basin) was subject to SGMA based on the 2014 Basin Prioritization by the California Department of Water Resources (DWR) that listed the Los Osos Basin as high priority and in critical conditions of overdraft.[2]

Basin Prioritization: On December 18, 2019, DWR released the SGMA 2019 Basin Prioritizations. Basins or subbasins reassess to low or very low priority basins or subbasins are not subject to SGMA regulations. A summary of DWR's Final SGMA Prioritizations for the Los Osos Area Subbasin and Warden Creek Subbasin are listed below:

---

[1] On September 16, 2014, Governor Jerry Brown signed into law a three-bill legislative package, composed of AB 1739 (Dickinson), SB 1168 (Pavley), and SB 1319 (Pavley), collectively known as SGMA

[2] SGMA mandates that all groundwater basins identified by DWR as high- or medium-priority by January 31, 2015, must have groundwater sustainability agencies established by June 30, 2017. The act also requires that all high- and medium-priority basins classified as being subject to critical conditions of overdraft in Bulletin 118, as of January 1, 2017, be covered by groundwater sustainability plans, or their equivalent, by January 31, 2020. Groundwater sustainability plans, or their equivalent, must be established for all other high- and medium-priority basins by January 31, 2022.

- Los Osos Area Subbasin is listed as **very low** priority for SGMA[3] and in critical conditions of overdraft [4]
  - SGMA does not apply to the portions of Los Osos Basin that are adjudicated provided that certain requirements are met (Water Code §10720.8).
- Warden Creek Subbasin is listed as **very low** priority for SGMA[3]

For more information on DWR's basin boundary modification and prioritization process, please visit:
https://water.ca.gov/Programs/Groundwater-Management/Basin-Prioritization

[3] As noted by DWR, the priority for the subbasin has been set to very low (0 total priority points) as a result of conditions being met under sub-component C of the Draft SGMA 2019 Basin Prioritizations.
[4] Critical conditions of overdraft have been identified in 21 groundwater basins as described in Bulletin 118 (Water Code Section 12924). Bulletin 118 (updates 2003) defines a groundwater basin subject to condition of critical overdraft as: "A basin is subject to critical conditions of overdraft when continuation of present water management practices would probably result in significant adverse overdraft-related environmental, social, or economic impacts."

TO: Los Osos Basin Management Committee

FROM: Dan Heimel, Executive Director

DATE: June 17, 2020

SUBJECT: Item 6a – Draft Land Use Planning Documents Presentation

Recommendations

Recommendation: Receive a presentation from County Planning Staff on the Draft 2016-18 Resources Summary Report, Growth Management Ordinance and Los Osos Community Plan, review the Draft Program U and C Sustainable Yield Update Technical Memorandum and provide direction to staff.

Discussion

The County of San Luis Obispo Department of Planning and Building (County) has prepared draft provisions of the Resource Summary Report, Growth Management Ordinance and the Los Osos Community Plan. A summary of the draft provisions is provided in the attached document.

Public review drafts of the planning documents are available at: www.slocounty.ca.gov/LosOsosPlan.aspx. The public comment period for these planning documents is open until June 26th, 2020 and comments can be provided to khensley@co.slo.ca.us.

The Board of Supervisors Hearing dates for the Resource Summary Report, Growth Management Ordinance and the Los Osos Community Plan are outlined below:

July 7, 2020 Board of Supervisors Meeting – Submittal of revised RSR and introduction of GMO amendment
August 18, 2020 Board of Supervisors Meeting (tentative) – Hearing to consider adopting GMO amendment and Los Osos Community Plan

County Planning Staff will provide an overview presentation to the BMC.

Basin Plan Program U and C Sustainable Yield Update

To account for changing conditions and additional data that has been obtained since the development of the Basin Plan in 2015, the Los Osos Community Services District (LOCSD) requested that Cleath-Harris Geologist (CHG) prepare an update to the Basin Plan Program U (Urban Water Reinvestment) and Infrastructure Program C (Expansion Wells) sustainable yield estimates.

The results for the updated Program U and C Sustainable Yield Estimates and comparison to the calculations from the 2015 Basin Plan are summarized in the following table:

Program E+AC+U Yield Estimates		
	2015 Basin Plan	**Updated Program U & C**
Maximum Sustainable Yield (AFY)	3,000	2,810
80% of Maximum Sustainable Yield (AFY)	2,400	2,250
Assumed Agriculture Demand (AFY)	750	750
Average Urban Demand (AFY)	1,480	1,350
Total Estimated Demand (AFY)	2,230	2,100
Basin Yield Metric	0.74	0.75
Marginal Available Water Supply (AFY)	170	150
Estimated Water Level Metric[1] (ft)	8	8
Estimated Chloride Metric[1] (mg/L)	<100	<100
[1]Estimated Water Level and Chloride Metric values for (E+AC+U Program Combination) at steady-state conditions. Most recent estimates anticipate that the Basin will reach the assumed Steady-State conditions for the Water Level Metric in 2033.		

Additional details regarding the updated Program U & C Sustainable Yield estimates are provided in CHG's Draft Technical Memorandum (attached) for the BMC's review and consideration. It is recommended that the BMC provide the updated Yield Estimates to County Planning for inclusion in the Land Use Documents.

COUNTY OF SAN LUIS OBISPO
DEPARTMENT OF PLANNING & BUILDING
TREVOR KEITH, *DIRECTOR*

To: Los Osos Basin Management Committee
From: County Department of Planning & Building, Long Range Planning Division
Date: June 17, 2020
Subject: Presentation regarding draft provisions of the Resource Summary Report, Growth Management Ordinance and Los Osos Community Plan

Background

Although the Stipulated Judgement for the Los Osos Basin states that "nothing in this Stipulated Judgment, the Basin Management Committee's authority established herein, or the Basin Plan is intended to modify or otherwise restrict the County's land use decision making authority," County land use planning documents must take into consideration the available water supply. Thus, in addition to utilizing the Los Osos Basin Plan ("Basin Plan") and the Committee's annual reports in the preparation of such documents, the County has also provided periodic presentations to / received input from the Committee. For example, County staff previously presented proposed language for the update to the Los Osos Community Plan and the Committee elected to send a comment letter in response on or about June 2017. Consistent with this historical practice and after discussions with the Executive Director, County Planning is providing a presentation on various draft land use planning documents to the Committee during the comment period and prior to their finalization and consideration by the Board of Supervisors.

Public Comment Period

Please email comments to khensley@co.slo.ca.us. Comments received by June 26, 2020 will be considered in staff report. Comments may be submitted to respective bodies until the dates listed below. Planning welcomes and encourages comments from both the Committee as well as from each of its respective members.

Dates

July 9, 2020 Planning Commission – Growth rate and Los Osos Community Plan
August 11, 2020 Board of Supervisors – Submittal of revised Resource Summary Report
August 18, 2020 Board of Supervisors (may be delayed) – Hearing to consider adopting growth rate and Los Osos Community Plan

Attached:

1) Presentation
2) Revised Los Osos water supply section of 2016-2018 Resource Summary Report
3) Growth Management Ordinance amendment
4) Growth rate calculations
5) Los Osos Community Plan, Los Osos Groundwater Basin Standard

Discussion

Draft Land Use Planning Documents

County Planning staff requests that the Committee receive a presentation on the following, all of which are discussed in more detail below:

1) Draft Revisions to the 2016-2018 Resource Summary Report ("RSR") to better incorporate data from the 2016-2019 Basin Plan annual monitoring reports, which propose a Level of Severity III for the Basin Plan Area water supply, and
2) Draft revisions to the Growth Management Ordinance which propose a growth rate for new dwelling units in the Los Osos Urban Area, with some exemptions, that would remain 0% until the Basin Plan programs recommended for immediate implementation are complete and then 1.3% for 5 years, prioritizing the sewer service area waitlist, and
3) Provision in the draft Los Osos Community Plan that prohibits new non-residential development until the Basin Plan programs recommended for immediate implementation are complete.

Underlying Understanding Regarding Basin Plan Programs

The above-identified documents reflect Planning's understanding from the Basin Plan that the following six programs are recommended for immediate implementation to meet existing water demand and halt and reverse seawater intrusion:

1. Program "M" – Groundwater Monitoring
2. Program "E" – Urban Water Use Efficiency
3. Program "U" – Urban Water Reinvestment
4. Program "A" – Infrastructure Program A
5. Program "C" – Infrastructure Program C
6. Program "P" – Wellhead Protection

Planning is aware that at least two expansion wells remain to be completed to shift groundwater production into the Upper Aquifer and inland: one well for Program "A" and one or two wells for Program "C" based on the groundwater-pumping capacity of the first expansion well in Program C.

If the Committee does not intend to proceed with completing these programs and/or intends to pursue alternate programs or measures either under the adaptive management provisions of the Basin Plan or through an amendment to the Basin Plan based on the status of the Basin (e.g., changes to the Sustainable Yield based on the results of what has been completed or changes in water use), this information would be helpful to know as Planning finalizes these documents. Planning has tried to account for the possibility of such revisions through reference to the Committee's ability to engage in adaptive management (see below).

RSR and Level of Severity III Designation

The RSR assigns a LOS designation to a water supply based on the timeframe for the remaining estimated dependable water supply for forecasted demand – for coastal zone areas, the criteria is LOS I for 9 years, LOS II for 7 years, and LOS III if the existing demand already equals or exceeds the estimated existing dependable supply.

Although much progress has been made in Los Osos with construction of the Los Osos Water Reclamation Facility to remove the nitrate contamination point source, implementation of water use efficiency technologies to reduce water demand, reinvesting treated wastewater back into the hydrologic cycle, and construction of new wells, and the annual monitoring shows the seawater intrusion front has retreated from its 2016 position and a mounding effect at the Broderson leach field, the revised RSR continues to recommend a Level of Severity III for the Los Osos Basin Plan Area water supply because the programs recommended for immediate implementation in the Basin Plan to meet existing demand and halt and reverse seawater intrusion have not all been completed. Also, the estimated water supply based on modeling of the Basin is being verified with ongoing monitoring. The LOS may be reduced as the programs are completed and depending on monitoring results. The revised Los Osos water supply section of the RSR circulated for public review is included in Attachment 2.

Los Osos Community Plan and Growth Management Ordinance

Restrictions on New Development Until 6 Basin Plan Programs are Complete

The draft Los Osos Community Plan and proposed amendments to the Growth Management Ordinance ("GMO") would restrict new development until the six Basin Plan Programs recommended for immediate implementation are complete, as certified by the Board of Supervisors in an adopted resolution, accounting for program modifications made through the Basin Plan's adaptive management provision. Affordable housing, accessory dwelling units, agricultural worker dwellings, and replacement dwellings would be exempt from these restrictions.

Growth Rate for New Dwelling Units in Urban Area after 6 Programs are Complete

The proposed amendments to the GMO would establish a growth rate for new dwelling units in the Los Osos Urban Area of 1.3% for five years once the six programs are certified complete by the Board of Supervisors. Affordable housing, accessory dwelling units, agricultural worker dwellings, and replacement dwellings would be exempt from these restrictions.

The advisory memo in Attachment 4 describes the growth rate calculation in detail. The draft Los Osos Community Plan estimates 6,321 existing dwelling units and 8,182 dwelling units at buildout for a 20-year planning horizon. The 1.3% growth rate was calculated using the formula for compounding annual growth rate because the GMO specifies the annual increase in new dwelling units shall be based on the number of existing units, which will compound over time. The 20-year buildout timeframe of the draft Los Osos Community

Plan was used in the formula to allow the growth rate to be sufficient to allow residential buildout if maintained beyond the initial 5-year time period. 35% of the 1.3% annual increase is reserved for multi-family dwellings, and 80% of the annual increase allowed for single family dwellings is reserved for use within the sewer service area, with preference given to the existing waitlist for vacant lots in the sewer service area that have not been able to build until the Los Osos Community Plan and Community-Wide Habitat Conservation Plan are adopted.

The proposed growth rate would allow an annual increase of 82-86 new dwelling units each year, 11 outside and 71-75 within the sewer service area with an estimated 12-13 acre-feet per year (AFY) annual increase in water demand for five years, resulting a total increase of 421 new dwelling units and 63 AFY estimated increase in water demand over five years.

The proposed growth rate would allow for all of the dwelling units on the existing sewer service area waitlist (215 single family and 130 multi-family) to be built within 5 years of the Board certifying the completion of the Basin Plan Programs recommended for immediate implementation, if the maximum allocation of allowed new dwelling units is used each year.

The 63 AFY proposed estimated increase in residential urban water demand over five years is significantly less than the 500 AFY difference between 80% of the estimated sustainable basin yield once the six Basin Plan programs are complete (2,400 AFY) and 2019 total groundwater extraction (1,900 AFY).

Annual Review of Growth Rate

The draft Los Osos Community Plan and GMO amendments would:

- Require the growth rate to be reviewed annually based on the most recent annual monitoring report and adjusted if there are significant:
    a. Changes in water usage rates for existing development,
    b. Updates to the basin model,
    c. Implementation of additional Basin Plan programs to increase sustainable yield, or
    d. Evaluation that the Basin Plan programs are being less or more effective than predicted, including adjustments to the programs made through adaptive management; and
- Require the growth rate to be re-established after five years.

Flowchart for New Development

New Development in the Los Osos Urban Area

Now (June 2020)

Wastewater treatment plant cannot serve undeveloped parcels

Waitlist of 215 single family units and 130 multi-family units
to apply for building permits inside the sewer service area

Average of 2 new dwellings per year outside the sewer service area

Los Osos Community Plan and Habitat-Conservation Plan Adopted
Growth Management Ordinance Amendment Adopted

Wastewater treatment plant may serve undeveloped parcels

No new development except exempt dwellings*

Basin Plan Programs M+E+U+AC+P Implemented

1.3% growth rate for 5 years for new dwelling units*
No restriction on non-residential growth

82-86 new dwelling units per year, 11outside and 71-75 within the sewer service area
estimated 12-13 AFY annual increase in water demand

421 new dwelling units and 63 AFY estimated increase in water demand by year 5

New Basin Plan Programs Implemented
Basin Management Committee Criteria for New Development Updated

Re-evaluate growth rate

* Exempt dwellings include ADUs, affordable housing, agricultural worker dwellings, and replacement dwellings.

Planning Provisions Related to the Los Osos Water Supply

Los Osos Basin Management Committee
June 17, 2020

1

Background

- *The Stipulated Judgment, Basin Plan, or Basin Management Committee do not restrict or modify the County's land use decision making authority.*
- County Planning must consider the available water supply for Los Osos in the following land use planning documents:
  - Resource Summary Plan
  - Growth Management Ordinance
  - Los Osos Community Plan
- Planning referenced the Los Osos Basin Plan and annual monitoring reports for the most recent information.
- The Basin Management Committee may comment on draft land use planning documents.

COUNTY OF SAN LUIS OBISPO www.slocounty.ca.gov

2

Programs for Immediate Implementation

The land use planning documents reflect Planning's understanding from the Basin Plan that six programs are recommended for immediate implementation:

1. **Program "M" – Groundwater Monitoring**

   In place, ongoing annual reporting.
2. **Program "E" – Urban Water Use Efficiency**

   99% complete, 44 properties remain to be retrofitted and connected to the Los Osos Water Reclamation Facility.
3. **Program "U" – Urban Water Reinvestment**

   In place, ongoing supply of treated wastewater from the LOWRF to the Broderson and Bayridge Estates leach fields and Sea Pines Golf Course. New adaptive management efforts include creek discharge program and storm water recovery.

COUNTY OF SAN LUIS OBISPO www.slocounty.ca.gov

3

Programs for Immediate Implementation

4. **Program "A" – Infrastructure Program A**

   One expansion well to be constructed.
5. **Program "C" – Infrastructure Program C**

   One or two expansion wells to be constructed, depending on groundwater-pumping capacity of the first expansion well.
6. **Program "P" – Wellhead Protection**

   Drinking Water Source Assessment and Protection surveys to be completed.

Overall Status:

- Not complete. At least two expansion wells remain to be completed.
- Modifications may be made through adaptive management or revising the Basin Plan.

COUNTY OF SAN LUIS OBISPO www.slocounty.ca.gov

4

Water Supply for Marginal Growth

- The Basin Plan estimates marginal growth would be allowed if water demand is less than 80% of sustainable yield.
- 2019 production of 1,900 AFY was less than the demand projected in the Basin Plan with Programs E+U+AC completed.

Table 46. Most Likely Program Combinations

Combination	Water Demand†	Sustainable Yield$_X$†	Basin Yield Metric	Water Level Metric‡	Chloride Metric*
Existing Population Scenario					
E+U+AB	2,230	3,170	70	10	60
E+U+AC	2,230	3,000	74	10	65
E+U+A+S	1,980	2,650	75	10	65
Buildout Population Scenario					
E+UG+ABC	2,380	3,350	72	9	70
E+U+ABCD	2,880	3,500	82	8	85
E+UG+ABCD	2,380	3,500	68	10	60
E+U+A+S	2,130	2,650	80		

† Expressed in AFY. ‡ Expressed in feet msl. * Expressed in mg/l.

COUNTY OF SAN LUIS OBISPO www.slocounty.ca.gov

5

Program Modifications

- If the Basin Management Committee does not intend to proceed with completing these six programs and/or intends to pursue alternative programs, this information would be helpful to know as Planning finalizes land use planning documents and updates them in the future.

COUNTY OF SAN LUIS OBISPO www.slocounty.ca.gov

6

Potential Programs for Buildout

Potential programs not yet initiated that could accommodate buildout:

- **Program "B" – Infrastructure Program B**
  Construct a community nitrate removal facility and additional purveyor wells to maximize production from the Upper Aquifer.
- **Program "D" – Infrastructure Program D**
  Construct additional purveyor wells to shift groundwater production within the Lower Aquifer inland to induce less seawater intrusion.
- **Program "G" – Agricultural Water Reinvestment**
  Offset agricultural pumping with recycled treated wastewater.
- **Program "S" – Supplemental Water**
  Offset groundwater pumping with supplemental sources
- **Adaptive Management Provisions**

7

Potential Programs for Buildout

Combination of Basin Plan Programs	New Program(s) to be Completed	Estimated Buildout Demand (AFY)[1]	Estimated Sustainable Basin Yield (AFY)	Projected Basin Metrics[2]		
				Basin Yield	Water Level (feet above msl[3])	Chloride (mg/L)
M+E+U+AC+P	-	2,880	3,000	96	NE	NE
M+E+U+ABC+P	B	2,880	3,350	86	NE	NE
M+E+UG+ABC+P	B + G	2,380	3,350	72	9	70
M+E+U+ABCD+P	B + D	2,880	3,500	82	8	85
M+E+UG+ABCD+P	B + D + G	2,380	3,500	68	10	60
			Target Basin Metric:	<80	8+	<100

Notes
(1) Estimated buildout demand for the Basin Plan Area, based on the Estero Area Plan. The buildout demand for the Los Osos Community Plan is less than the Estero Area Plan.
(2) Source: Basin Plan, Table 46 Most Likely Program Combinations
(3) msl = mean sea level
NE = Not evaluated in the Basin Plan.

8

Resource Summary Report

- Assigns Level of Severity ("LOS") to a water supply based on the timeframe for the remaining estimated dependable water supply for forecasted demand. For coastal areas:
  - LOS I – 9 years remaining supply
  - LOS II – 7 years remaining supply
  - LOS III – existing demand already equals or exceeds supply
- The revised 2016-2018 Resource Summary Report conservatively recommends a **Level of Severity III** for the Los Osos Basin Plan Area water supply because:
  - Six Basin Plan programs recommended for immediate implementation are not all completed.
  - Annual monitoring is verifying program effectiveness.
- Level of Severity may be revised down as programs are completed and depending on basin monitoring results.

COUNTY OF SAN LUIS OBISPO www.slocounty.ca.gov

9

New Development in Los Osos

Now (June 2020)

Wastewater treatment plant cannot serve undeveloped parcels

Waitlist of 215 single family units and 130 multi-family units to apply for building permits inside the sewer service area

Average of 2 new dwellings per year outside the sewer service area

↓

Los Osos Community Plan and Habitat-Conservation Plan Adopted
Growth Management Ordinance Amendment Adopted

Wastewater treatment plant may serve undeveloped parcels

No new development except exempt dwellings*

* Exempt dwellings include ADUs, affordable housing, agricultural worker dwellings, and replacement dwellings.

COUNTY OF SAN LUIS OBISPO www.slocounty.ca.gov

10

New Development in Los Osos

Basin Plan Programs M+E+U+AC+P Implemented

1.3% growth rate for 5 years for new dwelling units*
No restriction on non-residential growth

82-86 new dwelling units per year, 11outside and 71-75 within the sewer service area
estimated 12-13 AFY annual increase in water demand

421 new dwelling units and 63 AFY estimated increase in water demand by year 5

New Basin Plan Programs Implemented
Basin Management Committee Criteria for New Development Updated

Re-evaluate growth rate

* Exempt dwellings include ADUs, affordable housing, agricultural worker dwellings, and replacement dwellings.

COUNTY OF SAN LUIS OBISPO www.slocounty.ca.gov

11

Questions and Comments

- Email khensley@co.slo.ca.us.
- Comments received by June 26, 2020 will included in staff report.
- Comments may be submitted until the dates listed below to be considered by the respective bodies.
- Comments are welcome from both the Committee and each of its respective members.

- **July 9, 2020 – Planning Commission**
  - GMO growth rate and Los Osos Community Plan.
- **August 11, 2020 – Board of Supervisors**
  - Submittal of revised 2016-2018 RSR and introduction of GMO.
- **August 18, 2020 (tentative) – Board of Supervisors**
  - GMO growth rate and Los Osos Community Plan.

COUNTY OF SAN LUIS OBISPO www.slocounty.ca.gov

12

2016 -2018

Resource Summary Report

San Luis Obispo County General Plan

Volume II of II – Supporting Data and Analysis

Adopted by the Board of Supervisors March 12, 2019

PUBLIC REVIEW DRAFT

District 2 Addition

Los Osos Water Supply Section

Public comments accepted until June 26, 2020.

Please email comments to khensley@co.slo.ca.us.

Introduction

On March 12, 2019, the Board of Supervisors approved the 2016-2018 Resource Summary Report. The Board's approval included the removal of all references to resources within Board of Supervisor District 2 due to concerns about the water supply sections. On July 7, 2020, the Board of Supervisors will consider revisions to this 2016-2018 Resource Summary Report to add District 2 information back into the report. Updated information from the 2019 annual monitoring report for the Los Osos Groundwater Basin is also included for consideration in evaluating the Recommended Level of Severity Designation for Los Osos water supply.

Level of Severity Criteria

WATER SUPPLY

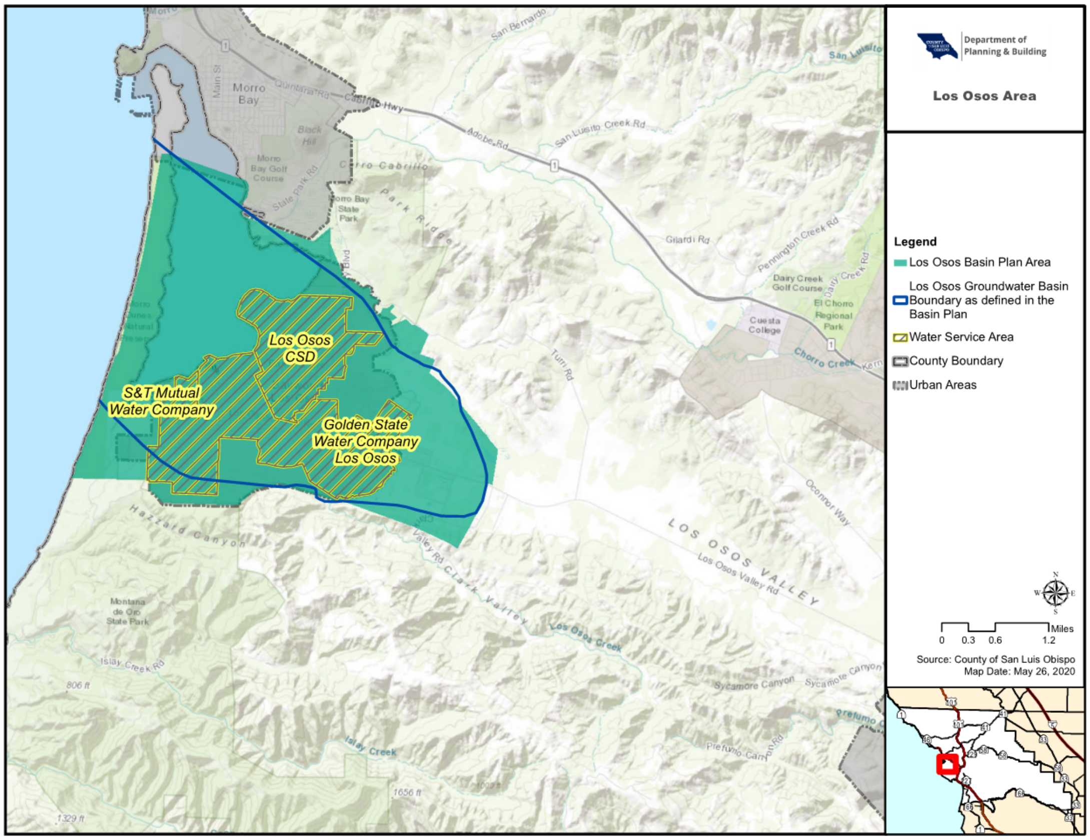
Level of Severity	Water Supply Criteria*	
	Coastal Zone	Inland Areas
I	Timeframe for remaining dependable water supply is 9 years	Water demand projected over 20 years equals or exceeds the estimated dependable supply. LOS I provides five years for preparation of resource capacity studies and evaluation of alternative courses of action.
II	Timeframe for remaining dependable water supply is 7 years	Water demand projected over 15-20 years (or other lead time determined by a resource capacity study) equals or exceeds the estimated dependable supply.
III	Demand equals or exceeds estimated dependable supply	Water demand projected over 15 years (or other lead time determined by a resource capacity study) equals or exceeds the estimated dependable supply, OR The time required to correct the problem is longer than the time available before the dependable supply is reached.

*These criteria do not consider the cyclical effects of drought or above-average rainfall.

Recommended Levels of Severity

Los Osos Area

Figure II-10 –Water Purveyors Serving the Los Osos Area



The Los Osos Valley Groundwater Basin (DWR Bulletin 118 No. 3-008)[1] is the primary source of water supply in the Los Osos area. Groundwater extractors are the three water purveyors in the urban area – Golden State Water Company, S&T Mutual Water Company, and the Los Osos Community Services District -- and overlying private well owners, including rural residents, community facilities and agricultural operations. The 2015 Updated Basin Plan for the Los Osos Groundwater Basin ("Basin Plan") was prepared by the three water purveyors, along with the County, as a part of the settlement of groundwater rights litigation, which was approved by the San Luis Obispo Superior Court in October 2015. The purveyor boundaries, Basin Plan management area, and the locally defined groundwater basin boundary used in the Basin Plan are shown in the figure above.

[1] The Final 2018 Basin Boundary Modifications were released by the California Department of Water Resources on February 11, 2019, which identified two subbasins of the Los Osos Valley Groundwater Basin: the Los Osos Area Subbasin (No. 3-008.01) and the Warden Creek Subbasin (No. 3-008.02).

The section of the groundwater basin assessed by the Basin Plan consists of five layered coastal aquifers. Historically the urban area relied on septic systems, which resulted in nitrate contamination in the Upper Aquifer. Overpumping in the Lower Aquifer contributed to seawater intrusion. The Los Osos Water Recycling Facility (LOWRF) community sewer/recycled water system became operational in 2016. This facility allowed the community to move off of individual septic systems in the majority of the urban area, reducing the nitrate loading on the basin, and also providing tertiary-treated effluent to offset basin uses and recharge the basin, which is projected to push back the seawater intrusion front over time. Nearly 100% of the community within the sewer service area are now connected to the community wastewater system, which is discussed in greater detail in Chapter III -- Wastewater. With the point source of contamination significantly reduced, the nitrate contamination in the Upper Aquifer is expected to degrade over time.

The Basin Plan analyzed the impacts of implementing various combinations of programs through use of a groundwater model for the multiple aquifers and recommended programs for immediate implementation to increase the sustainable basin yield to accommodate the existing demand and halt and reverse seawater intrusion over time. The Basin Plan also identified possible combinations of programs to be implemented to accommodate buildout demand. The annual monitoring reports prepared for the Basin Management Committee provide updates on the program implementation status and program modifications made through the Plan's adaptive management provision. The 2017, 2018, and 2019 annual reports show the seawater intrusion front moving back towards the coast from its position in 2016.

Los Osos Groundwater Basin - Sustainable Yield

The sustainable basin yield refers to the volume of groundwater that can be extracted while halting and reversing seawater intrusion. The Basin Plan estimated the sustainable basin yield as 2,450 AFY for a "No Programs" scenario without implementation of any of the recommended programs in the Basin Plan. The Basin Plan recommends six (6) programs for immediate implementation. These programs are modeled to increase sustainable basin yield to 3,000 AFY. The 2017 annual report estimates sustainable yield as 2,760 AFY accounting for the two incomplete Program C wells with the rest of the immediate programs complete. The Basin Plan identifies four (4) additional programs that could be implemented to increase the sustainable yield to accommodate buildout demand and buffer for uncertainties of climate change.

<u>Basin Plan Programs for Immediate Implementation (increase basin yield to 3,000 AFY)</u>

The Basin Plan recommends the following programs for immediate implementation. The goal and status of each are summarized below, based on information from the 2017, 2018, and 2019 annual monitoring reports.

- Program "M" – Groundwater Monitoring
- Program "E" – Urban Water Use Efficiency
- Program "U" – Urban Water Reinvestment
- Program "A" – Infrastructure Program A
- Program "C" – Infrastructure Program C
- Program "P" – Wellhead Protection

Program "M" – Groundwater Monitoring (Complete). The groundwater monitoring program includes annual reporting on metrics to measure nitrate impacts to the Upper Aquifer, seawater intrusion within the Lower Aquifer, and the effect of implemented Basin Plan programs and adaptive management efforts, with flexibility to adapt over time. This program is complete and subject to ongoing adaptive management. In 2019 an additional monitoring well was constructed in Cuesta by the Sea to improve assessment of the seawater intrusion front.

Program "E" – Urban Water Use Efficiency (99% Complete). This program retrofits commercial and institutional uses and requires residential properties to retrofit existing fixtures to be water efficient before connecting to the LOWRF and also provides rebate programs to incentivize further conservation efforts. At the end of 2017, only 177 properties remained to be retrofitted within the sewer service area. As of April 2020, only 44 properties remained to be retrofitted and connected to the sewer (CHG, 2018, 2020). More efficient urban water use allows purveyors and well users to decrease the amount of groundwater extracted from the Basin to stabilize the freshwater-seawater interface.

Program "U" – Urban Water Reinvestment. This program reinvests treated wastewater from the LOWRF back into the hydrologic cycle to reduce extraction volumes and reverse seawater intrusion over time. In 2017, this program came online and 452 AFY of recycled water from the LOWRF was reinvested to the Broderson (445 AFY) and Bayridge Estates (7 AFY) leach fields The average wastewater flows were 200 AFY less than the anticipated volume of 780 AFY (CHG, 2018). In 2018, 505 AFY of recycled water was reinvested to the Broderson (486 AFY) and Bayridge Estates (20 AFY) leach fields (CHG, 2019). In 2019, 516 AFY of recycled water was reinvested to the Broderson (431 AFY) and Bayridge Estates (14 AFY) leach fields and 71 AFY to the Sea Pines Golf

Course. The mounding at the leach fields is being monitored and is projected to take years to form; however, preliminary signs of a small mound were detected hydraulically downgradient of the Broderson leach field beginning in June 2017. (CHG, 2020). As part of Basin Plan adaptive management, as of 2019, the Basin Management Committee approved a contract for a Creek Discharge Program for recycled water from the LOWRF and approved funding for an urban storm water recovery project (CHG, 2020).

Program "A" – Basin Infrastructure Program A. Program A supports the mitigation of seawater intrusion by shifting groundwater production from the Lower Aquifer to the Upper Aquifer to the greatest extent practicable without construction of large-scale nitrate removal facilities. One Upper Aquifer well on 8th Street remains to be complete, although it is fully funded and the design in complete (CHG, 2020).

Program "C" – Basin Infrastructure Program C. Program C shifts groundwater production within the Lower Aquifer from the Western Area to the Central Area with three expansion wells and purveyor interconnection to mitigate seawater intrusion. The first expansion well at Los Olivos was completed, resulting in an estimated increase in basin yield of 110 AFY (CHG, 2017). Two more wells remain to be completed. One well may be deferred per the adaptive management process (CHG, 2020).

Program "P" – Wellhead Protection. This program manages activities within a delineated source area or protection zone around drinking water wells to protect water quality. This program consists primarily of the purveyors conducting Drinking Water Source Assessment and Protection surveys for each of their wells. The purveyors have deferred performing the surveys (CHG, 2020).

The status of the Basin Plan Programs recommended for immediate implementation is as follows:

- Program E - 177 properties remained to be retrofitted and connected to the LOWRF at the end of 2017 and 44 properties as of April 2020.
- Program U – Reinvestment volume from the LOWRF was 200 AFY less than projected in 2017 and 264 AFY less than projected in 2019. Adaptive management efforts include a creek discharge program and storm water recovery project.
- Program A - One well (8th Street) needed to be completed at the end of 2017. The well still remained to be completed and was fully funded and designed at the end of 2019. The well is anticipated to be complete by 2021.
- Program C - Two wells needed to be completed at the end of 2017 and 2019. One well may be deferred through the adaptive management.

- Program P - Surveys still needed to be completed at the end of 2017 and 2019.

Additional Basin Plan Programs (increase basin yield to meet buildout)

The Basin Plan identifies the following programs that could be implemented to increase the sustainable basin yield to accommodate buildout demand and buffer for uncertainties such as climate change. The goal and status of each are summarized below, based on information from the 2017, 2018, and 2019 annual monitoring reports.

- Program “B” – Basin Infrastructure Program B
- Program “D” – Basin Infrastructure Program D
- Program “G” – Agricultural Water Reinvestment
- Program “S” – Supplemental Water

Program “B” – Basin Infrastructure Program B. Program B is the construction of a community nitrate removal facility and additional purveyor wells to maximize production from the Upper Aquifer. This program is not complete. Completion of Program B is estimated to contribute 350 AFY and achieve a sustainable basin yield of 3,350 AFY.

Program “D” – Basin Infrastructure Program D. Program D is constructing additional purveyor wells to shift groundwater production within the Lower Aquifer from the Western Area to the Central and Eastern Areas to induce less seawater intrusion and increase the sustainable basin yield. This program is currently deferred. Completion of Program D is estimated to contribute 150 AFY and achieve a sustainable basin yield of 3,500 AFY.

Program “G” – Agricultural Water Reinvestment. Program G is to reinvest treated wastewater from the LOWRF or recycled water for agricultural purposes to reduce agricultural groundwater pumping. This program is not complete. Program G would not increase the sustainable yield of the basin.

Program “S” – Supplemental Water. Potential sources of supplemental water include rainwater harvesting, stormwater capture, greywater reuse, and groundwater desalination. Program S is not recommended in the Basin Plan but is estimated to decrease basin demand by 250 AFY or 750 AFY, although proposed updates to the urban water use efficiency program include offering rebates for rainwater harvesting and greywater reuse.

The Basin Plan recommends that total annual groundwater extraction not exceed 80% of the estimated sustainable annual basin yield to account for uncertainties in the projected basin yield and demand over time, such as reduced basin yield due to climate change or an increase in agricultural water demand. A 2013 study funded by the US EPA’s Climate Ready Water Utilities Project determined that reduced precipitation would have the most significant effect on basin yield, compared to increased temperature and sea-level rise. The sea-level rise projections that CHG considered correspond with the 5% probability scenario appropriate for medium risk averse decisions per the 2018 California Ocean Protection Council (OPC) Sea-Level Rise Guidance. The study projected the basin yield may reduce to 2,325 AFY by 2050 due to climate change with basin infrastructure improvements in place. The planning horizon for the draft Estero Area Plan Los Osos Urban Area (commonly known as the "Los Osos Community Plan") is 2040. If the programs needed to achieve buildout as identified in the Basin Plan are implemented by 2040, the climate change study estimates that keeping groundwater extraction within 80% of the estimated basin yield is enough buffer for the potential reduction in yield due to climate change.

The County is in the process of updating the Los Osos Community Plan. The Coastal Development Permit for the LOWRF prohibits vacant lots within the service area from connecting to the sewer until the Los Osos Community Plan and Community-Wide Habitat Conservation Plan are adopted. Vacant parcels within the sewer service area are prohibited from using septic systems, so they are unable to develop until the two planning documents are adopted. The County maintains a waitlist for vacant properties within this prohibition zone until they can apply for construction permits. As of May 14, 2020, there were 215 requests for single family dwellings and 130 requests for multi-family dwellings on the waitlist. In addition, the County Construction Ordinance (Title 19) requires new development to offset its water use at a 2:1 ratio by completing retrofit projects on existing uses within the groundwater basin. An average of two dwelling units are constructed each year, but the new development decreases overall demand.

The draft Los Osos Community Plan requires new dwelling units to be limited with the Growth Management Ordinance (Tile 26) based on the available sustainable basin yield as determined by the status of Basin Plan program implementation and annual monitoring of Basin Plan program effectiveness and water usage trends.

In June 2017, the County, acting as the GSA, initiated a hydrogeological basin characterization study of the fringe areas, to support a Basin Boundary Modification Request to DWR. In September 2018, the County submitted a Basin Boundary Modification Request to DWR, which included: (1) a jurisdictional basin subdivision to create two proposed subbasins (i.e., Los Osos Area subbasin and Warden Creek subbasin), and (2) a scientific basin exclusion to remove two non-basin areas from Bulletin 118 basin boundary. The proposed Los Osos Area subbasin underlies the adjudicated area, except for a minor northern fringe area, and is covered under the court approved Basin Management Plan. DWR approved the boundary modification in it 2019 Basin Prioritization. The Los Osos Area subbasin (3-008.01) and the Warden Creek subbasin (3-008.02) are classified as very low priority and are no longer subject to SGMA requirements. Therefore, the Level of Severity for water supply is assigned to the Los Osos Basin Plan Area.

Table II-14 – Los Osos Basin Plan Area[1]: Existing and Forecasted Water Supply and Demand *Based on the 1996 Coastal RMS Criteria*					
Demand	**Los Osos CSD**	**S&T Mutual Water Co.**	**Golden State Water Co.**	**Agriculture**	**Rural**
FY 2017/2018 Demand (AFY)[2]	470.0	32.6	443	(2)	(2)
2017 Demand (AFY)[3]	568	32	450	670	350
2018 Demand (AFY)[3]	522	32	464	670	340
2019 Demand (AFY)[3]	506	31	454	630	280
Forecast Demand in 7 Years (AFY)[5]	(4)			270-750	290
Forecast Demand in 9 Years (AFY)[5]	(4)			270-750	290
Buildout Demand (30 or More Years) (AFY)[5]	1,840			270-750	290
Supply					
Los Osos Basin Plan Area[1]	2,048 AFY[6] 2,208 AFY when Program A 8th Street expansion well is complete[6]				
Water Supply Versus Forecasted Demand	In 2017, the total water demand (2,070 AFY) exceeded the estimated supply. In 2018 and 2019, the water demand (2,030 AFY and 1,900 AFY) did not exceed the estimated supply. However, the estimated water supply is based on the Basin Plan modeling and is being verified with ongoing monitoring, and the Basin Plan programs recommended to meet existing demand have not been completed. The forecasted demand in 7 and 9 years may exceed the water supply if existing usage rates increase or if the estimated water supply is adjusted. For these reasons, the RSR conservatively recommends LOS III for the Los Osos Basin. The LOS may be reduced as Basin Plan programs are completed and depending on monitoring results.				

Sources: [1]Water System Usage forms: July 2016 – June 2017 and July 2017 – June 2018, 2015 Basin Plan, 2017, 2018, and 2019 Annual Monitoring Reports prepared for the Basin Management Committee, 2012 Basin Model Results for Los Osos Climate Ready Water Utilities Project.

Notes:
1. As defined locally in the 2015 updated Basin Plan for the Los Osos Groundwater Basin.
2. Based on water purveyor reported data. See Table II-1. Fiscal year data is not available for non-purveyor usage rates.
3. Based on 2017, 2018, and 2019 annual monitoring reports prepared for the Basin Management Committee based on a calendar year reporting period rather than fiscal year. Rural water demand is extraction from private wells, listed as "domestic" and "community" usage in the annual monitoring reports.
4. Subject to changes in water usage rates for existing development and timing of Basin Plan programs implementation, which is not forecasted. The majority (75%) of urban water use is residential. The draft Los Osos Community Plan requires new dwelling units to be limited with the Growth Management Ordinance (Tile 26) based on the available sustainable basin yield as determined by the status of Basin Plan program implementation and annual monitoring of Basin Plan program effectiveness and non-residential water usage trends.
5. Based on the 2015 Basin Plan, Table 44. Summary of Water Demand Program Combinations with Programs E+U or E+UG implemented. Of 2,060 AFY for urban and 70 AFY for community usage, 220 AFY of "urban" use is considered domestic private wells, listed under "rural" for this report.
6. Water supply is considered 80% of the sustainable basin yield estimated in the Basin Plan, per the Basin Plan goal of extraction not exceeding 80% of estimated yield to account for uncertainty. The annual reports indicate 2,760 AFY as the sustainable yield, but the Program A 8th Street expansion well is not yet completed. Until the well is complete, the sustainable basin yield estimate for the Basin Plan "No Programs" scenario is used, with a 110 AFY increase in yield estimated for completion of first Program C expansion well (CHG, 2017). The estimated sustainable basin yield may be adjusted based on ongoing monitoring of Basin Plan program effectiveness.

Key observations for the area include:

- A coastal aquifer subject to seawater intrusion that has been contaminated with nitrate is the sole water supply source for the community of Los Osos.
- Completion of the LOWRF and decommissioning of septic systems within the sewer service area reduced the point source of nitrate contamination. The nitrate contamination is expected to degrade over time. Recharged water from the LOWRF is projected to help reverse seawater intrusion over time.
- A Habitat Conservation Plan will be adopted before significant increase in new development to address water supply availability for ecological needs.
- The Basin Management Committee has almost completed the programs recommended for immediate implementation, which are projected to halt seawater intrusion based on the existing development scenario with marginal population growth.
- Los Osos participated in the US EPA Climate Ready Water Utilities Project to identify potential reductions in basin yield due to reduced precipitation, sea-level rise, and increased temperature through the rest of the century. Implementation of additional Basin Plan programs is projected to increase

sustainable basin yield and reduce demand to accommodate buildout demand and potential reductions in basin yield due to climate change.

- The 2016 – 2019 annual monitoring reports prepared for the Basin Management Committee have shown the annual groundwater production to be below 80% of the sustainable basin yield (2,760 AFY) estimated assuming the Basin Plan programs recommended for immediate implementation are complete, except for two Program C expansion wells (CHG, 2017). However, one Program A expansion well remains to be completed. The 2017 estimated production (2,070 AFY) was 75% of this estimated sustainable basin yield. The 2018 estimated production (2,030 AFY) was 74% of this sustainable basin yield. (The 2019 estimated production (1,900 AFY) was 69% of this estimated sustainable basin yield.

- The estimated groundwater production in 2017 (2,070 AFY) was 81% of the estimated sustainable basin yield for a "No Programs" scenario in the Basin Plan (2,450 AFY). However, one well for Program C was completed, which increased the estimated sustainable basin yield by 110 AFY (2,560 AFY). Assuming 2,560 AFY sustainable basin yield, the 2017 production was less than 80% of the sustainable basin yield.

- The estimated groundwater production in 2019 (1,900 AFY) was 78% of the estimated sustainable basin yield for a "No Programs" scenario in the Basin Plan (2,450 AFY). However, one well for Program C was completed, which increased the estimated sustainable basin yield by 110 AFY (2,560 AFY). Assuming 2,560 AFY sustainable basin yield, the 2019 production was 69% of the sustainable basin yield.

- The Basin Management Committee maintains a groundwater monitoring network, releases annual monitoring reports with updates on program status and effectiveness, and practices adaptive management. The estimated sustainable basin yield may be re-evaluated based on the Basin Plan programs' effectiveness, especially considering halting and reversing seawater intrusion.

Based on the 1996 Coastal RMS Criteria, **Recommended Level of Severity III.** While in 2018 and 2019 water supply was estimated as sufficient to meet demand, the RSR conservatively estimates LOS III for the Los Osos Basin since the Basin Plan programs for immediate implementation were not completed as of the end of the 2016-2018 RSR reporting period. The LOS may be revised down as the Basin Plan programs are completed and depending on basin monitoring results.

Sources:

Cleath-Harris Geologists, Inc. (CHG). 2012. *Model Results for Los Osos Climate Ready Water Utilities Project.*

______ 2017. *Basin Yield Metric response to reduced long-term precipitation in the Los Osos Groundwater Basin.*

______ 2018. *Los Osos Basin Plan Groundwater Monitoring Program 2017 Annual Monitoring Report.*

______ 2019. *Los Osos Basin Plan Groundwater Monitoring Program 2018 Annual Monitoring Report.*

______ 2020. *Los Osos Basin Plan Groundwater Monitoring Program 2019 Annual Monitoring Report.*

TITLE 26 AMENDMENTS – LOS OSOS GROWTH RATE & ORDINANCE CLEANUP.
PUBLIC REVIEW DRAFT 5-26-20. See highlighted sections on pages 11-15 for Los Osos.
Email comments to khensley@co.slo.ca.us by June 26, 2020.

Title 26 - GROWTH MANAGEMENT

Chapter 26.01 - GENERAL PROVISIONS

26.01.010 - Title and purpose.

The ordinance codified in this title is known as the growth management ordinance of the County of San Luis Obispo, Title 26 of the San Luis Obispo County Code. These regulations are established and adopted to protect and promote the public health, safety and welfare; and

(1) To implement the county general plan by establishing an annual rate of growth that will give further guidance to the future growth of the county in accordance with that plan;

(2) To establish an annual rate of growth that is consistent with the ability of community resources to support the growth, as established by the Resource Management System (RMS) of the county general plan;

(3) To establish a system for allocating the number of residential construction permits to be allowed each year by the annual growth rate set by the county board of supervisors;

(4) To minimize adverse effects resulting from a rate of growth which will affect the resources necessary to support existing and proposed new development as envisioned by the county general plan; and

(5) To assist the public in understanding the growth management system affecting the development and use of land in San Luis Obispo County.

(Ord. 3155 § 1, 2008: Ord. 2477 § 2 (part), 1990)

26.01.020 - Maps and text included by reference.

In order to effectively implement the provisions of this title, the following documents, including maps and text, are adopted and included by reference as part of this title, as though they are fully set forth herein:

(1) San Luis Obispo County general plan, including all elements thereof and all amendments thereto, as adopted by the board of supervisors pursuant to Sections 65000, et seq. of the Government Code;

(2) Building and construction ordinance, Title 19 of this code;

(3) Land use ordinance, Title 22 of this code;

(4) Coastal zone land use ordinance, Title 23 of this code;

(5) The Woodlands Specific Plan.

(Ord. 2957A § 1, 2002; Ord. 2477 § 2 (part), 1990)

26.01.030 - Applicability of the growth management ordinance.

The provisions of this title apply to the issuance of all construction permits for dwelling units within the unincorporated areas of San Luis Obispo County, as follows:

(1) Proposed Dwelling Units. The provisions of the title apply to all dwelling units proposed to be constructed whether by new construction or remodel after the adoption of this title unless specifically exempted by this title. It shall be unlawful and a violation of this code for any person

to construct a dwelling unit contrary to or without satisfying all applicable provisions of this title. This includes but is not limited to:

a. Placement of a mobilehome on an individual parcel;

b. Placement of a mobilehome within a mobilehome park; or

c. The conversion of a nonresidential structure to a dwelling unit.

(2) Completion of Existing Construction Permits. Nothing in the title shall require any change in the plans, construction or approved use of a dwelling unit for which a permit has been issued before the effective date of this title, provided construction is commenced and completed in accordance with the provisions of the county code, including but not limited to: Title 19, Building and Construction Ordinance; Title 22, Land Use Ordinance; and Title 23, Coastal Zone Land Use Ordinance.

(Ord. 3155 § 2, 2008; Ord. 2743 § 1, 1995; Ord. 2477 § 2 (part), 1990)

26.01.032 - Compliance with the growth management ordinance required.

No application to construct a new dwelling unit shall be accepted for processing or approved, unless the proposed new dwelling unit is determined to be in compliance with the provisions of this title and other applicable provisions of this code.

(Ord. 2477 § 2 (part), 1990)

26.01.034 - Exemptions.

The provisions of the title do not apply to any of the following:

(1) ~~Secondary~~ Accessory Dwelling~~s~~ Units (ADUs). Proposed new accessory dwelling units constructed ~~as secondary dwellings~~ in conformance with the requirements of the Land Use Ordinance, Title 22 and the Coastal Zone Land Use Ordinance, Title 23 of the county code.

(2) Affordable Housing. Proposed new dwelling units which will be affordable housing for persons and families of low or moderate income as defined by California Health and Safety Code Section 50093, with long-term affordability guaranteed as provided by all applicable sections of the Land Use Ordinance, Title 22 and the Coastal Zone Land Use Ordinance, Title 23 of the county code.

(3) Vesting Tentative Maps. Building permit applications for new dwelling units using the rights conferred by a vesting tentative map as provided by Government Code Sections 66498.1 et seq. where the vesting tentative map application was filed with the planning and building department on or before July 10, 1990, except where such applications are denied pursuant to any of the provisions of California Government Code Section 66498.1.

(4) ~~Farm Support Quarters~~Agricultural Worker Dwellings. Construction permit applications for ~~farm support quarters~~agricultural worker dwellings and labor camps that house agricultural employees, on properties outside of village and urban reserve lines as defined in the county general plan, when authorized as ~~farm support quarters~~agricultural worker dwellings under all applicable sections of the Land Use Ordinance, Title 22 or the Coastal Zone Land Use Ordinance, Title 23 of the county code and in accordance with the requirements of Health and Safety Code Section 17008.

(5) Pipeline Projects for the Nipomo Mesa Area. Proposed new dwelling units to be located in the Nipomo Mesa area (as depicted in Figure 1) for which a request for allocation was filed with and accepted by the department of planning and building between November 14, 1999 and April 4,

2000, as shown on the list entitled "Pipeline Projects for the Nipomo Mesa Area" and on file with the department of planning and building.

(6) Replacement Dwellings.

(Ord. 3155 § 3, 2008: Ord. 3110 § 1, 2006: Ord. 3091 § 1, 2006; Ord. 3005 § 1, 2003; Ord. 2946 § 2, 2001; Ord. 2905 § 3, 2000; Ord. 2902 § 3, 2000; Ord. 2743 § 2, 1995; Ord. 2580 § 1, 1992; Ord. 2506 § 1, 1991: Ord. 2477 § 2 (part), 1990)

26.01.040 - Administration of the growth management ordinance.

This title shall be administered by the director of planning and building, who will establish specific procedures, consistent with the intent of this title, and advise the public about its requirements. The responsibilities of the planning director under this title include the following functions, which may be carried out by planning department employees under the supervision of the director:

(1) Application Processing. Receive and review all applications for projects; certify that applications submitted have been properly completed; establish permanent files; conduct site project analyses; meet with applicants; collect fees; prepare reports; process appeals; present staff reports to the planning commission and board of supervisors where applicable; and

(2) Permit Issuance. Issue construction permits for new dwelling units under this title and certify that all such permits are in full conformance with its requirements; and

(3) Coordination. Refer and coordinate matters related to the administration of this title with other agencies and county departments; and

(4) Amendment. Request that the board of supervisors initiate amendment of this title in a manner similar to Land Use Ordinance, Title 22, Section 22.70.040, Amendments, when such amendment would better implement the policies of the general plan and increase its effectiveness and/or improve or clarify the procedures or content of this title.

(Ord. 3155 § 4, 2008; Ord. 3005 § 2, 2003; Ord. 2477 § 2 (part), 1990)

26.01.050 - Rules of interpretation.

Any questions about the interpretation or applicability of any provision of this title, are to be resolved as provided by this section.

(1) Effect of Provisions.

a. Minimum Requirements. The regulations set forth in this title are to be considered minimum requirements, which are binding upon all persons and bodies charged with administering or enforcing this title.

b. Effect Upon Private Agreements. It is not intended that these regulations are to interfere with or annul any covenants or other agreements between parties. When these regulations are more restrictive upon the issuance of construction permits for new dwelling units than are imposed or required by other ordinances, rules, regulations or by covenants or agreements, these regulations shall control.

(2) Definitions. Definitions of the specialized terms and phrases used in this title are contained in certain other sections of this title where the terms and phrases are actually used, or in the documents comprising the county general plan, or in Titles 19, 22 or 23 of the county code. For purposes of this title, the following definitions shall also apply:

a. Allocation. The right, granted by this title, to make application for construction of a new dwelling unit (including the placement of a mobilehome or the conversion of a nonresidential structure to a dwelling unit) in the unincorporated area of San Luis Obispo County.

1. When no allocations for dwelling units are available the allocation request will be put on a waiting list.

2. When allocations for dwelling units are available and a complete application for a construction permit is submitted, an allocation can concurrently be approved.

An allocation is not a guarantee of receiving approval for the requested dwelling unit. The actual number of dwelling units to be allowed shall be determined by the board through an annual allocation review process. For those parcels that have requests filed prior to July 1, 2003 and therefore have vested rights, the filing of the construction permit may occur prior to completion of any discretionary permits in order to satisfy the time frames required to reserve the allocation.

b. Construction of this title. When used in this title, the words "shall," "will," and "is to" are always mandatory and not discretionary. The words "should" or "may" are permissive. The present tense includes the past and future tenses; and the future tense includes the present. The singular number includes the plural, and the plural the singular.

c. Maximum Annual Allocation. The maximum annual allocation equals the annual number of construction permits that may be issued for new dwelling units per year in the unincorporated area of the county. The actual number of dwelling units to be allowed shall be determined by the board through an annual allocation review process.

d. New Dwelling Unit. The construction of a new structure to be used as a dwelling unit includes but is not limited to:

1. Placement of a mobilehome on an individual parcel;

2. Placement of a mobilehome within a mobilehome park;

3. Conversion of a nonresidential structure to a residential use;

4. Action resulting in a structure becoming a primary dwelling unit;

5. Ministerial and discretionary approvals that result in a structure becoming a dwelling unit.

For the purposes of this title, "new dwelling unit" does not include the replacement of any existing, lawfully established dwelling unit with another unit on the same site, or the remodeling or enlargement of an existing unit, provided that the number of existing units is not increased.

e. Number of Days. Whenever a number of days is specified in this title, or in any request for allocation, or in any permit, condition, or notice issued or given as set forth in this title, such number of days shall be deemed to be consecutive calendar days, unless the number of days is specifically identified as business days. Whenever the term "week" is used, it shall mean the days from Sunday to the following Saturday, inclusive.

f. Residential Unit Ownership Project. A project based on a comprehensive, unified site design that will include a phasing schedule specifying the time period over which the project will be built and the number of dwelling units to be built in each phase, and meeting the following criteria: Each phase will provide the necessary services and infrastructure so as to be both self-supporting as well as integrated into the whole project, including specifying the standards for land use and related improvements (i.e., streets, utilities, public and private open space, buffers, etc.) plus responsibilities for their installation, ownership and maintenance; the overall project is characterized by creative and innovative design features and a variety of housing types. Such projects are to be approved as mixed use or cluster divisions within urban or village reserve lines under the provisions of Title 22 (Chapter 22.22) or 23 of the county code, approved through a development plan or conditional use permit, approved through a specific plan adopted by the county in accordance with the California Government Code, or covered by a development agreement approved by the board of supervisors.

g. Specific Plan. A plan adopted by the county for the systematic implementation of the county general plan in accordance with Section 65451 of the California Government Code.

(Ord. 3155 § 5, 2008; Ord. 3091 § 2, 2006; Ord. 3019 § 1, 2003; Ord. 3005 §§ 3, 4, 2003; Ord. 2743 §§ 3, 4, 1995; Ord. 2477 § 2 (part), 1990)

26.01.060 - Appeal.

Any person aggrieved by a decision of the director of planning and building involving the interpretation or application of this title may appeal any such decision as follows:

(1) Processing of Appeals.

a. Timing and Form of Appeal. An appeal shall be filed within fourteen days of the decision that is the subject of the appeal. The appeal shall be in writing and shall be filed with the planning commission secretary using the forms provided by the department. The written appeal must state the factual and legal basis by which the appellant contends that he or she is entitled to have the decision of the director overturned.

b. Filing Fee and Cost Recovery. The appeal shall be accompanied by an appeal fee in the amount then established by the county fee ordinance, representing a deposit to be used to reimburse the county for the actual costs and expenses incurred by the county in processing, investigating and deciding said appeal. The appellant shall execute a cost accounting agreement with the county pursuant to the county's fee ordinance to reimburse the county for the actual recorded costs, plus overhead, incurred by the county in processing the appeal.

c. Report and Hearing. When an appeal has been filed, the director shall prepare a report on the matter, and cause the appeal to be scheduled for consideration by the planning commission at its next available meeting after completion of the report.

d. Action and Findings. After holding a public hearing on the matter pursuant to subsection (2) of this section, the planning commission may affirm, affirm in part, or reverse the action, decision or determination that is the subject of the appeal, based upon findings of fact regarding the particular case. Such findings shall identify the reasons for the action on the appeal, and verify the compliance or noncompliance of the subject of the appeal with the provisions of this title.

e. Withdrawal of Appeal. After an appeal to a decision regarding the interpretation or application of this title has been filed, the appeal shall not be withdrawn except with the consent of the planning commission.

(2) Public Hearing Notice. When a public hearing is to be held pursuant to this title, notice of the public hearing shall be provided as required by Government Code Sections 65091, et seq. and by any additional means the director of planning and building deems appropriate.

(3) Appeal Jurisdiction. All appeals shall be heard by the planning commission. The following actions of the department of planning and building pertaining to the interpretation or application of this title may be appealed to the planning commission:

a. Determinations on the meaning or applicability of the provisions of this title which are believed to be in error, and cannot be resolved with staff;

b. Any determination that information submitted with any application or request required by this title is incomplete;

c. Any decision of the department to approve or deny any application or request required by this title;

d. Any decision by the director of planning and building to revoke or cancel any application or request approved pursuant to this title.

(4) Matters Excluded from Appeal. Specifically excluded from appeal are matters which for their resolution require the amendment or change of this title, or other county ordinances or resolutions.

(5) Planning Commission Decisions. All decisions of the planning commission on appeals filed pursuant to this title are final.

(Ord. 3155 § 6, 2008; Ord. 2477 § 2 (part), 1990)

26.01.070 - General procedures.

This section describes general procedures for determining the number of dwelling unit construction permit applications processed by the department of planning and building, how the annual allotment is to be conducted, what information must be included with an application submitted for processing under the provisions of this title, and the time limits for processing applications for new dwelling units to be permitted under this title.

(1) Maximum Number of New Dwelling Units Allowed. The maximum annual allocation shall be limited to an amount sufficient to accommodate an increase of 2.3% per fiscal year in the number of dwelling units, unless otherwise specified in subsections (8), (9), (10) or (11) of this section. The number of new dwelling units to be allowed shall be based on the number of existing county unincorporated housing units.

(2) Annual Review of Growth Management Program. The board of supervisors shall hold a public hearing to consider the resource summary report (RSR) of the resource management system (RMS) as described in framework for planning of the general plan. The resource summary report (RSR) is prepared biennially or as otherwise directed by the board of supervisors. The water supply sections of the RSR shall include information from the annual monitoring reports prepared for Basin Management Plans (e.g., Nipomo Mesa and Los Osos) and Groundwater Sustainability Plans (e.g., Paso Robles). Following the review of the ~~RMS~~RSR, the board shall evaluate the proposed growth rates for the ensuing fiscal year in light of the availability of resources and services necessary to accommodate new development and may initiate proceedings to amend this title to modify the annual growth rate based on the evaluation of the RSR~~MS~~ data. For those intermittent years in which the ~~resource summary report~~RSR is not prepared, the board shall evaluate the proposed growth rates in light of the most recently board of supervisors' approved ~~resource summary report.~~RSR

(3) Distribution of Annual Allocations. After the allowed number of new dwelling units is determined by the board of supervisors through the process described in subsections (1) and (2) of this section, the allocation shall be distributed countywide, based on the availability of resources needed to support the new development as defined by the ~~RMS~~RSR. No single applicant shall be eligible in any one fiscal year for more than five percent of the maximum annual allocation unless otherwise specified in this title.

a. Diversity of Dwelling Unit Types. In order to allow opportunities or development of individual dwelling units and larger residential projects and to encourage a variety of dwelling unit types, the maximum annual allocation of new dwelling units will be distributed as follows:

1. Thirty-five percent of the maximum annual allocation shall be reserved for developers of multifamily dwellings and dwelling unit projects approved as residential unit ownership projects such as cluster divisions, small lot single-family dwellings, or through adoption of a specific plan. Dwelling units to be developed in such projects may be carried over for one year upon written request of the applicant within the one hundred eighty days specified in subsection (7) of this section. If there are not enough applications for dwelling units to use up the thirty-five percent reservation, those unused allocations shall be made available for the sixty-five percent reservation noted in subsection (3)a.2. below.

2. The remaining sixty-five percent of the maximum annual allocation shall be available for all other applicants for new dwelling units. If there are not enough applications for dwelling units to use up the sixty-five percent reservation, those unused allocations shall be made available for the thirty-five percent reservation noted in subsection (3)a.1. above.

(4) Filing of Requests for Allocation. Applicants interested in building new dwelling units will file a request for allocation with the department of planning and building on a form provided by the department to allow the department to track the allocation. A complete application for the construction permits and full building plans are required at this time in addition to having completed any required discretionary permit review. If the application is determined to be incomplete by the department of planning and building, the construction permit application will be rejected and no allocation under the growth management ordinance will be approved.

(5) Filing of Requests for Allocation. Applicants eligible to file a request for allocation are allowed an exception to the requirement that a complete application be submitted as follows:

a. For a vested map that was filed and accepted for processing prior to May 20, 2003, a request for allocation can be selected for submittal as provided in the ordinance that was in place at the time of acceptance of the vesting map for processing.

b. For parcels located within communities with waiting lists as provided in subsection~~s (10) and~~ (11), or for any area where a waiting list of more than eighteen months exists.

If an application meets the requirements noted in subsection (5)a. or (5)b. above, complete construction applications are not required at this time. The request for allocation will be accepted only from the owner of the parcel proposed for development, or an agent acting with the written authorization of the owner. The department will accept requests for allocations at any time and they will be processed on a first-come-first-served basis for as long as the vested status period of the map. Once the allocation can be selected, the applicant will have one hundred twenty days to submit a complete application, except as provided in subsection (7) of this section. In any year where all allocations have been issued, requests for allocation will continue to be accepted and placed on a waiting list in the order in which they are filed.

(6) Limit on Number of Allocation Requests. A total of two requests for allocation will be accepted for any single legally-created parcel per year. An applicant may file a request for allocations for a maximum number of dwelling units not to exceed the following percentages of the total annual allocation for the respective areas:

a. Five percent in the countywide area;

b. Ten percent in the Nipomo Mesa area; or

c. Twenty percent of the total annual allotment in the Nipomo Mesa area for multifamily/residential unit ownership projects that have received intent to serve letters from the applicable water district and meet any one of the following:

1. Projects that are smart growth, senior housing, mixed use, green build (equivalent to LEED certified) and are located within, and meet the standards of the Olde Towne Nipomo design and circulation plan,

2. Projects that guarantee long-term affordability for at least thirty-five percent of the units in accordance with county ordinance, or

3. Projects that will result in the completion of construction of sections of road improvements identified on the South County circulation study road improvement list or will result in construction of road improvements where such construction will materially improve traffic and circulation on existing or proposed roads.

(7) Authorization to File Construction Permit Applications. The department of planning and building will accept complete applications for construction permits and make a growth management allocation on a first-come-first-served basis. For projects that qualify to use the request for allocation process, a growth management allocation will be made at the time of submittal and they will be allowed one hundred twenty days to submit a complete application from the time of selection. The method of allocation will be for the department to issue a letter of authorization to file a construction permit application for a new dwelling unit in accordance with Titles 19, 22, and 23 of the county code. Notification of authorization will be issued until the maximum annual allocation has been reached for the current fiscal year. The application of a construction permit must be filed with the department within one hundred twenty days of the date on the letter of authorization in order to retain the allocation. The prescribed time limits for filing an application for a construction permit shall apply to all requests for allocations filed with the department on or after May 2, 2000, except that any applicant who has been issued a letter of authorization prior to the effective date of this ordinance provision on July 20, 2000, shall have one hundred eighty days from the date of the authorization letter to submit a construction permit application, with an additional ninety days available upon submittal of a written request for the director of planning and building as described above.

(8) Maximum Number of New Dwelling Units Allowed in the Nipomo Mesa Area. The maximum number of new dwelling units allowed in the Nipomo Mesa area (see Figure 1) ~~for the period of July 1, 2019, through June 30, 2020,~~ shall not exceed a 1.8 percent increase in the number of existing dwelling units from the previous fiscal year.

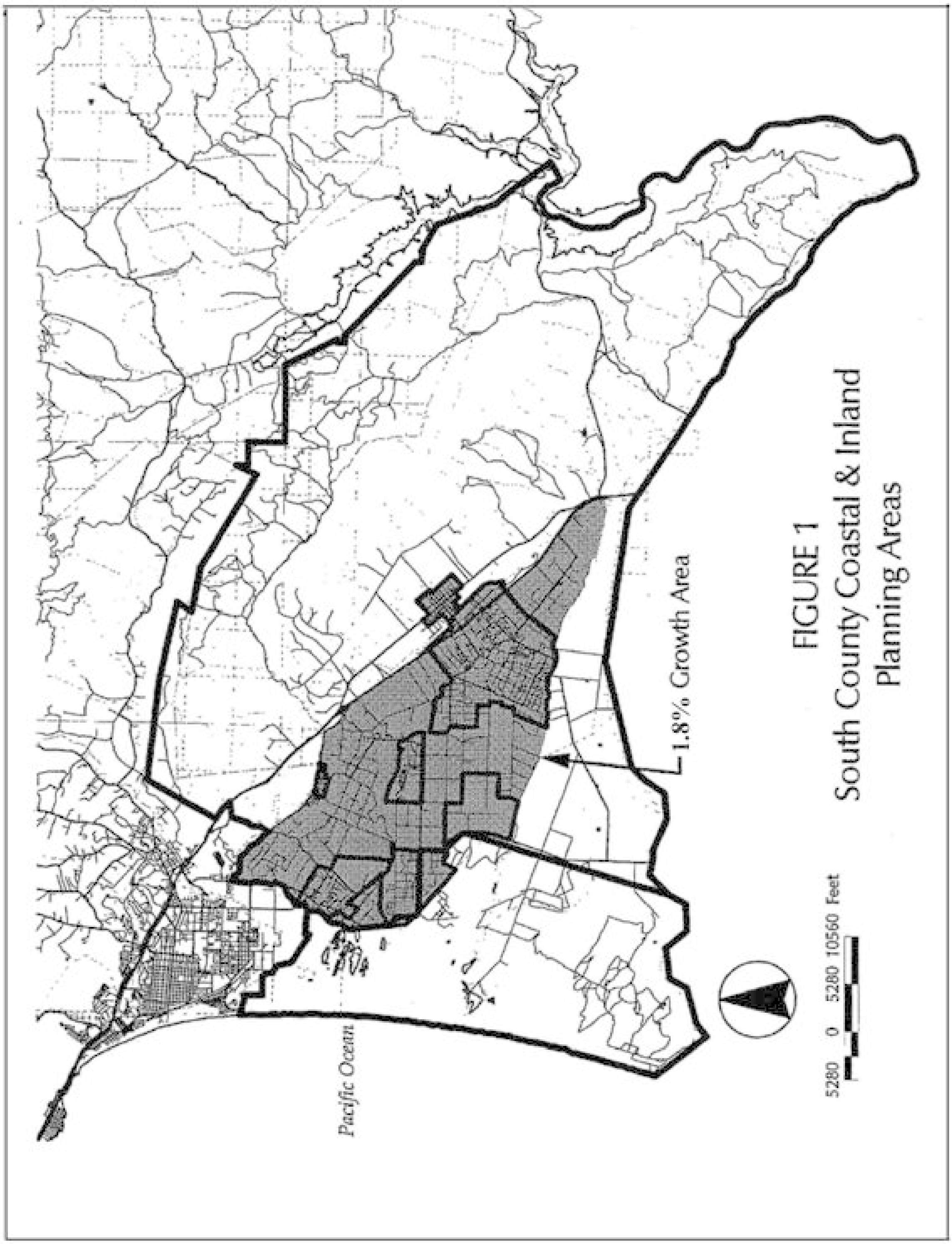


Figure 1. South County Coastal and Inland Planning Areas

(9) Maximum Number and Timing of New Dwelling Units Allowed Within the Woodlands Specific Plan Area. Notwithstanding any other provisions of this title, allocations may be issued for the Woodlands Specific Plan Area (see Figure 2) as follows:

a. In accordance with the adopted Woodlands Specific Plan phasing plan (four phases identified as 1A, 1B, 2A and 2B on the phasing plan map, Table 8 and accompanying text), allocations can be obtained for up to eight hundred twenty-five new dwelling units, at the rate of one hundred sixty-five units per year on a cumulative basis, in Phases 1A and 1B during the first five years following approval of the first development plan for Phases 1A and 1B.

b. Beginning in year six, allocations for each subsequent phase (Phases 2A and 2B) can be obtained sequentially, at the rate of ninety-nine units per year on a cumulative basis, upon final inspection of at least sixty percent of the residences for which building permits have been issued and upon completion of primary infrastructure and related mitigation measures of the previous phase(s) as identified in the Woodlands Specific Plan.

c. Allocations issued to the Woodlands Specific Plan Area are nontransferable and terminate only at issuance of building permits.

d. The maximum number of all dwelling units for the Woodlands Specific Plan Area shall be one thousand three hundred twenty.

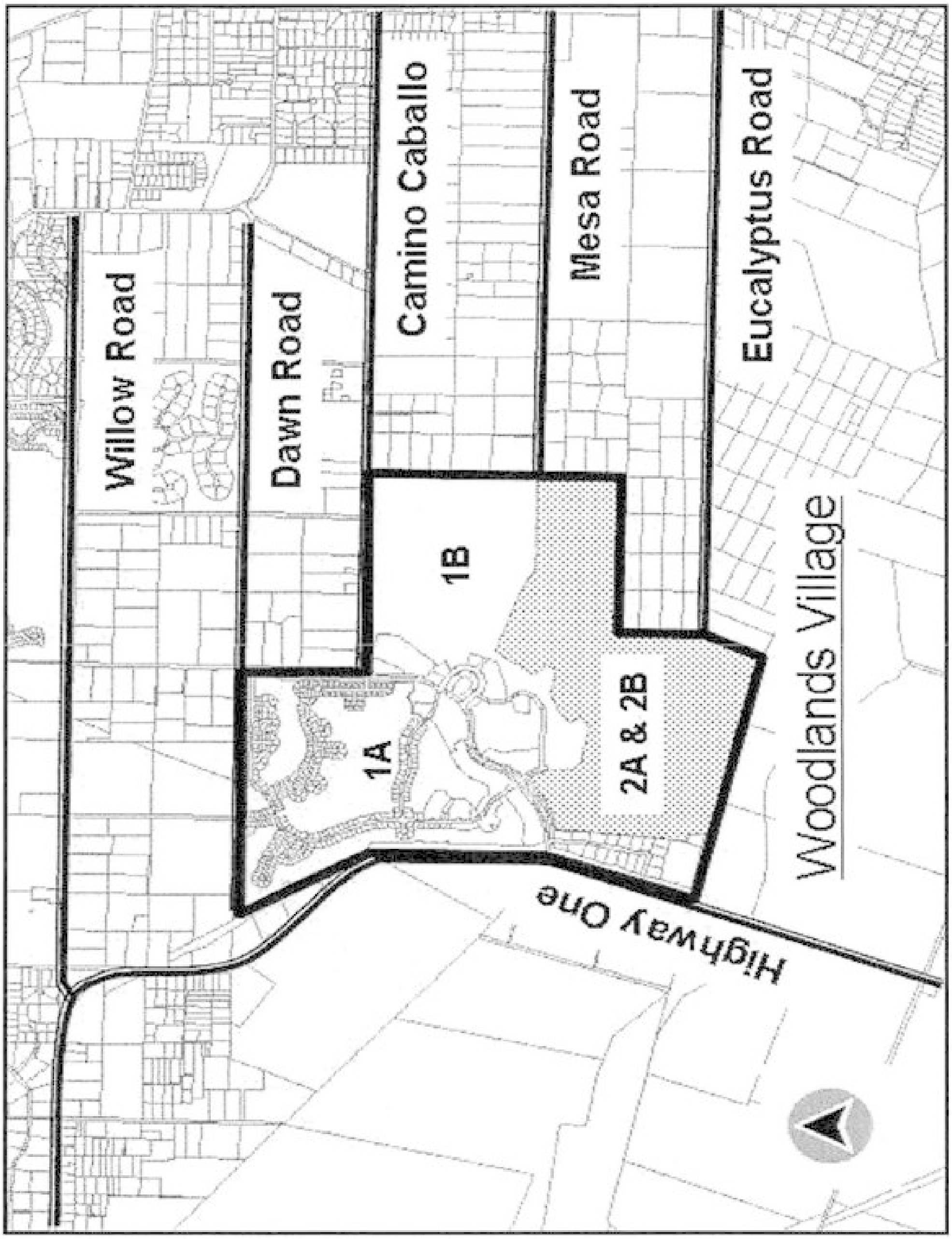


Figure 2. Woodlands Specific Plan Phasing Plan, amended, February 1999

(10) Maximum Number of New Dwelling Units Allowed in the Los Osos Urban Area. The annual growth rate for new dwelling units in the Los Osos Urban Area shall be 0%, with the exception of the dwelling units exempt from this ordinance, until the Board of Supervisors adopts a resolution certifying that the following programs required by the 2015 Updated Basin Plan for the Los Osos Groundwater Basin Plan are complete, accounting for program modifications made through the Plan's adaptive management provision:

- Program "M" – Groundwater Monitoring
- Program "E" – Urban Water Use Efficiency

- Program "U" – Urban Water Reinvestment
- Program "A" – Infrastructure Program A
- Program "C" – Infrastructure Program C
- Program "P" – Wellhead Protection

New allocation requests may be placed on the existing waitlist for the sewer service area or a new waitlist for outside the sewer service area.

For the five fiscal years following the resolution adoption date, the annual maximum number of new dwelling units in the Los Osos Urban Area shall not exceed a 1.3 percent increase in the number of existing dwelling units in the Urban Area, distributed as follows.

a. Outside the Sewer Service Area. The annual growth rate for new dwelling units in the urban area outside the sewer service area (see Figure 3 below) shall not exceed a 0.17 percent increase in the number of existing dwelling units in the entire urban area from the previous fiscal year, If the annual allocation of allowed new dwelling units is reached, a request for allocation may be submitted to be placed on a waitlist in the order it is received. Unused allocations outside the sewer service area may be used within the sewer service area if the sewer service area annual allocation is exceeded.

b. Within the Sewer Service Area. The annual growth rate for new dwelling units within the sewer service area shall not exceed a 1.14 percent increase in the number of existing dwelling units in the entire urban area from the previous fiscal year, reserving a 0.46 percent increase in existing units for multi-family units and a 0.68 percent increase in existing units for single family units. If the annual allocation of allowed new dwelling units is reached, a request for allocation may be submitted to be placed on the existing waitlist in the order it is received.

   There is currently a waiting list for vacant parcels within the sewer service area. See Section 11.b. below.

(1~~0~~1) Communities with Existing Waiting Lists. The following ~~communities~~ areas have waiting lists for development. ~~Those waiting lists are administered by the specified community service provider(s) and the issuance of allocations by the county shall be in accordance with the provisions of the local waiting lists, as specified below.~~

a. Cambria. ~~The Cambria Community Services District (CCSD) has an existing waiting list for water service permits. The CCSD is allocating resources in compliance with its own resource management policies and ordinances, so as to be compatible with the resource management system of the county general plan and to carry out the county's purposes, goals and objectives. In recognition of the management policies in place, the allocation of dwelling units in Cambria shall be conducted as follows:~~

~~1. Allocation Limit. The annual number of new dwelling units to be allocated shall not exceed 2.3 percent of the total number of dwelling units within the community services district boundary within the urban reserve line as designated in the county general plan. The dwelling units to be allocated shall be taken from those applicants next in line on the community waiting list. The number of allocated units may be reduced if the resources are not available to support the maximum number of potential allocations, as described below. Any dwelling unit allocations not utilized by Cambria shall become available for countywide allocation in accordance with the provisions of this title.~~

~~i. Allocation for the years July 1, 2018 through June 30, 2021. Based on the County 2005 Resource Management System (RMS) Annual Report approved by the Board of~~

~~Supervisors on December 20, 2005, the County 2008 Resource Management System (RMS) Annual Report approved by the Board of Supervisors on February 10, 2009, the 2009-2010 Resource Management System (RMS) Resource Summary Report approved by the board of supervisors on April 26, 2011, the 2010-2012 Resource Summary Report approved by the Board of Supervisors on March 12, 2013, the 2012-2014 Resource Summary Report approved by the board of supervisors on May 5, 2015, and the 2014-2016 Biennial Summary Report of the Resource Management System approved by the board of supervisors on May 16, 2017, the maximum annual allocation shall be set at zero percent per fiscal year for the period from July 1, 2018 through June 30, 2021, resulting in n~~No new allocation requests may be issued for Cambria other than those accompanied by an intent-to-serve letter from the Cambria Community Services District for transferred meters and eight grandfathered allocations for new residences. ~~in Cambria each fiscal year in the period from July 1, 2018 through June 30, 2021.~~

1.~~ii.~~ "Grandfathered" Units in Cambria. Of the total number of dwelling units to be allowed in Cambria each year, the Cambria Community Services District (CCSD) shall reserve eight allocations for parcels certified by the district as having "grandfathered" right to water service and "will serve" letters will be issued to such applicants on a first-come-first-served basis. These grandfathered units shall be allocated as follows: four units for Tract 1804 and four for the remaining units on the grandfather list. This increase shall be re-evaluated once the ~~Cambria Community Services District~~ CCSD has lifted the current moratorium on development that is not considered as grandfathered or active meter status.

2.~~iii.~~ Transfer of Allocations in Cambria. Residential allocations may be transferred within the CCSD as long as any such transfer conforms with District Ordinance 1-93, as may be amended from time to time by the district relating to retirement of development rights.

3.~~2.~~ ~~Freezing of Existing Waiting Lists.~~ Frozen Waiting Lists. CCSD has an existing waiting list for water service permits that has been frozen for the purposes of administering this title. All future allocations issued for Cambria, except for the grandfathered and transferred allocations, shall come first from the certified CCSD waiting list until it is exhausted and then from the County-maintained waiting list, which has also been frozen until new allocations may be issued beyond the grandfathered and transferred allocations. ~~In order to eventually eliminate the need for an individual community waiting list for services, the CCSD list that exists as of December 31, 1990, shall be frozen for purposes of administering this title. The county shall obtain a certified copy of the waiting list and all future allocations within the community shall come from the certified list. Any applicant wishing to apply for a dwelling unit allocation that is not on the certified list shall apply to the county for placement on the county's waiting list for requests for allocation. However, per section (a)(i) above, no new allocation requests other than those accompanied by an intent-to-serve letter from the Cambria Community Services District for transferred meters and eight grandfathered allocations for new residences in Cambria each fiscal year in the period from July 1, 2018 through June 30, 2021. At the point in the future when the existing community waiting list is exhausted, all future requests for new dwelling units shall be added to the county's waiting list on a first-come-first-served basis and all allocations for new dwelling units in the unincorporated county shall be made from the county waiting list.~~

b.~~(11)~~ Los Osos ~~Prohibition~~ Sewer Service Area. The Los Osos Water Recycling Facility cannot serve vacant parcels within its service area (Figure 3) until the Los Osos Community Plan and Community-Wide Habitat Conservation Plan are adopted to meet the conditions of its Coastal Development Permit. ~~A portion of the unincorporated community of Los Osos is presently unable to have construction permits issued for new dwelling units because of a sewage disposal prohibition imposed by the California Regional Water Quality Control Board, Central Coast Region. On September 8, 1999, the regional board adopted~~

~~criteria by which exemptions to the prohibition might be granted~~ Parcels within the Bayview Heights and Martin Tract areas (Figure 3) may use septic systems and are subject to the growth rate for new dwelling units outside the sewer service area. ~~of Los Osos, a copy of which is on file with the director of the department of planning and building.~~.

~~In the areas where the development prohibition is imposed, a~~A request for allocation may be filed ~~and land use permits and construction permits for new dwelling units may be processed as specified below.~~ for vacant parcels within the sewer service area to be placed on a waiting list to apply for construction permits for new dwelling units. When the Los Osos Water Recycling Facility can serve vacant parcels within its service area, the existing waitlist shall be notified as described below. Construction permit applications for new dwelling units for vacant parcels not on the waitlist will not be accepted until all of the properties on the waitlist have been notified and have an opportunity to submit a permit application or to defer.

1~~a~~. Notice of Authorization to File Construction Permit Applications to Persons on Existing Waiting List. Those persons who have filed requests for allocation and are on the existing waiting list for Los Osos will be notified that they can proceed to file construction permit applications and accompanying land use permit applications where necessary, in accordance with the time frames specified in subsection (5) of this section.

i~~1~~. Request to Defer Filing of Application. Those persons receiving the notice described in subsection (10)a. above may notify the department within the time frames specified in subsection (5) of this section that they do not wish to proceed at this time and request that their allocation be deferred until a future date.

ii~~2~~. Activation of Deferred Allocations. The applicant may notify the department at some future date that they wish to proceed with the filing of a development application. As long as there are unused allocations within the current maximum annual allocation established by the board of supervisors, the department will issue a letter of authorization to proceed in accordance with the subsection (5) of this section.

iii~~3~~. Expiration of Deferred Allocations. All deferred allocations will be retained on the waiting list for Los Osos through June 30, 2040~~21~~, at which time all unused allocations will be considered expired.

~~b. Processing of Applications. The department will process all applications for land use and construction permits; however, no permits will be issued until the applicant provides verification to the department that an exemption to the area wide prohibition has been granted by the Regional Water Quality Control Board in accordance with the criteria adopted by the California Regional Water Quality Control Board, Central Coast Region, on September 8, 1999, or as subsequently amended.~~

2~~c~~. New Requests for Allocation Within the ~~Prohibitions~~ Sewer Service Area. All requests for allocation will be accepted in accordance with subsections (4) and (5) above and added to the countywide list of requests for allocation.

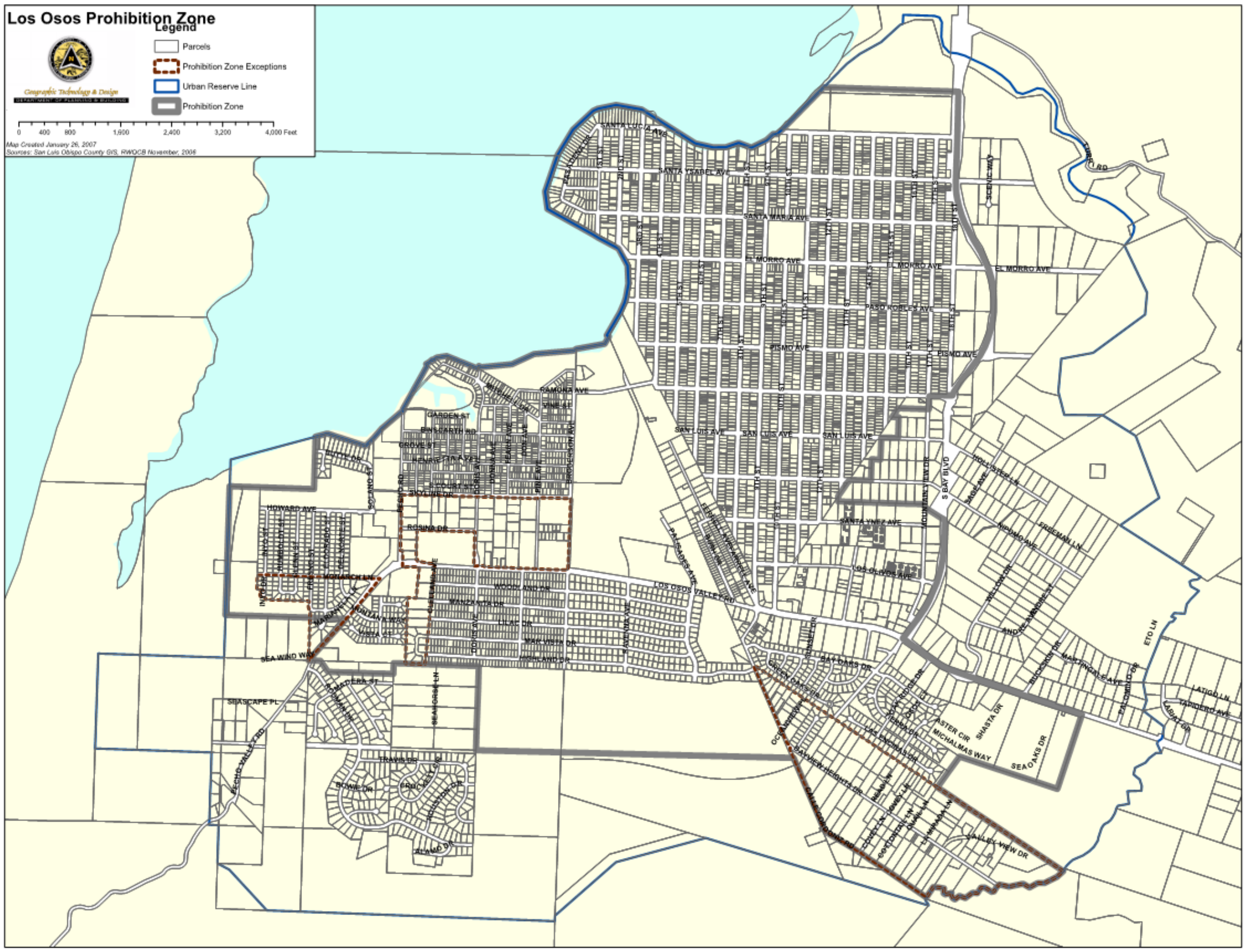


Figure 3. Los Osos Sewer Service Area

(Ord. 3155 §§ 7—9, 2008: Ord. 3091 §§ 3—10, 2006; Ord. 3066 § 1, 2005; Ord. 3029 §§ 1, 2, 2004: Ord. 3019 §§ 3, 4, 2003; Ord. 3017 § 1, 2003; Ord. 3005 §§ 5—10, 2003; Ord. 2989 §§ 1—3, 2002; Ord. 2957A § 2, 2002; Ord. 2955 §§ 1, 2, 2001; Ord. 2946 § 2, 2001; Ord. 2932 §§ 1, 2, 2001; Ord. 2905 §§ 4, 5, 2000; Ord. 2895 §§ 4, 5, 2000; Ord. 2889 § 1, 1999; Ord. 2867 § 2, 1999; Ord. 2743 §§ 5—10, 1995; Ord. 2506 § 3, 1991; Ord. 2477 § 2 (part), 1990)

(Ord. No. 3178, §§ 1—4, 5-19-09; Ord. No. 3194, § 1, 5-18-10; Ord. No. 3213, § 1, 5-24-11; Ord. No. 3227, §§ 1—4, 5-22-12; Ord. No. 3241, § 1, 5-21-13; Ord. No. 3260, § 1, 5-20-14; Ord. No. 3298, §§ 1—3, 5-19-15; Ord. No. 3321, §§ 1, 2, 5-17-16; Ord. No. 3348, § 1, 5-16-17; Ord. No. 3368, §§ 1—3, 5-15-18; Ord. No. 3389, §§ 1, 2, 5-21-19)

26.01.072 - Post-allocation procedures.

Following the determination by the board of supervisors of the maximum annual allocation, those allocations shall be subject to the following:

(1) Transfer of Allocations. Dwelling units will be allocated through the process described in Section 26.01.070 of this chapter to specific parcels, except that allocations may be transferred within the Cambria community services district as described in Section 26.01.070(10)a.1.iii. of this chapter, or on other properties in the unincorporated county where approved as part of a county transfer of development credits (TDC) program.

(2) Expiration of Allocations. After receiving a dwelling unit allocation as provided by this chapter, the applicant must file a complete construction permit application along with any required land use permit application within the number of days of the date of notice of an allocation as provided in Section 26.01.070(7), plus any requested time extension for such filing.

(3) Carryover of Individual Annual Allocations. The only exceptions to the expiration rules specified in subsection (2) of this section will be for properties for which multifamily units or units in residential unit ownership projects are proposed in compliance with Section 26.01.070(3)a.1.

(4) Carryover of Unused Maximum Annual Allocation. If all the units allocated countywide are not requested in the year in which they are allocated, the unused allocations may be carried over to the following allocation year at the discretion of the board of supervisors in a number not to exceed ten percent of the maximum annual allocation of that year. Such a determination shall be made at the time the board establishes the next maximum annual allocation as specified in this title.

(5) Reallocation of Expired Units. Where any applicant withdraws his application, or where such application has been deemed expired pursuant to the provisions of this chapter, that unused allocation shall become available for use within the current maximum annual allocation as if it were a new request for allocation, subject to all provisions of this chapter. Where the allocation is located within a community subject to a waiting list as described in Section 26.01.070(10) of this chapter, the allocation shall be made available within that community subject to the ordinance or administrative procedures adopted by the service provider within that community.

(Ord. 3155 § 10, 2008; Ord. 3091 §§ 11—13, 2006; Ord. 2905 § 6, 2000; Ord. 2743 §§ 11—14, 1995; Ord. 2506 § 4, 1991; Ord. 2477 § 2 (part), 1990)

26.01.080 - Time for judicial review.

Any court action or proceeding to attack, review, set aside, void or annul any decision pursuant to this title, or concerning any of the proceedings, acts or determinations taken, done or made prior to any such decision, shall not be maintained by any person unless such action or proceeding is commenced within ninety days and service is made within one hundred twenty days after the date of the decision. Thereafter, all persons are barred from any such action or proceeding or any defense of invalidity or unreasonableness of such decisions, proceedings, acts or determinations.

(Ord. 2477 § 2 (part), 1990)

26.01.082 - Severability of provisions.

If any section, subsection, sentence, clause or phrase of the ordinance codified in this chapter is for any reason held to be invalid or unconstitutional by the decision of a court of competent jurisdiction, such decision shall not affect the validity or the constitutionality of the remaining portions of the ordinance codified in this chapter. The board of supervisors declares that it would have passed the ordinance codified in this chapter and each section, subsection, sentence, clause or phrase thereof irrespective of the fact that any one or more sections, subsections, sentences, clauses or phrases be declared invalid or unconstitutional.

(Ord. 2477 § 2 (part), 1990)

COUNTY OF SAN LUIS OBISPO
DEPARTMENT OF PLANNING & BUILDING
TREVOR KEITH, *DIRECTOR*

ADVISORY MEMO
PUBLIC REVIEW DRAFT 5-26-20
Email comments to khensley@co.slo.ca.us by June 26, 2020.

Date: July 7, 2020
To: Board of Supervisors
From: Department of Planning & Building, Long Range Planning Division
Subject: Los Osos Growth Rate Calculations

Context. The 2015 Updated Basin Plan for the Los Osos Groundwater Basin ("Basin Plan") prepared by the three water purveyors in Los Osos and the County as part of the adjudication of groundwater resources recommends programs to implement to provide a sustainable water supply for existing and future development, halt and reverse seawater intrusion, and remove nitrate contamination. The draft Estero Area Plan Los Osos Urban Area (commonly known as the "Los Osos Community Plan" or "LOCP") restricts new development in the urban area, except for affordable housing and accessory dwelling units, until the following programs recommended for immediate implementation to accommodate existing water demand (with a marginal increase in new development) and halt seawater intrusion are complete, accounting for program modifications made through the Plan's adaptive management provision:

- Program "M" – Groundwater Monitoring
- Program "E" – Urban Water Use Efficiency
- Program "U" – Urban Water Reinvestment
- Program "A" – Infrastructure Program A
- Program "C" – Infrastructure Program C
- Program "P" – Wellhead Protection

The calculations in this memo are for the annual growth rate for new residential development in the Los Osos Urban Area once the updated Los Osos Community Plan has been adopted and the required Basin Plan Programs are implemented to allow marginal new development. As additional Basin Plan Programs are implemented to increase the sustainable basin yield, the growth rate shall be re-calculated based on the best available data at the time, in consultation with the Basin Management Committee, a committee comprised of representatives from all three water purveyors and the County, responsible for implementing the Basin Plan. The growth rate is codified in the Growth Management Ordinance ("GMO"), Title 26 of the County Code. The GMO exempts affordable housing and accessory dwelling units from growth rate restrictions.

Method. The draft Los Osos Community Plan estimates 6,321 existing dwelling units and 8,182 dwelling units at buildout in 2040. The compounding annual growth rate formula is used for the 20-year period from 2020-2040 to determine the increase in new dwelling units each year based on the existing number of dwelling units from the previous year, which is the method specified in the GMO. As shown in the calculation below, the compounding annual growth rate to allow residential buildout by 2040 is 1.3%.

Compounding annual growth rate = (final value/starting value) ^ (1/years) – 1
Compounding annual growth rate = (8,182/6,321)^(1/20) – 1 = 1.3%

The GMO specifies 65% of new units will be for single family and 35% for multi-family. This ratio is close to the ratio of the waitlist for vacant parcels in the sewer service area that may not connect until the Los Osos Community Plan and Community-Wide Habitat Conservation Plan are adopted (62% single, 38% multi), so it is appropriate for Los Osos at this stage. All vacant multi-family and commercial parcels are located in the sewer service area. There are currently 439 RSF vacant parcels in the sewer service area and 113 RSF or RS vacant parcels outside of the sewer service area within the urban area. In accordance with this ratio, 80% of the single family allocation is reserved for inside the sewer service area, and 20% for outside. The breakdown of the 1.3% increase in existing dwelling units is as follows:

- Multi- Family
  - 0.46% annual increase from total existing dwelling units in urban area
  - 35% of total maximum annual increase in dwelling units
- Single Family within the sewer service area
  - 0.68% annual increase from total existing dwelling units in urban area
  - 52% of total maximum annual increase in dwelling units
- Single Family outside the sewer service area
  - 0.17% annual increase from total existing dwelling units in urban area
  - 13% of total maximum annual increase in dwelling units

The water demand estimate assumes 130 gallons per day of water use per dwelling unit, or 0.15 acre-feet per year (AFY). This estimate is based on the average water use for a single family connection based on data provided by the Los Osos Community Services District for average usage per connection type per billing cycle in 2019. It is assumed there is one dwelling unit per single family connection. Usage data for multi family connections does not indicate the number of dwelling units per connection, so the data for average water usage per multi family dwelling unit is not available. It is assumed that a multi-family dwelling unit has the same water demand as a single family dwelling unit, which is a conservative assumption because multi-family units typically have lower outdoor water use per unit than single family dwellings. The provided data is included in Attachment 1.

Results. The estimated allowed increase in new dwelling units per year and associated increase in water demand, assuming all allocations are used each year, is shown in Table 1 for a five-year period.

Table 1: Estimated Increase in Dwelling Units and Water Demand for Proposed Growth Rate

Fiscal Year After LOCP Conditions Are Met to Allow New Growth	Existing Dwelling Units	Increase in Dwelling Units								Increase in Water Demand (AFY)[2]	
		Multi-Family (35% of total)		Single Family, Within the Sewer Service Area[1] (52% of total)		Single Family, Outside the Sewer Service Area[1] (13% of total)		Total			
		Per Year	Cumulative	Per Year	Cumulative	Per Year	Cumulative	Per Year	Cumulative	Per Year	Cumulative
1	6,321	29	29	43	43	11	11	82	82	12	12
2	6,403	29	58	43	86	11	21	83	165	12	25
3	6,486	29	87	44	130	11	32	84	249	13	37
4	6,570	30	117	44	174	11	44	85	335	13	50
5	6,656	30	147	45	219	11	55	86	421	13	63

[1]The allowance for new dwelling units outside the sewer service area may be used inside the sewer service area if there are fewer requests than the allowance.
[2]Assuming 0.15 AFY water use per dwelling unit, based on attached 2019 water usage data.

Based on this table, the proposed growth rate would allow an annual increase of 82-86 new dwelling units each year, 11 outside and 71-75 within the sewer service area with an estimated 12-13 AFY annual increase in water demand, and a total increase of 421 new dwelling units and 63 AFY estimated increase in water demand over five years.

Waitlist. There are currently requests for 215 single family and 130 multi-family units on the waitlist. Based on this projected timeline, all of the applicants on the waitlist could apply for construction permits by the 5th year after the conditions in the Los Osos Community Plan are met to allow new residential growth, assuming the maximum allocation was issued each year.

Historic Growth Rate. While the retrofit-to-build requirement has been in place, an average of two construction permits per year have been issued for new dwelling units outside of the sewer service area, so the increase of 11 dwelling units per year allowed outside of the sewer service area per this proposed growth rate should be sufficient to meet demand. The growth rate is reviewed annually and may be amended if 11 units per year is not sufficient. The allowance for new dwelling units outside the sewer service area may be used inside the sewer service area if there are fewer requests than the allowance.

Water Supply. The 63 AFY proposed estimated increase in residential urban water demand over five years is significantly less than the difference between estimated sustainable basin yield and 2019 total groundwater extraction. In 2019, the total groundwater production was estimated as 1,900 AFY, 69% of the estimated sustainable basin yield of 2,760 AFY once the Basin Plan Program A 8th Street expansion well is complete, as required by the draft LOCP before new development may occur.

Annual Review. The GMO requires this proposed growth rate, if adopted, to be reviewed annually based on the most recent Resource Summary Report. The LOCP requires the annual review of the growth rate to consider the most recent annual monitoring report prepared for the Basin Management Committee. The growth rate shall be adjusted based on significant changes in existing usage rate or an updated evaluation of the effectiveness of Basin Plan programs, and/or the implementation of additional Basin Plan programs to increase the available sustainable basin yield. After five years, the growth rate shall be re-evaluated and the GMO amended to establish a new growth rate.

Sources:

Cleath-Harris Geologists, Inc. (CHG). 2020. *Los Osos Basin Plan Groundwater Monitoring Program 2019 Annual Monitoring Report*.

Interlocutory Stipulated Judgment Working Group (ISJWG). 2015. *Updated Basin Plan for the Los Osos Groundwater Basin*

Attached:

1) Los Osos Community Services District 2019 Water Consumption Data

Los Osos Community Service District Water Consumption			
Cycle 1 for 2019 Averages			
	Number of Connections	Average Usage (Hundred Cubic Feet)	Average Usage per Connection
Single Family Residential	1024	10203	10.0
Multi Family Residential	99	1909	19.3
Commercial	85	1454	17.1
Irrigation	2	421	210.5
Totals	1210	13987	
Cycle 2 for 2019 Averages			
	Number of Connections	Average Usage (Hundred Cubic Feet)	Average Usage per Connection
Single Family Residential	1444	14986	10.4
Multi Family Residential	60	1114	18.6
Commercial	55	2303	41.9
Irrigation	4	15	3.8
Totals	1563	18418	
Totals for Both Cycles for 2019 Averages			
	Number of Connections	Total Water Usage (Hundred Cubic Feet)	Average Usage per Connection
Single Family Residential	2468	25189	10.2
Multi Family Residential	159	3023	19.0
Commercial	140	3757	26.8
Irrigation	6	436	72.7
Totals	2773	32405	

1 cycle = 2 months

Average daily usage for single family residential connection:
Assume 30 day month.
10.2 hundred cubic feet per cycle * (7.48 gallons/cubic foot) / 30 days / 2 months per cycle =
127 gallons per day
130 gallons per day, rounded
0.15 acre-feet per year (AFY)

Los Osos Community Plan - Water Supply Standards
PUBLIC REVIEW DRAFT 6-1-20

Chapter 7 of the Community Plan provides the Planning Area Standards. Planning area standards implement the goals and policies of the plan and the Local Coastal Program. The standards are mandatory requirements that apply to new land uses and proposed development. Section 7.3 Communitywide Standards includes the following standards related to water supply. The numbering and text below has been copied from the Los Osos Community Plan, excluding standards that do not specifically relate to water.

B. Resource Capacity and Service Availability.

1. Verification of water and sewer service. All applications for land divisions and new development shall be accompanied by a letter from the applicable water purveyor and provider of sewer service indicating their willingness and intent to provide service to the new development.

2. Water and Wastewater Service Capacity, Land Divisions. New land divisions, other than condominium conversions, shall not be approved unless the Review Authority makes the following findings:

a. The development can be accommodated by the sustainable yield of the Los Osos Groundwater Basin without causing seawater intrusion, as identified in the Basin Plan for the Los Osos Groundwater Basin and annual monitoring reports.

For the purposes of the above findings, the Review Authority shall consider not only the water and wastewater demands of the development being proposed, but also the water and wastewater demands from existing development and development of all vacant parcels within the Los Osos Urban Services Line.

D. Los Osos Groundwater Basin.

1. Non-Residential Development. Development of non-residential land uses that use water from the Los Osos Groundwater Basin shall be prohibited until the Board of Supervisors adopts a resolution certifying successful completion and implementation of the following programs from the 2015 Updated Basin Plan for the Los Osos Groundwater Basin, as amended or adjusted through adaptive management described in annual monitoring reports:

a. Program "M" – Groundwater Monitoring
b. Program "E" – Urban Efficiency
c. Program "U" – Urban Water Reinvestment
d. Program "A" – Infrastructure Program A
e. Program "C" – Infrastructure Program C
f. Program "P" – Wellhead Protection

2. Residential Development. The Growth Management Ordinance, Title 26 of the County Code, shall be amended to establish an annual growth rate for new residential units in the Los Osos Urban Area consistent with the available sustainable water supply. Residential units exempt from Title 26 are exempt from this standard (e.g., affordable housing, accessory dwelling units).

a. Best Available Data. The annual growth rate shall be established based on the best available data at the time, including the most recent annual monitoring report prepared for the Los Osos Basin Management Committee.

b. Annual Review. The adopted annual growth rate shall be reviewed on an annual basis and updated as needed, as follows:

(i) New Implemented Basin Plan Programs. When additional Basin Plan programs are implemented, the annual growth rate shall be updated to reflect the estimated increase in sustainable basin yield.

(ii) Basin Plan Effectiveness. If the data from the annual monitoring reports prepared for the Los Osos Basin Management Committee indicate that completed Basin Plan programs have been less or more effective in reducing groundwater demand, increasing the perennial safe yield, or facilitating seawater retreat as predicted in the Basin Plan, then the development of new residential units shall be limited or increased accordingly. Modifications made to the Basin Plan programs through the Plan's adaptive management provision shall also be considered.

(iii) Non-Residential Usage Trends. If the data from the Basin Plan annual monitoring reports, individual purveyors, or private wells, indicate a significant increase in water demand for non-residential uses (e.g., commercial, agricultural, public facilities) or for residential uses not subject to the growth limitation standards in Title 26 (e.g., affordable housing, accessory dwelling units) that the Basin Plan adaptive management is not mitigating, then the residential growth rate shall be decreased.

3. Exemptions. All development approved (pursuant to land use permits or entitlements) prior to the effective date of this standard that complies with Title 19 retrofit requirements shall be exempt from the provisions of these standards in Subsections D.1 and D.2.

DRAFT

Cleath-Harris Geologists, Inc.
75 Zaca Lane, Suite 110
San Luis Obispo, CA 93401
(805) 543-1413

Technical Memorandum

Date: June 10, 2020

From: Spencer Harris, HG 633

To: Ron Munds, General Manager
Los Osos Community Services District

SUBJECT: Update of Los Osos Basin Plan Programs U and C with respect to Basin Sustainable Yield.

Dear Mr. Munds:

As requested, Cleath-Harris Geologists (CHG) has prepared an update of Los Osos Basin Plan (LOBP) Program U (Urban Water Reinvestment) and Infrastructure Program C (Expansion Wells) with respect to the Basin sustainable yield. The 2019 Annual Monitoring Report recommended updating the sustainable yield estimate once the location of the second Program C Expansion Well was finalized and to incorporate revised expectations for recycled water availability[1]. Although the location of the second Expansion Well is still under review, the purpose of this update is to supplement information presented in the public review drafts of land use planning documents prepared by the County of San Luis Obispo[2].

All three referenced public review draft documents describe six programs contained in the LOBP that were recommended for immediate implementation and that would increase the maximum sustainable yield of the Basin to an estimated 3,000 acre-feet per year (AFY). These LOBP programs are:

- Program M – Groundwater Monitoring
- Program E – Urban Water Use Efficiency
- Program U – Urban Water Reinvestment
- Program A – Basin Infrastructure Program A
- Program C – Basin Infrastructure Program C
- Program P – Wellhead Protection Program

Three of the above six programs, Program U, Program A, and Program C have a direct effect on the Basin sustainable yield. Of these three, Program A is the only one currently on track to be completed with no significant changes from the LOBP description. Program U and Program C, however, are subject to modifications that can reduce the Basin sustainable yield estimate for

[1]CHG, 2019 Annual Monitoring Report, June 2019
[2]County of San Luis Obispo, (1) 2016-2018 Resource Summary Report (RSR), District 2 Revision, Updated Los Osos water supply section; (2) Growth Management Ordinance (Title 26) proposed amendments to establish a growth rate for Los Osos; and (3) Advisory Memo explaining the Los Osos growth rate calculations.

DRAFT

program combinations. The program combination E+AC+U was recommended for the existing population scenario in the LOBP, and is a simplification of terms for the implementation of all six LOBP programs listed above.

Program U

LOBP Infrastructure Program U involves the reinvestment of recycled water in an appropriate manner to help sustainably manage the Basin water resources. For the existing population, Program U anticipated 780 AFY of recycled water, but with 99 percent of the require parcels connected to the Los Osos Water Recycling Facility (LOWRF), actual recycled water flows are projected to only reach 540 AFY[3]. The distribution of recycled water in the basin has a direct effect on Basin sustainable yield, and recycled water discharges to the Broderson site community leach field is needed for sea water intrusion mitigation[4].

All the maximum sustainable yield scenarios performed using the Model have assumed 448 AFY of recycled water discharges to Broderson. With a projected recycled water supply of 540 AFY for the existing population, however, there may be less than 448 AFY discharged to Broderson once other parts of Program U are completed, resulting in less seawater intrusion mitigation.

Program C

LOBP Program C included three Expansion Wells along the eastern edge of the Central Area. The first Expansion Well was completed in 2016, bringing the estimated Basin yield to 2,760 AFY[5]. Several potential locations are currently being evaluated for the second Expansion Well, some of which are less efficient at increasing the Basin yield than others[6]. A third Expansion Well is considered unnecessary to meet the water demand of the existing population[7].

As previously noted, the estimated sustainable yield for the E+AC+U program combination recommended for immediate implementation in the LOBP was 3,000 AFY. Once a second Expansion Well is completed (assuming 448 AFY recycled water discharges to Broderson), the estimated sustainable yield would increase to 2,830-2,900 AFY, depending on the location of the second well[8].

---

[3]CHG, 2019 Annual Monitoring Report, June 2019
[4]CHG, Lower Aquifer nitrate concentrations review and LA11 seawater intrusion evaluation, BMC Adaptive Management TM dated November 6, 2019.
[5]CHG, Basin Yield Metric response to reduced long-term precipitation in the Los Osos Groundwater Basin, Los Osos BMC / Morro Bay NEP TM dated March 3, 2017.
[6]CHG, Los Osos Basin Plan Program C Expansion Well No. 2 Sites Alternatives Update, Los Osos CSD TM dated February 19, 2020.
[7]CHG, Los Osos Basin Plan Metric Trends Review and Infrastructure Program C Evaluation, February 28, 2019.
[8]CHG, Los Osos Basin Plan Program C Expansion Well No. 2 Sites Alternatives Update, Los Osos CSD TM dated February 19, 2020.

Program Combination E+U+AC

The maximum sustainable yield of the Basin has been estimated using the Model for a modified program combination E+U+AC scenario. Recycled water discharges to Broderson are reduced by 48 AFY (from 448 AFY to 400 AFY). This would allow Program U to distribute 140 AFY of recycled water between the Bayridge Estates leach fields, Urban reuse sites, and Sea Pines golf course. Program C is also modified to include only one additional Program C well completed at Site E (Bay Oaks Drive). Site E, owned by the Los Osos Community Services District, is a reasonably conservative placeholder for this analysis while the location of the second Expansion Well is finalized. The resulting maximum sustainable yield for the modified program combination E+U+AC is estimated in the Basin Model at 2,810 AFY, of which 80 percent, or 2,250 AFY, is considered available to Basin water users in order to provide a buffer against uncertainty. In addition, 750 AFY of the available water is reserved for agriculture in accordance with the Interlocutory Stipulated Judgment[9].

Groundwater production for domestic, purveyor, and community facilities over the last five years has averaged 1,350 AFY[10]. Assuming this average is representative of future existing population water demand, and adding 750 AFY reserved for future agricultural water use, total Basin water demand for the existing population scenario is estimated at 2,100 AFY. The resulting Basin Yield Metric for modified program combination E+U+AC would be 75 (2,100 AFY/2,810 AFY). By comparison, LOBP estimates for program combination E+U+AC included an existing population water demand of 2,230 AFY, an estimated sustainable yield of 3,000 AFY, and a Basin Yield Metric of 74.

The marginal water supply available for increases to the existing population under program combination E+AC+U was estimated in the LOBP at 170 AFY. With modifications to Programs U and C, the corresponding marginal water supply available for potential development is estimated at 150 AFY (2,250 AFY available water – 2,100 AFY water demand). By comparison, the proposed amendments to the Growth Management Ordinance are estimated to result in a cumulative increase in Basin water use after five years of 63 AFY[11].

Water Level and Chloride Metrics

The LOBP Water Level Metric goal is 8 feet above mean sea level, and the Chloride Metric goal is to lower the metric below 100 milligrams per liter (mg/L). Water Level Metric and Chloride Metric projections for modified program scenario E+AC+U with 2,250 AFY production (a Basin Yield Metric of 80) are estimated by the Model to reach 8 feet and 75 mg/L, respectively. The Model estimates steady-state (long-term) conditions for a balanced basin.

---

[9]Interlocutory Stipulated Judgment filed 2/13/2004 in San Luis Obispo County Superior County, Case No. CV 040126.
[10]CHG, 2019 Annual Monitoring Report, June 2019
[11]County of San Luis Obispo Advisory Memo explaining the Los Osos growth rate calculation.

The projected timeline in the LOBP for the Water Level Metric to reach the metric goal was within approximately 10 years of achieving the targeted Basin Yield Metric value of 80 or less. A Basin Yield Metric of less than 80 was documented in 2016, however, subsequent evaluation of the metric trend from groundwater monitoring data indicated the Water Level Metric goal would not be reached until 2033[12]. Part of the extended timeline was due to lowering the LOBP metric values following removal of a density correction at the sandspit wells and adjustment of the datum used for survey reference point elevations[13]. Reevaluation of the metric goal is recommended, along with installation of water level transducers to help identify and interpret water level trends in the Lower Aquifer[14]. Groundwater mounding from recycled water discharges to the Broderson community leach field has been observed in the Upper Aquifer, and Lower Aquifer water levels are also expected to rise as the mound expands into the basin[15].

The anticipated trendline for the Chloride Metric in the LOBP was a continued rise in the metric over a period of 10 years, followed by decline, and reaching the metric goal within approximately 30 years of achieving the targeted Basin Yield Metric value. Although initial evaluation of the Chloride Metric from groundwater monitoring results indicated the goal could be reached within just a few years, subsequent consideration of wellbore leakage (Upper Aquifer influence) and variations in pumping at one of the metric wells indicated that more time will be needed, as originally projected, to meet the goal[16,17,18].

[12]CHG, Los Osos Basin Plan Metric Trends Review and Infrastructure Program C Evaluation, February 28, 2019.
[13]CHG, 2015 Annual Monitoring Report, June 2016.
[14]CHG, 2019 Annual Monitoring Report, June 2020.
[15]CHG, Los Osos Basin Plan Metric Trends Review and Infrastructure Program C Evaluation, February 28, 2019.
[16]Ibid.
[17]CHG, 2018 Annual Monitoring Report, June 2019.
[18]CHG, 2019 Annual Monitoring Report, June 2020.

TO: Los Osos Basin Management Committee

FROM: Dan Heimel, Executive Director

DATE: June 17, 2020

SUBJECT: Item 6b – Implementation Plan Approach

Recommendations

Recommendation: Review and provide direction on the proposed approach for preparing an Implementation Plan for the BMC and provide authorization for staff to initiate the Implementation Plan development; or provide alternate direction to staff.

Discussion

Section 5.13.2 of the Stipulated Judgment requires that the BMC Parties develop an annual budget to fund its activities. During the development of the CY 2020 BMC Budget, it was identified that the BMC would benefit from a comprehensive evaluation of the water resource initiatives potentially available to the BMC. This evaluation is described as an Implementation Plan and is intended to help the BMC build consensus around how to focus its efforts and funds for future water resources initiatives and to aid in the further implementation of the Basin Plan.

At the May 2020 BMC Meeting, the BMC directed the Executive Director for work with BMC to develop an outline for how to approach the development of an Implementation Plan. Included below is an outline of the proposed Implementation Plan development approach and identification of responsible parties for proposed tasks.

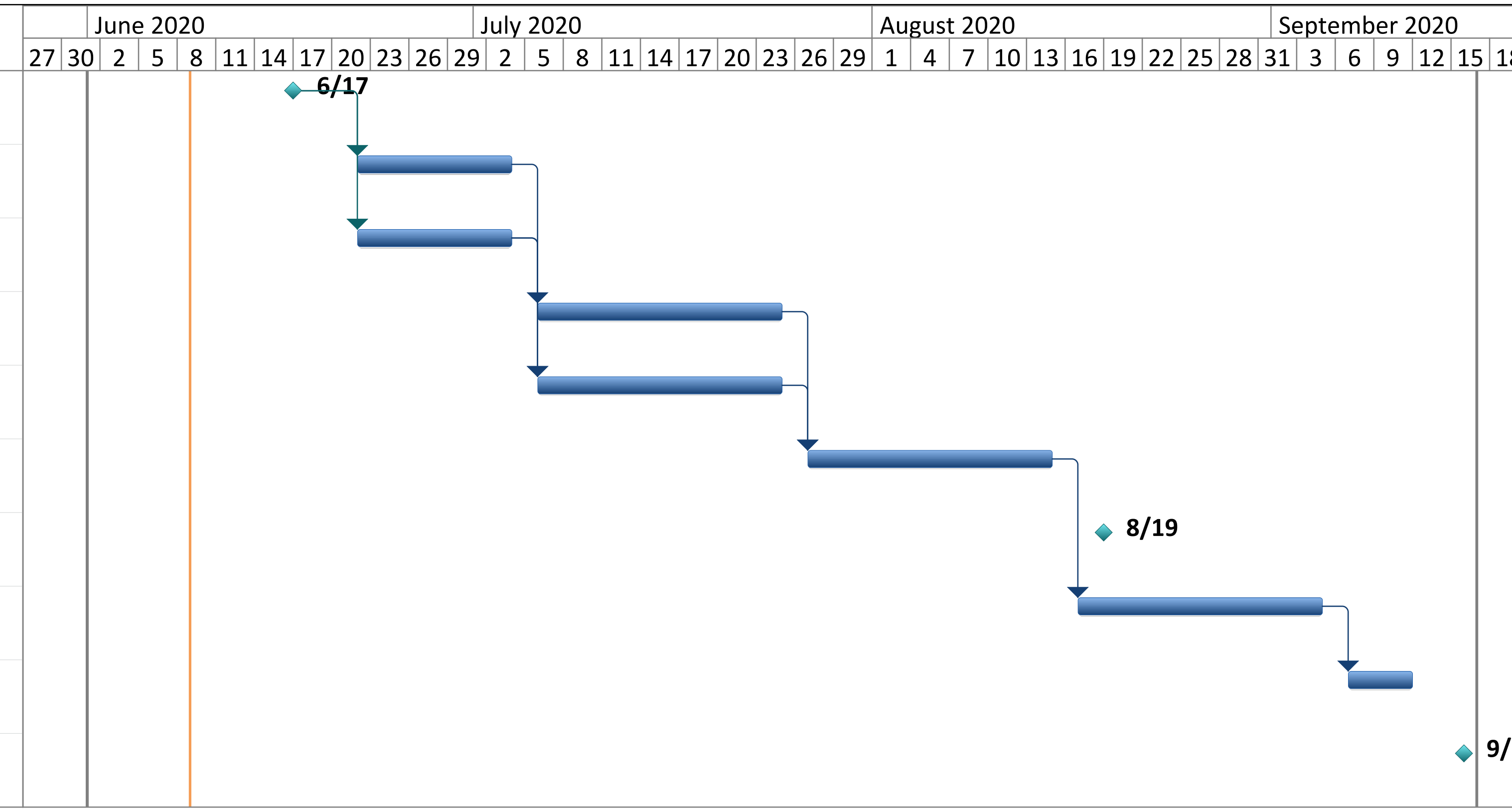
1. Review Stipulated Judgement, Basin Plan, Rules and Regulations, Annual Reports and other formation documents and summarize role and responsibilities
    a. Strategic Initiatives Development (BMC Party Staff)
2. Develop list of potential BMC strategic initiatives (e.g. Creek Discharge, Urban Stormwater Capture, Evaluation of Basin Metrics, Transient Model, Funding & Organization Studies, etc.)
3. Develop summary sheets describing key components of each initiative (WSC develops, BMC Staff reviews)
    a. Scoring and ranking criteria development (WSC/BMC Party Staff)
4. Develop, review and finalize scoring and ranking criteria for evaluating strategic initiatives
    a. Strategic Initiative Evaluation (WSC & BMC Party Staff)
5. Utilize scoring and ranking criteria to evaluate and prioritize BMC strategic initiatives (BMC Party Staff)
    a. Present scoring and ranking results to BMC at August BMC Meeting
6. Implementation Plan TM Development (WSC develops, BMC Party Staff reviews)
7. Develop summary of Implementation Plan process and results
8. Presentation to BMC at September BMC Meeting

Additionally, attached is a proposed schedule for the development of the Implementation Plan. The proposed schedule is relatively aggressive and was developed to target providing a draft of the Implementation Plan to the BMC at a September BMC Meeting to aid in the development of the CY 2021 BMC Budget.

Financial Considerations

The development of an Implementation Plan was not included in the Baseline Budget that was approved by the BMC for CY 2020. Based on the input provided by the BMC Directors regarding the approach to developing the Implementation Plan, staff will evaluate the potential to complete the Implementation Plan within the existing budget BMC budget. However, depending on the level of effort anticipated, the BMC may want to consider including a separate budget line item and additional budget for completion of the Implementation Plan in the CY 2020 Budget.

ID		Task Mode	Task Name	Duration	Start	Finish	Predecessors	Resource Names
1			BMC Approval (June 2020 BMC Meeting)	0 days	Wed 6/17/20	Wed 6/17/20		
2			Roles & Responsibilities Documentation	2 wks	Mon 6/22/20	Fri 7/3/20	1FS+3 days	
3			Strategic Initiative Development	2 wks	Mon 6/22/20	Fri 7/3/20	1FS+3 days	
4			Strategic Initiative Summary Sheets	3 wks	Mon 7/6/20	Fri 7/24/20	3	
5			Scoring and Ranking Criteria Development	3 wks	Mon 7/6/20	Fri 7/24/20	3,2	
6			Strategic Initiative Evaluation	3 wks	Mon 7/27/20	Fri 8/14/20	4,5	
7			August BMC Meeting	0 days	Wed 8/19/20	Wed 8/19/20		
8			Implementation Plan TM	3 wks	Mon 8/17/20	Fri 9/4/20	6	
9			Prepared BMC Staff Report	1 wk	Mon 9/7/20	Fri 9/11/20	8	
10			Presentation to BMC	0 days	Wed 9/16/20	Wed 9/16/20		



TO: Los Osos Basin Management Committee

FROM: Dan Heimel, Executive Director

DATE: June 17, 2020

SUBJECT: Item 6c – Final 2019 Annual Report

Recommendations

Recommendations: Receive the Final 2019 Annual Report, authorize submission to the Court, and provide direction to Staff on future Annual Report review and approval procedures; or provide alternate direction to staff.

Discussion

Section 5.8.3 of the Final Judgment requires that the preparation of an Annual Report by June 30 of each year. The BMC retained Cleath Harris Geologists (CHG) to prepare the fourth Annual Report for calendar year 2019. The final work product prepared by CHG is attached, and a staff summary will be provided at the meeting.

Additionally, to aid in streamlining the Annual Report preparation process for future years it is recommended that the BMC evaluate the current approach to reviewing and approving the Draft and Final Annual Reports. The current approach is described below:

1. Draft Annual Report is provided for Public Comment and review as an agenda item at a BMC Meeting.
2. Public and BMC Comments provided on the Draft Annual Report are addressed and a Final Annual Report is prepared.
3. Final Annual Report is presented to the BMC as a BMC Meeting Agenda Item for approval to submit to the Court.

To provide the BMC with additional flexibility for reviewing and approving the Annual Report, the following approach is provided for BMC consideration and approval:

1. Draft Annual Report is provided for Public Comment and review as an agenda item at a BMC Meeting.
2. If determined that there are no significant issues or comments that need to be discussed further, the BMC can authorize staff to prepare the Final Annual Report and submit to the Court.
3. If significant comments are identified, the BMC can request that the Final Annual Report be brought back to the BMC at a future BMC Meeting for approval before submission to the Court.

There are no specific Public or BMC review/comment period requirements for the preparation of the Annual Report identified in the Stipulation or the BMC Rules and Regulations. However, both describe that the Annual Report shall be made available to the public. Both the current and proposed approaches meet the requirements for public notification and review.

Financial Considerations

Budget items 5 and 6 in the adopted calendar year 2020 budget address monitoring and preparation of the annual report.

FINAL DRAFT

LOS OSOS BASIN PLAN
GROUNDWATER MONITORING PROGRAM
2019 ANNUAL MONITORING REPORT

Prepared for the

BASIN MANAGEMENT COMMITTEE

June 2020

CLEATH-HARRIS GEOLOGISTS
75 Zaca Lane, Suite 110
San Luis Obispo, California 93401

TABLE OF CONTENTS

List of Tables

List of Figures

List of Appendices

EXECUTIVE SUMMARY

The Los Osos Basin Plan Groundwater Monitoring Program - 2019 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 in calendar year 2019. 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 goals of the LOBP, including prevention of 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 2019 is summarized in Table ES-1 below. Purveyor production has decreased by three percent compared to 2018, while total Basin production has decreased by six percent compared to 2018.

Table ES-1. Groundwater Production

Description	2018 Production in Acre-Feet	2019 Production in Acre-Feet
Los Osos Community Services District	522	506
Golden State Water Company	464	454
S&T Mutual Water Company	32	31
Purveyor Subtotal	**1018**	**991**
Domestic wells	220	220
Community facilities	120	60
Agricultural wells	670	630
Total Estimated Production[1]	**2,030**	**1,900**

[1] Rounded to the nearest 10 acre-feet

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. 40)**. The Basin received above average rainfall in 2019. The drought condition for San Luis Obispo County ranged from moderate to severe drought conditions to no drought conditions during 2019 (NDMC/USDA/NOAA, 2019).
>
> **Seawater intrusion front (p. 54)**. The seawater intrusion front was repositioned closer to the coast based on adding a new monitoring well to the contouring data set, but is interpreted to have advanced inland between Fall 2018 and Fall 2019 (a deterioration).
>
> **Basin Yield Metric (p. 61)**. The Basin Yield Metric decreased between 2018 and 2019 (an improvement) and has met the LOBP goal for four consecutive years.
>
> **Water Level Metric (p. 64)**. The Water Level Metric decreased between Spring 2018 and Spring 2019 (a deterioration) and has not reached the target value.
>
> **Chloride Metric (p. 66)**. The Chloride Metric increased between Fall 2018 and Fall 2019 (a deterioration) and has not reached the target value.
>
> **Nitrate Metric (p. 67)**. The Nitrate Metric decreased between Winter 2018 and Winter 2019 (an improvement) but has not reached the target value.
>
> **Upper Aquifer Water Level Profile (p. 70)**. Water levels in the Upper Aquifer along the bay remain safely above the Protective Elevation.

The Chloride Metric is influenced by variations in pumping prior to sampling at metric well LA10, and a protocol for monitoring has been established to help standardize sampling conditions at that well. The decline in the Basin Water Level Metric is interpreted to be due to differences in the timing of measurements relative to seasonal fluctuations and the Spring high water level. Where continuous water level transducer data is available in the Central Area, Lower Aquifer water levels rose by two feet from Spring 2018 to Spring 2019. Recommendations for improving the quality and availability of data are contained in Section 9 of the Annual Report. The recommendations include developing a rating curve for the stream gage on Los Osos Creek, re-evaluating the Water Level Metric target following a wellhead survey, expanding the Lower Aquifer transducer network, and evaluating the feasibility of modifying up to four existing program wells for dedicated Zone E water quality monitoring.

LOBP Metrics

As described in Section 7.5 ("Basin Metrics") 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 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	**LOBP Goal**	**Calculated Value from 2019 Data**	**Recommended Actions in Addition to LOBP Programs**
Basin Yield Metric	80 or less	69	Implement additional conservation measures to reduce indoor and outdoor demands (See Section 10.3.2)
Water Level Metric	8 feet above mean sea level or higher	1.8 feet above mean sea level	Implement additional conservation measures to reduce indoor and outdoor demands (See Section 10.3.2)
Chloride Metric	100 mg/L or lower	162 mg/L	Implement additional conservation measures to reduce indoor and outdoor demands (See Section 10.3.2)
Nitrate Metric	10 mg/L or lower	22 mg/L (NO_3-N)	None recommended

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:

Potential Adaptation of Urban Water Use Efficiency Program. The BMC plans to evaluate the status and the effectiveness of the program throughout the year. The County has implemented a series of rebates as described in Section 10.

Development of Contingency Plan. The BMC plans to develop a contingency plan and related actions in the event Basin Metric trends fail to demonstrate progress toward LOBP goals, including defined schedules and milestones.

Lower Aquifer Nitrate Trends. The BMC will continue to monitor the leakage of groundwater with elevated nitrate concentrations from the Upper Aquifer through the regional aquitard into the Lower Aquifer. Trends of increasing nitrate concentrations at some Lower Aquifer community supply wells are projected to exceed State drinking water standards, possibly within the next 10 years, as reported in the 2019 Adaptive Management TM (CHG, 2019a). The BMC will address this issue as part of strategic planning.

Discussion and Development of Metrics for Future Growth. The BMC plans to provide input into the Los Osos Community Plan, including consideration of Basin Metrics and defined goals as they relate to the timing of future growth.

Additional Water Quality Metrics. The BMC intends to consider developing additional metrics and/or numerical goals as appropriate to protect the upper aquifer from water quality threats, such as seawater intrusion and chromium-6 contamination. An Upper Aquifer Water Level Profile was introduced in 2017, as described in Section 7.5 of this Annual Report.

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	Fully Funded	LOCSD/GSWC $103,550	Completed
Upper Aquifer Well (8th Street)	LOCSD	Fully Funded	$250,000	Well was drilled and cased in December 2016. Budget remaining $250,000 to equip the well. Design is 100% complete and project has been included in an IRWM Grant Application. If awarded, funding is anticipated to be available in late 2020/early 2021.
South Bay Well Nitrate Removal	LOCSD			Completed
Palisades Well Modifications	LOCSD			Completed
Blending Project (Skyline Well)	GSWC	Fully Funded	$1.15 mil	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 can be considered a 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	Fully Funded	$1.76 mil	Completed
Expansion Well No. 2	LOCSD is currently leading the project with potential GSWC and S&T involvement, depending on final location	LOCSD is currently leading the project with respect to funding	BMP: $2.0 mil	Property acquisition phase is on-going through efforts of LOCSD. Test hole at Site A (Los Osos Middle School) completed January 2020 and showed location was not suitable for Expansion Well. Alternative sites are being considered and plans for environmental review to identify preferred site are expected to begin in Q2 of 2020.
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	In conceptual design

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	Funded through BMC Budget	$115,000	Completed
Program U				
Creek Discharge Program	All Parties	$50k included and approved in the CY 2019 BMC Budget	Anticipated cost of $582,000 through feasibility phase	The 2019 budget includes funding for Soil Aquifer Treatment evaluation in the amount of $50,000. BMC authorized completion of the Soil Aquifer Testing to support implementation of the Creek Discharge Program. These activities are currently on hold pending outcome of the CY 2020 BMC Budget discussion.
8th and El Moro Urban Storm Water Recovery Project	All Parties	$15k included in CY 2019 BMC Budget for initial study	NA	On hold, pending outcome of the CY 2020 BMC Budget discussion.

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 fifth Annual Report for the Basin.

The 2019 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 prevention of 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). Water Systems Consulting 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.

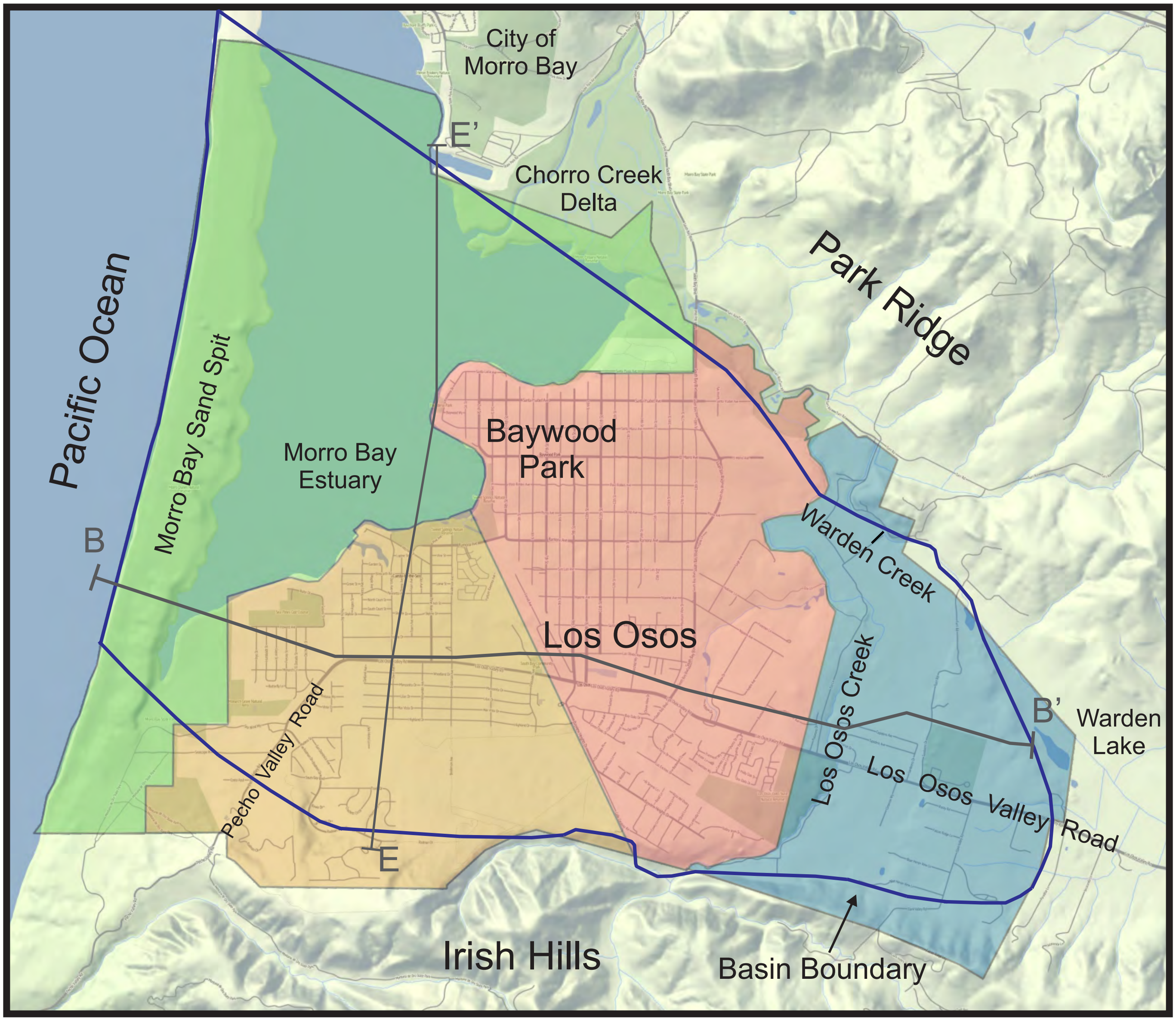
2.1 Groundwater Monitoring History

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 2019 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

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

Cross-section alignments (Figures 5, 19 and D4). 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
2019 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.

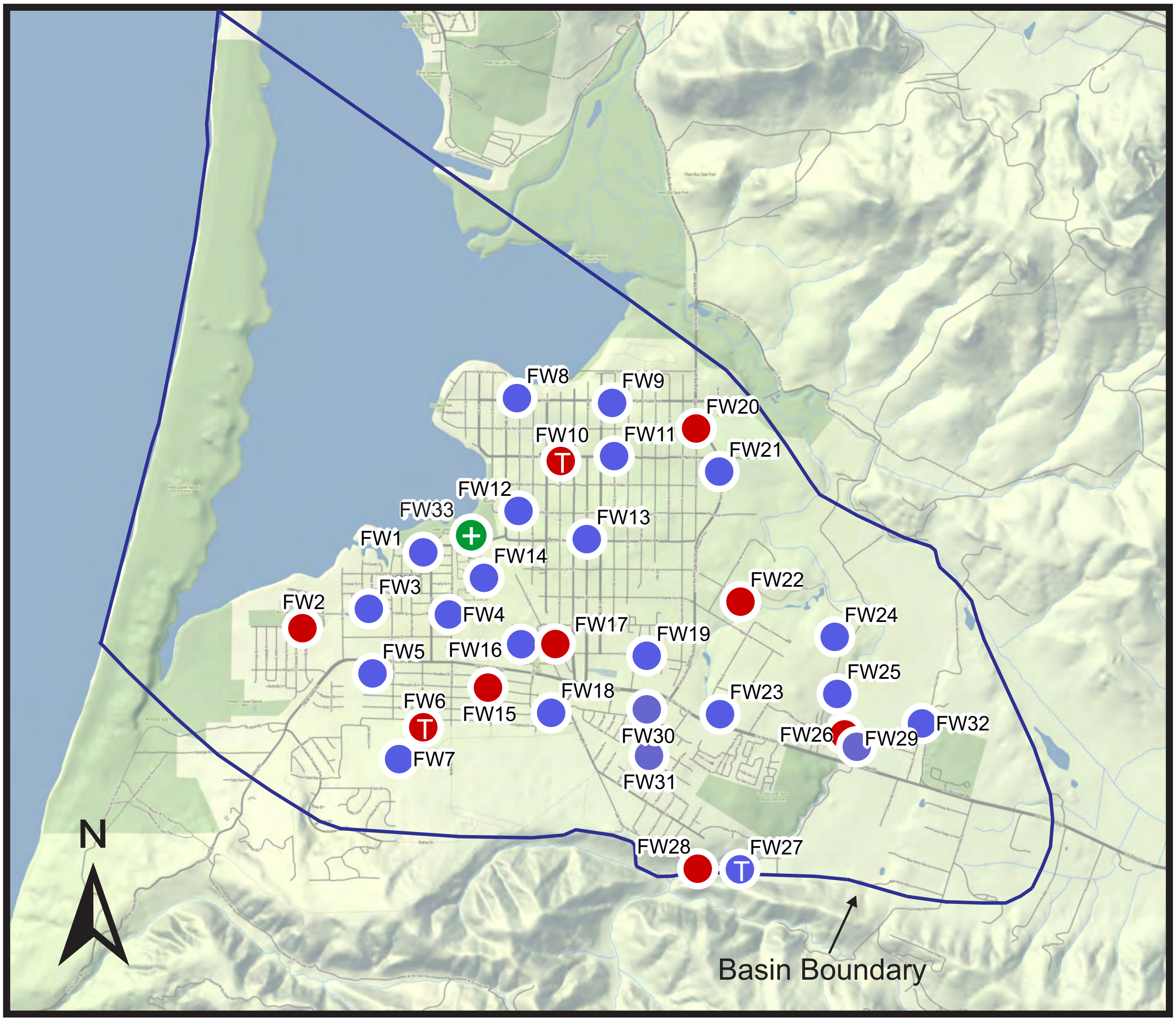
- Collect data sufficient to evaluate the effectiveness of Basin management strategies adopted in the LOBP via established metrics.

There were a total of 88 wells in the LOBP Groundwater Monitoring Program in 2018, including 38 BMC member agency monitoring wells, 17 municipal wells (active and inactive) and 33 private wells (CHG, 2017a). Four new wells were added to the program in 2019, for a total of 92 wells. Private well participation in the monitoring program during 2019 was 73 percent (25 out of 34 wells). "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. Construction of a Lower Aquifer monitoring well near the bay, as recommended in the LOBP, was approved in 2017 and completed in 2019. The nested monitoring well on Lupine Avenue monitors Lower Aquifer Zone D and Zone E (monitoring program wells LA41 and LA40, respectively). Access was also granted to monitor a private Zone C well near the bay (FW33). The fourth new well added to the monitoring network is the LOBP Program C well completed by GSWC and activated in 2017 (LA39).

2.2.1 Water Level Monitoring

Water level monitoring is a fundamental tool in 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. Seven 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

0 2000 4000 6000 8000 ft

Scale: 1 inch ≈ 4,000 feet

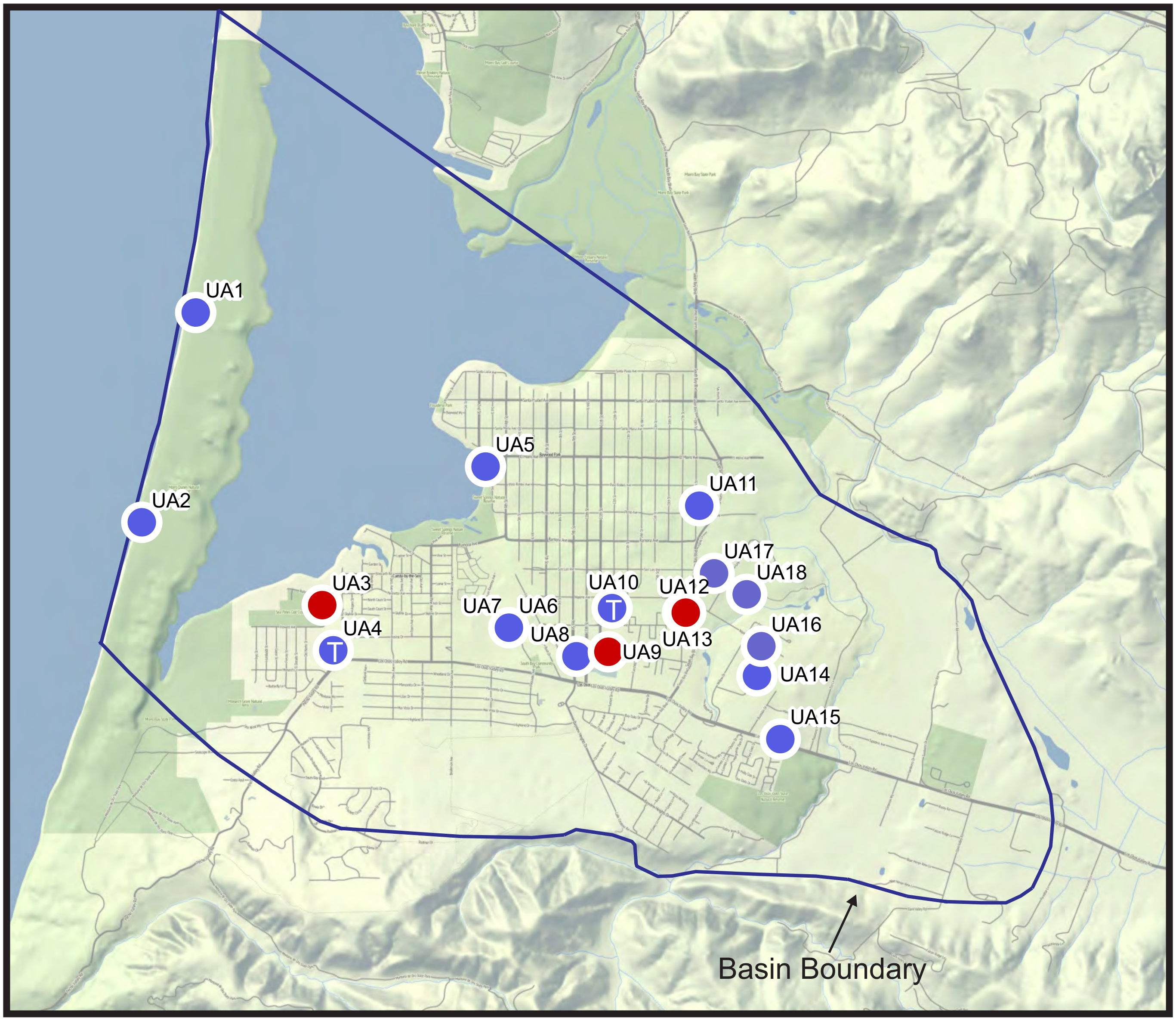
Explanation

- LOBP Water Level Monitoring Well
- Water Level Monitoring Well Addition (existing well)
- Water Level Transducer
- Water Level and Water Quality Monitoring Well
- Water Level Transducer and Water Quality Monitoring Well

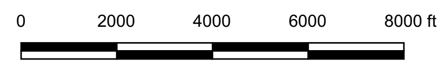
Note: First Water wells refers to wells screened within the first 50 feet of saturated sediments across the basin, regardless of the aquifer.

Figure 2
Groundwater Monitoring Program
First Water Wells
Los Osos Groundwater Basin
2019 Annual Report

Cleath-Harris Geologists



Base Image: Stamen-Terrain



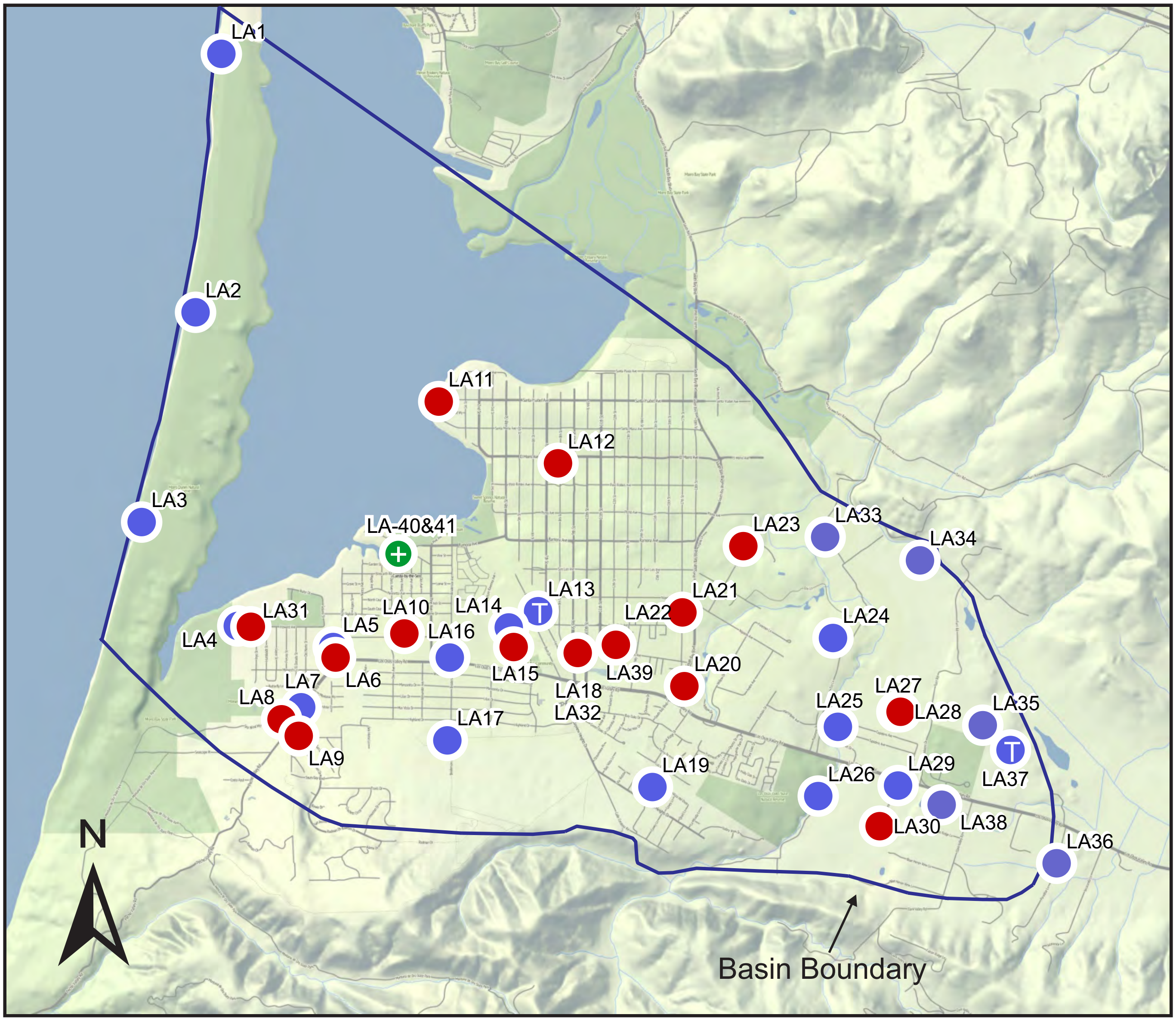
Scale: 1 inch ≈ 4,000 feet

Explanation

- LOBP Water Level Monitoring Well
- Water Level Monitoring Well Addition (existing 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
2019 Annual Report

Cleath-Harris Geologists



Base Image: Stamen-Terrain

0 2000 4000 6000 8000 ft

Scale: 1 inch ≈ 4,000 feet

Explanation

- LOBP Water Level Monitoring Well
- Water Level and Quality Monitoring Well Addition
- 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
2019 Annual Report

Cleath-Harris Geologists

Of the 92 wells currently in the LOBP Groundwater Monitoring Program, 33 are representative of First Water, 18 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, 38 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.

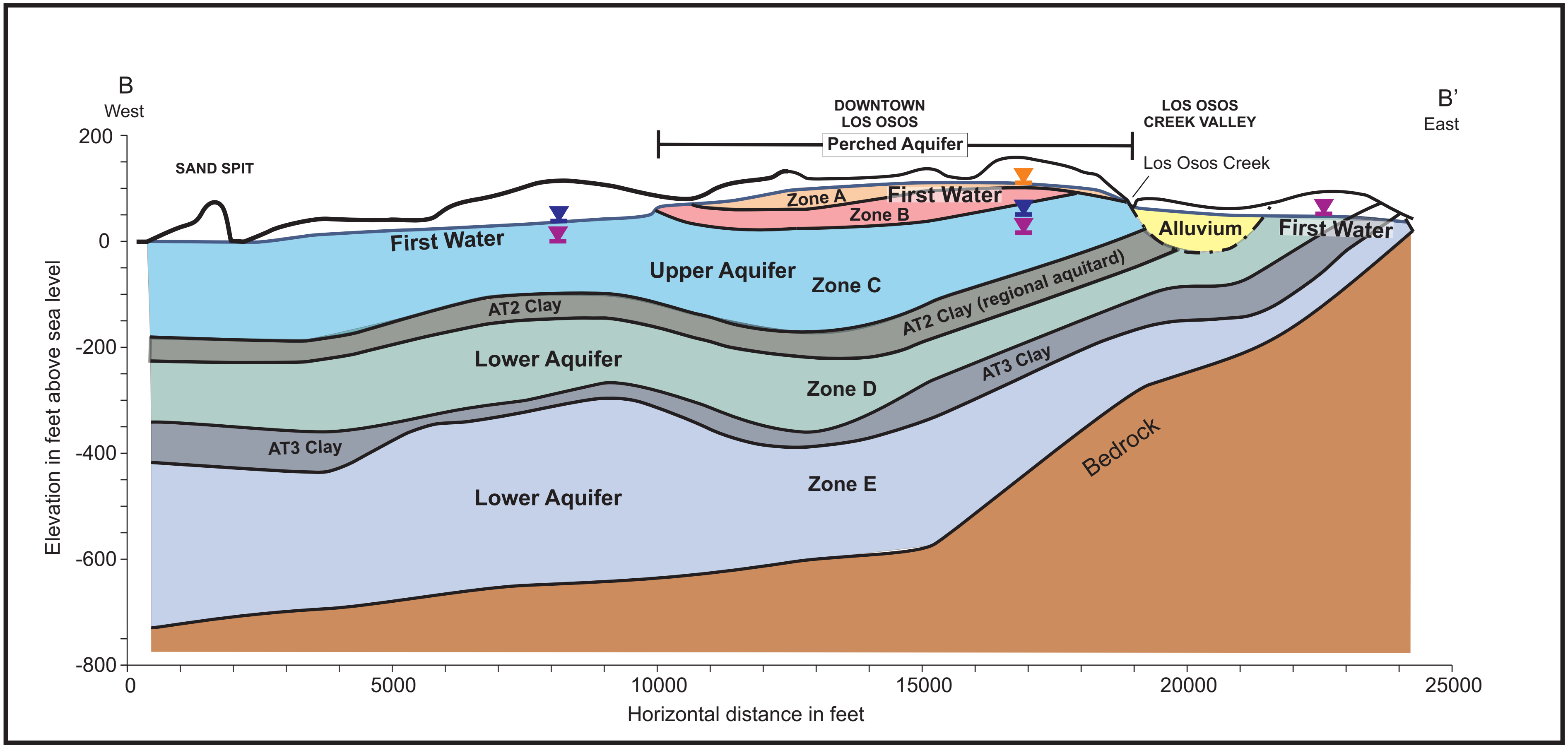
Upper Aquifer

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 is planned under 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 generalized aquifer zones within the Lower Aquifer. 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. The seawater intrusion front corresponds to the position of the 250 mg/L chloride concentration isopleth, and has been advancing inland at increasing rates over time. A significant reduction in Lower Aquifer production, together with other LOBP programs, is necessary to halt, slow and/or reverse intrusion.



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
2019 Annual Report

Cleath-Harris Geologists

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) will also be 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. The next scheduled induction logging will be performed in the Fall of 2021.

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	2.0	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	0.001
Triclosan	Antimicrobial		0.050
Caffeine	Stimulant		0.050
NDMA (Nitroso-dimethylamine)	Disinfection Byproduct		0.002
Gemfibrozil	Pharmaceutical Residue	Performance	0.010
DEET (Diethyl-meta-toluamide)	Personal Care Product		0.050
Iopromide	Pharmaceutical Residue		0.050
Sucralose	Food additive		0.100
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. Until last year, 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. 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 additional Basin studies were authorized or completed in 2019, including:

- A study was completed that reviews LOBP metric trends and performs a Program C infrastructure evaluation (CHG, 2019b).
- A study was authorized and a draft completed in 2019 that reviews Lower Aquifer nitrate concentration trends and evaluates seawater intrusion at LA11 (CHG, 2019a).
- The Lower Aquifer nested monitoring well at Lupine Avenue was constructed and tested in 2019. Results are summarized in this Annual Report (Section 4.4).

- LOCSD, a BMC member, authorized a test hole at Program C expansion well Site A, with field work beginning in 2020. The test hole results indicated Site A is not suitable for a public supply well, and evaluations of alternative sites are in progress.

3. CONDUCT OF WORK

This Annual Report covers monitoring activities performed during the 2019 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 2019.

3.1 Services Provided

All 2019 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 E. 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). Several wells were re-surveyed in 2003 and 2005 using NAVD 88, but there are still wells with elevations based on NGVD 29, along with wells with no known elevation survey. For the Annual Report, wellhead elevations reported in Table 3 through Table 8 are from the latest available survey or estimated from topographic maps (with datum given). For water level contouring and storage calculations, the NGVD 29 reference point elevation have been adjusted to NAVD 88 datum using a 2.8 feet upward shift, based on North American Vertical Datum Conversion (VERTCON) data reviewed for the Basin, as published by the National Geodetic Society. A review of all reference points by a licensed surveyor was scheduled for 2019 but not performed. When the surveyor review is completed, all data will be expressed in the current NAVD 88 standard, including the Water Level Metric (Section 7.5.3), which will allow direct comparison of all water elevation data and remove incorrect datum assumptions.

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. Seven 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 E.

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 E.

3.3 Monitoring Staff Affiliations

Monitoring services that contributed data to the 2019 Annual Report were performed by staff or consultants affiliated with the following agencies:

- San Luis Obispo County Department of Public Works, Water Resources Division. County staff performed semi-annual water level monitoring, collected and maintained precipitation and stream gage records. Rincon Consultants 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 2019 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 2019 monitoring program reports (Rincon Consultants, 2019, 2020).

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 2019, 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 2019, rather than using the June and December 2019 LOWRF monitoring event values.

Table 3. Spring 2019 Water Levels - First Water					
Well ID	**State Well Number**	**R. P. Elevation and Datum (feet)**	**Date**	**Water Level (feet)**	
				Depth	**Elevation**
FW1	30S/10E-13A7	PRIVATE (not measured)			
FW2	30S/10E-13L8	32.63 [1]	4/4/2019	21.96	10.7
FW3	30S/10E-13G	50.95 [1]	4/4/2019	40.05	10.9
FW4	30S/10E-13H	49.33 [1]	4/4/2019	23.14	26.2
FW5	30S/10E-13Q2	101.27 [1]	4/4/2019	82.7	18.6
FW6	30S/10E-24A	193.04 [1]	4/5/2019	150.28	42.8
FW7	30S/10E-24Ab	Not measured (damaged)			
FW8	30S/11E-7L4	45.76 [1]	4/4/2019	36.91	8.9
FW9	30S/11E-7K3	90.71 [1]	4/4/2019	53.73	37.0
FW10	30S/11E-7Q1	25.29 [1]	4/5/2019	7.95	17.3
FW11	30S/11E-7R2	61.93 [1]	4/4/2019	23.03	38.9
FW12	30S/11E-18C2	34.55 [1]	4/4/2019	19.36	15.2
FW13	30S/11E-18B2	79.89 [1]	4/4/2019	20.89	59.0
FW14	30S/11E-18E1	PRIVATE (not measured - destroyed)			
FW15	30S/11E-18N2	125.53 [1]	4/4/2019	80.76	44.8
FW16	30S/11E-18L11	88.02 [1]	4/4/2019	45.68	42.3
FW17	30S/11E-18L12	103.85 [1]	4/4/2019	20.39	83.5
FW18	30S/11E-18P	150 [2]	4/3/2019	24.36	125.6
FW19	30S/11E-18J7	125.74 [1]	4/4/2019	23.79	102.0
FW20	30S/11E-8Mb	95 [2]	4/4/2019	45.00	50
FW21	30S/11E-8N4	95.99[1]	4/4/2019	39.00	57.0
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 (measured)			
FW30	30S/11E-18R1	PRIVATE (measured)			
FW31	30S/11E-19A	213 [2]	4/5/2019	27.95	185.1
FW32	30S/11E-21D14	PRIVATE (measured)			
FW33+	30S/11E-18D1S	PRIVATE (measured)			

NOTES: 1 NAVD88 elevation as reported by licensed land surveyor
2 estimated elevation (NAVD 88)

Table 4. Spring 2019 Water Levels - Upper Aquifer					
Well ID	**State Well Number**	**R. P. Elevation and Datum (feet)**	**Date**	**Water Level (feet)**	
				Depth	**Elevation**
UA1	30S/10E-11A1[4]	16.01 [1]	2/21/2019	10.5	5.5
UA2	30S/10E-14B1[4]	23.90 [1]	2/21/2019	19.12	4.7
UA3	30S/10E-13F4	19 [2]	4/11/2019	9.3	9.7
UA4	30S/10E-13L1	38.68 [3]	4/5/2019	30.2	8.5
UA5	30S/11E-7N1	9.13 [3]	4/12/2019	4.2	4.9
UA6	30S/11E-18L8	79.18 [1]	3/25/2019	55.68	23.5
UA7	30S/11E-18L7	79.16 [1]	3/25/2019	63.76	15.4
UA8	30S/11E-18K7	135.65 [3]	4/10/2019	117.71	17.9
UA9	30S/11E-18K3	121.18 [3]	4/8/2019	111	10.2
UA10	30S/11E-18H1	107.10 [3]	4/5/2019	91.53	15.6
UA11	30S/11E-17D	PRIVATE (not measured)			
UA12	30S/11E-17E9	105.85 [3]	4/10/2019	85.2	20.7
UA13	30S/11E-17E10	106[2]	4/12/2019	87.9	18.1
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 (not measured)			

NOTES:
1 NAVD88 elevation as reported by licensed land surveyor
2 estimated elevation (assume NAVD 88)
3 reported elevation by County (datum unknown, likely NGVD 29)
4 measured in February (Winter)
All NGVD 29 elevations are converted to NAVD 88 prior to contouring

Table 5. Spring 2019 Water Levels - Lower Aquifer					
Well ID	State Well Number	R. P. Elevation and Datum (feet)	Date	Water Level (feet)	
				Depth	Elevation
LA1	30S/10E-2A1[4]	23.13 [1]	2/21/2019	16.03	7.1
LA2	30S/10E-11A2[4]	16.07 [1]	2/21/2019	11.7	4.4
LA3	30S/10E-14B2[4]	23.89 [1]	2/21/2019	21.9	2.0
LA4	30S/10E-13M1	41.20 [3]	4/3/2019	43.46	-2.3
LA5	30S/10E-13L7	37 [2]	4/26/2019	31.7	5.3
LA6	30S/10E-13L4	68 [2]	4/25/2019	64	4.0
LA7	30S/10E-13P2	PRIVATE (not measured)			
LA8	30S/10E-13N	138.50 [2]	4/3/2019	133.5	5.0
LA9	30S/10E-24C1	178.32 [3]	4/11/2019	172.1	6.2
LA10	30S/10E-13J1	95.31 [3]	4/11/2019	94	1.3
LA11	30S/10E-12J1	8.43 [1]	4/9/2019	5.34	3.1
LA12	30S/11E-7Q3	24.30 [3]	4/12/2019	36.2	-11.9
LA13	30S/11E-18F2	100 [3]	4/5/2019	101.14	-1.1
LA14	30S/11E-18L6	79.36 [1]	3/25/2019	75.95	3.4
LA15	30S/11E-18L2	85 [2]	4/12/2019	105.8	-20.8
LA16	30S/11E-18M1	106.82 [3]	3/25/2019	99.6	7.2
LA17	30S/11E-24A2	210.40 [3]	3/26/2019	169.02	41.4
LA18	30S/11E-18K8	135.74 [3]	4/10/2019	134.5	1.2
LA19	30S/11E-19H2	256.20 [3]	3/26/2019	265.81	-9.6
LA20	30S/11E-17N10	140 [2]	4/12/2019	145	-5.0
LA21	30S/11E-17E7	105.85 [3]	3/22/2019	105.6	0.3
LA22	30S/11E-17E8	105.85 [3]	3/22/2019	96.8	9.1
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 [1]	4/22/2019	3.81	22.3
LA35	30S/11E-21Bb	86.8[1]	4/5/2019	63	23.8
LA36	30S/11E-21Ja	PRIVATE (measured)			
LA37	30S/11E-21B1	81.4[2]	4/5/2019	57.66	23.7
LA38	30S/11E-21E	PRIVATE (measured)			
LA39+	30S/11E-18K	121.7[2]	4/11/2019	138.5	-16.8

NOTES:
1 NAVD88 elevation as reported by licensed land surveyor
2 estimated elevation (assume NAVD 88)
3 reported elevation by County (datum unknown, likely NGVD 29)
4 measured in February (Winter)
All NGVD 29 elevations are converted to NAVD 88 prior to contouring
+ added for current reporting year

Table 6. Fall 2019 Water Levels - First Water					
Well ID	State Well Number	R. P. Elevation and Datum (feet)	Date	Water Level (feet)	
				Depth	Elevation
FW1	30S/10E-13A7	PRIVATE (not measured)			
FW2	30S/10E-13L8	32.63 [1]	10/3/2019	22.02	10.6
FW3	30S/10E-13G	50.95 [1]	10/3/2019	40.22	10.7
FW4	30S/10E-13H	49.33 [1]	10/3/2019	25.2	24.1
FW5	30S/10E-13Q2	101.27 [1]	10/16/2019	81.87	19.4
FW6	30S/10E-24A	193.04 [1]	10/4/2019	147.56	45.5
FW7	30S/10E-24Ab	Not measured (damaged)			
FW8	30S/11E-7L4	45.76 [1]	10/4/2019	37.95	7.8
FW9	30S/11E-7K3	90.71 [1]	10/2/2019	54.56	36.2
FW10	30S/11E-7Q1	25.29 [1]	10/4/2019	9.2	16.1
FW11	30S/11E-7R2	61.93 [1]	10/2/2019	24.51	37.4
FW12	30S/11E-18C2	34.55 [1]	10/4/2019	20.25	14.3
FW13	30S/11E-18B2	79.89 [1]	10/4/2019	22.98	56.9
FW14	30S/11E-18E1	PRIVATE (not measured - destroyed)			
FW15	30S/11E-18N2	125.53 [1]	10/3/2019	78.85	46.7
FW16	30S/11E-18L11	88.02 [1]	10/3/2019	45.01	43.0
FW17	30S/11E-18L12	103.85 [1]	10/3/2019	22.2	81.7
FW18	30S/11E-18P	150 [2]	10/4/2019	25.85	124.2
FW19	30S/11E-18J7	125.74 [1]	10/3/2019	25.88	99.9
FW20	30S/11E-8Mb	95 [2]	10/2/2019	45.87	49.1
FW21	30S/11E-8N4	95.99 [1]	10/2/2019	40.05	55.9
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 (measured)			
FW30	30S/11E-18R1	PRIVATE (measured)			
FW31	30S/11E-19A	213 [2]	10/4/2019	26.8	186.2
FW32	30S/11E-21D14	PRIVATE (measured)			
FW33+	30S/11E-18D1S	PRIVATE (measured)			

NOTES: 1 NAVD88 elevation as reported by licensed land surveyor
2 estimated elevation (NAVD 88)
+ added for current reporting year

Table 7. Fall 2019 Water Levels - Upper Aquifer					
Well ID	State Well Number	R. P. Elevation and Datum (feet)	Date	Water Level (feet)	
				Depth	Elevation
UA1	30S/10E-11A1	16.01 [1]	10/31/2019	12.7	3.3
UA2	30S/10E-14B1	23.9 [1]	10/31/2019	19.9	4.0
UA3	30S/10E-13F4	19 [2]	10/1/2019	10	9
UA4	30S/10E-13L1	38.68 [3]	10/4/2019	30.34	8.3
UA5	30S/11E-7N1	9.1 [2]	10/11/2019	3.7	5.4
UA6	30S/11E-18L8	79.18 [1]	10/1/2019	56.4	22.8
UA7	30S/11E-18L7	79.16 [1]	10/1/2019	65.8	13.4
UA8	30S/11E-18K7	135.65 [3]	10/9/2019	122.25	13.4
UA9	30S/11E-18K3	121.18 [3]	10/1/2019	115	6.2
UA10	30S/11E-18H1	107.10 [3]	10/4/2019	95.04	12.1
UA11	30S/11E-17D	PRIVATE (not measured)			
UA12	30S/11E-17E9	105.85 [3]	10/9/2019	92.84	13.0
UA13	30S/11E-17E10	106 [2]	10/11/2019	94.3	11.7
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 (not measured)			

NOTES: 1 NAVD88 elevation as reported by licensed land surveyor

2 estimated elevation (assume NAVD 88)

3 reported elevation by County (datum unknown, likely NGVD 29)

All NGVD 29 elevations are converted to the NAVD 88 prior to contouring.

Table 8. Fall 2019 Water Levels - Lower Aquifer					
Well ID	State Well Number	R. P. Elevation and Datum (feet)	Date	Water Level (feet)	
				Depth	Elevation
LA1	30S/10E-2A1	23.13 [1]	10/31/2019	15.65	7.5
LA2	30S/10E-11A2	16.07 [1]	10/31/2019	11.45	4.6
LA3	30S/10E-14B2	23.89 [1]	10/31/2019	21.79	2.1
LA4	30S/10E-13M1	41.20 [3]	10/3/2019	44.35	-3.2
LA5	30S/10E-13L7	37 [2]	10/17/2019	31.7	5.3
LA6	30S/10E-13L4	68 [2]	11/15/2019	64.5	3.5
LA7	30S/10E-13P2	PRIVATE (not measured)			
LA8	30S/10E-13N	138.50 [2]	10/17/2019	133.9	4.6
LA9	30S/10E-24C1	178.32 [3]	9/23/2019	175	3.3
LA10	30S/10E-13J1	95.31 [3]	10/1/2019	93	2.3
LA11	30S/10E-12J1	8.43 [1]	10/2/2019	6.93	1.5
LA12	30S/11E-7Q3	24.30 [3]	10/11/2019	35.7	-11.4
LA13	30S/11E-18F2	100 [3]	10/4/2019	106.32	-6.3
LA14	30S/11E-18L6	79.36 [1]	10/1/2019	79.8	-0.4
LA15	30S/11E-18L2	85 [2]	10/11/2019	98.1	-13.1
LA16	30S/11E-18M1	106.82 [3]	10/1/2019	100.6	6.2
LA17	30S/11E-24A2	210.40 [3]	10/3/2019	201	9.4
LA18	30S/11E-18K8	135.74 [3]	10/9/2019	139.12	-3.4
LA19	30S/11E-19H2	256.20 [3]	10/2/2019	266.9	-10.7
LA20	30S/11E-17N10	140 [2]	10/1/2019	169	-29
LA21	30S/11E-17E7	105.85 [3]	10/2/2019	115.8	-10.0
LA22	30S/11E-17E8	105.85 [3]	10/2/2019	125.6	-19.8
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 [1]	10/1/19	6.2	20
LA35	30S/11E-21Bb	86.8 [1]	10/4/2019	85	1.8
LA36	30S/11E-21Ja	PRIVATE (not measured)			
LA37	30S/11E-21B1	81.4 [2]	10/4/2019	63.62	17.8
LA38	30S/11E-21E	PRIVATE (measured)			
LA39+	30S/11E-18K	121.7 [2]	10/1/2019	146	-24.3
LA40+	30S/10E-13Ba	12.3 [2]	11/5/2019	9.64	2.7
LA41+	30S/10E-13Bb	12.3 [2]	11/6/2019	8.92	3.4

NOTES: 1 NAVD88 elevation as reported by licensed land surveyor

2 estimated elevation (assume NAVD 88)

3 reported elevation by County (datum unknown, likely NGVD 29)

All NGVD 29 elevations are converted to the NAVD 88 prior to contouring.

+ added for current reporting year

4.2 Water Quality Results

Available Fall 2019 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 2019 water quality monitoring at First Water or Upper Aquifer Wells. Available Spring and Fall 2019 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 2019 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 were not sampled in 2019. These are Morro Bay sand spit wells that 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 2020.

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 2019 in the County's LOWRF Groundwater Monitoring Program reports (Rincon Consultants, 2019, 2020). Nitrate concentration trends are tracked using the Nitrate Metric (see Section 7.5.3).

Lower Aquifer water quality results for 2019 show one well (LA31) 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 FW26 in October 2019 (Table 2). Well FW5 is 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. Well 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, based on sucralose and nitrate concentrations, but not likely at FW26.

Table 9. Fall 2019 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	12/10/2019	*751*	6.29	680	--	--	--	130	29	30	0.17	--	--	--	130	68.0
FW6*	30S/10E-24A	12/11/2019	*674*	6.55	570	--	--	--	150	2.3	54	0.15	--	--	--	91	64.4
FW10*	30S/11E-7Q1	NOT SAMPLED															
FW15*	30S/11E-18N2	12/11/2019	*580*	6.67	530	--	--	--	89	27	46	0.24	--	--	--	66	66.7
FW17*	30S/11E-18L12	12/12/2019	*485*	6.78	450	--	--	--	57	23	46	0.10	--	--	--	50	65.5
FW20*	30S/11E-8Mb	NOT SAMPLED															
FW22*	30S/11E-17F4	12/12/2019	*537*	7.37	410	--	--	--	120	1.1	27	<0.05	--	--	--	66	60.6
FW26	30S/11E-20A2	10/16/2019	675	7.13	370	<10	220	180	80	<0.1	29.4	<0.1	35	35	1	36	62.6
FW28	30S/11E-20M2	10/3/2019	965	7.37	600	<10	380	310	64	<0.1	102	0.1	67	55	1	38	63.0
UA3	30S/10E-13F1	10/14/2019	527	7.01	370	<10	70	60	63	17.8	24.2	<0.1	20	15	1	49	64.5
UA9	30S/11E-18K3	10/14/2019	333	7.2	240	<10	60	50	42	9.3	8.2	<0.1	15	11	1	27	65.7
UA13	30S/11E-17E10	10/2/2019	559	7.73	360	<10	120	100	60	15.7	25.5	0.10	25	25	1	42	67.8

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 2019 (Rincon Consultants, 2019)
Only field reading available

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	4/3/2019	434	8.73	250	<10	50	40	75	7.2	12.7	<0.1	17	14	1	36	65.1
LA9	30S/10E-24C1	4/15/2019	488	7.17	310	<10	70	60	92	5.7	15.6	<0.1	17	17	2	45	65.6
LA10	30S/10E-13J1	4/15/2019	744	7.17	600	<10	80	70	174	1.9	10.4	<0.1	38	38	2	31	68.1
LA11	30S/10E-12J1	4/9/2019	1430	7.28	860	<10	350	290	196	<0.1	189	0.2	76	85	4	85	67.1
LA12	30S/10E-7Q3	4/9/2019	844	7.37	480	<10	300	240	94	<0.1	49.7	0.2	48	44	2	53	70.0
LA15	30S/11E-18L2	4/9/2019	774	7.11	460	<10	250	200	102	0.8	29.2	<0.1	48	44	1	38	68.9
LA18	30S/11E-18K8	4/10/2019	620	7.94	380	<10	290	240	32	<0.1	37.4	<0.1	52	28	2	25	73.2
LA20	30S/11E-17N10	4/15/2019	559	7.41	310	<10	200	160	42	3.1	21.7	0.1	28	27	2	34	68.1
LA22	30S/11E-17E8	4/10/2019	466	7.55	290	<10	180	150	46	5.8	13.6	<0.1	25	22	1	28	67.8
LA23,28	PRIVATE (not sampled)																
LA30	30S/11E-20H1	4/3/2019	903	7.85	540	<10	390	320	52	<0.1	92.8	0.1	68	55	1	36	64.4
LA31	30S/10E-13M2	4/3/2019	3290	7.96	2010	<10	70	50	940	0.6	179	0.2	103	93	4	641	65.7
LA32	30S/11E-18K9	4/9/2019	474	7.42	270	<10	200	160	34	1.6	21.5	<0.1	26	26	1	33	69.1
LA39+	30S/11E-18K	4/15/2019	619	7.22	350	<10	290	240	38	<0.1	27.4	<0.1	33	36	2	41	70.3

Table 10. Spring 2019 Water Quality Results - Lower Aquifer

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, + indicates addition to monitoring program.

Table 11. Fall 2019 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	Total as CaCO3									
			µS/cm	pH units	mg/L												°F
LA8	30S/10E-13N	10/7/2019	446	7.62	250	<10	60	50	77	7.7	14.4	<0.1	15	14	1	37	65.3
LA9	30S/10E-24C1	Well Out of Service															
LA10	30S/10E-13J1	10/14/2019	961	7.24	830	<10	80	70	229	2	12.7	<0.1	54	48	1	33	68.1
LA11	30S/10E-12J1	10/2/2019	1520	7.49	1000	50	250	290	187	<0.1	189	0.3	80	90	5	91	70.34
LA12	30S10E-7Q3	10/2/2019	877	7.55	530	20	290	280	91	<0.1	50.9	0.2	49	46	2	56	71.24
LA15	30S/11E-18L2	11/14/2019	806	7.43	430	<10	250	210	107	0.7	32.9	<0.1	49	44	2	39	69.26
LA18	30S/11E-18K8	10/9/2019	647	7.72	390	<10	290	240	33	<0.1	40.5	<0.1	52	30	2	26	72.86
LA20	30S/11E-17N10	10/14/2019	626	7.42	380	<10	290	240	41	0.7	29	<0.1	34	33	2	40	68.9
LA22	30S/11E-17E8	10/9/2019	485	7.31	270	<10	150	120	49	7	14.9	<0.1	24	23	1	28	69.26
LA23,28	PRIVATE (not sampled)																
LA30	30S/11E-20H1	10/3/2019	981	7.51	530	<10	380	310	59	<0.1	82.3	0.1	63	50	2	37	68
LA31	30S/10E-13M2	10/3/2019	3120	7.61	2120	<10	70	50	827	0.7	169	0.2	90	85	4	340	64.58
LA32	30S/11E-18K9	10/2/2019	531	7.95	310	<10	200	180	36	1.4	24.7	0.1	28	28	1	35	71.06
LA39+	30S/11E-18K	10/14/2019	628	7.36	370	<10	300	240	37	<0.1	28.6	<0.1	34	34	1	41	72.2
LA40+	30S/10E-13Ba	11/6/2019	5330	6.85	4750	<10	210	170	1460	1.3	224	<0.1	388	272	6	182	70.5
LA41+	30S/10E-13Bb	11/7/2019	1310	7.46	760	<10	210	170	136	3.1	188	<0.1	69	34	4	140	69.4

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 addition to monitoring program.

Table 12. CEC Monitoring Results						
Constituent or Parameter	Units	FW5	FW26	QA1 Travel Blank	QA2 Equipment Blank	LOWRF Recycled Water[1]
		October 16, 2019				November 6, 2019
Health-based						
17β-estradiol	ng/L	ND (<1)	ND (<1)	ND (<1)	ND (<1)	ND (<10)[2]
Triclosan	ng/L	ND (<2)	ND (<2)	ND (<2)	ND (<2)	ND (<200)
Caffeine[3]	ng/L	ND (<1)	ND (<1)	ND (<1)	1.8	ND (<10)
NDMA	ng/L	ND (<2)	ND (<2)	--	--	ND (<2.2)
Performance-based						
Gemfibrozil	ng/L	ND (<1)	ND (<1)	ND (<1)	ND (<1)	ND (<5)
DEET[3]	ng/L	2.3	12	1.9	2.4	33
Iopromide	ng/L	ND (<5)	ND (<5)	ND (<5)	ND (<5)	ND (<5)
Sucralose	ng/L	190	21	ND (<65)	ND (<5)	76,000
Surrogate						
Ammonia	mg/L	ND (<0.10)	0.21	--	--	--
Nitrate-Nitrogen	mg/L	33	ND (<0.2)	--	--	2.2[4]
Total Organic Carbon	mg/L	1.2	1.8	--	--	--
UV Light Absorption	1/cm	0.016	0.035	--	--	--
Specific Conductance	µmhos/cm	1100	650	--	--	--

[1]2019 LOWRF CEC Blue Ribbon Report and 2019 LOWRF Annual Report (SLO Co. 2019a, 2019b).
[2] As 17-alpha Ethinyl Estradiol
[3] Blank Contamination. Analyte also detected in the laboratory method blank.
[4] October 2019 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")

Caffeine, one of the health-based class indicators of CEC indicators, was detected in one field blank, QA2, and in the laboratory blank (CEC laboratory results in Appendix C).

DEET (Diethyl-meta-toluamide), a personal care product used for insect repellent, was also detected in the groundwater samples and field blanks at concentrations close to the method reporting limit, as well as in the laboratory blank. The exception is in well FW26, with a result six times higher than the other samples or the blanks. DEET, however, was reported in the 2018 equipment blank at levels similar to the Fall 2019 result at FW26 (CHG, 2019c).

Sucralose, an artificial sweetener, was detected at 190 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 groundwater from FW26 at 21 ng/L, which is a considered a trace amount (close to the detection limit of 5 µg/L).

Total ammonia was detected at FW26 in 2017, 2018 and 2019 at concentrations close to the laboratory detection limit. Total ammonia includes NH_3 (ammonia) and its ionized form, NH_4^+ (ammonium). Ammonium is the principal form of dissolved nitrogen discharged from septic systems, and is typically converted to nitrate (NO_3^-) under aerobic conditions. The presence of trace amounts of total ammonia concentrations in groundwater at FW26, along with DEET and sucralose, suggests a potential for low level influence from septic tank discharges, although no nitrate has been detected at FW26 in since CEC monitoring began in 2017.

Nitrate-nitrogen was reported at 33 mg/L in groundwater from FW5, and not detected in groundwater from FW26. Available CEC-constituent quality of recycled water from LOWRF is also provided in Table 12 for comparison.

Results of the CEC testing are interpreted to indicate wastewater influence at FW5, based on sucralose and nitrate concentrations, but not likely at FW26. The sucralose detection at FW26 is within the 10-20 ng/L range of common laboratory equipment contamination as observed in 2017 and 2018 (CHG, 2018a, 2019b), DEET was detected at similar levels in a 2018 equipment blank, and no nitrate was detected.

Wastewater influence at FW5 is interpreted to be a residual from septic tank discharges, rather than from recycled water discharges at the Broderson leach field. A greater concentration of caffeine was detected at FW5 in 2018 (20 ng/L) compared to 2019, and there was a decrease in sucralose, which would be the opposite to be expected given the high concentrations in LOWRF discharges (Table 12).

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). Now that the drought is over and groundwater mounding from the Broderson Site has reached FW6, there is sufficient water column to allow CEC testing. CHG has scheduled CEC testing at FW6 in Fall 2020. A comparison between CECs in LOWRF recycled water and in groundwater from FW5 and FW6 will help characterize the influence of recycled water on groundwater downgradient of the disposal site and help identify those compounds most useful for tracking recycled water as it moves into the Basin.

4.3 Geophysics

Induction and natural gamma logging were last performed at Lower Aquifer monitoring well LA4 (30S/10E-13M1) and LA14 (30S/11E-18L6) in October 2018. 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.

Geophysical monitoring events have been performed in 1985, 2004, 2009, 2014, 2015, and 2018. The next scheduled geophysical logging will be in October of 2021.

4.4 New Monitoring Well

In October 2019, a new monitoring well was constructed near the bay along Lupine Avenue in the Western Area of the basin. The well consists of a pair of nested, 2.5-inch diameter PVC wells that are screened in Zone D and Zone E of the Lower Aquifer (program wells LA41 and LA40, respectively). Both LA40 and LA41 were monitored in Fall 2019, and results are incorporated into this Annual Report. Well construction, lithology, and a basin cross-section showing the new monitoring well are provided in Appendix D. Monitoring LA40 and LA41 will fill a data gap identified in the LOBP and will contribute to tracking the movement of the seawater intrusion front.

5. GROUNDWATER PRODUCTION

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 (2013-2019)				
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

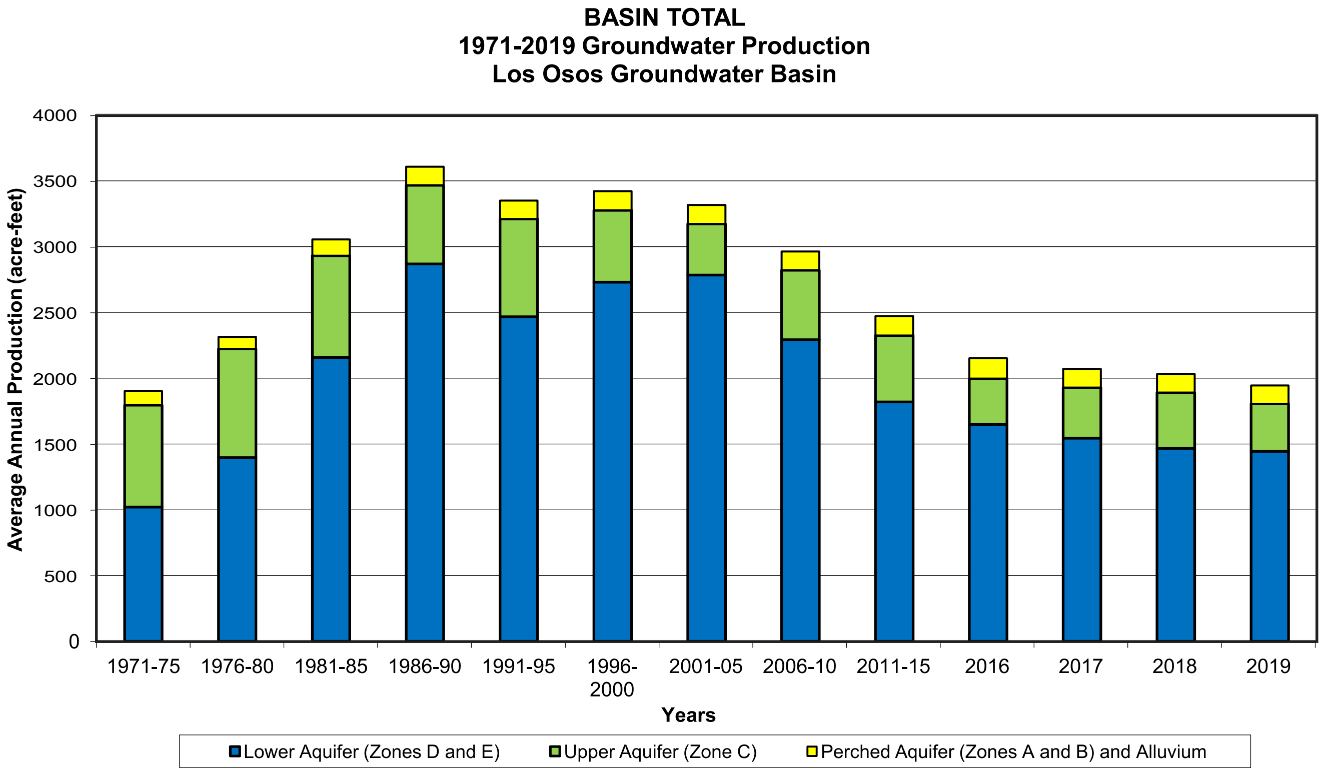
Note: [1]Metered production

Table 14. Basin Groundwater Production (2013-2019)					
Year	**Purveyors**	**Domestic**	**Community**	**Agriculture**	**Total**
	Acre-Feet[1]				
2013	1,470	200	140	750	2,560
2014	1,250	220	130	800	2,400
2015	1,010	220	140	800	2,170
2016	1,000	220	140	800	2,160
2017	1,050	220	130	670	2,070
2018	1,020	220	120	670	2,030
2019	990	220	60	630	1,900

Note: [1]All figures rounded to the nearest 10 acre-feet

Figure 6 shows the historical pumping distribution between Basin aquifers since 1970, along with the pumping distribution in the Western Area. Figure 7 show the historical pumping distribution for the Central and Eastern Areas. There has been a 35 percent reduction in Basin production over the last 10 years, with current production similar to the values reported for the early 1970s. The largest reduction in pumping has occurred in the Lower Aquifer Western Area (Figure 6).

Land use and water use areas overlying the Basin, including purveyor service areas, agricultural parcels, domestic parcels, and community facilities are included in Appendix F. 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, 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 G). Basin groundwater production estimates are reported to closest 10 acre-feet, which is considered within the accuracy of metered production, but not unmetered production. 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 five percent of the sustainable yield of the Basin (LOBP page 47; ISJ Group, 2015).



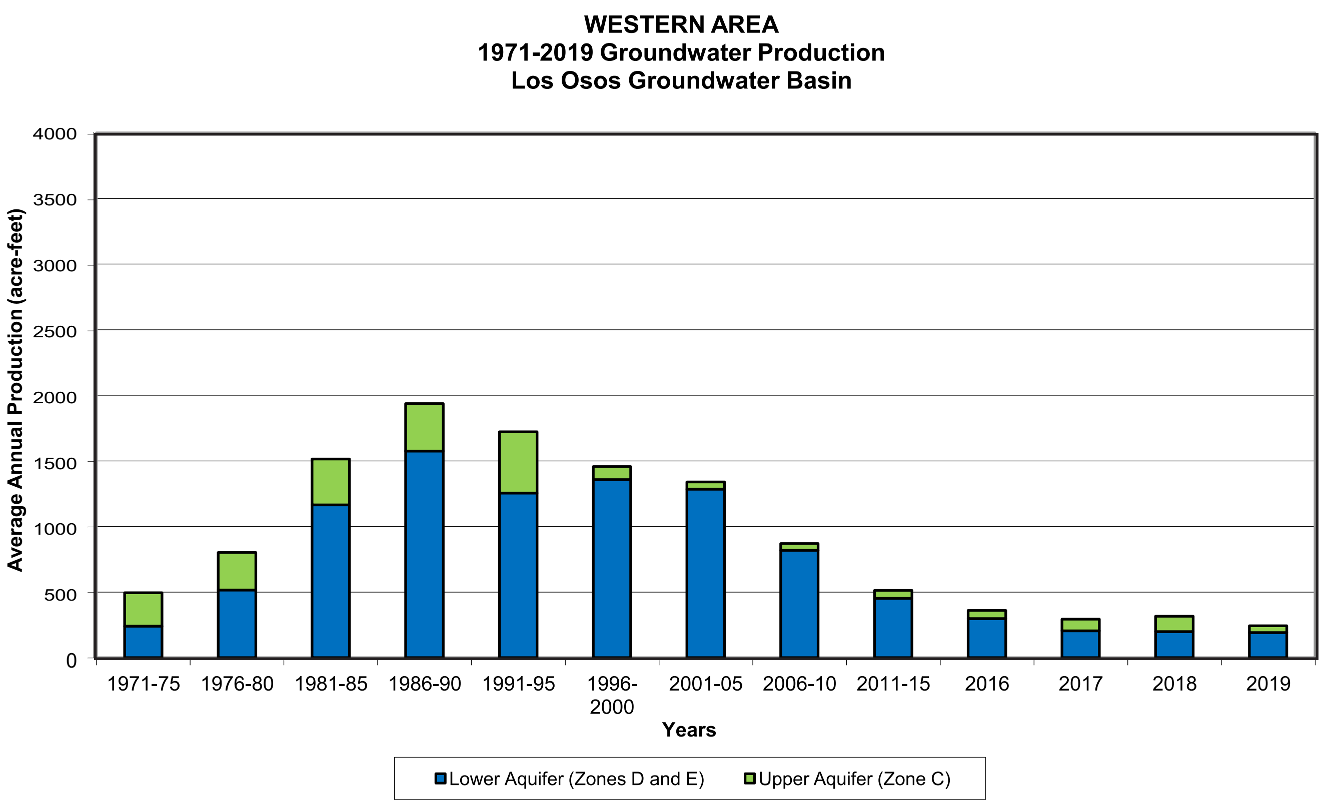
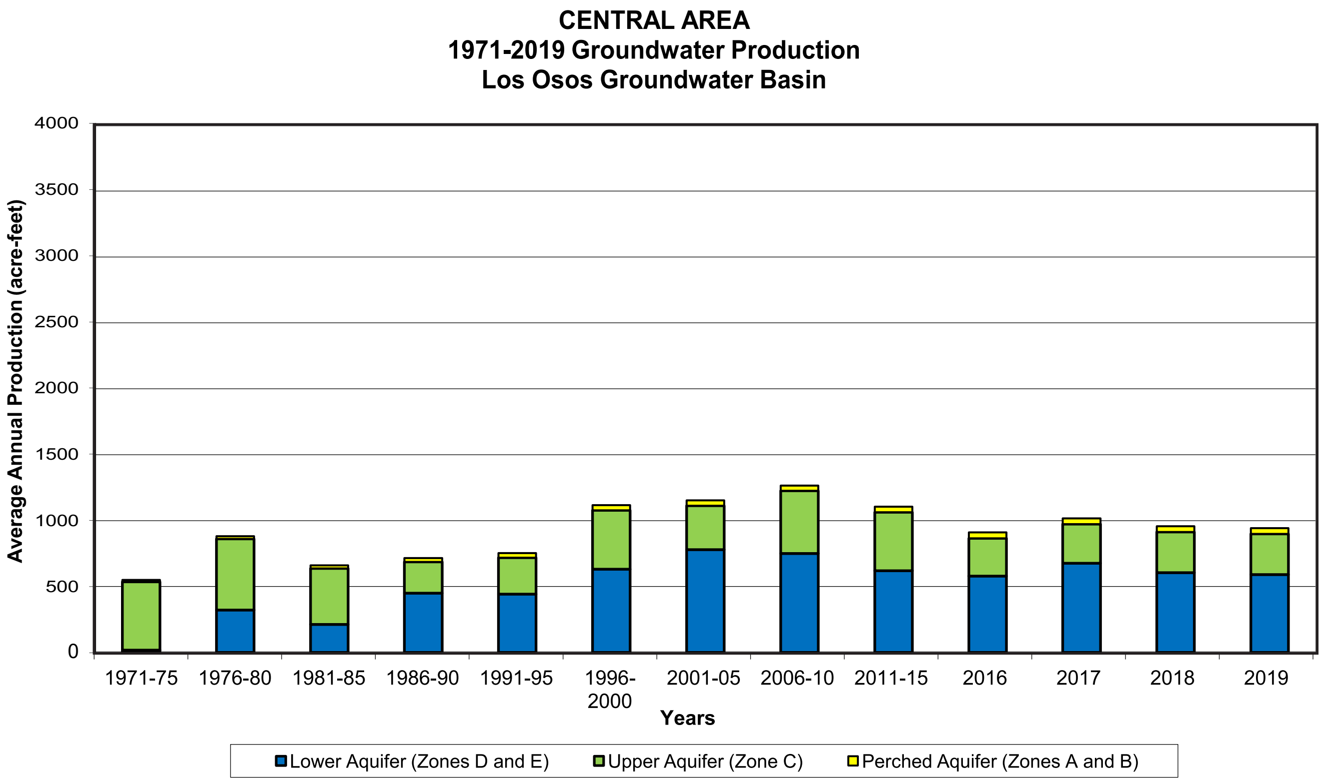


Figure 6
Basin Production 1971-2019
Basin Total and Western Area
Los Osos Goundwater Basin
2019 Annual Report

Cleath-Harris Geologists



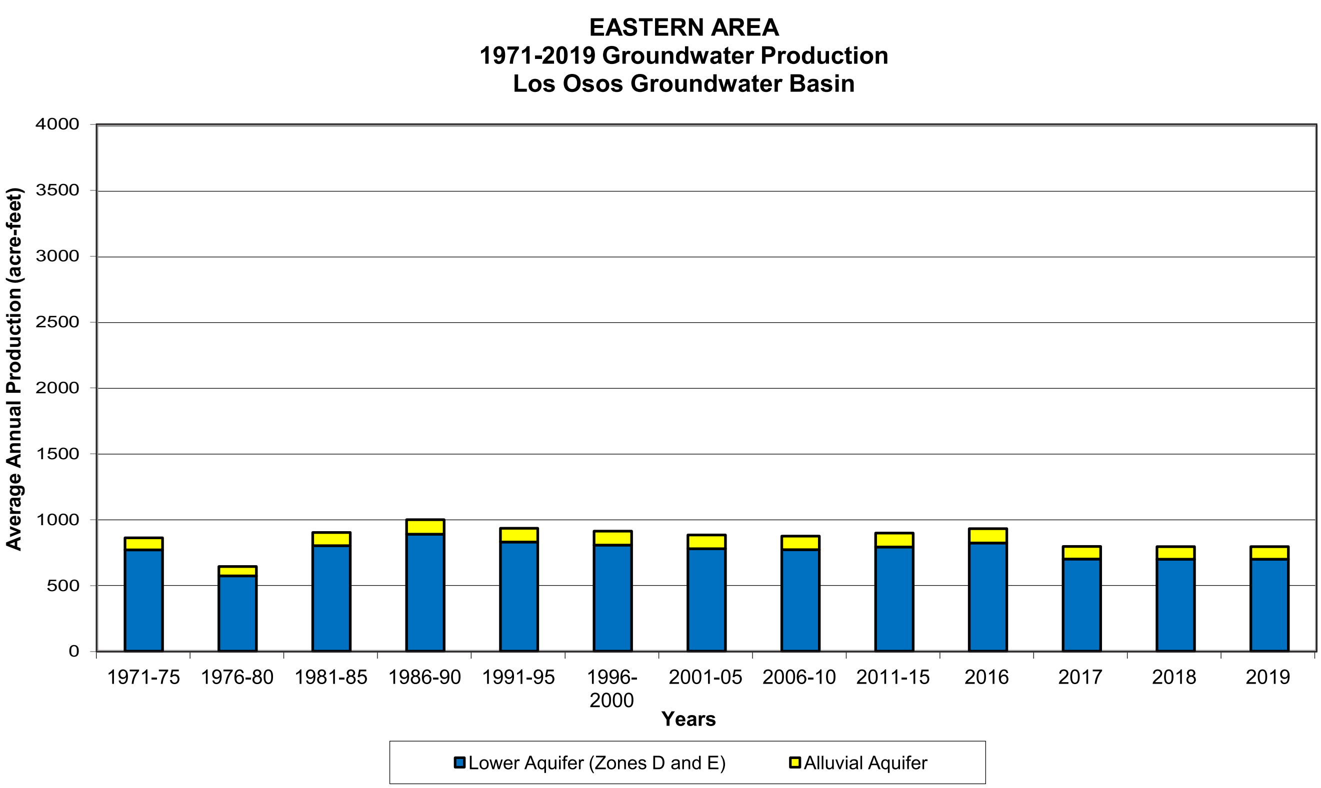


Figure 7
Basin Production 1971-2019
Central and Eastern Areas
Los Osos Groundwater Basin
2019 Annual Report

Cleath-Harris Geologists

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 16.22 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 2019 rainfall year was reported at 23.9 inches (above average). Records for Station #727 through the calendar year 2019 are included in Appendix H. 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.

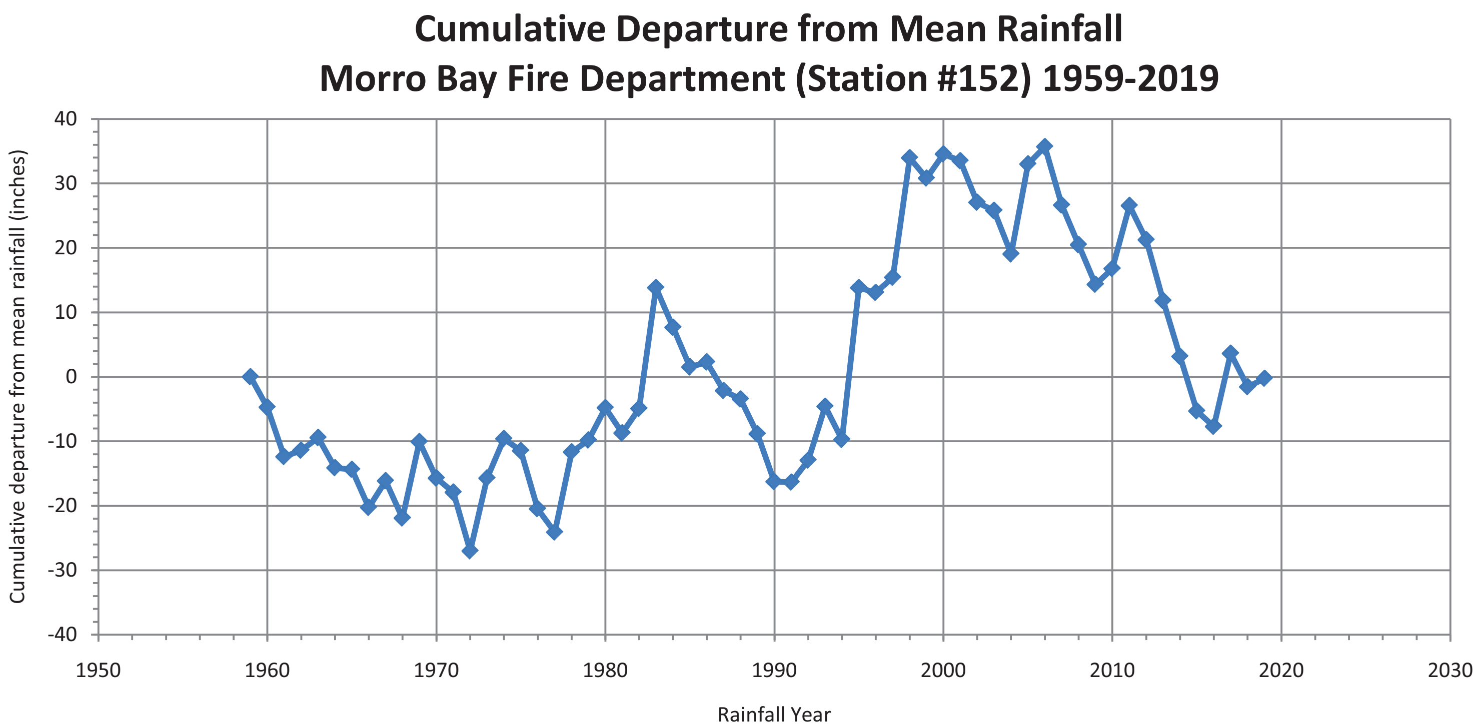
Table 15. Active and Former Precipitation Stations

Station No.	Name	Period of Record (rainfall years)	Average Annual Precipitation (inches)
144.1	Bender	1955-1987	19.17
152	Morro Bay Fire Dept.	1959-2019 (active)	16.23
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	2006-2019 (active)	16.22*

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 2019 (the period of record for Station #727), rainfall at Station #152 was averaging more than two inches per year below normal. 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 2019 with moderate to severe drought conditions in January (two middle levels of drought intensity). There were no drought conditions reported at the end of the calendar year in December 2019 (NDMC/USDA/NOAA, 2019).



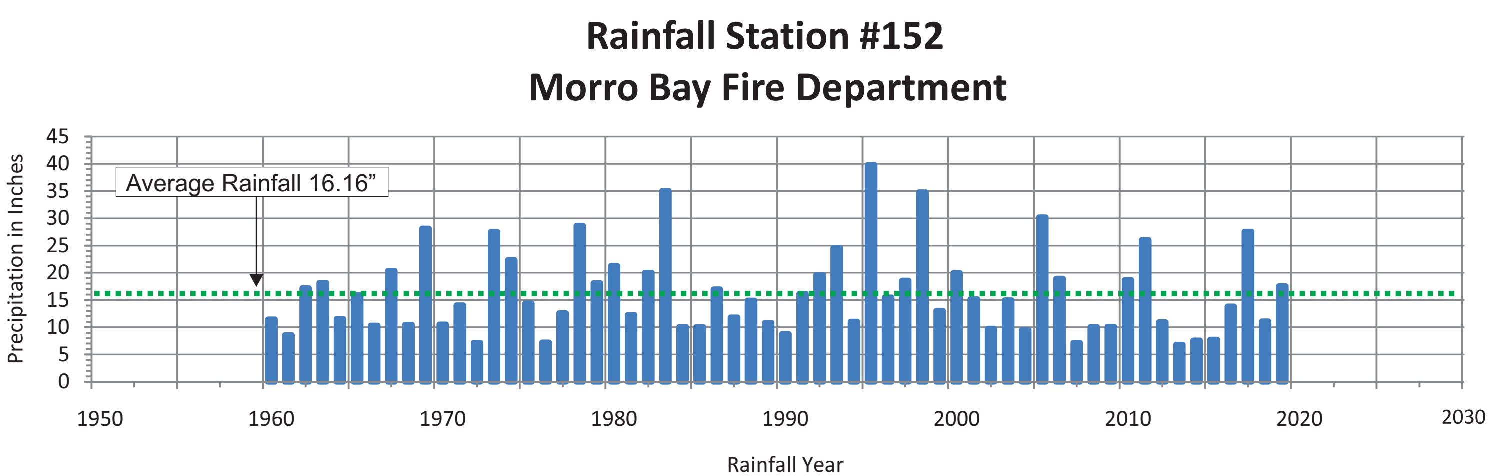


Figure 8
Cumulative Departure from
Mean Rainfall at Morro Bay Fire Department
Los Osos Groundwater Basin
2019 Annual Report

Cleath-Harris Geologists

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 through 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 H.

Streamflow was recorded at the gage for 146 individual days during the 2019 water year (October 1, 2018 to September 30, 2019), including 114 days of continuous flow between January 31 and May 24, 2019. The dates and maximum stage value from Station #727 for the peak flow days in each month are listed below in Table 16.

Table 16. Maximum Stream Stage for Los Osos Creek, 2019 Water Year

Date	Maximum Stream Stage County Sensor #751 (feet)
1/17/2019	5.14
2/4/2019	3.93
3/2/2019	3.80
4/1/2019	2.25
5/16/2019	2.22

There is no current rating curve for Sensor 751, which measures flow stage above the natural stream bed as it enters a box culvert beneath the bridge. A rating curve is needed to correlate stage records to streamflow volume records; therefore, no streamflow volumes are reported. Development of a rating curve for Sensor 751 is recommended. 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 2019 are included in Appendix H.

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 2019, together with selected historical data, have been used to develop the following information:

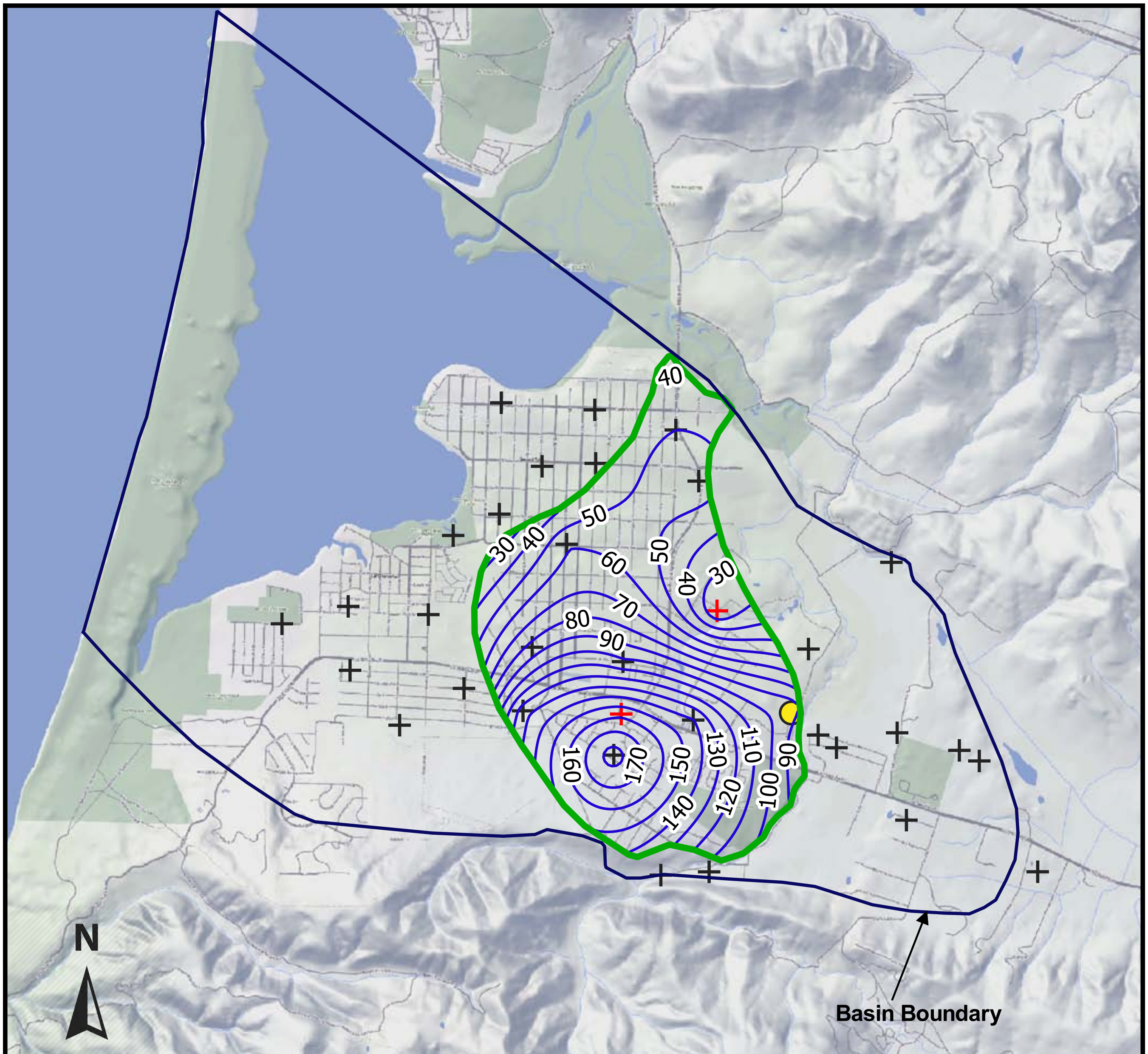
- Groundwater elevation contour maps for the Perched Aquifer, Upper Aquifer (with Alluvial Aquifer), and Lower Aquifer for both Spring and Fall 2019 conditions.
- Water level hydrographs for wells representative of aquifers in the Western, Central, and Eastern Areas of the Basin.
- The lateral extent of seawater intrusion and the Fall 2019 position of the seawater intrusion front.
- Estimates of groundwater in storage for Spring and Fall 2019, including amount above mean sea level.
- Estimates of changes to groundwater in storage from Spring 2018 to Spring 2019, 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 2019 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 2019 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). All groundwater elevations were adjusted to a common datum (NAVD 88) prior to contouring and groundwater storage calculations. These adjustments are approximate, pending a review of all reference point elevations by a licensed land surveyor.

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. Although the Fall 2019 measurement at FW31 was slightly higher elevation than the Spring measurement due to recycled water discharge operations, overall Perched Aquifer groundwater levels declined approximately 0.14 feet from Spring to Fall 2019.



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)

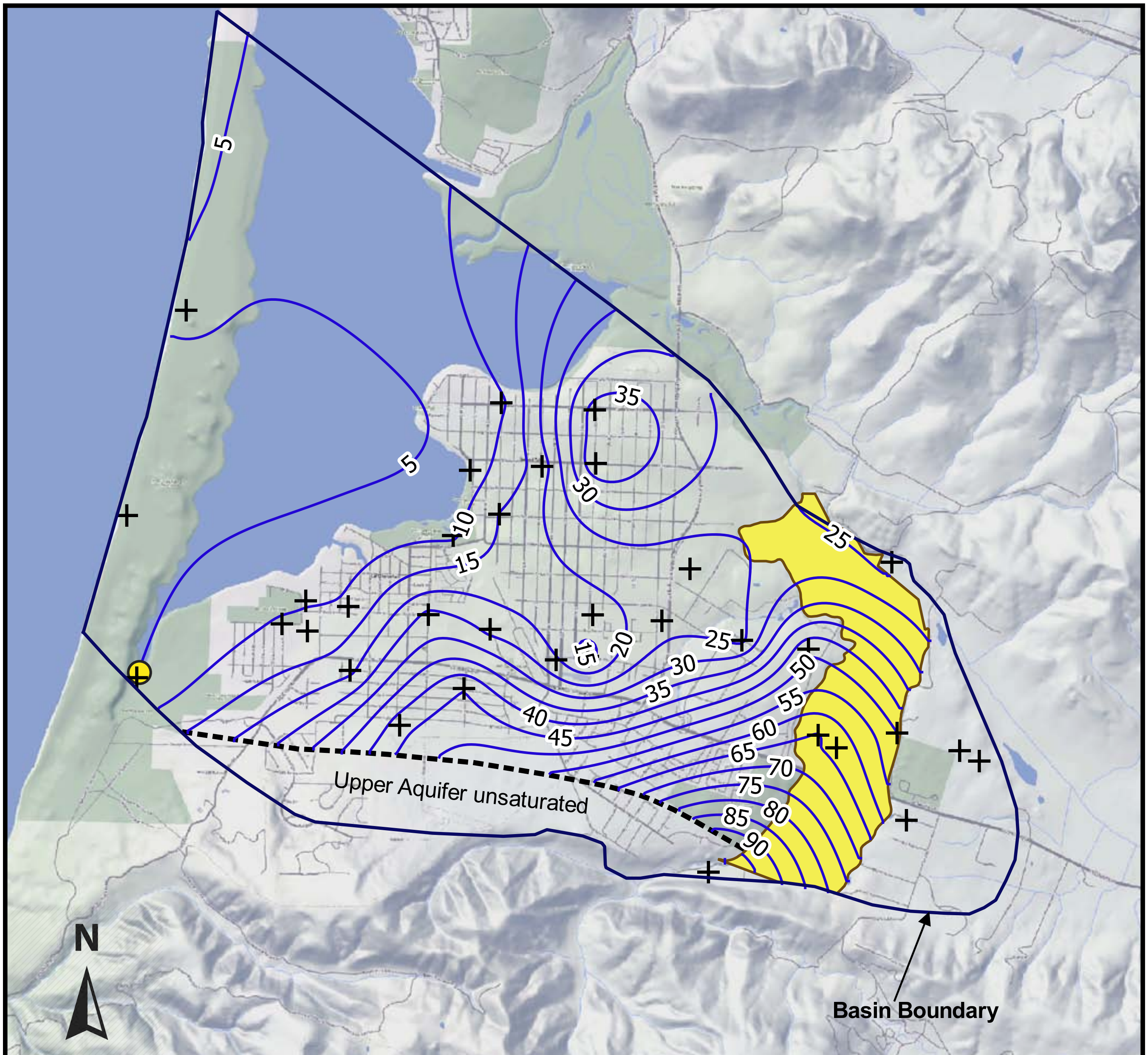
Spring 2019 groundwater elevation data point (contours not applicable outside of Perched Aquifer limits

Alternate date groundwater elevation data point

Spring seep used for groundwater elevation

Figure 9
Spring 2019 Water Level Contours
Perched Aquifer
Los Osos Groundwater Basin
2019 Annual Report

Cleath-Harris Geologists



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

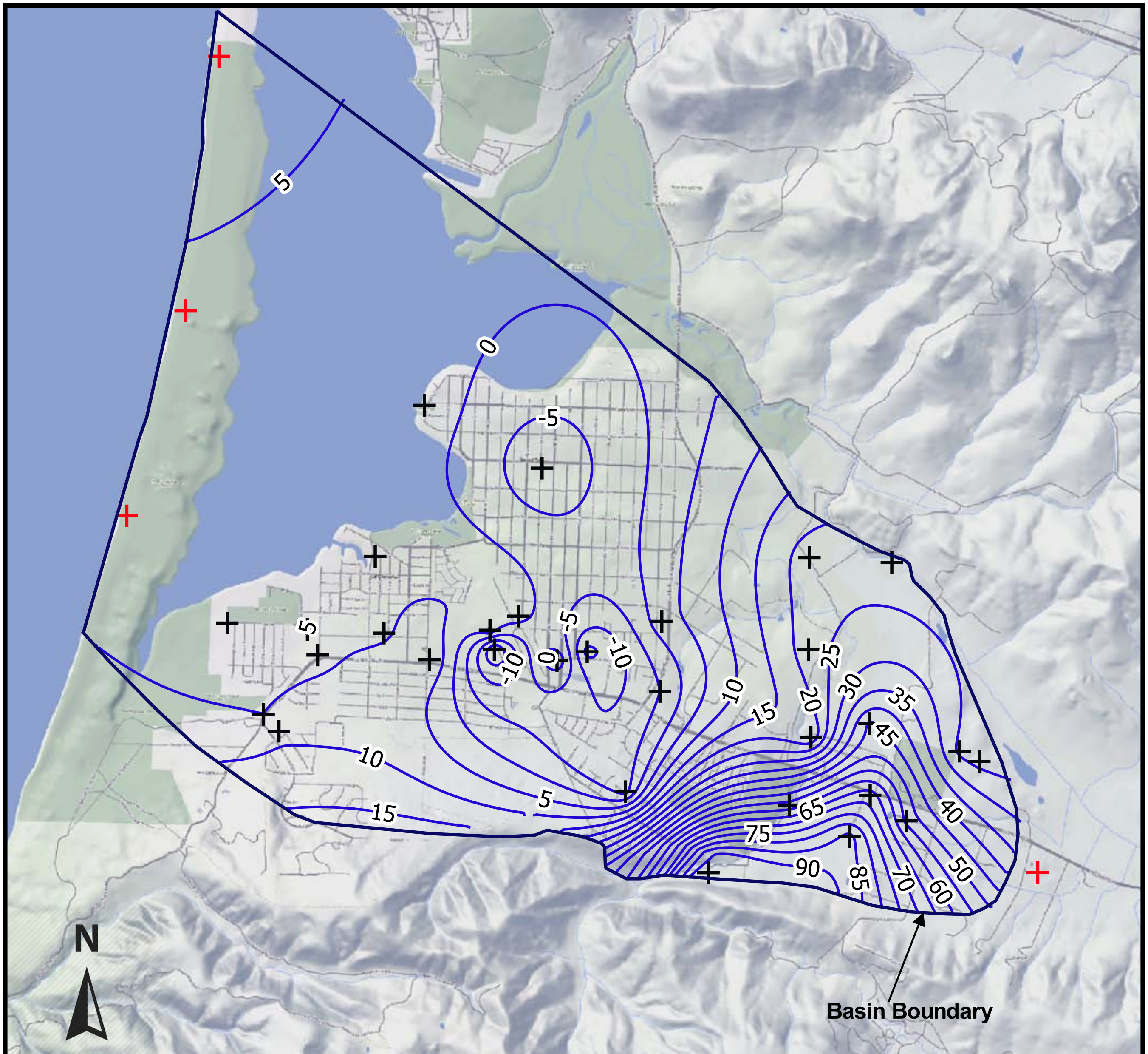
+ Spring 2019 groundwater elevation data point
(contours not applicable outside of Perched Aquifer limits

+ Alternate date groundwater elevation data point

Spring seep used for groundwater elevation

Figure 10
Spring 2019 Water Level Contours
Upper Aquifer
Los Osos Groundwater Basin
2019 Annual Report

Cleath-Harris Geologists



Base Image: Stamen-Terrain

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

Scale: 1 inch ≈ 4,000 feet

Explanation

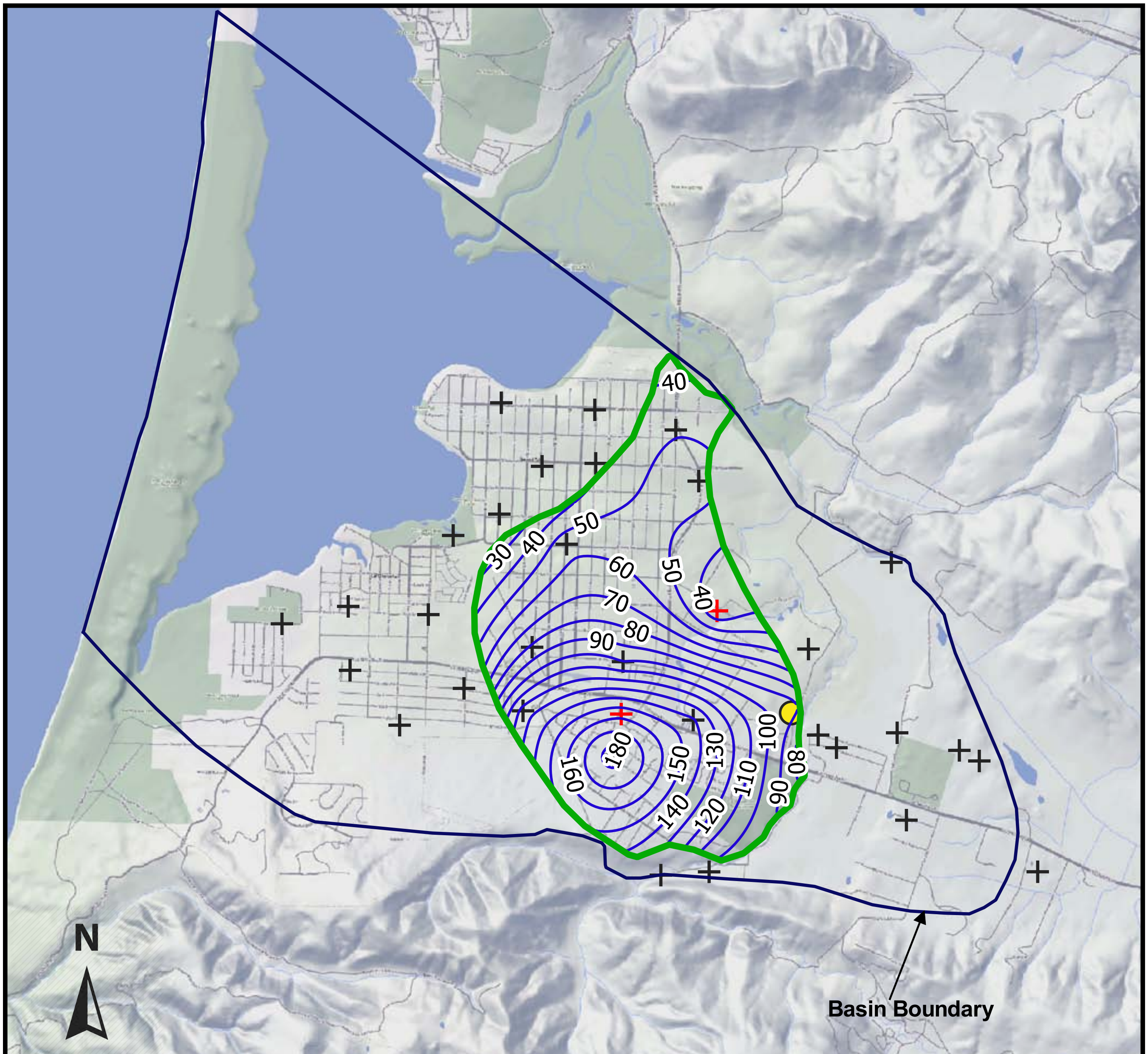
Groundwater elevation contour
in feet above sea level (NAVD 88 datum)

+ Spring 2019 groundwater elevation data point
(contours not applicable outside of Perched Aquifer limits

+ Alternate date groundwater elevation data point

Figure 11
Spring 2019 Water Level Contours
Lower Aquifer
Los Osos Groundwater Basin
2019 Annual Report

Cleath-Harris Geologists



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)

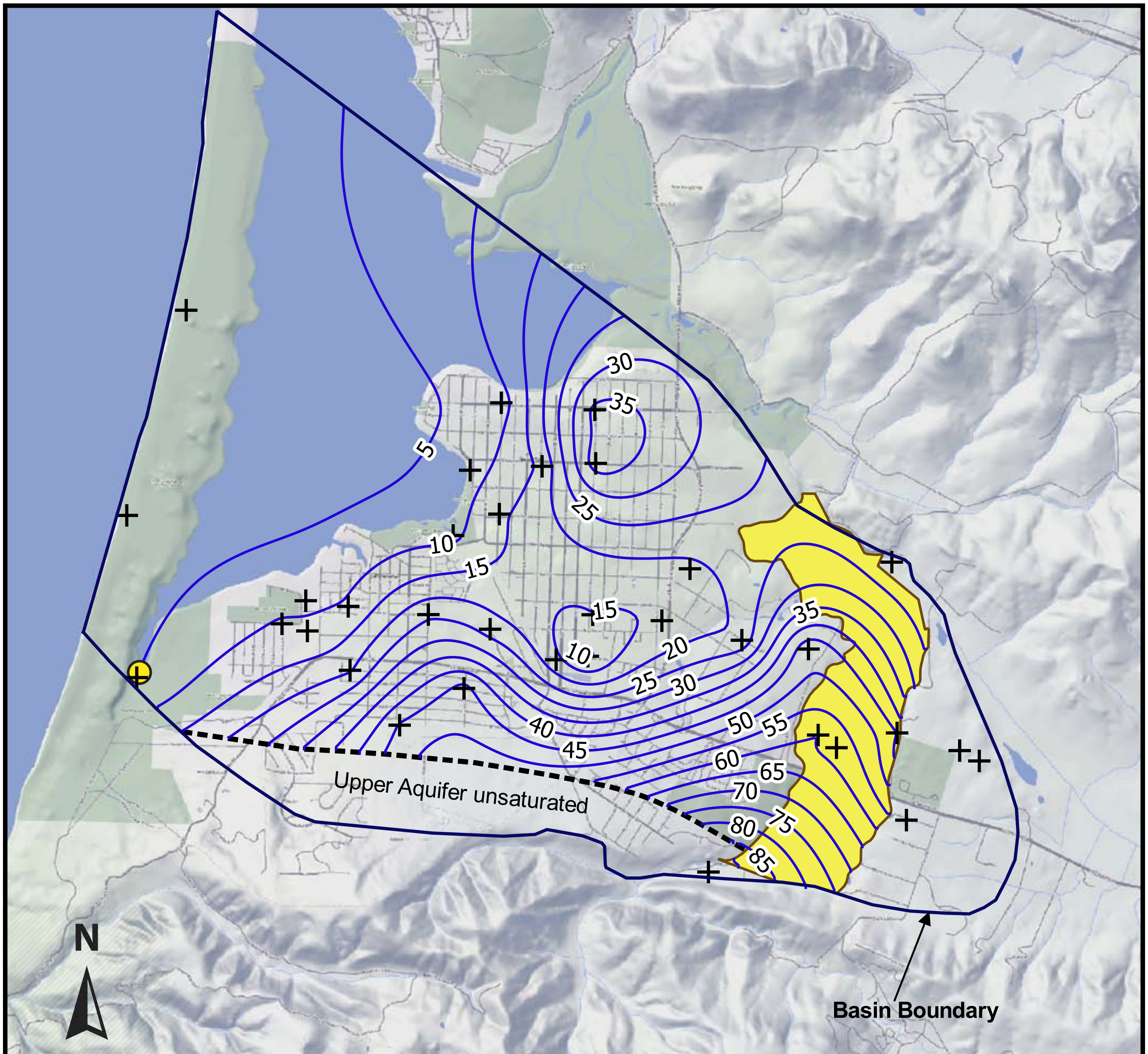
Fall 2019 groundwater elevation data point (contours not applicable outside of Perched Aquifer limits

Alternate date groundwater elevation data point

Spring seep used for groundwater elevation

Figure 12
Fall 2019 Water Level Contours
Perched Aquifer
Los Osos Groundwater Basin
2019 Annual Report

Cleath-Harris Geologists



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

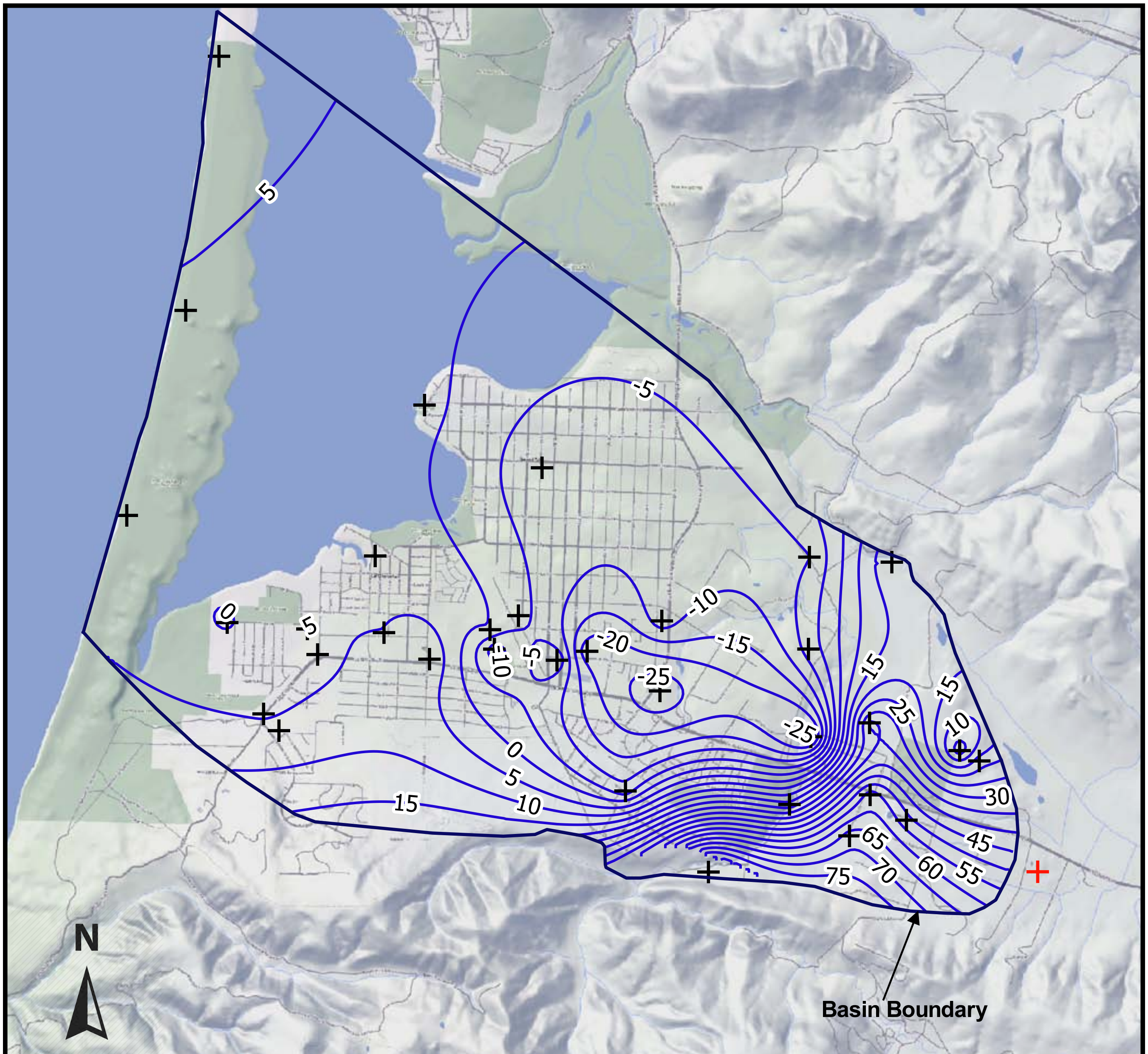
+ Fall 2019 groundwater elevation data point
(contours not applicable outside of Perched Aquifer limits

+ Alternate date groundwater elevation data point

Spring seep used for groundwater elevation

Figure 13
Fall 2019 Water Level Contours
Upper Aquifer
Los Osos Groundwater Basin
2019 Annual Report

Cleath-Harris Geologists



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 2019 groundwater elevation data point
(contours not applicable outside of Perched Aquifer limits

+ Alternate date groundwater elevation data point

Figure 14
Fall 2019 Water Level Contours
Lower Aquifer
Los Osos Groundwater Basin
2019 Annual Report

Cleath-Harris Geologists

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 1.8 feet of water level decline from Spring 2019 to Fall 2019.

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 5.8 feet of water level decline from Spring 2019 to Fall 2019.

7.2 Water Level Hydrographs

Water levels 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. A seven-year trend is reported for 2019.

The Spring to Spring water level trend for the last seven years (2012-2019), based on First Water hydrographs in Western and Central Area wells was 0.15 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 (2009-2019), based on Central and Western wells was an increase of 0.35 feet per year in the Upper Aquifer, and 0.60 feet of rise per year in Lower Aquifer water levels (Figures 16 and 17, respectively).

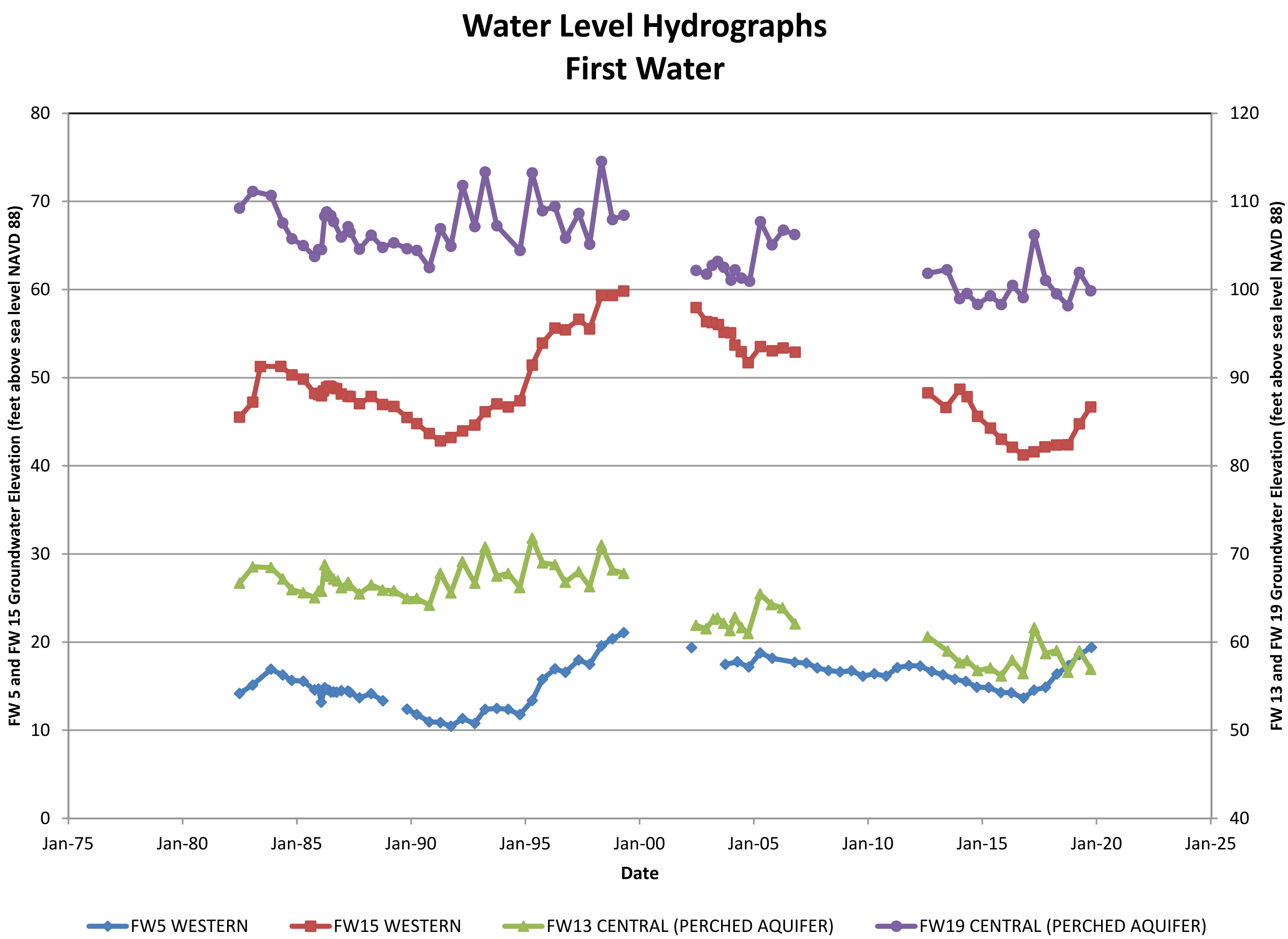


Figure 15
Water Level Hydrographs
Perched Aquifer / First Water
Los Osos Groundwater Basin
2019 Annual Report

Cleath-Harris Geologists

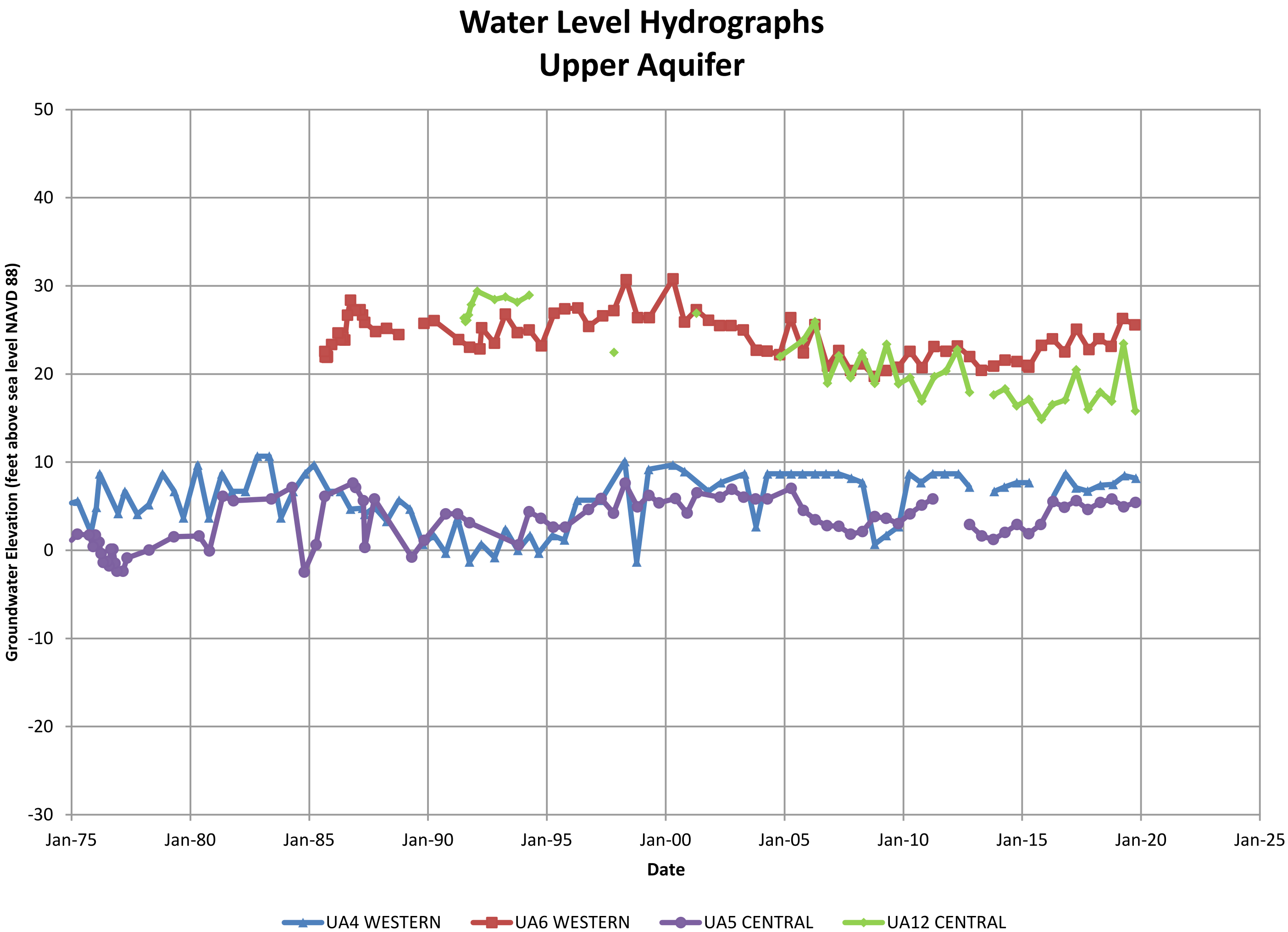


Figure 16
Water Level Hydrographs
Upper Aquifer
Los Osos Groundwater Basin
2019 Annual Report

Cleath-Harris Geologists

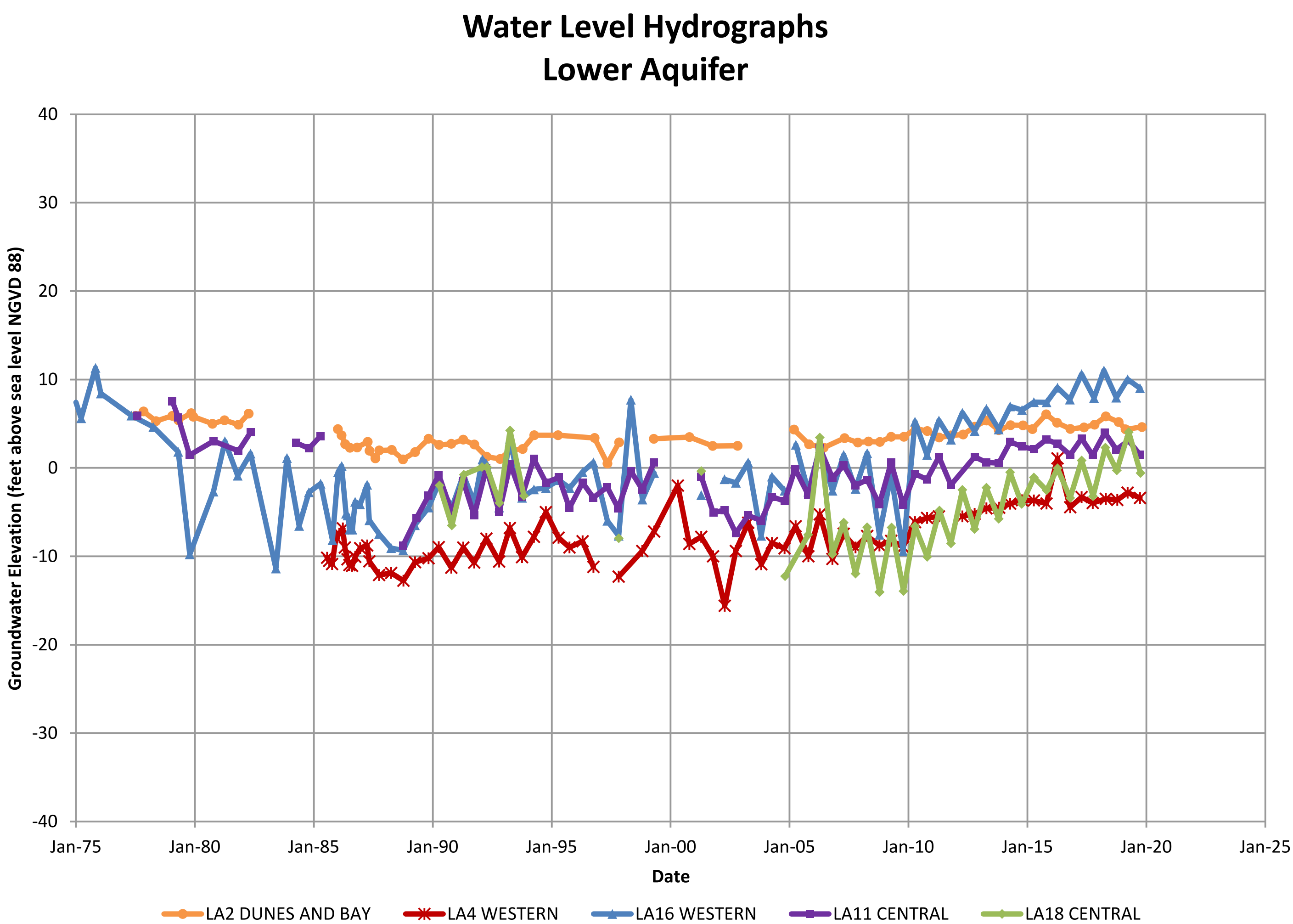


Figure 17
Water Level Hydrographs
Lower Aquifer
Los Osos Groundwater Basin
2019 Annual Report

Cleath-Harris Geologists

Hydrographs for seven wells equipped with pressure transducers are shown in Appendix I. 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 two Lower Aquifer wells equipped with transducers.

The transducer hydrographs have been interpreted to show the following short-term trends:

- FW6 is screened in the top of the Upper Aquifer near the Broderson leach field in the Western Area of the Basin. The hydrograph shows a relatively flat water level trend until June of 2017, followed by a steady rise of over 15 feet before reaching a plateau in December 2019. The rise in water level is credited to groundwater mounding on the regional aquitard beneath the Broderson leach field. The apparent stall in water level rise is likely temporary and may be related to the start of recycled water deliveries to Sea Pines during the summer. 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.

- 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 bottom of the Upper Aquifer in the Western Area and Central Area of the Basin respectively. These wells 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.

- 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 36 feet. The relatively large seasonal fluctuation is 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.

- LA13 and LA37 are screened in Lower Aquifer in the Central Area and Eastern Area of the Basin, respectively. These wells displayed a seasonal fluctuation of approximately six to seven feet, including interference related to nearby pumping wells.

7.3 Seawater Intrusion

The position of the Fall 2019 seawater intrusion front in Lower Aquifer Zone D is shown in Figure 18, along with the positions of the seawater intrusion front in 2015-2019 and 2005. The seawater intrusion front corresponds to the position of the 250 mg/L chloride concentration isopleth, based on water quality samples from six Lower Aquifer wells: LA8, LA10, LA11, LA12, LA15, and LA31, with a seventh well, LA41, added in 2019.

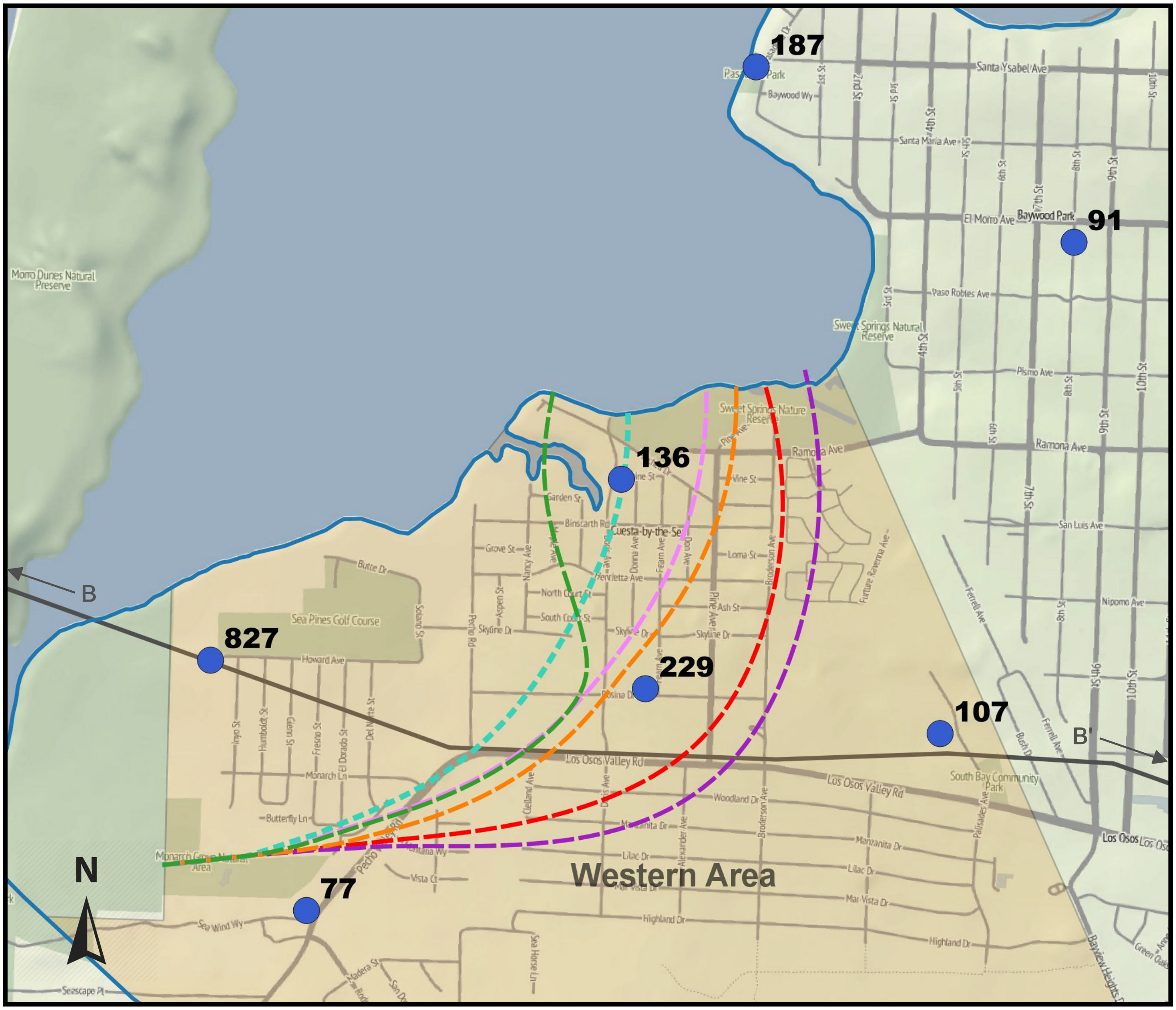
The addition of LA41 (Lupine Avenue Zone D) has contributed to a refinement of the location of the seawater intrusion front along the bay, resulting in a more westerly (improved) position compared to previous years (Figure 18). The new information shows the intrusion front located up to 1,400 feet closer to the coast between Fall 2018 and Fall 2019, but this is only due to the addition of LA41 to the contouring data set, and not to actual movement of the intrusion front. Without data from LA41, the Fall 2019 intrusion front would plot up to 200 feet east of the Fall 2018 position, indicating a slight deterioration of conditions (Appendix D).

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 are two orders of magnitude greater than the Western Area wells and were 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. Lower Aquifer Zone D intrusion is discussed above. There is insufficient information to represent current Lower Aquifer Zone E intrusion in a plan view figure. A generalized plan view interpretation of Zone E intrusion using data from various years is included in Appendix D. Wells along the bay which represent Zone E water quality are LA4, located near Sea Pines Golf Course, LA11 on Pasadena Drive, and the new LA40 on Lupine Avenue (Figure 4). Water quality at LA4 has been close to seawater (17,000 mg/L chloride) since first sampled in 1985 (Cleath & Associates, 2005), while LA40 was sampled for the first time in 2019, with chloride measuring 1,460 mg/L. LA11 has historically had much lower chloride concentrations (less than 200 mg/L). Other control points for Zone E water quality along the B-B' cross-section orientation in Figure 19 are LA15 and LA18 in the Central Area. The seawater front reached LA15 in 2009, but there has been no evidence of further inland movement toward LA18, and geophysics in 2018 at nearby deep monitoring well LA14 continues to show no sign of intrusion. In 2013, LA15 was modified to remove Zone E production (CHG, 2014).

There are four locations where existing wells could potentially be modified to provide Zone E water quality data for the monitoring program, and would allow better delineation of seawater intrusion (see Appendix D). Evaluating the feasibility and costs of these modifications is recommended.



Base Image: Stamen-Terrain

0 750 1,500 2,250 3,000 ft

Scale: 1 inch ≈ 1,500 feet

Explanation

827 Groundwater with Fall 2019 lower aquifer chloride concentration in milligrams per liter (mg/L)

Cross-section alignment (Figures 5 and 19)

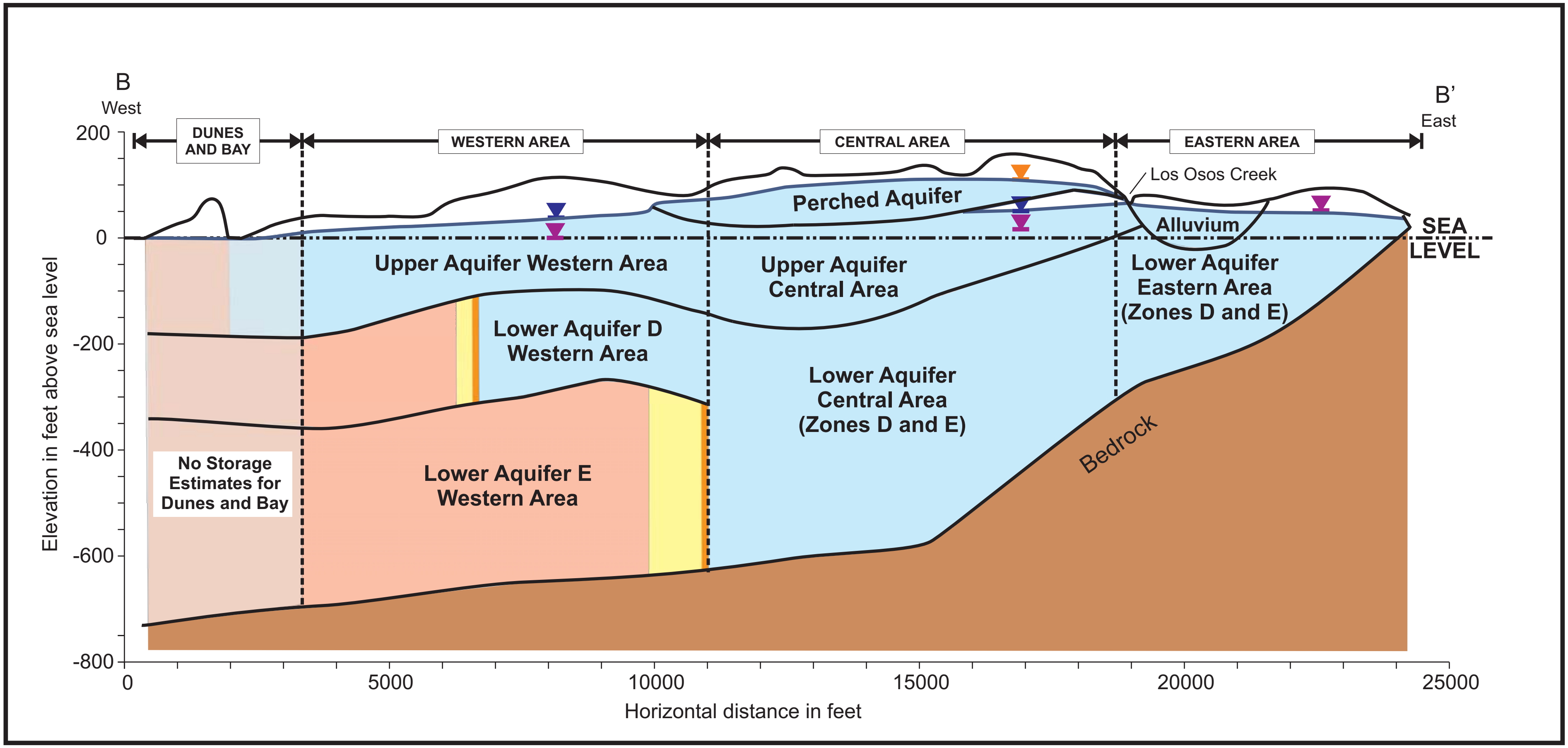
Bulletin 118 Basin Boundary

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

- 2019
- 2018
- 2017
- 2016
- 2015
- 2005

Figure 18
Seawater Intrusion Front
Western Area Lower Aquifer Zone D
Los Osos Groundwater Basin
2019 Annual Report

Cleath-Harris Geologists



Cross-section alignment shown in Figure 18

Explanation

Groundwater in Storage <250 mg/l Chloride 2018

Groundwater in Storage >250 mg/l Chloride 2005

Change in Groundwater in Storage >250 mg/l Chloride Winter 2005-2019

Fall 2019 seawater intrusion front

Perched Aquifer Water level

Upper Aquifer Water level

Lower Aquifer Water level

NOTE: Inland movement of intrusion front between Fall 2018 and Fall 2019 shown in Figure 18 is for Lower Aquifer Zone D. There is no evidence of further inland movement of the intrusion front in Zone E.

Figure 19
Basin Storage Compartments
Los Osos Groundwater Basin
2019 Annual Report

Cleath-Harris Geologists

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 J. Storage estimates were performed for Spring and Fall 2019 and included separate estimates for the following areas and aquifers shown in Figure 19:

- 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 19. 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 (with log correlations in Appendix J).

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	13.0
Zones D&E [2]	9.8
Qal, Zones D&E [3]	10.1

Notes: [1] Weighted specific yield values based on log correlations in Appendix K.
[2] Used for Central Area storage calculations
[3] Used for Eastern Area storage calculations

Storage calculations prior to this Annual Report had assumed a fixed specific yield value of 10 percent. Beginning in 2018, storage calculations are based on specific yields for each individual aquifer zone and are more representative of Basin conditions.

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 19 and Figure D6, Appendix D).

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 19). Appendix J includes a list of wells used for 2019 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 2019.

Table 18. Groundwater in Storage Spring and Fall 2019 (<250 mg/L Chloride)

Basin Area	Aquifer	Zone	Spring 2019		Fall 2019	
			Total	Above Sea Level	Total	Above Sea Level
			ACRE-FEET			
Western and Central	Perched	A, B	5,700	5,700	5,700	5,700
	Upper	C	28,900	7,000	28,300	6,500
Western	Lower[1]	D[2]	14,300	<10	15,100	<10
Central	Lower[1]	D, E	55,100	<10	55,100	<10
Eastern	Alluvial and Lower	Alluvial, D, E	19,400	4,900	18,900	4,400
TOTAL			123,400	17,600	123,100	16,600

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 123,400 acre-feet in Spring 2019, with an estimated 17,600 acre-feet above sea level (Table 18). There was a calculated net seasonal storage decline of 300 acre-feet between Spring 2019 and Fall 2019, although there was an estimated gain of 800 acre-feet of freshwater storage in Lower Aquifer Zone D. This increase in Zone D freshwater storage from Spring to Fall 2019 does not represent a retreat of the seawater intrusion front, but is a one-time adjustment from adding monitoring well LA41 to the Fall 2019 contoured data set.

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 2018 groundwater in storage with Spring 2019.

Table 19. Change in Storage Spring 2018 to Spring 2019 (<250 mg/L Chloride)

Basin Area	Aquifer	Zone	Spring 2018[1]		Change from Spring 2018 to Spring 2019	
			Total	Above Sea Level	Total	Above Sea Level
			ACRE-FEET			
Western and Central	Perched	A, B	5,800	5,800	-100	-100
	Upper	C	28,600	6,700	300	300
Western	Lower[2]	D[3]	14,200	<10	100	0
Central	Lower[2]	D, E	55,100	<10	0	0
Eastern	Alluvial and Lower	Alluvial, D, E	19,000	4,500	400	400
TOTAL			122,700	17,000	700	600

NOTES: [1]Spring 2019 storage based on updated specific yield values

[2]Includes fixed and confined storage.

[3] Western Area Zone E not included due to chloride>250 mg/L.

As shown in Table 19, there was a gain of 100 acre-feet of freshwater storage in the Lower Aquifer between Spring 2018 and Spring 2019. There was also a gain of 600 acre-feet in storage above sea level in the Basin over the same period, for a net gain of 700 acre-feet of storage between Spring 2018 and Spring 2019.

7.5 Basin Metrics

The LOBP 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.

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 is estimated using the Basin model as the maximum amount of water that may be extracted from the Basin with none of the active wells producing water with chloride concentration in excess of 250 mg/L (ISJ Group, 2015). 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). The Basin Yield Metric for 2019 is a ratio expressed as follows:

$$\frac{\text{2019 Groundwater Production}}{\text{2019 Sustainable Yield}} * 100$$

Groundwater production in 2019 was 1,900 acre-feet. The sustainable yield of the Basin with the infrastructure in place at year-end 2016 was estimated using the Basin model to be 2,760 acre-feet per year (CHG,2017b). The 2016 estimate included the first Program C well and is applicable to year-end 2019, therefore, the Basin Yield Metric in 2019 is 69. The LOBP objective for the Basin Yield Metric is 80 or less and has been met in each of the last four years.

Figure 20 compares the Basin Yield Metric and area production in the Basin since 2005. The Basin Yield Metric has dropped from an average of 125 between 2005 and 2009 to 69 in 2019. Two development scenarios from the LOBP are also provided for comparison in Figure 20.

Estimated sustainable yield in the equation above is not simply a volume of water, however, but is also the distribution of groundwater pumping across the Basin that maintains a stationary seawater front, with no active well producing water with chloride concentrations above 250 mg/L. Long-term climatic conditions are assumed for the estimated sustainable yield.

The estimated sustainable yield of the Basin has been reported to the closest 10 acre-feet, similar other water balance components estimated using the Basin model (LOBP, 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 of seawater intrusion at the coast showed the two models were within 2 percent of each other. The SEAWAT model also matched the historical average velocity of sea water 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).

7.5.2 Basin Development Metric

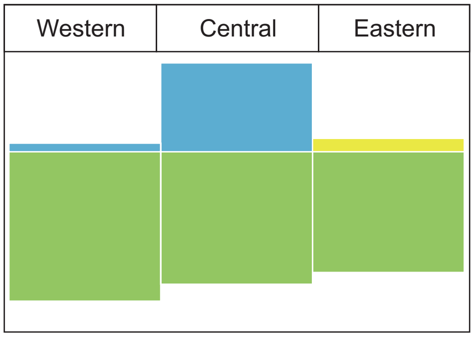
The Basin Development Metric compares the estimated sustainable yield of the Basin in a given year with the estimated maximum sustainable yield of the Basin with all potential LOBP Projects implemented (see Section 10 for a brief overview of LOBP Programs). The Basin Development Metric for 2019 is a ratio expressed as follows:

$$\frac{\text{2019 Sustainable Yield}}{\text{Maximum Sustainable Yield}} * 100$$

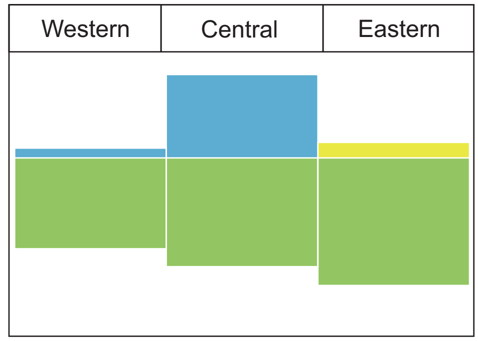
The 2019 sustainable yield is estimated at 2,760 acre-feet. The maximum sustainable yield with all LOBP projects implemented is estimated at 3,500 acre-feet. Therefore, the Basin Development Metric in 2019 is 79, which is the same value as 2018. The purpose of the metric is to inform the BMC on the percentage 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 once 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.

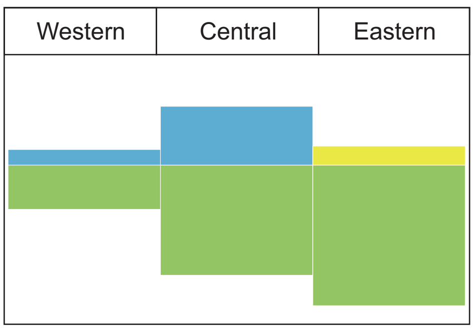
2005-2009
Average Production 3,060 AFY
Basin Yield Metric = 128



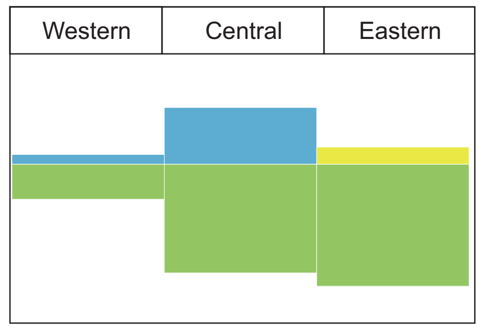
2010-2014
Average Production 2,600 AFY
Basin Yield Metric = 106



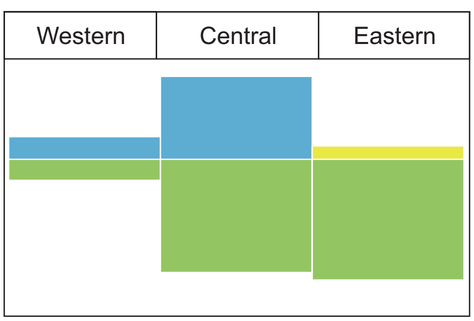
2015-2018
Average Production 2,103 AF
Basin Yield Metric = 76



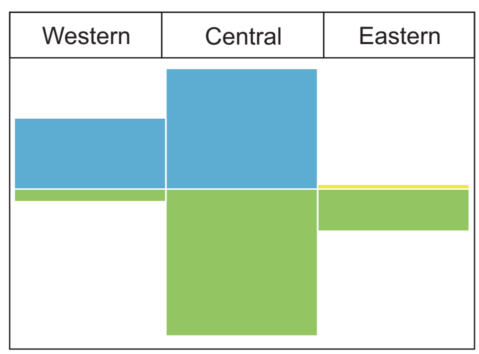
Year 2019
Average Production 1,900 AF
Basin Yield Metric = 69



E+AC+U (No Further Development Scenario)
refer to Basin Plan for full description
Average Production 2,230 AFY
Basin Yield Metric = 74



E+UG+ABC (Buildout Scenario)
refer to Basin Plan for full description
Average Production 2,380 AFY
Basin Yield Metric = 71



Explanation:

Size of rectangle is proportional to groundwater production

- Alluvial Aquifer
- Upper and Perched Aquifer
- Lower Aquifer

Note: historical (pre-2015) and future/projected Basin Yield Metrics are from LOBP

Figure 20
Basin Yield Metric Comparison
Los Osos Groundwater Basin
2019 Annual Report

Cleath-Harris Geologists

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.

<u>Water Level Metric</u>

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 21 graphs historical trends in the metric. Table 20 presents the 2019 Water Level Metric.

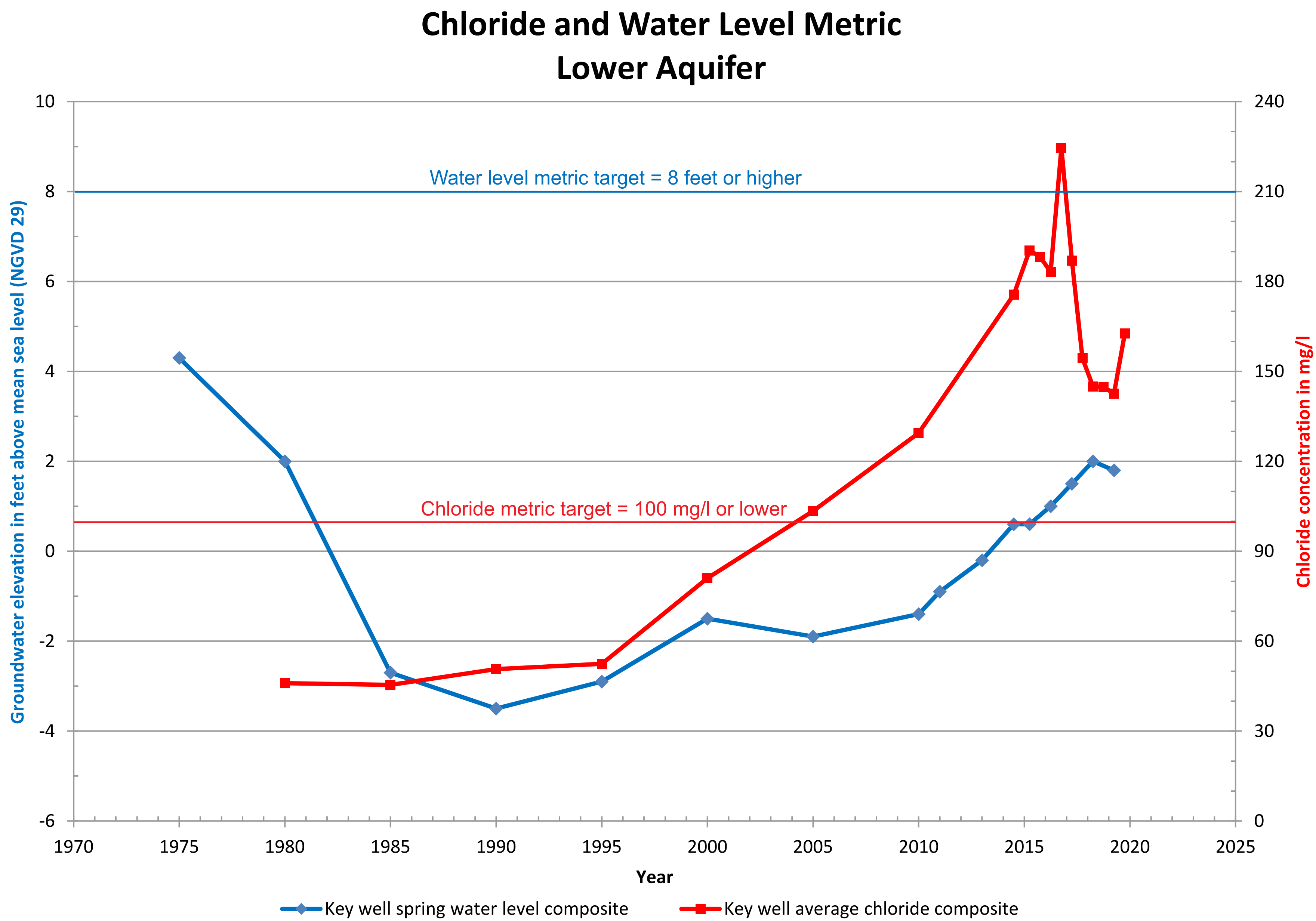
Table 20. 2019 Water Level Metric

Metric Well	Spring 2019 Groundwater Elevation (feet above sea level - NGVD 29 Datum)
LA2	1.57[1]
LA3	-0.81[1]
LA11	0.63[1]
LA14	0.61[1]
LA16	7.22[1]
Water Level Metric (average)	1.8 feet

Data Source: LOBP and County Groundwater Monitoring Programs

[1]Subtracted 2.8 feet from NAVD 88 elevations in Table 5 to convert to NGVD 29 datum for metric.

The Spring 2019 Water Level Metric is 1.8 feet NGVD 29 (approximately 4.6 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 2014, likely in response to a decrease in Lower Aquifer production. Following a flat interval between 2014 and 2015, the metric continued to rise through



Note: 2019 water levels at key wells 11A2 and 14B2 were measured in winter as opposed to the spring.

Figure 21
Chloride and Water Level Metric
Los Osos Groundwater Basin
2019 Annual Report

Cleath-Harris Geologists

2018, but has declined slightly in 2019 (Figure 21). The LOBP objective for the Water Level Metric is 8 feet or higher (ISJ Group, 2015). Removal of the density correction at the sandspit wells, and adjustment of reference point elevations to the NGVD 29 datum has lowered the metric by a few feet compared to prior calculations (CHG 2016b). Reevaluation of the metric objective may be appropriate, however, a review of all well elevation reference points by a licensed surveyor is recommended prior to considering a change in the water level metric objective.

The decline in the Water Level Metric in 2019 during an above-average precipitation year appears anomalous, considering 2019 basin production also decreased, and is interpreted to be due to local conditions at individual metric wells. A decline of 0.2 feet is minor, and may be related to the timing of individual water level measurements relative to active pumping in the confined Lower Aquifer. Water level transducer data for LA13 (Appendix I; not a Water Level Metric well) records a two-foot rise in Lower Aquifer water levels in the Central Area between Spring 2018 and Spring 2019, with high water levels in March. Two of the metric wells were monitored in in February 2019, possibly before representative peak Spring values had been reached at those locations. An expansion of the Lower Aquifer transducer network is recommended, which will help to identify groundwater mounding effects from treated wastewater disposal at the Broderson Site (CHG, 2019a) and would provide support for interpreting Water Level Metric trends.

<u>Chloride Metric</u>

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). Table 21 presents the Spring and Fall 2019 Chloride Metric. Figure 21 graphs historical values in 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. Implementation of a pre-defined pumping program at LA10 was recommended to address Upper Aquifer wellbore leakage and ensure better data quality during the Spring and Fall monitoring events (CHG, 2018a). A protocol was subsequently established to sample LA10 at the end of a regular pumping cycle and following the greatest relative use period during the sampling month. In 2019, water samples collected from LA10 during both Spring and Fall monitoring events indicated no Upper Aquifer influence from wellbore leakage.

Table 21. 2019 Chloride Metric		
Metric Well (Aquifer Zone)	**Spring 2019 Chloride Concentrations**	**Fall 2019 Chloride Concentrations**
LA8 (Zone D)	75 mg/L	77 mg/L
LA10 (Zone D/E)	174 mg/L (double counted for average)	229 mg/L (double counted for average)
LA11 (Zone E)	196 mg/L	187 mg/L
LA12 (Zone D)	94 mg/L	91 mg/L
Chloride Metric (weighted average)	143 mg/L	163 mg/L

Data Source: LOBP Groundwater Monitoring Program (Appendix C)

The 2019 water quality monitoring results indicate an advance of the seawater intrusion front, 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 2019 and Fall 2019 shows an increase in the metric, and the Chloride Metric has increased relative to the target value between Fall 2018 (145 mg/L) and Fall 2019 (163 mg/L), indicating intrusion during 2019 (Figure 21).

Table 21 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 (Appendix D). As previously mentioned, there are four locations where existing wells could potentially be modified to provide Zone E water quality data for the monitoring program, which would allow better delineation of seawater intrusion (Appendix D).

Nitrate Metric

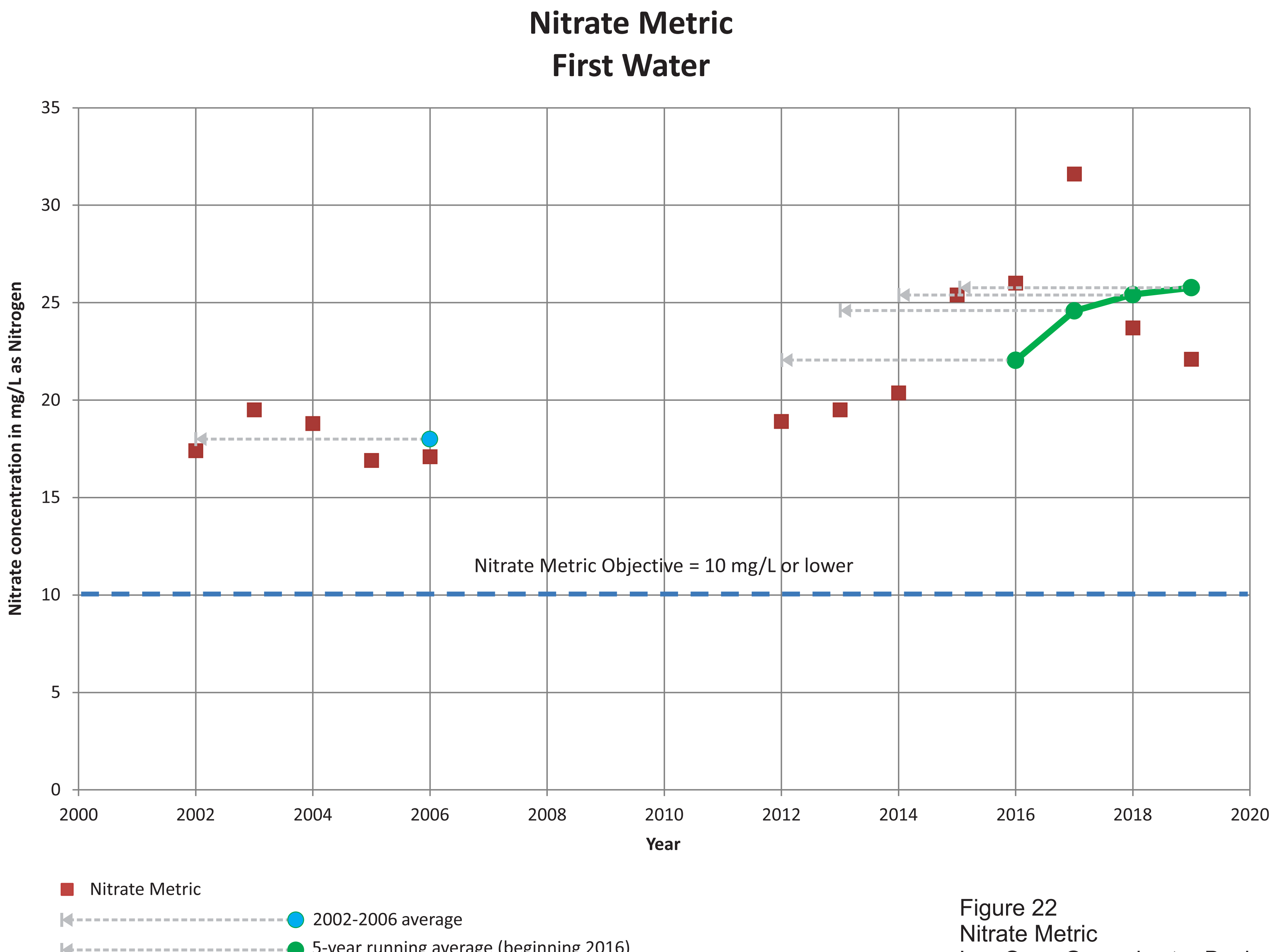
The Nitrate Metric is defined as the average concentration of nitrate in five First Water key wells located in areas of the Basin that have been impacted by elevated nitrate concentrations. The Nitrate Metric data is obtained from the LOWRF Groundwater Monitoring Program's winter sampling event and focuses on shallow, adversely impacted wells to track changes in nitrate concentrations in groundwater over time. FW10 was not sampled in 2019. Table 22 presents the Nitrate Metric for 2019. Figure 22 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 22. 2019 Nitrate Metric	
Metric Well	**Winter 2019 Nitrate-Nitrogen (NO_3-N) Concentrations**
FW2	29 mg/L
FW6	2 mg/L
FW10	29 mg/L[1]
FW15	27 mg/L
FW17	23 mg/L
Nitrate Metric (average)	22 mg/L

Data Source: LOWRF Groundwater Monitoring Program (Rincon Consultants, 2019)
[1]FW10 not sampled in 2019 – used 2018 value for metric.

The Nitrate Metric was measured at 22 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 2 mg/L decrease in the Nitrate Metric from Winter 2018 (24 mg/L), to Winter 2019 (22 mg/L), a slight improvement (Figure 22). 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, 10 mg/L in 2017, 3 mg/L in 2018, and 2 mg/L in 2019. FW6 is hydraulically downgradient of the Broderson site, and NO_3-N declines are attributable to recycled water discharges.

Independent of LOBP actions, construction and operation of the community sewer system and LOWRF will largely stop nitrate loading in the Basin from septic disposal within the wastewater service area. Nitrate concentrations in the Basin are expected to begin declining over the next decade, and in 2019 the Nitrate Metric reached the lowest point recorded since 2016. The five-year running average, which represents long term trends, is still increasing through 2015-2019 although the rate of increase has been slowing since 2016 (Figure 22).



NOTE: 5-year running average increased while 2019 Nitrate Metric decreased because data point removed from running average (2014; 20 mg/L) was less than data point added (2019; 22 mg/L).

Figure 22
Nitrate Metric
Los Osos Groundwater Basin
2019 Annual Report

Cleath-Harris Geologists

7.5.4 Upper Aquifer Water Level Profile

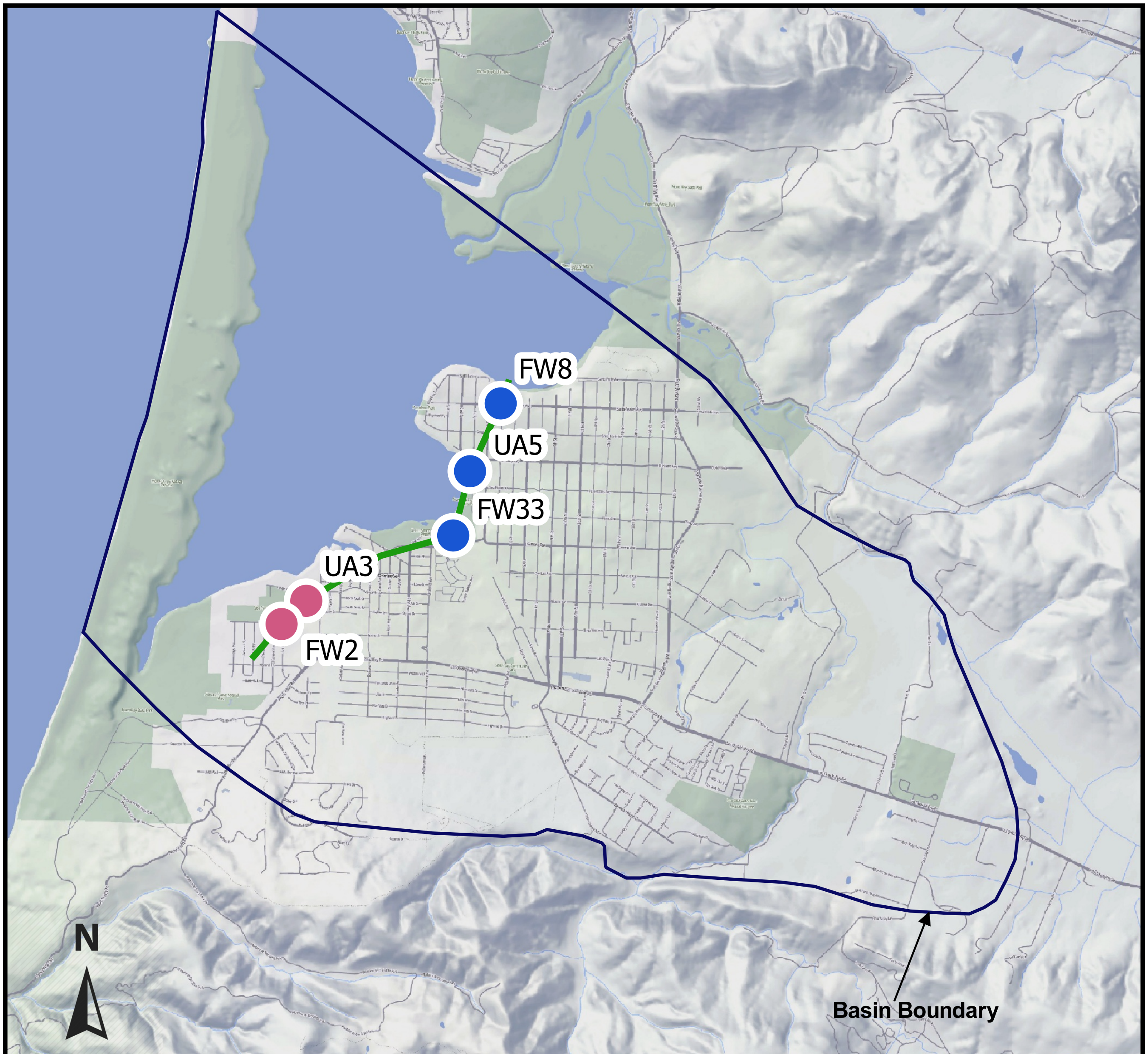
Metrics allow the BMC, regulatory agencies, and the public to evaluate the status of nitrate concentrations and seawater intrusion in the Basin through objective, numerical criteria that can be tracked over time (LOBP, 2015). The Upper Aquifer has a Nitrate Metric, but does not have Water Level Metric 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 2019 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 23 and 24.

Water levels along the Water Level Profile in Spring 2019 were above the Protective Elevation (Figure 24). Spring water levels shown above ground surface in low-lying areas near the bay represent artesian pressures in the aquifer, and incorporate an estimated pressure at 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. However, 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).



Base Image: Stamen-Terrain

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

Scale: 1 inch ≈ 4,000 feet

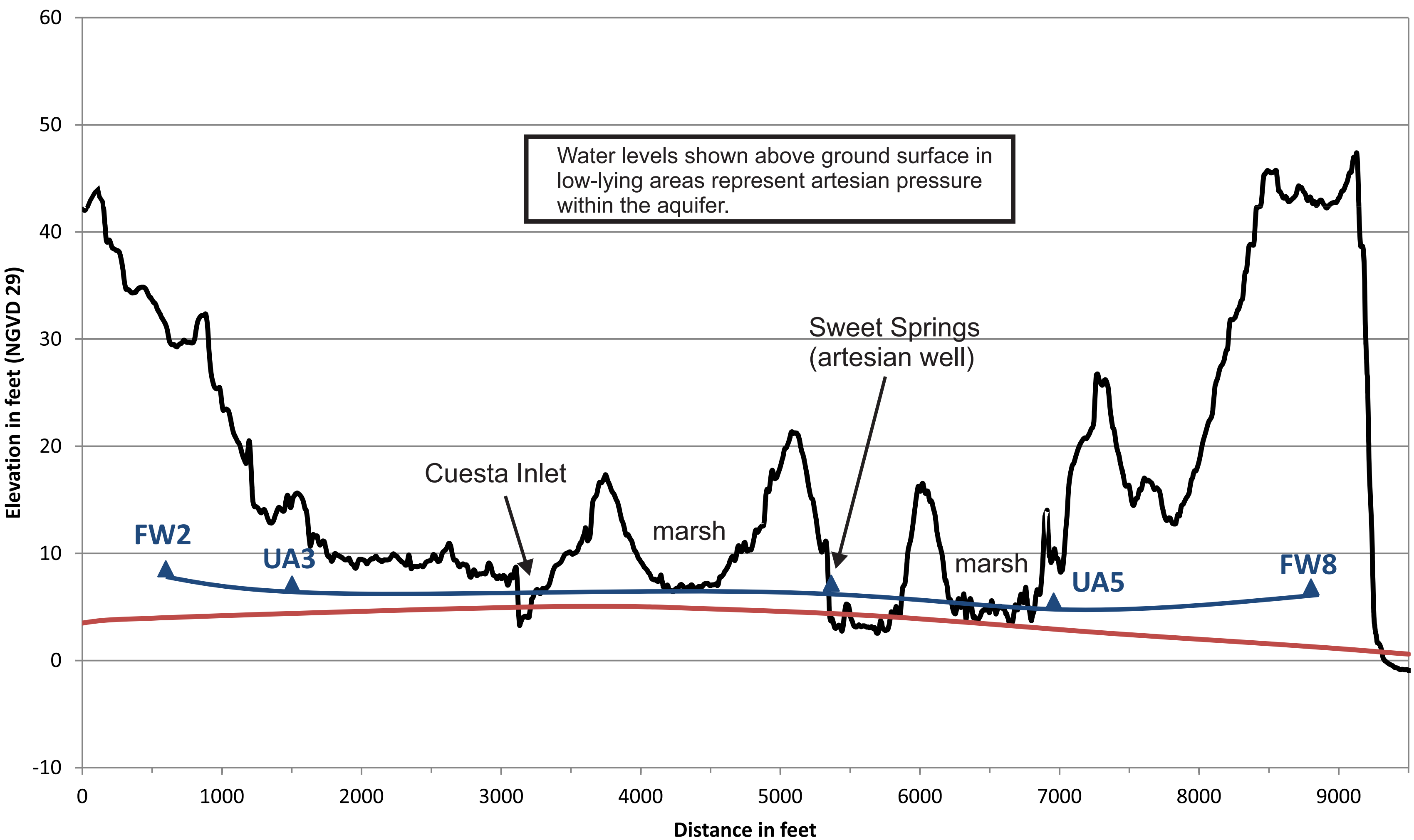
Explanation

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

Figure 23
Water Level Profile Alignment
Los Osos Groundwater Basin
2019 Annual Report

Cleath-Harris Geologists

Upper Aquifer Water Level Profile



Explanation

Figure 24
Upper Aquifer Water Level Profile
Los Osos Groundwater Basin
2019 Annual Report

Cleath-Harris Geologists

8. BASIN STATUS

The status of the Basin in 2019 is summarized as follows:

- The Basin received above normal rainfall in 2019. San Luis Obispo County started 2019 with moderate to severe drought conditions in January and ended in December 2019 with no drought conditions to report (NDMC/USDA/NOAA, 2019).

- Groundwater production for the Basin totaled 1,900 acre-feet in the 2019 calendar year, compared to 2,030 acre-feet in 2018. Purveyor groundwater production decreased by approximately 30 acre-feet while community facilities decreased by an estimated 60 acre-feet in 2019, compared to 2018. The large drop in community water use is attributed to the use of recycled water at Sea Pines Golf Course. Agricultural irrigation decreased by an estimated 40 acre-feet in 2019, compared to 2018.

- Long-term water level trends over the last 7 years in First Water wells averaged 0.15 feet of decline per year. Long-term water level trends over the last 10 years in Upper Aquifer wells averaged 0.35 feet of rise per year, and in Lower Aquifer wells averaged 0.6 feet of rise per year.

- A data gap was filled with completion of Lower Aquifer nested monitoring wells LA40 and LA41 on Lupine Avenue near the bay. The repositioned seawater intrusion front in Zone D is up to 1,400 feet closer to the coast. There was a net gain of 700 acre-feet of Basin freshwater storage between Spring 2018 and Spring 2019.

- Repositioning the seawater intrusion front toward the coast by adding monitoring well LA41 to the contouring data set does not represent movement of the front over time. Relative movement of the seawater intrusion front between Spring 2018 and Spring 2019 is interpreted to be up inland (intrusion).
- The Basin Yield Metric decreased from 74 in 2018 to 69 in 2019. The metric has met the LOBP goal of 80 or less for four consecutive years.
- The Basin Development Metric in 2019 indicates that 79 percent of the estimated maximum potential sustainable yield of the Basin has been developed. There is no LOBP objective for the Basin Development Metric. The metric has not changed from 2018, meaning that no new infrastructure projects affecting Basin sustainable yield have been completed.

- The Water Level Metric declined by 0.2 feet between Spring 2018 (2.0 foot) and Spring 2019 (1.8 feet), indicating a deterioration in 2019, and remains several feet below the target value of 8 feet. This decline in the metric value during an above-average precipitation year with lower basin production is interpreted to be due differences in timing of the measurements relative to Spring high water levels. Where continuous water level transducer data is available in the Central Area, Lower Aquifer water levels rose by two feet from Spring 2018 to Spring 2019.

- The Chloride Metric increased relative to the 100 mg/L target value between Fall 2018 (145 mg/L) and Fall 2019 (162 mg/L), indicating a deterioration in 2019.

- Upper Aquifer water levels were above the Protective Elevation along the bay, including UA3, which was below the protective elevation in 2019. There is no indication of seawater intrusion at UA3, based on chloride concentrations.

- The Nitrate Metric decreased relative to the 10 mg/L target value, from 24 mg/L NO_3-N in 2018 to 22 mg/L NO_3-N in 2019, indicating improvement in 2019.

9. RECOMMENDATIONS

The following LOBP Groundwater Monitoring Program recommendations from the 2018 Annual Report were completed, are in progress, or are planned for completion in 2020:

- Add a new Upper Aquifer and Lower Aquifer monitoring well near the bay, as recommended in the LOBP (ISJ Group, 2015). ***- Completed***

- Retain a licensed surveyor to review all available documentation on reference point elevations and to perform wellhead surveys as needed (Section 3.2.1). – ***Planned for 2020***

- Analyze FW6 for CEC's – ***Planned for 2020***

- Implementation of a pre-defined pumping program at LA10 would be recommended to address wellbore leakage and ensure better data quality during the Spring and Fall monitoring events. – ***Completed***

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

- Develop a rating curve for stream flow Sensor 751 on Los Osos Creek (Section 6).

- Re-evaluate Water Level Metric target after completion of wellhead surveys (Section 7.5.3)

- Expand the Lower Aquifer transducer network to help identify groundwater mounding effects from treated wastewater disposal at the Broderson Site and to provide support for Water Level Metric trend interpretation (Section 7.5.3).

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

- Consider updating the Maximum Sustainable Yield once 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 (Section 7.5.2).

10. ADAPTIVE MANAGEMENT PROGRAM AND STATUS OF LOBP PROGRAM IMPLEMENTATION

The LOBP describes seven potential programs of action, each of which focuses on a different aspect of Basin management (see Section 10.3). Implementation of the identified combination of the LOBP Programs is expected to result in sustainable use of the Basin.

The LOBP also 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 degradation of water quality, including increased levels of contamination and/or increased levels of seawater intrusion.

The Adaptive Management Program will provide a status update on the implementation of the LOBP Programs, assess the overall effectiveness of the LOBP, and offer a tool with which to modify the LOBP programs 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 to the 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 2019 metric values are summarized in Table 23 for easy reference during discussion and evaluation of the LOBP programs.

As discussed in Section 7.5.4, an Upper Aquifer Water Level Profile has been developed to track the potential for sea water intrusion in the Upper Aquifer. This profile currently shows that water levels in the Upper Aquifer remain safely above the Protective Elevation. The profile will be evaluated annually.

10.2 Adaptations to LOBP Programs

Based on the Basin status (Section 8) and recommendations (Section 9), the BMC intends to continuously develop and pursue additional measures related to the Groundwater Monitoring and Urban Water Use Efficiency programs. The following is an update on additional measures related to the Groundwater Monitoring and Urban Water Use Efficiency program:

Table 23. LOBP Metric Summary			
Metric	LOBP Goal	Calculated Value from 2019 Data	Recommended Actions in Addition to LOBP Programs
Basin Yield Metric: Comparison of current well production to sustainable yield	80 or less	69	Implement additional conservation measures to reduce indoor and outdoor demands (See Section 10.3.2)
Water Level Metric: Average groundwater elevation in 5 key wells in the Lower Aquifer	8 feet above mean sea level or higher	1.8 feet above mean sea level	Implement additional conservation measures to reduce indoor and outdoor demands (See Section 10.3.2)
Chloride Metric: Weighted average chloride concentration in 4 key wells in the Lower Aquifer	100 mg/L or lower	162 mg/L	Implement additional conservation measures to reduce indoor and outdoor demands (See Section 10.3.2)
Nitrate Metric: Average nitrate concentration in 5 key wells in the Upper Aquifer	10 mg/L or lower	22 mg/L (NO_3-N)	None recommended

Additional Water Quality Metrics. In addition to the Upper Aquifer Water Level Profile, the BMC will continue to consider developing additional metrics and/or numerical goals to protect the Upper Aquifer from water quality threats.

Contingency Plan Development. As metric trends and Basin response become better defined, the BMC intends to develop contingency plans to respond to unforeseen conditions. As funding and siting for Program C projects progress, detailed milestone schedules will also be developed.

Lower Aquifer Nitrate Trends. The BMC will continue to monitor the leakage of groundwater with elevated nitrate concentrations from the Upper Aquifer through the regional aquitard into the Lower Aquifer. Trends of increasing nitrate concentrations at some Lower Aquifer community supply wells are projected to exceed State drinking water standards, possibly within the next 10 years, as reported in the 2019 Adaptive Management TM (CHG, 2019a). The BMC will address this issue as part of strategic planning.

Adaptation of Water Conservation Measures. Evaluate the Urban Water Use Efficiency Program to determine which conservation measures are the most efficient and effective to meet the LOBP's goals.

Discussion and Recommendation of Criteria for Future Growth. 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. In its May 2017 meeting, 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 Los Osos Community Plan should be consistent with the water supply estimates provided in the Basin Management Plan.
2. The Community Plan should acknowledge any infrastructure projects contemplated by the Basin Plan 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 Community Plan/LCP] should provide a growth rate for Los Osos consistent with the adaptive management provision of the Basin Plan. In particular, the rate of growth must be set so that the monitoring provisions of the Basin Plan confirm the adequacy of a sustainable water supply in support of any contemplated future growth.

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[1]. 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[2]:

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

---

[1]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.

[2]The LOBP also recommends the following programs for potential 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. Since additional development has not been authorized, these additional programs have not been included in this Annual Report.

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 network of 92 wells.[3] 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 fourth 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 24 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. In October 2012, the San Luis Obispo County Board of Supervisors adopted a Water Conservation Implementation Plan ("County Water Conservation Plan"), the details of which are described in Table 25. The County Water Conservation Plan was configured to provide detailed financial and administrative structure, while substantially conforming to the LOBP. Under this program, all properties connecting to the sewer project are required to be retrofitted prior to connection, and the program is essentially complete with the exception of 44 unconnected properties (as of April 2020). Table 26 shows the total fixtures retrofitted and the total rebates provided as of December 2019.

[3]The wells are distributed laterally across the Western, Central and Eastern Areas and vertically among First Water and the Upper and Lower Aquifers. Fifteen existing wells were added to the program since 2015.

Table 24. 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	*Not initiated		
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		

* The wellhead survey project requires approval of temporary access from private landowners. Obtaining this approval has been started but is expected to be a complicated process.

Table 25. Summary from Adopted 2012 County Water Conservation Plan					
Implementation Program Plan Measure Number	**Measure**	**Customer Category**	**Program Length**	**Total Estimated Activities**	**Total Estimated Budget**
Category 1. Residential Programs					
1A	Subsidize Partial Community Retrofit, Residential	Single-Family Residential Toilets	3 Years	8,000	$2,061,375
		Single-Family Residential Showerheads	3 Years	8,000	$368,575
		Single-Family Residential Faucet Aerators	3 Years	13,500	$100,769
1B	Residential Clothes Washer Rebate	Single-Family Residential Washer	5 years	2,000	$385,000
1C	Options for Fully Retrofitted Residences	Hot Water on Demand; Dishwashers,	3 years	500	199,525
1D	Retrofit on Resale	Single-Family Residential: Owners complete retrofits through this ongoing water conservation measure.			$0
Category 2 - Commercial and Institutional					
2A	Subsidize Partial Community Retrofit, Commercial	Commercial	3 years	141	$192,223
2B	Replace Restaurant Spray Nozzles	Commercial	3 years	45	$3,649
2C	Institutional Building Retrofit	Institutional	3 years	13	$38,588
2D	Commercial High Efficiency Clothes Washer Rebate	Commercial	3 years	40	$14,280
Category 3 - Education and Outreach Program					
3A	Residential Water Surveys	Single-Family Residential	3years	5,000	$824,250
3B	Commercial, Industrial and	Commercial	3 years	141	$35,102

Table 25. Summary from Adopted 2012 County Water Conservation Plan					
Implementation Program Plan Measure Number	**Measure**	**Customer Category**	**Program Length**	**Total Estimated Activities**	**Total Estimated Budget**
	Institutional Surveys				
3C	Public Information Program	Single-Family Residential	10 years	23,000	$220,500
3D	Media Campaign	Single-Family Residential	10 years	7,000	$178,500
Category 4 - New Development (developer pays to implement water conservation measures)					$0
Contingency for Additional Measures in Years 4-10					$327,600
Category 1 - Plan Development Cost to Date					$974,558
Total Funding Commitment					$5,000,000

Table 26. Summary of Conservation Rebates Provided through December 2019				
Fixture	**Cumulative Total Thru 2016**	**Cumulative Total Thru 2017**	**Cumulative Total Thru 2018**	**Cumulative Total Thru 2019**
Toilets	3,246	3,325	3,338	3,347
Showerheads	2,362	2,385	2,387	2,389
Faucet aerators	3,211	3,226	3,226	3,226
Clothes washers	101	110	120	126
Hot water recirculator	0	0	0	3
Recycled Water Irrigation Commercial & Institutional	0	0	0	1
Total Value of Provided Rebates	$955,920	$961,888	$969,880	$974,558

Note: Total value of provided rebates is for Category 1 fixtures from Table 25.

In 2016 the BMC recommended programs to be added to the County Water Conservation Plan. The proposed BMC programs are outlined in Table 26. The County has included all of the proposed rebates within the Los Osos Wastewater Project rebate program with the exception of measures Outdoor 1 and Outdoor 2. The County has indicated that these two programs were not included due to a lack of nexus with the wastewater project. Table 27 shows the current rebates available to customers in the wastewater project service area.

Table 27. BMC Recommended Water Conservation Measures

Item No.	Conservation Measure Name	Draft Rebate Amount	Water Savings Potential and Assumptions (ac-ft/year)	Estimated Savings per Unit (gal/yr)	Fixture or Program Estimated Lifespan	Cost of rebate per acre-ft saved	Approximate Savings Potential (AFY)[4]
Indoor-1	Hot water recirculation system	$300	EPA Water Sense estimates > 10,000 gal/year, assume 5,000 to 10,000 gal/year	7,000	10	$1,396	50 to 100
Indoor -2	High efficiency clothes washer	$250	3,000 to 5,000 gal/year, depending on household size	3,300	5	$4,936	40 to 60
Indoor - 3	Replace 1.6 gpf toilets with 1.28 or below	$250	1,000 to 2,000 gal/year, depending on use	1,500	20	$2,715	30 to 50 (See Note 5)
Indoor - 4	Replace 2.0 gpm showerheads with 1.5 gpm	$40	1,000 to 2,000 gal/year, depending on use	1,500	10	$869	30 to 50 (See Note 5)
Outdoor - 1	Septic tank repurpose - roof water only	$500 (see Note 3)	Assume 3 to 4 tank volumes, at 1,000 gallons each	3,500	20	$2,327	40 to 60 (See Note 1)
Outdoor - 2	Septic tank repurpose - with recycled water hauling	$500 (see Note 3)	Potentially eliminate outdoor potable usage	6,000	20	$1,358	70 to 90 (See Note 1)
Outdoor - 3	Gray water system	$500 (see Note 3)	Potentially eliminate outdoor potable usage	6,000	20	$1,358	70 to 90 (See Note 1)
Outdoor - 4	Laundry to landscape program	$50 (see Note 3)	1,000 to 1,500 gallons per year, depending on use	1,250	5	$2,606	10 to 20 (see Note 1)
Notes:	1. Total savings for outdoor programs are not additive. For example, outdoor use can be addressed through gray water or hauled recycled water. 2. All estimates depend on use patterns and other factors. Values are stated for comparison. 3. Only one $500 rebate will be provided per property under programs Outdoor -1, 2, and 3. Participants in these programs are not eligible for program Outdoor - 4. Property owners who have already backfilled their septic tank will receive a rebate of $500 for implementation of an alternative storage tank/basin with a minimum of 500 gallons of capacity. 4. Approximate Savings Potential assumes total 4,500 unit participation. 5. Assumes 2 replacement fixtures per household unit.						

Table 28. Updated County Water Conservation Plan Los Osos Wastewater Project Proposed Rebate Program			
Measures Required for Connection to the Wastewater System			
Fixture or Appliance	**Existing Fixture Flow Rate**	**New Fixture Flow Rate Eligible for Rebate**	**Rebates**
Toilets Residential & Commercial	Greater than 1.6 gpf	1.28 gpf or less	$160
Showerheads Residential & Commercial	Greater than 2.0 gpm	1.5 gpm or less	$30
Faucet Aerators Residential	Greater than 1.5 gpm	1.5 gpm or less	$0
Faucet Aerators Commercial	Greater than 0.5 gpm	0.5 gpm	$0
Urinals Commercial	Greater than 1.0 gpf	0.5 gpf or less	$0
Pre-rinse Spray valves Commercial	Greater than 1.15 gpm	1.15 gpm or less	N/A
Optional Measures Eligible for Rebates **(Requires Connection to the Wastewater System and Compliance with Above Measures)**			
Toilets Residential & Commercial	Equal to 1.6 gpf	1.28 gpf or less	$160
Washers Residential & Commercial	Less than Tier 3, Water Factor 4	Tier 3, Water Factor 4 or Less	$450[1]
Hot Water Recirc System Residential & Commercial	N/A	N/A	$350
Showerheads Residential & Commercial	1.5 gpm or more	Less than 1.5 gpm	$30
Complete Gray Water System	N/A	N/A	$500
Laundry only Gray Water System	N/A	N/A	$50
Recycled Water Irrigation Commercial & Institutional	N/A	N/A	Negotiated

gpf = gallons per flush
gpm = gallons per minute
Notes: [1] Rebate not retroactive to prior rebated or prior purchased appliances.

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 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 29, along with the actual uses from 2019[4].

Table 29. Planned Recycled Water Uses in the Urban Water Reinvestment Program

Potential Use	Estimated Annual Volume (AFY)	Actual Annual Volume in 2019 (AFY)
Broderson Leach Fields	448	431
Bayridge Estates Leach Fields	33	14
Urban Reuse	63	0
Sea Pines Golf Course	40	71
Los Osos Valley Memorial Park	50	0
Agricultural Reuse	146	0
Total	**780**	**516**

The LOWRF construction was completed in March 2016. Through the end of 2019, the sewer service area had connected 99.1 percent of parcels that are required to connect. Flows to the wastewater plant in 2019 were averaging approximately 480,000 gallons per day, with daily peaks of up to 540,000 gallons (535 AFY). With 99.1 percent of the required parcels connected, average wastewater flows are lower than anticipated. Projecting the actual average flow per connection through the remainder of the project results in a total estimated volume of 540 AFY, which is 240 AFY less than the anticipated 780 AFY.

Treated water in 2019 was conveyed to the Broderson and Bayridge Estates leach fields, and Sea Pines Golf Course. The anticipated groundwater mound[5] resulting from infiltration of treated wastewater disposal to leach fields at the Broderson site was detected hydraulically downgradient beginning in June 2017. Recycled water for irrigation will be provided to the schools, parks, and various agricultural areas within the Basin once flows at the wastewater plant approach anticipated

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

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

volumes. The purveyors have executed agreements with the County of San Luis Obispo to supply recycled water to the schools. It is anticipated that recycled water will be provided as soon as the required retrofits are completed on the various school sites and all other agreement terms and conditions have been met. Retrofits at the Los Osos Middle School will be completed in the fall/winter of 2020/2021, and additional schools will be retrofitted each year until all schools are receiving recycled water.

The BMC is currently analyzing the feasibility, cost, and water supply benefits of a dry weather discharge to Los Osos Creek as a means of recharging the Lower Aquifer and enhancing Basin yield. The results of the current study will be summarized in future Annual Reports.

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 also increase the Basin's sustainable yield, which in turn will help to drive down the Basin Yield Metric.

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 Basin Management Plan 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. Table 30 provides an overview of 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 30.

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 30. Basin Infrastructure Projects				
Project Name	**Parties Involved**	**Funding Status**	**Capital Cost**	**Status**
Program A				
Water Systems Interconnection	LOCSD/ GSWC	Fully Funded	LOCSD/GSWC $103,550	Completed
Upper Aquifer Well (8th Street)	LOCSD	Fully Funded	$250,000	Well was drilled and cased in December 2016. Budget remaining $250,000 to equip the well. Design is 100% complete and project has been included in an IRWM Grant Application. If awarded, funding is anticipated to be available in late 2020/early 2021.
South Bay Well Nitrate Removal	LOCSD			Completed
Palisades Well Modifications	LOCSD			Completed
Blending Project (Skyline Well)	GSWC	Fully Funded	$1.15 mil	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 can be considered a 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	Fully Funded	$1.76 mil	Completed
Expansion Well No. 2	LOCSD is currently leading the project with potential GSWC and S&T involvement, depending on final location	LOCSD is currently leading the project with respect to funding	BMP: $2.0 mil	Property acquisition phase is on-going through efforts of LOCSD. Test hole at Site A (Los Osos Middle School) completed January 2020 and showed location was not suitable for Expansion Well. Alternative sites are being considered and plans for environmental review to identify preferred site are expected to begin in Q2 of 2020.
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	In conceptual design

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	Funded through BMC Budget	$115,000	Completed
Program U				
Creek Discharge Program	All Parties	$50k included and approved in the CY 2019 BMC Budget	Anticipated cost of $582,000 through feasibility phase	The 2019 budget includes funding for Soil Aquifer Treatment evaluation in the amount of $50,000. BMC authorized completion of the Soil Aquifer Testing to support implementation of the Creek Discharge Program. These activities are currently on hold pending outcome of the CY 2020 BMC Budget discussion.
8th and El Moro Urban Storm Water Recovery Project	All Parties	$15k included in CY 2019 BMC Budget for initial study	NA	On hold, pending outcome of the CY 2020 BMC Budget discussion.

11. REFERENCES

Burt, C.M., Mutziger, A., Howes, D.J., and Solomon, K.H., 2002, Evaporation from Irrigated Agricultural Land in California, January.

Brown and Caldwell, 1983, Los Osos - Baywood Park Phase I Water Quality Management Study, prepared for San Luis Obispo Service Area No. 9, April 1983.

Carollo, 2012, San Luis Obispo County Master Water Report, prepared for the San Luis Obispo County Flood Control and Water Conservation District, May 2012. http://www.slocountywater.org/site/Frequent%20Downloads/Master%20Water%20Plan/

Central Coast Regional Water Quality Control Board (CCRWQCB), 2011, Waste Discharge/Recycled Water Requirements for the Los Osos Water Recycling Facility, San Luis Obispo County, Order No. R3-2011-001, May 5. https://www.waterboards.ca.gov/centralcoast/board_decisions/adopted_orders/2011/2011_0001_wdr_order.pdf.

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

Cleath & Associates, 2005, Sea Water Intrusion Assessment and Lower Aquifer Source Investigation of the Los Osos Valley Ground Water Basin, San Luis Obispo County, California, prepared for the Los Osos Community Services District, October 2005.

Cleath & Associates, 2006, Task 3 Upper Aquifer Water Quality Characterization, prepared for the Los Osos Community Services District, June 2006.

Cleath & Associates, 2002-2006, Quarterly Groundwater Monitoring Reports for the Los Osos Nitrate Monitoring Program, prepared for the Los Osos Community Services District.

Cleath & Associates, 2002-2006, Semi-Annual Groundwater Monitoring Reports for the Los Osos Nitrate Monitoring Program, prepared for the Los Osos Community Services District.

Cleath-Harris Geologists, 2009a, Flow Model Conversion and Urban Area Yield Update, Technical Memorandum prepared for the Los Osos ISJ Group, July 29, 2009.

Cleath-Harris Geologists, 2009b, Water Use Estimates for Private Domestic Wells, Technical Memorandum prepared for the Los Osos ISJ Group, July 29, 2009.

Cleath-Harris Geologists, 2009c, Water Use Estimates for Los Osos Creek Valley Irrigation Wells, Technical Memorandum prepared for the Los Osos ISJ Group, July 29, 2009.

Cleath-Harris Geologists, 2010, Water Quality Monitoring Results Summary, November 2009-January 2010, Los Osos Valley Groundwater Basin, Technical Memorandum prepared for the Los Osos ISJ Group, April 26, 2010.

Cleath-Harris Geologists, 2012, Los Osos Water Recycling Facility Baseline Groundwater Quality Monitoring, August 2012, prepared for San Luis Obispo County Department of Public Works, October 2012.

Cleath-Harris Geologists, 2013, Los Osos Water Recycling Facility Baseline Groundwater Quality Monitoring, June 2013, prepared for San Luis Obispo County Department of Public Works, July 2013.

Cleath-Harris Geologists, 2014, Seawater Intrusion Monitoring, Los Osos Valley Groundwater Basin, Technical Memorandum, prepared for the Los Osos ISJ Group, October 7, 2014.

Cleath-Harris Geologists, 2015a, April 2015 Lower Aquifer Monitoring, Los Osos Groundwater Basin, Draft Technical Memorandum prepared for the Los Osos ISJ Group, May 26, 2015.

Cleath-Harris Geologists, 2015b, October 2015 Lower Aquifer Monitoring, Los Osos Groundwater Basin, Technical Memorandum prepared for the Los Osos ISJ Group, December 28, 2015.

Cleath-Harris Geologists, 2015c, Los Osos Water Recycling Facility Baseline Groundwater Quality Monitoring, May 2015, prepared for San Luis Obispo County Department of Public Works, June 2015.

Cleath-Harris Geologists, 2015d, Los Osos Water Recycling Facility Baseline Groundwater Quality Monitoring, November 2015, prepared for San Luis Obispo County Department of Public Works, December 2015.

Cleath-Harris Geologists, 2016a, Los Osos Valley Groundwater Basin Boundary Modification Request, Technical Memorandum prepared for San Luis Obispo County Department of Public Works, March 25, 2016.
http://sgma.water.ca.gov/basinmod/docs/download/2071

Cleath-Harris Geologists, 2016b, Los Osos Basin Plan, Groundwater Monitoring Program 2015 Annual Monitoring Report, prepared in association with Wallace Group for the Los Osos Groundwater Basin Management Committee, September 2016.
https://www.slocountywater.org/site/Water%20Resources/LosOsos/pdf/Los%20Osos%20BMC%202015%20Annual%20Report%20Final.pdf

Cleath-Harris Geologists, 2017a, Los Osos Basin Plan, Groundwater Monitoring Program 2016 Annual Monitoring Report, prepared for the Los Osos Groundwater Basin Management Committee, June2017.
http://www.slocountywater.org/site/Water%20Resources/LosOsos/pdf/2016%20Annual%20Report%20Final.pdf

Cleath-Harris Geologists, 2017b, Basin Yield Metric Response to reduced long-term precipitation in the Los Osos Groundwater Basin, Technical Memorandum prepared for the Los Osos Groundwater Basin Management Committee and Morro Bay National Estuary program, March 3,2017.
http://www.slocountywater.org/site/Water%20Resources/LosOsos/pdf/TM%20Basin%20Yield%20Metric%20Los%20Osos%20GW%20Basin%2020180303.pdf

Cleath-Harris Geologists, 2018a, Los Osos Basin Plan, Groundwater Monitoring Program 2017 Annual Monitoring Report, prepared for the Los Osos Groundwater Basin Management Committee, June 2017.
http://www.slocountywater.org/site/Water%20Resources/LosOsos/pdf/2017%20Annual%20Report%20Final.pdf

Cleath-Harris Geologists, 2018b, Los Osos Valley Groundwater Basin Fringe Areas Characterization, prepared for San Luis Obispo County Flood Control and Water Conservation District, May 2017.
https://www.slocountywater.org/site/Water%20Resources/SGMA/lososos/pdf/Report_Fringe%20Area%20Technical%20Memorandum_Los%20Osos%20Basin.pdf

Cleath-Harris Geologists, 2019a, Draft Lower Aquifer nitrate concentrations trends review and LA11 seawater intrusion evaluation, prepared for the Los Osos Groundwater Basin Management Committee, November 6, 2019.

Cleath-Harris Geologists, 2019b, Los Osos Basin Plan Metric Trends Review and Infrastructure Program C, prepared for the Los Osos Groundwater Basin Management Committee, February 28, 2019.

Cleath-Harris Geologists, 2019c, Los Osos Basin Plan, Groundwater Monitoring Program 2018 Annual Monitoring Report, prepared for the Los Osos Groundwater Basin Management Committee, June 2019.

Department of Water Resources (DWR), State of California, 1973, Los Osos - Baywood Ground Water Protection Study, Southern District Report, October 1973.

Department of Water Resources (DWR), State of California, 2014, California Groundwater Elevation Monitoring Basin Prioritization Process, Appendix A, June 2014.

Department of Water Resources (DWR), State of California, 2016, California's Groundwater, Working Toward Sustainability, Bulletin 118 Interim Update 2016, December 22, 2016. https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Bulletin-118/Files/Statewide-Reports/Bulletin_118_Interim_Update_2016.pdf

Department of Water Resources (DWR), State of California, 2018a, Bulletin 118 Groundwater Basins Subject to Critical Conditions of Overdraft – Update based on 2018 Final Basin Boundary Modifications. https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Bulletin-118/Critically-Overdrafted-Basins/Files/2018CODBasins.pdf?la=en&hash=3014D2F2299AA503C469D41BBC0E8DCFCE0267F8

Department of Water Resources (DWR), State of California, 2018b,Basin Boundary Modification Request System – San Luis Obispo County 3-008 Los Osos Valley https://sgma.water.ca.gov/basinmod/basinrequest/preview/238

Department of Water Resources (DWR), State of California, 2019,Basin Boundary Modifications – Final Decisions, February 11, 2019. https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Basin-Boundary-Modifications/Files/2018_BBM_SummaryTable.pdf?la=en&hash=5DAF7E8CA73DB0FED363D5C6BF78C25E96A33ADD

Freeze, R. A., and Cherry, J. A., 1979, Groundwater, Prentice-Hall, 604 p.

ISJ Group, 2015, Updated Basin Plan for the Los Osos Groundwater Basin, January 2015,http://www.slocountywater.org/site/Water%20Resources/LosOsos/pdf/Los%20Osos%20Groundwater%20Basin%20Plan%20January%202016.pdf

Johnson, A.I., 1967, Specific Yield - Compilation of Specific Yields for Various Materials, U. S. Geological Survey Water-Supply Paper 1662-D, prepared in cooperation with the California Department of Water Resources. https://pubs.usgs.gov/wsp/1662d/report.pdf

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).

National Drought Mitigation Center / U.S. Department of Agriculture / National Oceanic and Atmospheric Association, 2018, U.S. Drought Monitor, California maps. Website access: https://droughtmonitor.unl.edu/Maps/MapArchive.aspx

Rincon Consultants, 2014a, Baseline Groundwater Quality Monitoring Report for the Los Osos Water Recycling Facility, prepared for San Luis Obispo County Department of Public Works, February 2014.

Rincon Consultants, 2014b, May 2014 Baseline Groundwater Quality Monitoring Report, Los Osos Water Recycling Facility, prepared for San Luis Obispo County Department of Public Works, June 2014.

Rincon Consultants, 2014c, October 2014 Baseline Groundwater Quality Monitoring Report, Los Osos Water Recycling Facility, prepared for San Luis Obispo County Department of Public Works, December 2014.

Rincon Consultants, 2017a, December 2016 Baseline Groundwater Quality Monitoring Report, Los Osos Water Recycling Facility, prepared for San Luis Obispo County Department of Public Works, December 2016.

Rincon Consultants, 2017b, June 2017 Semiannual Groundwater Quality Monitoring Report, Los Osos Water Recycling Facility, prepared for San Luis Obispo County Department of Public Works, July 2017.

Rincon Consultants, 2018a, December 2017 Semiannual Groundwater Quality Monitoring Report, Los Osos Water Recycling Facility, prepared for San Luis Obispo County Department of Public Works, January 2018.

Rincon Consultants, 2018b, June 2018 Semiannual Groundwater Quality Monitoring Report, Los Osos Water Recycling Facility, prepared for San Luis Obispo County Department of Public Works, August 2018.

Rincon Consultants, 2019, December 2018 Semiannual Groundwater Quality Monitoring Report, Los Osos Water Recycling Facility, prepared for San Luis Obispo County Department of Public Works, January 2019.

Rincon Consultants, 2019, June 2019 Semiannual Groundwater Quality Monitoring Report, Los Osos Water Recycling Facility, prepared for San Luis Obispo County Department of Public Works, August 2019.

Rincon Consultants, 2020, December 2019 Semiannual Groundwater Quality Monitoring Report, Los Osos Water Recycling Facility, prepared for San Luis Obispo County Department of Public Works, February 2020.

San Luis Obispo County Flood Control & Water Conservation District, 2014, CASGEM Monitoring Plan for High and Medium Priority Groundwater Basins in the San Luis Obispo County Flood Control & Water Conservation District, September 2014.
http://www.slocountywater.org/site/Water%20Resources/Reports/pdf/20141002%20SLO%20FC&WCD%20CASGEM%20Monitoring%20Plan.pdf

Smith, C. T., and Griggs, A. B., 1944, Chromite Deposits near San Luis Obipo, San Luis Obispo County, California, U. S. Geological Survey Bulletin 945-B.

https://pubs.er.usgs.gov/publication/b945B

SWRCB, 2009, Recycled Water Policy, adopted in Resolution No. 2009-0011 - Adoption of Policy for Water Quality Control for Recycled Water.
http://www.swrcb.ca.gov/board_decisions/adopted_orders/resolutions/2009/rs2009_0011.pdf

San Luis Obispo County Public Works Department, 2005, Water Years 2001-02 and 2002-03 Hydrologic Report, May 16, 2005.
http://slocountywater.org/site/Water%20Resources/Reports/pdf/Hydrologic%20Report%202002.pdf

San Luis Obispo County Public Works Department,2019a, Los Osos Water Recycling Facility Laboratory Report for CEC Blue Ribbon, prepared by Eurofins-Eaton Analytical, January 10, 2020.
https://ciwqs.waterboards.ca.gov/ciwqs/readOnly/PublicReportEsmrAtGlanceServlet?reportID=2&isDrilldown=true&documentID=1754256

San Luis Obispo County Public Works Department,2018b, Los Osos Water Recycling Facility 2018 Semi-Annual Report.
https://ciwqs.waterboards.ca.gov/ciwqs/readOnly/PublicReportEsmrAtGlanceServlet?reportID=2&isDrilldown=true&documentID=1754245

Yates, E.B., and Wiese, J. H., 1988, Hydrogeology and Water Resources of the Los Osos Valley Ground-Water Basin, San Luis Obispo County, California, U. S. Geological Survey, Water-Resources Investigations Report 88-4081.
http://pubs.usgs.gov/wri/1988/4081/report.pdf

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, 2019, 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.

<u>Historical Investigations</u>

- *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 Boundary Modification Request, Technical Memorandum (CHG, 2018).*

<u>Monitoring Reports</u>:

- *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, 2014a, 2014b, 2014c, 2017a, 2017b, 2018a, 2018b, 2019; CHG 2015a, CHG 2015b, CHG 2015c, 2015d);

- *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);

- 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.

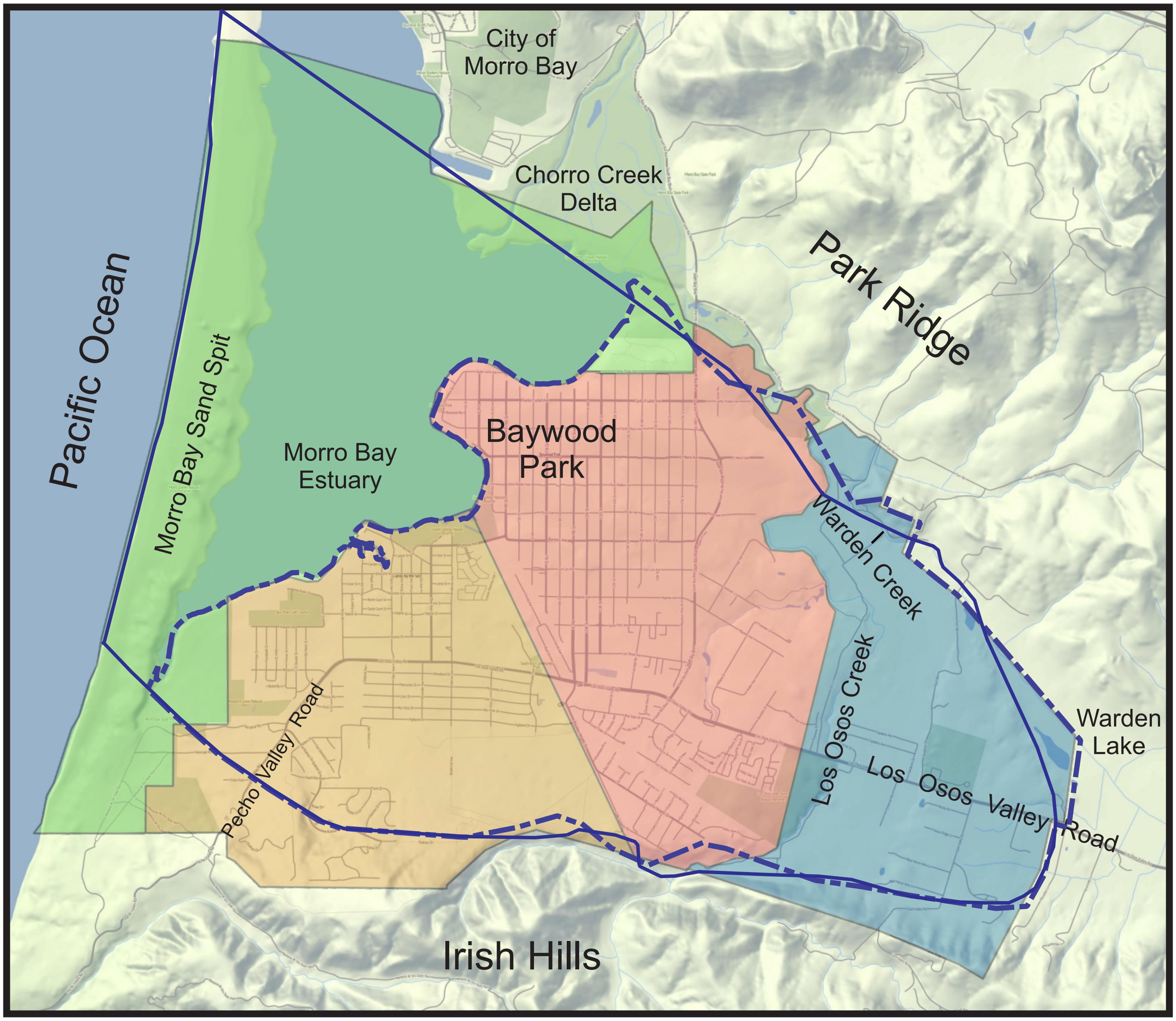
- 2002-2006 Los Osos Nitrate Monitoring Program. Water levels measured quarterly to semi-annually; program ended October 2006.

- 2012-2019 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 2019 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 G).



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
2019 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)	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	2			x		
FW3	30S/10E-13G	South Court	Western	35.3162	120.8498	50.95	MW	LOCSD	47-52	54	2			x		
FW4	30S/10E-13H	Broderson/Skyline	Western	35.3158	120.8432	49.33	MW	LOCSD	154-164	164	2			x		
FW5	30S/10E-13Q2	Woodland Dr.	Western	35.3119	120.8495	101.27	MW	LOCSD	97-100	105	2			x		
FW6	30S/10E-24A	Highland/Alexander	Western	35.3083	120.8453	193.04	MW	LOCSD	154-164	164	2			x		
FW7	30S/10E-24Ab	Broderson leach field	Western	35.3065	120.8460	255	MW	LOCSD	200-240	240	5			x		
FW8	30S/11E-7L4	Santa Ysabel/5th	Central	35.3302	120.8377	45.76	MW	LOCSD	40-50	50	2			x		
FW9	30S/11E-7K3	12th/ Santa Ysabel	Central	35.3299	120.8300	90.71	MW	LOCSD	55-65	70	2			x		
FW10	30S/11E-7Q1	LOCSD 8th Street - shallow	Central	35.3260	120.8342	25.29	MW	LOCSD	29-43, 54-75	75	8			x		
FW11	30S/11E-7R2	El Moro/12th St.	Central	35.3263	120.8298	61.93	MW	LOCSD	25-35	35	2			x		
FW12	30S/11E-18C2	Pismo Ave./ 5th St.	Central	35.3227	210.8376	34.55	MW	LOCSD	25-35	35	2			x		
FW13	30S/11E-18B2	Ramona/10th	Central	35.3208	120.8320	79.89	MW	LOCSD	25-35	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	2		x			
FW16	30S/11E-18L11	Palisades Ave.	Western	35.3138	120.8374	88.02	MW	LOCSD	43-53	53	2		x			
FW17	30S/11E-18L12	Ferrell Ave.	Central	35.3138	120.8346	103.85	MW	LOCSD	25-35	35	2		x			
FW18	30S/11E-18P	Sunnyside #1	Western	35.3095	120.8352	150	MW	SLCUSD	15-35	35	2		x			
FW19	30S/11E-18J7	Los Olivos/Fairchild	Central	35.3130	120.8271	125.74	MW	LOCSD	25-35	35	2		x			
FW20	30S/11E-8Mb	Santa Maria/18th Street	Central	35.3287	120.8233	95	MW	LOCSD	37-47	47	2		x			
FW21	30S/11E-8N4	South Bay Blvd. OBS	Central	35.3253	120.8213	95.99	MW	LOCSD	40-50	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	87	MW	PRIVATE[1]	50-70	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	213	MW	LOCSD	18-38	38	4		x			
FW32	30S/11E-21D14							PRIVATE								
FW33+	30S/11E-18D1S							PRIVATE								

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

*Datum varies between NGVD 29 and NAVD 88 (see report Tables 4-8 for details).

MW = Monitoring Well

\+ New for 2019 Reporting Year

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)	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	160	2			x		
UA2	30S/10E-14B1	Sandspit #3 Shallow	Dunes and bay	35.3219	120.8682	19.48	MW	SLO CO.	190-200	200	1.5			x		
UA3	30S/10E-13F1	GSWC Skyline #1	Western	35.3165	120.8533	19	M	GSWC	90-195	206	14			x		
UA4	30S/10E-13L1	S&T Mutual #1	Western	35.3148	120.8531	38.68	M	S&T	100-141	141	8			x		
UA5	30S/11E-7N1	LOCSD 3rd St. Well	Central	35.3256	120.8401	9.13	M	LOCSD	56-84	80	8			x		
UA6	30S/11E-18L8	USGS Palisades OBS East 2"	Western	35.3149	120.8381	79.18	MW	SLO CO.	100-140	140	2			x		
UA7	30S/11E-18L7	USGS Palisades OBS West 2"	Western	35.3149	120.8381	79.16	MW	SLO CO.	180-220	220	2			x		
UA8	30S/11E-18K7	LOCSD 10th St. Observation West	Central	35.3130	120.8326	135.65	MW	LOCSD	200-220	220	2			x		
UA9	30S/11E-18K3	GSWC Los Olivos #3	Central	35.3133	120.8300	121.18	M	GSWC	148-202, 222-232	232	8			x		
UA10	30S/11E-18H1	LOCSD - 12th St.	Central	35.3161	120.8297	107.10	M	LOCSD	112-125, 145-159, 172-186, 216-231	232	10			x		
UA11	30S/11E-17D							PRIVATE								
UA12	30S/11E-17E9	So. Bay Blvd OBS shallow	Central	35.3158	120.8240	105.85	MW	LOCSD	184-194	204	2			x		
UA13	30S/11E-17E10	LOCSD South Bay upper	Central	35.3159	120.8239	106	M	LOCSD	170-210	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								

*Datum varies between NGVD 29 and NAVD 88 (see report Tables 4-8 for details).

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			Well Type	Well Owner	Well Data			Aquifer				
				Latitude	Longitude	RP Elevation* (feet amsl)			Screened Interval (feet bgs)	Well Depth (feet bgs)	Casing Diameter (inches)	Creek Valley Alluvium	Zone A/B	Zone C	Zone D	Zone E
LA1	30S/10E-2A1	Sandspit #2 North	Dunes and Bay	35.3530	120.8617	23.13	MW	SLO CO.	220-230	230	2					x
LA2	30S/10E-11A2	Sandspit #1 East	Dunes and Bay	35.3358	120.8638	16.07	MW	SLO CO.	234-244	244	2				x	
LA3	30S/10E-14B2	Sandspit #3 Deep	Dunes and	35.3219	120.8682	19.47	MW	SLO CO.	270-280	280	2				x	
LA4	30S/10E-13M1	USGS Howard West	Western	35.3149	120.8597	41.20	MW	PRIVATE	477-537	820	6					x
LA5	30S/10E-13L7	S&T Mutual #4	Western	35.3146	120.8531	37	M	S&T	160-300	300	8					
LA6	30S/10E-13L4	GSWC Pecho #1	Western	35.3129	120.8522	68	M	GSWC	240-380	675	14				x	
LA7	30S/10E-13P2							PRIVATE								
LA8	30S/10E-13N	S&T Mutual #5	Western	35.3088	120.8565	138.50	M	S&T	260-340	350	8				x	
LA9	30S/10E-24C1	GSWC Cabrillo #1	Western	35.3077	120.8552	178.32	M	GSWC	250-500	508	10				x	
LA10	30S/10E-13J4	GSWC Rosina #1	Western	35.3145	120.8468	95.31	M	GSWC	290-406	409	10				x	x
LA11	30S/10E-12J1	Morro Bay Observation #5	Central	35.3299	120.8440	8.43	MW	SLO CO.	349-389	389	2					x
LA12	30S/11E-7Q3	LOCSD 8th St. Lower	Central	35.3259	120.8342	24.30	M	LOCSD	230-270	270	10				x	
LA13	30S/11E-18F2	LOCSD Ferrell #2	Central	35.3159	120.8358	100	M	LOCSD	425-620	625	12				x	x
LA14	30S/11E-18L6	USGS Palisades OBS 6"	Western	35.3149	120.8381	79.36	MW	SLO CO.	355-375, 430-480, 550-600	620	6				x	x
LA15	30S/11E-18L2	LOCSD Palisades	Western	35.3136	120.8377	85	M	LOCSD	340-380	394	12				x	
LA16	30S/11E-18M1	Former CCW #5 - Broderson OBS	Western	35.3128	120.8430	106.82	MW	PRIVATE	330-355, 395-415, 465-505, 530-575	577	10				x	x
LA17	30S/11E-24A2	USGS Broderson	Western	35.3074	120.8433	210.40	MW	SLO CO.	800-860	860	6				x	x
LA18	30S/11E-18K8	10th St. Observation East	Central	35.3130	120.8325	135.74	MW	LOCSD	630-650	650	2					x
LA19	30S/11E-19H2	USGS Bayview Heights 6"	Central	35.3043	120.8266	256.20	MW	SLO CO.	280-380	740	6				x	
LA20	30S/11E-17N10	GSWC South Bay #1	Central	35.3111	120.8240	140	M	GSWC	225-295, 325-395, 485-695	715	12			x	x	x
LA21	30S/11E-17E7	So. Bay Blvd OBS deep #3	Central	35.3158	120.8240	105.85	MW	LOCSD	480-490, 500-510	520	2					x
LA22	30S/11E-17E8	So. Bay Blvd OBS middle #2	Central	35.3158	120.8240	105.85	MW	LOCSD	270-280, 370-380	390	2				x	
LA23	30S/11E-17C1							PRIVATE								
LA24	30S/11E-17J1	USGS Eto North - deep	Eastern	35.3142	120.8119	71.62	I	PRIVATE[1]	160-190, 245-260	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	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	135	M	LOCSD	235-270, 350-49	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	47.5					x	
LA35	30S/11E-21Bb	LOWRF South Well	Eastern	35.3076	120.7993	96	Ind	SLO CO.	180-230	230						x
LA36	30S/11E-21Ja							PRIVATE								
LA37	30S/11E-21B1	Andre Windmill Well	Eastern	35.3069	120.7976	81.4	MW	SLO CO.			6					x
LA38	30S/11E-21E							PRIVATE								
LA39	30S/11E-18K_	Los Olivos #5	Central			118	M	GSWC	335-365, 385-450	470	12				x	
LA40+	30S/10E-	LOCSD Zone E Well	Western	35.31966	120.8478	12.26	MW	LOCSD	390-410	490	2.5					x
LA41+	30S/10E-	LOCSD Zone D Well	Western	35.31966	120.8478	12.26	MW	LOCSD	310-330	350	2.5				x	

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

*Datum varies between NGVD 29 and NAVD 88 (see report Tables 4-8 for details).	M = Municipal
	MW = Monitoring Well
	Ind = Industrial Well
+ New for 2019 Reporting Year	I = Irrigation

Los Osos Basin Plan
Monitoring Well Network 2019
FIRST WATER

Program Well ID	Well Owner	Basin Plan Monitoring Code	County Water Level Program	LOWRF Groundwater Monitoring Program[1]	**2019 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, CEC		L	**L, CEC**
FW6	LOCSD	TL, G		G	**TL, G**
FW7	LOCSD	L			**L**
FW8	LOCSD	L		L	**L**
FW9	LOCSD	L		L	**L**
FW10	LOCSD	TL, G		G[3]	**TL, G**
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	L	L		
FW30	PRIVATE	L		L	**L**
FW31	LOCSD	L			**L**
FW32	PRIVATE	L			**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

NOTES:
1 - Summer and winter monitoring schedule
2 - Spring and fall monitoring schedule
3 - Biennial LOWRF schedule (mon by BMC in 2019)

Los Osos Basin Plan
Monitoring Well Network 2019
UPPER AQUIFER

Program Well ID	Well Owner	Basin Plan Monitoring Code	County Water Level Program	LOWRF Groundwater Monitoring Program[1]	**2019 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	L	L		
UA17	PRIVATE	L	L		
UA18	PRIVATE	L	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 monitoring schedule

Los Osos Basin Plan
Monitoring Well Network 2019
LOWER AQUIFER

Program Well ID	Well Owner	Basin Plan Monitoring Code	County Water Level Program	**2019 Basin Plan Monitoring Program**
LA1	SLO CO.	L	L	
LA2	SLO CO.	L	L	
LA3	SLO CO.	L	L	
LA4	PRIVATE	L, GL		**L**
LA5	S&T	L	L	
LA6	GSWC	L	L	
LA7	PRIVATE	TL		**TL**
LA8	S&T	L, G		**L , G**
LA9	GSWC	L,G		**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	
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,G	L	**G**
LA23	PRIVATE	L, G		**L, G**
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**
LA31	PRIVATE	G		**G**
LA32	LOCSD	G		**G**
LA33	PRIVATE	L		**L**
LA34	SLO CO.	L	L	
LA35	SLO CO.	L		**L**
LA36	PRIVATE	L		**L**
LA37	SLO CO.	L		**TL**
LA38	PRIVATE	L		**L**
LA39[3]	GSWC	L,G		**L,G**

L = WATER LEVEL
G = GENERAL MINERAL
GL = GEOPHYSICAL LOG (2018)
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 - Remove G from LA6 - out of service.
3 - Well added to LOBP program
Well IDs with both April and October water quality monitoring in Italics

APPENDIX C

Field Logs and Laboratory Analytical Reports for 2019 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 2019 Field Logs and Analytical Results

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 4/3/2019
Operator: Andrea Berge
Well number and location: 30S/11E-13N (LA8)
Site and wellhead conditions: Overcast, cool. Chlorinated water purged from line for 5 minutes at 200 gpm.

Static water depth (feet): 133.5
Well depth (feet): 350
Water column (feet): 216.5
Casing diameter (inches): 8
Minimum purge volume (gal) flush line
Purge rate (gpm): 200
Pumping water level (feet): --
Pump setting (feet): --
Minimum purge time (min): flush line
Time begin purge: 8:57 AM

Time	Gallons	EC (µS/cm)	pH	Temp. (°C)	Comments*
9:02	1200	427.8	8.86	18.4	Clear, colorless, odorless
9:04	1400	409	8.73	18.4	Clear, colorless, odorless
					Sampled @ 9:07 AM

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

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 4/9/2019
Operator: Andrea Berge
Well number and location: 30S/10E-12J1 (LA11)
Site and wellhead conditions: Cap in place and site secure

Static water depth (feet):	5.34
Well depth (feet):	389
Water column (feet):	383.66
Casing diameter (inches):	2
Minimum purge volume (gal)	190
Purge rate (gpm):	1.7
Pumping water level (feet):	--
Pump setting (feet):	25
Minimum purge time (min):	120
Time begin purge:	9:04 AM

Time	Gallons	EC (µS/cm)	pH	Temp. (°C)	Comments*
9:05	1	1,112	7.17	17.7	Clear, colorless, odorless, some plant matter
9:07	5	1,146	7.05	18	Clear, colorless, odorless
9:09	10	1,135	7.10	18.02	Clear, colorless, odorless
9:16	20	1,130	7.17	18.6	Clear, colorless, odorless
9:35	50	1,307	7.20	20	Cloudy, Odorless
9:47	75	1,373	7.21	20.3	Slight tinge, odorless
10:02	100	1,339	7.27	20.1	Slight tinge, odorless
10:13	120	1,329	7.29	20	Slightly cloudy, odorless
10:28	145	1,321	7.27	20.2	Clear, colorless, odorless
10:40	170	1,321	7.29	19.6	Clear, colorless, odorless
10:54	190	1,316	7.28	19.5	Clear, colorless, odorless
					Sampled @ 11:34 AM

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

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 4/9/2019
Operator: Andrea Berge
Well number and location: 30S/11E-7Q3 (LA12)
Site and wellhead conditions: Sunny, gusty. Pump turned on @ 10:30 AM at 353 gpm

Static water depth (feet):	36.2 on 4/12/19
Well depth (feet):	270
Water column (feet):	233.80
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:	10:30 AM

Time	Gallons	EC (μS/cm)	pH	Temp. (°C)	Comments*
11:30	1	815	7.57	21.2	Slight sulfur odor, pre-sample
11:35	2	806	7.37	21.1	Slight sulfur odor, post-sample
					Sampled @ 11:34 AM

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

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 4/9/2019
Operator: Andrea Berge
Well number and location: 30S/11E-18L2 (LA15)
Site and wellhead conditions: Sunny, gusty. Pump turned on @ 10:50 AM at 600 gpm

Static water depth (feet): 105.8 on 4/12/19
Well depth (feet): 394
Water column (feet): 288.20
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: 11:59 AM

Time	Gallons	EC (µS/cm)	pH	Temp. (°C)	Comments*
12:00	1	739.2	7.37	20.5	Clear, colorless, odorless, pre-sample
12:03	5	741.6	7.11	20.5	Clear, colorless, odorless, post-sample
					Sampled @ 12:02 PM

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

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 4/10/2019
Operator: Andrea Berge
Well number and location: 30S/11E-18K8 (LA18)
Site and wellhead conditions: Sunny, clear. Site secure and gate opened.

Static water depth (feet):	134.5
Well depth (feet):	650
Water column (feet):	515.5
Casing diameter (inches):	2
Minimum purge volume (gal)	250
Purge rate (gpm):	2
Pumping water level (feet):	142.9
Pump setting (feet):	155
Minimum purge time (min):	130
Time begin purge:	8:43 AM

Time	Gallons	EC (µS/cm)	pH	Temp. (°C)	Comments*
8:43	1	508.6	7.61	19.5	Clear, colorless, odorless
8:44	5	571.7	7.31	20.6	Clear, colorless, odorless
8:49	10	598	7.40	20.5	Clear, colorless, odorless
8:55	20	601	7.32	20.9	Clear, colorless, odorless
9:00	30	603.6	7.33	20.9	Clear, colorless, odorless
9:12	50	604.2	7.26	22.2	Clear, colorless, odorless
9:24	80	605.2	7.89	22.9	Clear, colorless, odorless
9:50	120	605	7.58	23.4	Clear, colorless, odorless
10:17	170	591.4	8.05	22.5	Clear, colorless, odorless
10:46	220	589.9	7.91	22.5	Clear, colorless, odorless
11:02	250	593.6	7.94	22.9	Clear, colorless, odorless
					Sampled @ 11:50 AM

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

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 4/10/2019
Operator: Andrea Berge
Well number and location: 30S/11E-17E8 (LA22)
Site and wellhead conditions: Sunny, clear. Site secure and gate opened.

Static water depth (feet): 97.06
Well depth (feet): 380
Water column (feet): 282.9
Casing diameter (inches): 2
Minimum purge volume (gal) 140
Purge rate (gpm): 2
Pumping water level (feet): 100.3
Pump setting (feet): 120
Minimum purge time (min): 70
Time begin purge: 12:03 PM

Time	Gallons	EC (µS/cm)	pH	Temp. (°C)	Comments*
12:03	1	510.4	7.83	20.3	Clear, colorless, odorless
12:05	5	508.2	7.95	19.6	Clear, colorless, odorless
12:07	10	506	7.96	19.5	Clear, colorless, odorless
12:17	30	470	7.73	19.8	Clear, colorless, odorless
12:28	50	460.5	7.62	19.7	Clear, colorless, odorless
12:40	80	458.6	7.77	20.1	Clear, colorless, odorless
12:52	100	460	7.62	19.8	Clear, colorless, odorless
13:01	120	462.4	7.64	20.2	Clear, colorless, odorless
13:12	140	459.1	7.55	19.8	Clear, colorless, odorless
					Sampled @ 1:14 PM

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

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 4/3/2019
Operator: Andrea Berge
Well number and location: 30S/11E-20H1 (LA30)
Site and wellhead conditions: Overcast, cool. Flushed line.

Static water depth (feet): 1.7
Well depth (feet): 140
Water column (feet): 138.3
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: 11:24 AM

Time	Gallons	EC (µS/cm)	pH	Temp. (°C)	Comments*
11:32	5	780.3	8.04	17.9	Slight brown tinge
11:35	10	783.3	7.88	18	Slight tinge
11:38	15	782.6	7.85	18	Clearer, faint tinge
					Sampled @ 11:37 AM

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

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 4/3/2019
Operator: Andrea Berge
Well number and location: 30S/10E-13M2 (LA31)
Site and wellhead conditions: Overcast, cool. Gate opened.

Static water depth (feet): 39.29 on 4/4/19
Well depth (feet): --
Water column (feet): --
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: 11:57 AM

Time	Gallons	EC (µS/cm)	pH	Temp. (°C)	Comments*
11:58	1	2,950	8.01	18.8	Clear, colorless, odorless
12:01	5	3,000	8.03	18.8	Clear, colorless, odorless
12:02	10	2,980	7.97	18.9	Clear, colorless, odorless
12:03	15	2,980	7.96	18.7	Clear, colorless, odorless
					Sampled @ 12:05 PM

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

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 4/9/2019
Operator: Andrea Berge
Well number and location: 30S/11E-18K9 (LA32)
Site and wellhead conditions: Sunny, windy. Site secure and gate opened.
Pump on since 11:00 AM
Static water depth (feet): 152.7 on 4/12/19
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: 11:48 AM

Time	Gallons	EC (µS/cm)	pH	Temp. (°C)	Comments*
11:49	3	485.2	7.66	20.8	Clear, colorless, odorless
11:50	5	480.4	7.42	20.6	Clear, colorless, odorless
					Sampled @ 11:50 AM

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

April 25, 2019

Cleath-Harris Geologists
Attn: Spencer Harris
71 Zaca Lane
Suite 140
San Luis Obispo, CA 93401
Description : 13N LA8 LA-8
Project : Los Osos BMC Monitoring

Lab ID : CC 1981073-001
Customer ID : 8-514

Sampled On : April 3, 2019-09:07
Sampled By : Andrea Berge
Received On : April 3, 2019-14:35
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	100	--	mg/L		200.7	04/05/19:203736	200.7	04/05/19:204901
Calcium	17	1	mg/L		200.7	04/05/19:203736	200.7	04/05/19:204901
Magnesium	14	1	mg/L		200.7	04/05/19:203736	200.7	04/05/19:204901
Potassium	1	1	mg/L		200.7	04/05/19:203736	200.7	04/05/19:204901
Sodium	36	1	mg/L		200.7	04/05/19:203736	200.7	04/05/19:204901
Total Cations	3.6	--	meq/L		200.7	04/05/19:203736	200.7	04/05/19:204901
Boron	ND	0.1	mg/L		200.7	04/05/19:203736	200.7	04/05/19:204901
Copper	30	10	ug/L		200.7	04/05/19:203736	200.7	04/05/19:204901
Iron	ND	30	ug/L		200.7	04/05/19:203736	200.7	04/05/19:204901
Manganese	ND	10	ug/L		200.7	04/05/19:203736	200.7	04/05/19:204901
Zinc	ND	20	ug/L		200.7	04/05/19:203736	200.7	04/05/19:204901
SAR	1.6	--	--		200.7	04/05/19:203736	200.7	04/05/19:204901
Total Alkalinity (as CaCO3)	40	10	mg/L		2320B	04/08/19:203781	2320B	04/08/19:205015
Hydroxide as OH	ND	10	mg/L		2320B	04/08/19:203781	2320B	04/08/19:205015
Carbonate as CO3	ND	10	mg/L		2320B	04/08/19:203781	2320B	04/08/19:205015
Bicarbonate as HCO3	50	10	mg/L		2320B	04/08/19:203781	2320B	04/08/19:205015
Sulfate	12.7	0.5	mg/L		300.0	04/04/19:203920	300.0	04/04/19:205133
Chloride	75	1	mg/L		300.0	04/04/19:203920	300.0	04/04/19:205133
Nitrate as NO3	32.1	0.4	mg/L		300.0	04/04/19:203920	300.0	04/04/19:205133
Nitrite as N	ND	0.2	mg/L		300.0	04/04/19:203920	300.0	04/04/19:205133
Nitrate + Nitrite as N	7.2	0.1	mg/L		300.0	04/04/19:203920	300.0	04/04/19:205133
Fluoride	ND	0.1	mg/L		300.0	04/04/19:203920	300.0	04/04/19:205133
Total Anions	3.7	--	meq/L		2320B	04/08/19:203781	2320B	04/08/19:205015
pH	6.3	--	units		4500-H B	04/12/19:204035	4500HB	04/12/19:205293
Specific Conductance	434	1	umhos/cm		2510B	04/05/19:203701	2510B	04/05/19:204853
Total Dissolved Solids	250	20	mg/L		2540CE	04/05/19:203717	2540C	04/08/19:204927
MBAS Screen	Negative	0.1	mg/L		5540C	04/05/19:203812	5540C	04/15/19:204989
Aggressiveness Index	9.5	--	--		4500-H B	04/12/19:204035	4500HB	04/12/19:205293
Langelier Index (20°C)	-2.3	--	--		4500-H B	04/12/19:204035	4500HB	04/12/19:205293
Nitrate Nitrogen	7.2	0.1	mg/L		300.0	04/04/19:203920	300.0	04/04/19:205133

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

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA ELAP Certification No. 1573

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

May 14, 2019

Cleath-Harris Geologists
Attn: Spencer Harris
71 Zaca Lane
Suite 140
San Luis Obispo, CA 93401
Description : Cabrillo (24C1) LA-9
Project : Los Osos BMC Monitoring

Lab ID : CC 1981198-002
Customer ID : 8-514

Sampled On : April 15, 2019-11:50
Sampled By : Zac Reineke
Received On : April 15, 2019-14:23
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	112	--	mg/L		200.7	04/18/19:204255	200.7	04/22/19:205841
Calcium	17	1	mg/L		200.7	04/18/19:204255	200.7	04/22/19:205841
Magnesium	17	1	mg/L		200.7	04/18/19:204255	200.7	04/22/19:205841
Potassium	2	1	mg/L		200.7	04/18/19:204255	200.7	04/22/19:205841
Sodium	45	1	mg/L		200.7	04/18/19:204255	200.7	04/22/19:205841
Total Cations	4.3	--	meq/L		200.7	04/18/19:204255	200.7	04/22/19:205841
Boron	ND	0.1	mg/L		200.7	04/18/19:204255	200.7	04/22/19:205841
Copper	ND	10	ug/L		200.7	04/18/19:204255	200.7	04/22/19:205841
Iron	ND	30	ug/L		200.7	04/18/19:204255	200.7	04/22/19:205841
Manganese	ND	10	ug/L		200.7	04/18/19:204255	200.7	04/22/19:205841
Zinc	ND	20	ug/L		200.7	04/18/19:204255	200.7	04/22/19:205841
SAR	1.8	--	--		200.7	04/18/19:204255	200.7	04/22/19:205841
Total Alkalinity (as CaCO3)	60	10	mg/L		2320B	04/24/19:204498	2320B	04/24/19:205996
Hydroxide as OH	ND	10	mg/L		2320B	04/24/19:204498	2320B	04/24/19:205996
Carbonate as CO3	ND	10	mg/L		2320B	04/24/19:204498	2320B	04/24/19:205996
Bicarbonate as HCO3	70	10	mg/L		2320B	04/24/19:204498	2320B	04/24/19:205996
Sulfate	15.6	0.5	mg/L		300.0	04/16/19:204295	300.0	04/16/19:205656
Chloride	92	1	mg/L		300.0	04/16/19:204295	300.0	04/16/19:205656
Nitrate as NO3	25.4	0.4	mg/L		300.0	04/16/19:204295	300.0	04/16/19:205656
Nitrite as N	ND	0.2	mg/L		300.0	04/16/19:204295	300.0	04/16/19:205656
Nitrate + Nitrite as N	5.7	0.1	mg/L		300.0	04/16/19:204295	300.0	04/16/19:205656
Fluoride	ND	0.1	mg/L		300.0	04/16/19:204295	300.0	04/16/19:205656
Total Anions	4.5	--	meq/L		2320B	04/24/19:204498	2320B	04/24/19:205996
pH	7.1	--	units		4500-H B	04/23/19:204456	4500HB	04/23/19:205876
Specific Conductance	488	1	umhos/cm		2510B	04/17/19:204194	2510B	04/17/19:205499
Total Dissolved Solids	310	20	mg/L		2540CE	04/18/19:204266	2540C	04/19/19:205646
MBAS Screen	Negative	0.1	mg/L		5540C	04/16/19:204223	5540C	04/16/19:205535
Aggressiveness Index	10.5	--	--		4500-H B	04/23/19:204456	4500HB	04/23/19:205876
Langelier Index (20°C)	-1.3	--	--		4500-H B	04/23/19:204456	4500HB	04/23/19:205876
Nitrate Nitrogen	5.7	0.1	mg/L		300.0	04/16/19:204295	300.0	04/16/19:205656

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

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA ELAP Certification No. 1573

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

May 14, 2019

Lab ID : CC 1981198-001
Customer ID : 8-514

Cleath-Harris Geologists
Attn: Spencer Harris
71 Zaca Lane
Suite 140
San Luis Obispo, CA 93401

Sampled On : April 15, 2019-11:30
Sampled By : Zac Reineke
Received On : April 15, 2019-14:23
Matrix : Ground Water

Description : Rosina (13J1) LA-10
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	251	--	mg/L		200.7	04/18/19:204255	200.7	04/22/19:205841
Calcium	38	1	mg/L		200.7	04/18/19:204255	200.7	04/22/19:205841
Magnesium	38	1	mg/L		200.7	04/18/19:204255	200.7	04/22/19:205841
Potassium	2	1	mg/L		200.7	04/18/19:204255	200.7	04/22/19:205841
Sodium	31	1	mg/L		200.7	04/18/19:204255	200.7	04/22/19:205841
Total Cations	6.4	--	meq/L		200.7	04/18/19:204255	200.7	04/22/19:205841
Boron	ND	0.1	mg/L		200.7	04/18/19:204255	200.7	04/22/19:205841
Copper	ND	10	ug/L		200.7	04/18/19:204255	200.7	04/22/19:205841
Iron	130	30	ug/L		200.7	04/18/19:204255	200.7	04/22/19:205841
Manganese	ND	10	ug/L		200.7	04/18/19:204255	200.7	04/22/19:205841
Zinc	ND	20	ug/L		200.7	04/18/19:204255	200.7	04/22/19:205841
SAR	0.9	--	--		200.7	04/18/19:204255	200.7	04/22/19:205841
Total Alkalinity (as CaCO3)	70	10	mg/L		2320B	04/24/19:204498	2320B	04/24/19:205996
Hydroxide as OH	ND	10	mg/L		2320B	04/24/19:204498	2320B	04/24/19:205996
Carbonate as CO3	ND	10	mg/L		2320B	04/24/19:204498	2320B	04/24/19:205996
Bicarbonate as HCO3	80	10	mg/L		2320B	04/24/19:204498	2320B	04/24/19:205996
Sulfate	10.4	0.5	mg/L		300.0	04/16/19:204295	300.0	04/16/19:205656
Chloride	174	5*	mg/L		300.0	05/13/19:205365	300.0	05/13/19:207057
Nitrate as NO3	8.6	0.4	mg/L		300.0	04/16/19:204295	300.0	04/16/19:205656
Nitrite as N	ND	0.2	mg/L		300.0	04/16/19:204295	300.0	04/16/19:205656
Nitrate + Nitrite as N	1.9	0.1	mg/L		300.0	04/16/19:204295	300.0	04/16/19:205656
Fluoride	ND	0.1	mg/L		300.0	04/16/19:204295	300.0	04/16/19:205656
Total Anions	6.6	--	meq/L		2320B	04/24/19:204498	2320B	04/24/19:205996
pH	7.0	--	units		4500-H B	04/23/19:204456	4500HB	04/23/19:205876
Specific Conductance	744	1	umhos/cm		2510B	04/17/19:204194	2510B	04/17/19:205499
Total Dissolved Solids	600	20	mg/L		2540CE	04/18/19:204266	2540C	04/19/19:205646
MBAS Screen	Negative	0.1	mg/L		5540C	04/16/19:204223	5540C	04/16/19:205535
Aggressiveness Index	10.8	--	--		4500-H B	04/23/19:204456	4500HB	04/23/19:205876
Langelier Index (20°C)	-1.1	--	--		4500-H B	04/23/19:204456	4500HB	04/23/19:205876
Nitrate Nitrogen	1.9	0.1	mg/L		300.0	04/16/19:204295	300.0	04/16/19:205656

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

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA ELAP Certification No. 1573

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

May 3, 2019

Cleath-Harris Geologists
Attn: Spencer Harris
71 Zaca Lane
Suite 140
San Luis Obispo, CA 93401
Description : 12J1 (LA11) LA-11
Project : Los Osos BMC Monitoring

Lab ID : CC 1981127-001
Customer ID : 8-514

Sampled On : April 9, 2019-10:55
Sampled By : Andrea Berge
Received On : April 9, 2019-14:03
Matrix : Ground Water

Sample Result - Inorganic

Constituent	Result	PQL	Units	Note	Sample Preparation		Sample Analysis	
					Method	Date/ID	Method	Date/ID
General Mineral								
Total Hardness as CaCO3	539	--	mg/L		200.7	04/11/19:203944	200.7	04/11/19:205239
Calcium	76	1	mg/L		200.7	04/11/19:203944	200.7	04/11/19:205239
Magnesium	85	1	mg/L		200.7	04/11/19:203944	200.7	04/11/19:205239
Potassium	4	1	mg/L		200.7	04/11/19:203944	200.7	04/11/19:205239
Sodium	85	1	mg/L		200.7	04/11/19:203944	200.7	04/11/19:205239
Total Cations	14.6	--	meq/L		200.7	04/11/19:203944	200.7	04/11/19:205239
Boron	0.2	0.1	mg/L		200.7	04/11/19:203944	200.7	04/11/19:205239
Copper	ND	10	ug/L		200.7	04/11/19:203944	200.7	04/11/19:205239
Iron	210	30	ug/L		200.7	04/11/19:203944	200.7	04/12/19:205366
Manganese	40	10	ug/L		200.7	04/11/19:203944	200.7	04/11/19:205239
Zinc	ND	20	ug/L		200.7	04/11/19:203944	200.7	04/11/19:205239
SAR	1.6	--	--		200.7	04/11/19:203944	200.7	04/11/19:205239
Total Alkalinity (as CaCO3)	290	10	mg/L		2320B	04/15/19:204109	2320B	04/15/19:205455
Hydroxide as OH	ND	10	mg/L		2320B	04/15/19:204109	2320B	04/15/19:205455
Carbonate as CO3	ND	10	mg/L		2320B	04/15/19:204109	2320B	04/15/19:205455
Bicarbonate as HCO3	350	10	mg/L		2320B	04/15/19:204109	2320B	04/15/19:205455
Sulfate	189	0.5	mg/L		300.0	04/10/19:204307	300.0	04/10/19:205153
Chloride	196	5*	mg/L		300.0	04/10/19:204307	300.0	04/10/19:205153
Nitrate as NO3	ND	0.4	mg/L		300.0	04/10/19:204307	300.0	04/10/19:205153
Nitrite as N	ND	0.2	mg/L		300.0	04/10/19:204307	300.0	04/10/19:205153
Nitrate + Nitrite as N	ND	0.1	mg/L		300.0	04/10/19:204307	300.0	04/10/19:205153
Fluoride	ND	0.5*	mg/L		300.0	04/10/19:204307	300.0	04/10/19:205153
Total Anions	15.2	--	meq/L		2320B	04/15/19:204109	2320B	04/15/19:205455
pH	7.4	--	units		4500-H B	04/12/19:204035	4500HB	04/12/19:205293
Specific Conductance	1430	1	umhos/cm		2510B	04/11/19:203962	2510B	04/11/19:205190
Total Dissolved Solids	860	20	mg/L		2540CE	04/11/19:203967	2540C	04/12/19:205249
MBAS Screen	Negative	0.1	mg/L		5540C	04/10/19:203926	5540C	04/10/19:205147
Aggressiveness Index	12.1	--	--		4500-H B	04/12/19:204035	4500HB	04/12/19:205293
Langelier Index (20°C)	0.2	--	--		4500-H B	04/12/19:204035	4500HB	04/12/19:205293
Nitrate Nitrogen	ND	0.1	mg/L		300.0	04/10/19:204307	300.0	04/10/19:205153

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

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA ELAP Certification No. 1573

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

May 3, 2019

Lab ID : CC 1981127-002
Customer ID : 8-514

Cleath-Harris Geologists
Attn: Spencer Harris
71 Zaca Lane
Suite 140
San Luis Obispo, CA 93401
Description : 7Q3 (LA12) LA-12
Project : Los Osos BMC Monitoring

Sampled On : April 9, 2019-11:34
Sampled By : Andrea Berge
Received On : April 9, 2019-14:03
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	301	--	mg/L		200.7	04/11/19:203944	200.7	04/11/19:205239
Calcium	48	1	mg/L		200.7	04/11/19:203944	200.7	04/11/19:205239
Magnesium	44	1	mg/L		200.7	04/11/19:203944	200.7	04/11/19:205239
Potassium	2	1	mg/L		200.7	04/11/19:203944	200.7	04/11/19:205239
Sodium	53	1	mg/L		200.7	04/11/19:203944	200.7	04/11/19:205239
Total Cations	8.4	--	meq/L		200.7	04/11/19:203944	200.7	04/11/19:205239
Boron	0.2	0.1	mg/L		200.7	04/11/19:203944	200.7	04/11/19:205239
Copper	ND	10	ug/L		200.7	04/11/19:203944	200.7	04/11/19:205239
Iron	180	30	ug/L		200.7	04/11/19:203944	200.7	04/12/19:205366
Manganese	60	10	ug/L		200.7	04/11/19:203944	200.7	04/11/19:205239
Zinc	ND	20	ug/L		200.7	04/11/19:203944	200.7	04/11/19:205239
SAR	1.3	--	--		200.7	04/11/19:203944	200.7	04/11/19:205239
Total Alkalinity (as CaCO3)	240	10	mg/L		2320B	04/15/19:204109	2320B	04/15/19:205455
Hydroxide as OH	ND	10	mg/L		2320B	04/15/19:204109	2320B	04/15/19:205455
Carbonate as CO3	ND	10	mg/L		2320B	04/15/19:204109	2320B	04/15/19:205455
Bicarbonate as HCO3	300	10	mg/L		2320B	04/15/19:204109	2320B	04/15/19:205455
Sulfate	49.7	0.5	mg/L		300.0	04/10/19:204307	300.0	04/10/19:205153
Chloride	94	1	mg/L		300.0	04/10/19:204307	300.0	04/10/19:205153
Nitrate as NO3	ND	0.4	mg/L		300.0	04/10/19:204307	300.0	04/10/19:205153
Nitrite as N	ND	0.2	mg/L		300.0	04/10/19:204307	300.0	04/10/19:205153
Nitrate + Nitrite as N	ND	0.1	mg/L		300.0	04/10/19:204307	300.0	04/10/19:205153
Fluoride	ND	0.1	mg/L		300.0	04/10/19:204307	300.0	04/10/19:205153
Total Anions	8.6	--	meq/L		2320B	04/15/19:204109	2320B	04/15/19:205455
pH	7.5	--	units		4500-H B	04/12/19:204035	4500HB	04/12/19:205293
Specific Conductance	844	1	umhos/cm		2510B	04/11/19:203962	2510B	04/11/19:205190
Total Dissolved Solids	480	20	mg/L		2540CE	04/11/19:203967	2540C	04/12/19:205249
MBAS Screen	Negative	0.1	mg/L		5540C	04/10/19:203926	5540C	04/10/19:205147
Aggressiveness Index	12.0	--	--		4500-H B	04/12/19:204035	4500HB	04/12/19:205293
Langelier Index (20°C)	0.09	--	--		4500-H B	04/12/19:204035	4500HB	04/12/19:205293
Nitrate Nitrogen	ND	0.1	mg/L		300.0	04/10/19:204307	300.0	04/10/19:205153

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

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA ELAP Certification No. 1573

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

May 3, 2019

Lab ID : CC 1981127-004
Customer ID : 8-514

Cleath-Harris Geologists
Attn: Spencer Harris
71 Zaca Lane
Suite 140
San Luis Obispo, CA 93401

Sampled On : April 9, 2019-12:02
Sampled By : Andrea Berge
Received On : April 9, 2019-14:03
Matrix : Ground Water

Description : 18L2 (LA15) LA-15
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	301	--	mg/L		200.7	04/11/19:203944	200.7	04/11/19:205239
Calcium	48	1	mg/L		200.7	04/11/19:203944	200.7	04/11/19:205239
Magnesium	44	1	mg/L		200.7	04/11/19:203944	200.7	04/11/19:205239
Potassium	1	1	mg/L		200.7	04/11/19:203944	200.7	04/11/19:205239
Sodium	38	1	mg/L		200.7	04/11/19:203944	200.7	04/11/19:205239
Total Cations	7.7	--	meq/L		200.7	04/11/19:203944	200.7	04/11/19:205239
Boron	ND	0.1	mg/L		200.7	04/11/19:203944	200.7	04/11/19:205239
Copper	ND	10	ug/L		200.7	04/11/19:203944	200.7	04/11/19:205239
Iron	ND	30	ug/L		200.7	04/11/19:203944	200.7	04/12/19:205366
Manganese	ND	10	ug/L		200.7	04/11/19:203944	200.7	04/11/19:205239
Zinc	ND	20	ug/L		200.7	04/11/19:203944	200.7	04/11/19:205239
SAR	1.0	--	--		200.7	04/11/19:203944	200.7	04/11/19:205239
Total Alkalinity (as CaCO3)	200	10	mg/L		2320B	04/15/19:204109	2320B	04/15/19:205455
Hydroxide as OH	ND	10	mg/L		2320B	04/15/19:204109	2320B	04/15/19:205455
Carbonate as CO3	ND	10	mg/L		2320B	04/15/19:204109	2320B	04/15/19:205455
Bicarbonate as HCO3	250	10	mg/L		2320B	04/15/19:204109	2320B	04/15/19:205455
Sulfate	29.2	0.5	mg/L		300.0	04/10/19:204307	300.0	04/10/19:205153
Chloride	102	1	mg/L		300.0	04/10/19:204307	300.0	04/10/19:205153
Nitrate as NO3	3.7	0.4	mg/L		300.0	04/10/19:204307	300.0	04/10/19:205153
Nitrite as N	ND	0.2	mg/L		300.0	04/10/19:204307	300.0	04/10/19:205153
Nitrate + Nitrite as N	0.8	0.1	mg/L		300.0	04/10/19:204307	300.0	04/10/19:205153
Fluoride	0.1	0.1	mg/L		300.0	04/10/19:204307	300.0	04/10/19:205153
Total Anions	7.6	--	meq/L		2320B	04/15/19:204109	2320B	04/15/19:205455
pH	7.4	--	units		4500-H B	04/12/19:204035	4500HB	04/12/19:205293
Specific Conductance	774	1	umhos/cm		2510B	04/11/19:203962	2510B	04/11/19:205190
Total Dissolved Solids	460	20	mg/L		2540CE	04/11/19:203967	2540C	04/12/19:205249
MBAS Screen	Negative	0.1	mg/L		5540C	04/10/19:203926	5540C	04/10/19:205147
Aggressiveness Index	11.8	--	--		4500-H B	04/12/19:204035	4500HB	04/12/19:205293
Langelier Index (20°C)	-0.08	--	--		4500-H B	04/12/19:204035	4500HB	04/12/19:205293
Nitrate Nitrogen	0.8	0.1	mg/L		300.0	04/10/19:204307	300.0	04/10/19:205153

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

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA ELAP Certification No. 1573

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

April 25, 2019

Lab ID : CC 1981156-001
Customer ID : 8-514

Cleath-Harris Geologists
Attn: Spencer Harris
71 Zaca Lane
Suite 140
San Luis Obispo, CA 93401

Sampled On : April 10, 2019-11:05
Sampled By : Andrea Berge
Received On : April 10, 2019-14:23
Matrix : Ground Water

Description : 18K8 (LA18) LA-18
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	245	--	mg/L		200.7	04/12/19:204025	200.7	04/12/19:205365
Calcium	52	1	mg/L		200.7	04/12/19:204025	200.7	04/12/19:205365
Magnesium	28	1	mg/L		200.7	04/12/19:204025	200.7	04/12/19:205365
Potassium	2	1	mg/L		200.7	04/12/19:204025	200.7	04/12/19:205365
Sodium	25	1	mg/L		200.7	04/12/19:204025	200.7	04/12/19:205365
Total Cations	6.0	--	meq/L		200.7	04/12/19:204025	200.7	04/12/19:205365
Boron	ND	0.1	mg/L		200.7	04/12/19:204025	200.7	04/12/19:205365
Copper	ND	10	ug/L		200.7	04/12/19:204025	200.7	04/12/19:205365
Iron	ND	30	ug/L		200.7	04/12/19:204025	200.7	04/12/19:205365
Manganese	70	10	ug/L		200.7	04/12/19:204025	200.7	04/12/19:205365
Zinc	ND	20	ug/L		200.7	04/12/19:204025	200.7	04/12/19:205365
SAR	0.7	--	--		200.7	04/12/19:204025	200.7	04/12/19:205365
Total Alkalinity (as CaCO3)	240	10	mg/L		2320B	04/16/19:204176	2320B	04/16/19:205514
Hydroxide as OH	ND	10	mg/L		2320B	04/16/19:204176	2320B	04/16/19:205514
Carbonate as CO3	ND	10	mg/L		2320B	04/16/19:204176	2320B	04/16/19:205514
Bicarbonate as HCO3	290	10	mg/L		2320B	04/16/19:204176	2320B	04/16/19:205514
Sulfate	37.4	0.5	mg/L		300.0	04/11/19:204164	300.0	04/11/19:205451
Chloride	32	1	mg/L		300.0	04/11/19:204164	300.0	04/11/19:205451
Nitrate as NO3	ND	0.4	mg/L		300.0	04/11/19:204164	300.0	04/11/19:205451
Nitrite as N	ND	0.2	mg/L		300.0	04/11/19:204164	300.0	04/11/19:205451
Nitrate + Nitrite as N	ND	0.1	mg/L		300.0	04/11/19:204164	300.0	04/11/19:205451
Fluoride	0.3	0.1	mg/L		300.0	04/11/19:204164	300.0	04/11/19:205451
Total Anions	6.4	--	meq/L		2320B	04/16/19:204176	2320B	04/16/19:205514
pH	7.6	--	units		4500-H B	04/16/19:204190	4500HB	04/16/19:205488
Specific Conductance	620	1	umhos/cm		2510B	04/12/19:204000	2510B	04/12/19:205245
Total Dissolved Solids	380	20	mg/L		2540CE	04/15/19:204119	2540C	04/16/19:205449
MBAS Screen	Negative	0.1	mg/L		5540C	04/12/19:204123	5540C	04/12/19:205399
Aggressiveness Index	12.1	--	--		4500-H B	04/16/19:204190	4500HB	04/16/19:205488
Langelier Index (20°C)	0.2	--	--		4500-H B	04/16/19:204190	4500HB	04/16/19:205488
Nitrate Nitrogen	ND	0.1	mg/L		300.0	04/11/19:204164	300.0	04/11/19:205451

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

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA ELAP Certification No. 1573

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

May 14, 2019

Lab ID : CC 1981198-003
Customer ID : 8-514

Cleath-Harris Geologists
Attn: Spencer Harris
71 Zaca Lane
Suite 140
San Luis Obispo, CA 93401

Sampled On : April 15, 2019-12:05
Sampled By : Zac Reineke
Received On : April 15, 2019-14:23
Matrix : Ground Water

Description : South Bay (17N10) LA-20
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	181	--	mg/L		200.7	04/18/19:204255	200.7	04/22/19:205841
Calcium	28	1	mg/L		200.7	04/18/19:204255	200.7	04/22/19:205841
Magnesium	27	1	mg/L		200.7	04/18/19:204255	200.7	04/22/19:205841
Potassium	2	1	mg/L		200.7	04/18/19:204255	200.7	04/22/19:205841
Sodium	34	1	mg/L		200.7	04/18/19:204255	200.7	04/22/19:205841
Total Cations	5.1	--	meq/L		200.7	04/18/19:204255	200.7	04/22/19:205841
Boron	0.1	0.1	mg/L		200.7	04/18/19:204255	200.7	04/22/19:205841
Copper	ND	10	ug/L		200.7	04/18/19:204255	200.7	04/22/19:205841
Iron	ND	30	ug/L		200.7	04/18/19:204255	200.7	04/22/19:205841
Manganese	ND	10	ug/L		200.7	04/18/19:204255	200.7	04/22/19:205841
Zinc	ND	20	ug/L		200.7	04/18/19:204255	200.7	04/22/19:205841
SAR	1.1	--	--		200.7	04/18/19:204255	200.7	04/22/19:205841
Total Alkalinity (as CaCO3)	160	10	mg/L		2320B	04/24/19:204498	2320B	04/24/19:205996
Hydroxide as OH	ND	10	mg/L		2320B	04/24/19:204498	2320B	04/24/19:205996
Carbonate as CO3	ND	10	mg/L		2320B	04/24/19:204498	2320B	04/24/19:205996
Bicarbonate as HCO3	200	10	mg/L		2320B	04/24/19:204498	2320B	04/24/19:205996
Sulfate	21.7	0.5	mg/L		300.0	04/16/19:204295	300.0	04/16/19:205656
Chloride	42	1	mg/L		300.0	04/16/19:204295	300.0	04/16/19:205656
Nitrate as NO3	13.7	0.4	mg/L		300.0	04/16/19:204295	300.0	04/16/19:205656
Nitrite as N	ND	0.2	mg/L		300.0	04/16/19:204295	300.0	04/16/19:205656
Nitrate + Nitrite as N	3.1	0.1	mg/L		300.0	04/16/19:204295	300.0	04/16/19:205656
Fluoride	0.1	0.1	mg/L		300.0	04/16/19:204295	300.0	04/16/19:205656
Total Anions	5.1	--	meq/L		2320B	04/24/19:204498	2320B	04/24/19:205996
pH	7.4	--	units		4500-H B	04/23/19:204456	4500HB	04/23/19:205876
Specific Conductance	559	1	umhos/cm		2510B	04/17/19:204194	2510B	04/17/19:205499
Total Dissolved Solids	310	20	mg/L		2540CE	04/18/19:204266	2540C	04/19/19:205646
MBAS Screen	Negative	0.1	mg/L		5540C	04/16/19:204223	5540C	04/16/19:205535
Aggressiveness Index	11.4	--	--		4500-H B	04/23/19:204456	4500HB	04/23/19:205876
Langelier Index (20°C)	-0.4	--	--		4500-H B	04/23/19:204456	4500HB	04/23/19:205876
Nitrate Nitrogen	3.1	0.1	mg/L		300.0	04/16/19:204295	300.0	04/16/19:205656

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

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA ELAP Certification No. 1573

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

April 25, 2019

Lab ID : CC 1981156-002
Customer ID : 8-514

Cleath-Harris Geologists
Attn: Spencer Harris
71 Zaca Lane
Suite 140
San Luis Obispo, CA 93401

Sampled On : April 10, 2019-13:14
Sampled By : Andrea Berge
Received On : April 10, 2019-14:23
Matrix : Ground Water

Description : 17G8 (LA22) LA-22
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	153	--	mg/L		200.7	04/12/19:204025	200.7	04/12/19:205365
Calcium	25	1	mg/L		200.7	04/12/19:204025	200.7	04/12/19:205365
Magnesium	22	1	mg/L		200.7	04/12/19:204025	200.7	04/12/19:205365
Potassium	1	1	mg/L		200.7	04/12/19:204025	200.7	04/12/19:205365
Sodium	28	1	mg/L		200.7	04/12/19:204025	200.7	04/12/19:205365
Total Cations	4.3	--	meq/L		200.7	04/12/19:204025	200.7	04/12/19:205365
Boron	ND	0.1	mg/L		200.7	04/12/19:204025	200.7	04/12/19:205365
Copper	ND	10	ug/L		200.7	04/12/19:204025	200.7	04/12/19:205365
Iron	ND	30	ug/L		200.7	04/12/19:204025	200.7	04/12/19:205365
Manganese	ND	10	ug/L		200.7	04/12/19:204025	200.7	04/12/19:205365
Zinc	ND	20	ug/L		200.7	04/12/19:204025	200.7	04/12/19:205365
SAR	1.0	--	--		200.7	04/12/19:204025	200.7	04/12/19:205365
Total Alkalinity (as CaCO3)	150	10	mg/L		2320B	04/17/19:204214	2320B	04/18/19:205601
Hydroxide as OH	ND	10	mg/L		2320B	04/17/19:204214	2320B	04/18/19:205601
Carbonate as CO3	ND	10	mg/L		2320B	04/17/19:204214	2320B	04/18/19:205601
Bicarbonate as HCO3	180	10	mg/L		2320B	04/17/19:204214	2320B	04/18/19:205601
Sulfate	13.6	0.5	mg/L		300.0	04/11/19:204164	300.0	04/11/19:205451
Chloride	46	1	mg/L		300.0	04/11/19:204164	300.0	04/11/19:205451
Nitrate as NO3	25.5	0.4	mg/L		300.0	04/11/19:204164	300.0	04/11/19:205451
Nitrite as N	ND	0.2	mg/L		300.0	04/11/19:204164	300.0	04/11/19:205451
Nitrate + Nitrite as N	5.8	0.1	mg/L		300.0	04/11/19:204164	300.0	04/11/19:205451
Fluoride	ND	0.1	mg/L		300.0	04/11/19:204164	300.0	04/11/19:205451
Total Anions	4.9	--	meq/L		2320B	04/17/19:204214	2320B	04/18/19:205601
pH	7.2	--	units		4500-H B	04/17/19:204230	4500HB	04/17/19:205552
Specific Conductance	466	1	umhos/cm		2510B	04/12/19:204000	2510B	04/12/19:205245
Total Dissolved Solids	290	20	mg/L		2540CE	04/15/19:204119	2540C	04/16/19:205449
MBAS Screen	Negative	0.1	mg/L		5540C	04/12/19:204123	5540C	04/12/19:205399
Aggressiveness Index	11.2	--	--		4500-H B	04/17/19:204230	4500HB	04/17/19:205552
Langelier Index (20°C)	-0.7	--	--		4500-H B	04/17/19:204230	4500HB	04/17/19:205552
Nitrate Nitrogen	5.8	0.1	mg/L		300.0	04/11/19:204164	300.0	04/11/19:205451

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

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA ELAP Certification No. 1573

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

April 25, 2019

Cleath-Harris Geologists
Attn: Spencer Harris
71 Zaca Lane
Suite 140
San Luis Obispo, CA 93401
Description : 20H1 LA30 LA-30
Project : Los Osos BMC Monitoring

Lab ID : CC 1981073-002
Customer ID : 8-514

Sampled On : April 3, 2019-11:37
Sampled By : Andrea Berge
Received On : April 3, 2019-14:35
Matrix : Ground Water

Sample Result - Inorganic

Constituent	Result	PQL	Units	Note	Sample Preparation		Sample Analysis	
					Method	Date/ID	Method	Date/ID
General Mineral								
Total Hardness as CaCO3	396	--	mg/L		200.7	04/05/19:203736	200.7	04/05/19:204901
Calcium	68	1	mg/L		200.7	04/05/19:203736	200.7	04/05/19:204901
Magnesium	55	1	mg/L		200.7	04/05/19:203736	200.7	04/05/19:204901
Potassium	1	1	mg/L		200.7	04/05/19:203736	200.7	04/05/19:204901
Sodium	36	1	mg/L		200.7	04/05/19:203736	200.7	04/05/19:204901
Total Cations	9.5	--	meq/L		200.7	04/05/19:203736	200.7	04/05/19:204901
Boron	0.1	0.1	mg/L		200.7	04/05/19:203736	200.7	04/05/19:204901
Copper	ND	10	ug/L		200.7	04/05/19:203736	200.7	04/05/19:204901
Iron	4190	30	ug/L		200.7	04/05/19:203736	200.7	04/05/19:204901
Manganese	1020	10	ug/L		200.7	04/05/19:203736	200.7	04/05/19:204901
Zinc	ND	20	ug/L		200.7	04/05/19:203736	200.7	04/05/19:204901
SAR	0.8	--	--		200.7	04/05/19:203736	200.7	04/05/19:204901
Total Alkalinity (as CaCO3)	320	10	mg/L		2320B	04/07/19:203746	2320B	04/07/19:204916
Hydroxide as OH	ND	10	mg/L		2320B	04/07/19:203746	2320B	04/07/19:204916
Carbonate as CO3	ND	10	mg/L		2320B	04/07/19:203746	2320B	04/07/19:204916
Bicarbonate as HCO3	390	10	mg/L		2320B	04/07/19:203746	2320B	04/07/19:204916
Sulfate	92.8	0.5	mg/L		300.0	04/04/19:203920	300.0	04/04/19:205133
Chloride	52	1	mg/L		300.0	04/04/19:203920	300.0	04/04/19:205133
Nitrate as NO3	ND	0.4	mg/L		300.0	04/04/19:203920	300.0	04/04/19:205133
Nitrite as N	ND	0.2	mg/L		300.0	04/04/19:203920	300.0	04/04/19:205133
Nitrate + Nitrite as N	ND	0.1	mg/L		300.0	04/04/19:203920	300.0	04/04/19:205133
Fluoride	0.2	0.1	mg/L		300.0	04/04/19:203920	300.0	04/04/19:205133
Total Anions	9.8	--	meq/L		2320B	04/07/19:203746	2320B	04/07/19:204916
pH	7.8	--	units		4500-H B	04/16/19:204190	4500HB	04/16/19:205488
Specific Conductance	903	1	umhos/cm		2510B	04/05/19:203701	2510B	04/05/19:204853
Total Dissolved Solids	540	20	mg/L		2540CE	04/05/19:203717	2540C	04/08/19:204927
MBAS Screen	Negative	0.1	mg/L		5540C	04/05/19:203812	5540C	04/05/19:204989
Aggressiveness Index	12.5	--	--		4500-H B	04/16/19:204190	4500HB	04/16/19:205488
Langelier Index (20°C)	0.7	--	--		4500-H B	04/16/19:204190	4500HB	04/16/19:205488
Nitrate Nitrogen	ND	0.1	mg/L		300.0	04/04/19:203920	300.0	04/04/19:205133

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

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA ELAP Certification No. 1573

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

April 25, 2019

Cleath-Harris Geologists
Attn: Spencer Harris
71 Zaca Lane
Suite 140
San Luis Obispo, CA 93401
Description : 13M2 LA31 LA-31
Project : Los Osos BMC Monitoring

Lab ID : CC 1981073-003
Customer ID : 8-514

Sampled On : April 3, 2019-12:05
Sampled By : Andrea Berge
Received On : April 3, 2019-14:35
Matrix : Ground Water

Sample Result - Inorganic

Constituent	Result	PQL	Units	Note	Sample Preparation		Sample Analysis	
					Method	Date/ID	Method	Date/ID
General Mineral								
Total Hardness as CaCO3	640	--	mg/L		200.7	04/05/19:203736	200.7	04/05/19:204901
Calcium	103	1	mg/L		200.7	04/05/19:203736	200.7	04/05/19:204901
Magnesium	93	1	mg/L		200.7	04/05/19:203736	200.7	04/05/19:204901
Potassium	4	1	mg/L		200.7	04/05/19:203736	200.7	04/05/19:204901
Sodium	341	1	mg/L		200.7	04/05/19:203736	200.7	04/05/19:204901
Total Cations	27.7	--	meq/L		200.7	04/05/19:203736	200.7	04/05/19:204901
Boron	0.2	0.1	mg/L		200.7	04/05/19:203736	200.7	04/05/19:204901
Copper	ND	10	ug/L		200.7	04/05/19:203736	200.7	04/05/19:204901
Iron	ND	30	ug/L		200.7	04/05/19:203736	200.7	04/05/19:204901
Manganese	ND	10	ug/L		200.7	04/05/19:203736	200.7	04/05/19:204901
Zinc	ND	20	ug/L		200.7	04/05/19:203736	200.7	04/05/19:204901
SAR	5.9	--	--		200.7	04/05/19:203736	200.7	04/05/19:204901
Total Alkalinity (as CaCO3)	50	10	mg/L		2320B	04/07/19:203746	2320B	04/07/19:204916
Hydroxide as OH	ND	10	mg/L		2320B	04/07/19:203746	2320B	04/07/19:204916
Carbonate as CO3	ND	10	mg/L		2320B	04/07/19:203746	2320B	04/07/19:204916
Bicarbonate as HCO3	70	10	mg/L		2320B	04/07/19:203746	2320B	04/07/19:204916
Sulfate	179	0.5	mg/L		300.0	04/04/19:203920	300.0	04/05/19:205133
Chloride	940	10*	mg/L		300.0	04/04/19:203920	300.0	04/05/19:205133
Nitrate as NO3	2.8	0.4	mg/L		300.0	04/04/19:203920	300.0	04/05/19:205133
Nitrite as N	ND	0.2	mg/L		300.0	04/04/19:203920	300.0	04/05/19:205133
Nitrate + Nitrite as N	0.6	0.1	mg/L		300.0	04/04/19:203920	300.0	04/05/19:205133
Fluoride	ND	0.1	mg/L		300.0	04/04/19:203920	300.0	04/05/19:205133
Total Anions	31.4	--	meq/L		2320B	04/07/19:203746	2320B	04/07/19:204916
pH	7.8	--	units		4500-H B	04/16/19:204190	4500HB	04/16/19:205488
Specific Conductance	3290	1	umhos/cm		2510B	04/05/19:203701	2510B	04/05/19:204853
Total Dissolved Solids	2010	20	mg/L		2540CE	04/05/19:203717	2540C	04/08/19:204927
MBAS Screen	Negative	0.1	mg/L		5540C	04/05/19:203812	5540C	04/05/19:204989
Aggressiveness Index	11.9	--	--		4500-H B	04/16/19:204190	4500HB	04/16/19:205488
Langelier Index (20°C)	-0.03	--	--		4500-H B	04/16/19:204190	4500HB	04/16/19:205488
Nitrate Nitrogen	0.6	0.1	mg/L		300.0	04/04/19:203920	300.0	04/05/19:205133

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

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA ELAP Certification No. 1573

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

May 3, 2019

Lab ID : CC 1981127-003
Customer ID : 8-514

Cleath-Harris Geologists
Attn: Spencer Harris
71 Zaca Lane
Suite 140
San Luis Obispo, CA 93401
Description : 18K9 (LA32) LA-32
Project : Los Osos BMC Monitoring

Sampled On : April 9, 2019-11:50
Sampled By : Andrea Berge
Received On : April 9, 2019-14:03
Matrix : Ground Water

Sample Result - Inorganic

Constituent	Result	PQL	Units	Note	Sample Preparation		Sample Analysis	
					Method	Date/ID	Method	Date/ID
General Mineral								
Total Hardness as CaCO3	172	--	mg/L		200.7	04/11/19:203944	200.7	04/11/19:205239
Calcium	26	1	mg/L		200.7	04/11/19:203944	200.7	04/11/19:205239
Magnesium	26	1	mg/L		200.7	04/11/19:203944	200.7	04/11/19:205239
Potassium	1	1	mg/L		200.7	04/11/19:203944	200.7	04/11/19:205239
Sodium	33	1	mg/L		200.7	04/11/19:203944	200.7	04/11/19:205239
Total Cations	4.9	--	meq/L		200.7	04/11/19:203944	200.7	04/11/19:205239
Boron	ND	0.1	mg/L		200.7	04/11/19:203944	200.7	04/11/19:205239
Copper	ND	10	ug/L		200.7	04/11/19:203944	200.7	04/11/19:205239
Iron	ND	30	ug/L		200.7	04/11/19:203944	200.7	04/12/19:205366
Manganese	ND	10	ug/L		200.7	04/11/19:203944	200.7	04/11/19:205239
Zinc	ND	20	ug/L		200.7	04/11/19:203944	200.7	04/11/19:205239
SAR	1.1	--	--		200.7	04/11/19:203944	200.7	04/11/19:205239
Total Alkalinity (as CaCO3)	160	10	mg/L		2320B	04/15/19:204109	2320B	04/15/19:205455
Hydroxide as OH	ND	10	mg/L		2320B	04/15/19:204109	2320B	04/15/19:205455
Carbonate as CO3	ND	10	mg/L		2320B	04/15/19:204109	2320B	04/15/19:205455
Bicarbonate as HCO3	200	10	mg/L		2320B	04/15/19:204109	2320B	04/15/19:205455
Sulfate	21.5	0.5	mg/L		300.0	04/10/19:204307	300.0	04/10/19:205153
Chloride	34	1	mg/L		300.0	04/10/19:204307	300.0	04/10/19:205153
Nitrate as NO3	6.9	0.4	mg/L		300.0	04/10/19:204307	300.0	04/10/19:205153
Nitrite as N	ND	0.2	mg/L		300.0	04/10/19:204307	300.0	04/10/19:205153
Nitrate + Nitrite as N	1.6	0.1	mg/L		300.0	04/10/19:204307	300.0	04/10/19:205153
Fluoride	0.1	0.1	mg/L		300.0	04/10/19:204307	300.0	04/10/19:205153
Total Anions	4.8	--	meq/L		2320B	04/15/19:204109	2320B	04/15/19:205455
pH	7.6	--	units		4500-H B	04/12/19:204035	4500HB	04/12/19:205293
Specific Conductance	474	1	umhos/cm		2510B	04/11/19:203962	2510B	04/11/19:205190
Total Dissolved Solids	270	20	mg/L		2540CE	04/11/19:203967	2540C	04/12/19:205249
MBAS Screen	Negative	0.1	mg/L		5540C	04/10/19:203926	5540C	04/10/19:205147
Aggressiveness Index	11.6	--	--		4500-H B	04/12/19:204035	4500HB	04/12/19:205293
Langelier Index (20°C)	-0.2	--	--		4500-H B	04/12/19:204035	4500HB	04/12/19:205293
Nitrate Nitrogen	1.6	0.1	mg/L		300.0	04/10/19:204307	300.0	04/10/19:205153

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

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA ELAP Certification No. 1573

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

May 14, 2019

Lab ID : CC 1981198-004
Customer ID : 8-514

Cleath-Harris Geologists
Attn: Spencer Harris
71 Zaca Lane
Suite 140
San Luis Obispo, CA 93401

Sampled On : April 15, 2019-12:20
Sampled By : Zac Reineke
Received On : April 15, 2019-14:23
Matrix : Ground Water

Description : Los Olivos #5 (I8K) LA-39
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	230	--	mg/L		200.7	04/18/19:204255	200.7	04/22/19:205841
Calcium	33	1	mg/L		200.7	04/18/19:204255	200.7	04/22/19:205841
Magnesium	36	1	mg/L		200.7	04/18/19:204255	200.7	04/22/19:205841
Potassium	2	1	mg/L		200.7	04/18/19:204255	200.7	04/22/19:205841
Sodium	41	1	mg/L		200.7	04/18/19:204255	200.7	04/22/19:205841
Total Cations	6.4	--	meq/L		200.7	04/18/19:204255	200.7	04/22/19:205841
Boron	ND	0.1	mg/L		200.7	04/18/19:204255	200.7	04/22/19:205841
Copper	ND	10	ug/L		200.7	04/18/19:204255	200.7	04/22/19:205841
Iron	ND	30	ug/L		200.7	04/18/19:204255	200.7	04/22/19:205841
Manganese	ND	10	ug/L		200.7	04/18/19:204255	200.7	04/22/19:205841
Zinc	ND	20	ug/L		200.7	04/18/19:204255	200.7	04/22/19:205841
SAR	1.2	--	--		200.7	04/18/19:204255	200.7	04/22/19:205841
Total Alkalinity (as CaCO3)	240	10	mg/L		2320B	04/24/19:204498	2320B	04/24/19:205996
Hydroxide as OH	ND	10	mg/L		2320B	04/24/19:204498	2320B	04/24/19:205996
Carbonate as CO3	ND	10	mg/L		2320B	04/24/19:204498	2320B	04/24/19:205996
Bicarbonate as HCO3	290	10	mg/L		2320B	04/24/19:204498	2320B	04/24/19:205996
Sulfate	27.4	0.5	mg/L		300.0	04/16/19:204295	300.0	04/16/19:205656
Chloride	38	1	mg/L		300.0	04/16/19:204295	300.0	04/16/19:205656
Nitrate as NO3	ND	0.4	mg/L		300.0	04/16/19:204295	300.0	04/16/19:205656
Nitrite as N	ND	0.2	mg/L		300.0	04/16/19:204295	300.0	04/16/19:205656
Nitrate + Nitrite as N	ND	0.1	mg/L		300.0	04/16/19:204295	300.0	04/16/19:205656
Fluoride	0.1	0.1	mg/L		300.0	04/16/19:204295	300.0	04/16/19:205656
Total Anions	6.4	--	meq/L		2320B	04/24/19:204498	2320B	04/24/19:205996
pH	8.1	--	units		4500-H B	05/07/19:205052	4500HB	05/07/19:206686
Specific Conductance	619	1	umhos/cm		2510B	04/17/19:204194	2510B	04/17/19:205499
Total Dissolved Solids	350	20	mg/L		2540CE	04/18/19:204266	2540C	04/19/19:205646
MBAS Screen	Negative	0.1	mg/L		5540C	04/16/19:204223	5540C	04/16/19:205535
Aggressiveness Index	12.4	--	--		4500-H B	05/07/19:205052	4500HB	05/07/19:206686
Langelier Index (20°C)	0.5	--	--		4500-H B	05/07/19:205052	4500HB	05/07/19:206686
Nitrate Nitrogen	ND	0.1	mg/L		300.0	04/16/19:204295	300.0	04/16/19:205656

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

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA ELAP Certification No. 1573

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

Fall 2019 Field Logs and Analytical Results

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 10/3/2019
Operator: Andrea Berge
Well number and location: 30S/11E-20M2 (FW28)
Site and wellhead conditions: Sunny, breezy. Site secure, well not running.

Static water depth (feet):	28.77
Well depth (feet):	102
Water column (feet):	73.23
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:	11:05 AM

Time	Gallons	EC (µS/cm)	pH	Temp. (°C)	Comments*
11:06	1	866	7.79	21.5	Clear, colorless, odorless
11:11	10	863.3	7.61	21	Pump turns on. Clear, colorless, odorless
11:16	20	864.9	7.46	19	Clear, colorless, odorless
11:21	40	859.7	7.37	17.2	Clear, colorless, odorless
					Sampled @ 11:22 AM

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

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 10/2/2019
Operator: Andrea Berge
Well number and location: 30S/11E-17E10 (UA13)
Site and wellhead conditions: Well has been running since 7:00 am

Static water depth (feet): 94.3 on 10/11/19
Well depth (feet): 142
Water column (feet): 47.7
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: 12:31 PM

Time	Gallons	EC (µS/cm)	pH	Temp. (°C)	Comments*
12:32		531.1	7.73	19.9	Clear, colorless, odorless
					Sampled @ 12:34 PM

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

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 10/7/2019
Operator: Andrea Berge
Well number and location: 30S/11E-13N (LA8)
Site and wellhead conditions: Site secure. Well running at 200 gpm for 5 minutes

Static water depth (feet): 133.9
Well depth (feet): 350
Water column (feet): 216.1
Casing diameter (inches): 8
Minimum purge volume (gal) flush line
Purge rate (gpm): 200
Pumping water level (feet): --
Pump setting (feet): --
Minimum purge time (min): flush line
Time begin purge: 9:53 AM

Time	Gallons (from spigot)	EC (µS/cm)	pH	Temp. (°C)	Comments*
9:55	1200	459.2	7.65	18.6	Clear, colorless, odorless
9:57	1600	434	7.91	18.4	Clear, colorless, odorless
9:58	2200	431.3	7.62	18.5	Clear, colorless, odorless
					Sampled @ 10:00 AM

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

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 10/2/2019
Operator: Andrea Berge, James Carlson
Well number and location: 30S/10E-12J1 (LA11)
Site and wellhead conditions: Sunny and still. Site secure, cap in place

Static water depth (feet): 6.93
Well depth (feet): 389
Water column (feet): 382
Casing diameter (inches): 2
Minimum purge volume (gal) 187.74
Purge rate (gpm): ~1.8
Pumping water level (feet): 11.38
Pump setting (feet): 25
Minimum purge time (min): 120
Time begin purge: 9:15 AM

Time	Gallons	EC (µS/cm)	pH	Temp. (°C)	Comments*
9:15	1	1,128	8.08	18.7	Clear, colorless, odorless
9:19	5	1,123	7.95	18.6	Clear, colorless, odorless
9:24	10	1,120	7.74	19	Clear, colorless, odorless
9:31	20	1,114	7.79	19.5	Clear, colorless, odorless
9:47	45	1,145	8.01	20.1	Clear, colorless, odorless
9:55	55	1,337	7.87	20.2	Slightly cloudy, odorless
10:09	75	1,353	7.56	21.1	Faintly cloudy, odorless
10:26	100	1,342	7.50	21.2	Faintly cloudy, odorless
10:40	120	1,326	7.78	20.6	Clear, colorless, odorless
10:56	145	1,309	8.08	20.9	Clear, colorless, odorless
11:15	170	1,310	7.71	21.3	Clear, colorless, odorless
11:27	190	1,308	7.49	21.3	Clear, colorless, odorless
					Sampled @ 11:32 AM

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

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 10/2/2019
Operator: James Carlson
Well number and location: 30S/11E-7Q3 (LA12)
Site and wellhead conditions: Sunny and clear, site secure.

Static water depth (feet):	35.7 on 10/11/19
Well depth (feet):	270
Water column (feet):	234
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:	11:56 AM

Time	Gallons	EC (µS/cm)	pH	Temp. (°C)	Comments*
11:57	2	790	7.55	21.8	Clear, colorless, odorless
					Sampled @ 11:59 AM

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

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 10/2/2019
Operator: James Carlson
Well number and location: 30S/11E-18L2 (LA15)
Site and wellhead conditions: Well has been running 7:30 am to 9:00 am at 600 gpm.
Well turned back on for sampling at 12:40 pm
Static water depth (feet): 98.1 on 10/11/19
Well depth (feet): 394
Water column (feet): 296
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: 12:41 PM

Time	Gallons (from spigot)	EC (µS/cm)	pH	Temp. (°C)	Comments*
12:42	2	355.0	7.60	19.3	Clear, colorless, odorless

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

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 10/9/2019
Operator: Andrea Berge, James Carlson
Well number and location: 30S/11E-18K8 (LA18)
Site and wellhead conditions: Overcast, site secure and gate opened

Static water depth (feet): 139.12
Well depth (feet): 650
Water column (feet): 511
Casing diameter (inches): 2
Minimum purge volume (gal) 250
Purge rate (gpm): 1
Pumping water level (feet): 144.8
Pump setting (feet): 160
Minimum purge time (min): 180
Time begin purge: 8:58 AM

Time	Gallons	EC (µS/cm)	pH	Temp. (°C)	Comments*
8:57	1	550.6	7.75	20	Clear, colorless, odorless
8:59	5	577.5	7.52	21	Clear, colorless, odorless
9:03	10	588.9	7.59	21.4	Clear, colorless, odorless
9:11	20	592	7.53	21.7	Clear, colorless, odorless
9:19	30	588.8	7.76	21.6	Clear, colorless, odorless
9:41	50	590.8	7.56	22.3	Clear, colorless, odorless
10:07	80	591.2	7.58	22.7	Clear, colorless, odorless
10:42	120	584.3	8.09	23	Clear, colorless, odorless
11:22	170	588.8	7.56	22.8	Clear, colorless, odorless
12:03	220	593	7.51	23.1	Clear, colorless, odorless
12:18	240	592.4	7.54	23.2	Clear, colorless, odorless
12:25	250	589.7	7.72	22.7	Clear, colorless, odorless
					Sampled @ 12:26 PM

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

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 10/9/2019
Operator: Andrea Berge, James Carlson
Well number and location: 30S/11E-17E8 (LA22)
Site and wellhead conditions: Overcast, cool. Site secure.

Static water depth (feet): 126.08
Well depth (feet): 390
Water column (feet): 263.9
Casing diameter (inches): 2
Minimum purge volume (gal) 125
Purge rate (gpm): ~1.3
Pumping water level (feet): 128.3
Pump setting (feet): 120
Minimum purge time (min): 97
Time begin purge: 12:52 PM

Time	Gallons	EC (µS/cm)	pH	Temp. (°C)	Comments*
12:53	1	501.8	8.23	20.3	Clear, colorless, odorless
12:26	5	505.3	8.22	20.3	Slightly cloudy, odorless
13:01	10	504	8.16	20.3	Slightly cloudy, odorless
13:04	15	500	7.94	20.4	Clear, colorless, odorless
13:16	25	470.3	7.75	20.7	Clear, colorless, odorless
13:24	35	468.2	7.38	20.7	Clear, colorless, odorless
13:31	45	468.6	7.49	20.5	Clear, colorless, odorless
13:39	55	467.5	7.38	20.6	Clear, colorless, odorless
13:46	75	470.7	7.35	23.4	Clear, colorless, odorless
14:13	95	471.3	7.84	20.7	Clear, colorless, odorless
14:29	115	467.4	7.71	20.4	Clear, colorless, odorless
14:37	125	464.9	7.31	20.7	Clear, colorless, odorless
					Sampled @ 14:37

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

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 10/3/2019
Operator: Andrea Berge
Well number and location: 30S/11E-20H1 (LA30)
Site and wellhead condition:

Static water depth (feet): 20.86 (recovering)
Well depth (feet): 140
Water column (feet): 119.14
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: 10:15 AM

Time	Gallons	EC (µS/cm)	pH	Temp. (°C)	Comments*
10:17	1	800.6	7.69	25.2	Slightly cloudy, odorless
10:19	5	827.3	7.73	20.4	Slightly cloudy, odorless
10:21	10	831.6	7.62	19.6	Clear, colorless, odorless
10:23	20	814.3	7.51	20	Clear, colorless, odorless
					Sampled @ 10:25 AM

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

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 10/3/2019
Operator: Andrea Berge
Well number and location: 30S/10E-13M2 (LA31)
Site and wellhead conditions: Sunny breezy. Gate locked, site secure.

Static water depth (feet): 36.04
Well depth (feet): --
Water column (feet): --
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: 12:18 PM

Time	Gallons	EC (µS/cm)	pH	Temp. (°C)	Comments*
12:19	1	2,880	7.85	18.6	Clear, colorless, odorless
12:25	10	2,940	7.75	18	Clear, colorless, odorless
12:26	15	2,960	7.63	17.8	Clear, colorless, odorless
12:27	20	2,930	7.61	18.1	Clear, colorless, odorless
					Sampled @ 12:28 PM

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

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 10/2/2019
Operator: Andrea Berge, James Carlson
Well number and location: 30S/11E-18K9 (LA32)
Site and wellhead conditions: Sunny and clear. Site secure and gate opened.

Static water depth (feet): 159.8 on 10/11/19
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: 12:16 PM

Time	Gallons (from spigot)	EC (µS/cm)	pH	Temp. (°C)	Comments*
12:17	2	494.2	7.95	21.7	Clear, colorless, odorless
					Sampled @ 12:18 PM

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

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 11/5/2019
Operator: J. Carlson
Well number and location: Lupine Zone E (LA40)
Site and wellhead conditions: Site secure, temporary fence gone, temporary caps in place and replaced with permanent caps.
Static water depth (feet): 9.64
Well depth (feet): 487.5
Water column (feet): 477.86
Casing diameter (inches): 2.26
Minimum purge volume (gal) 240.0
Pumping water level (feet): 123.1
Purge Rate (GPM): ~0.8
Pump setting (feet): 150
Time begin purge: 10:55 AM

Time	Gallons	EC (µS)	pH	Temp. (°C)	Comments*
10:55 AM	1	997	7.82	19.7	clear, colorless, odorless
11:07 AM	10	1018	7.68	19.0	clear, colorless, odorless
11:26 AM	20	2480	7.33	19.3	clear, colorless, odorless
11:57 AM	40	2690	7.19	19.8	clear, colorless, odorless
12:25 PM	60	3530	7.07	20.6	clear, colorless, odorless
1:05 PM	80	3670	7.01	20.8	clear, colorless, odorless
1:40 PM	100	4540	6.93	20.7	clear, colorless, odorless
2:21 PM	120	4680	6.89	21.3	clear, colorless, odorless
2:50 PM	140	4650	6.86	21.3	clear, colorless, odorless
3:28 PM	160	4850	6.85	21.1	clear, colorless, odorless
4:06 PM	180	4920	6.84	20.2	clear, colorless, odorless
4:37 PM	200	5050	6.84	20.5	clear, colorless, odorless
Purge stopped at 4:37 PM 11/5/2019 and continued at 9:18 AM 11/6/2019					
9:18 AM	220	5170	6.90	19.2	clear, colorless, odorless
9:47 AM	240	4670	6.92	19.8	clear, colorless, odorless
10:28 AM	260	5230	6.85	20.7	clear, colorless, odorless
11:07 AM	280	5190	6.84	21.4	clear, colorless, odorless
11:42 AM	300	5250	6.85	21.4	clear, colorless, odorless
					Sampled @ 11:49 AM

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

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 11/6/2019
Operator: J. Carlson
Well number and location: Lupine Zone D (LA41)
Site and wellhead conditions: Site secure, new caps in place.

Static water depth (feet): 8.92
Well depth (feet): 350
Water column (feet): 341.08
Casing diameter (inches): 2.26
Minimum purge volume (gal): 213.0
Pumping water level (feet): 119.8
Purge Rate (GPM): ~0.6
Pump setting (feet): 150
Time begin purge: 12:10 PM

Time	Gallons	EC (µS)	pH	Temp. (°C)	Comments*
12:11 PM	1	1035	7.41	19.4	clear, colorless, odorless
12:53 PM	20	906	7.40	19.0	clear, colorless, odorless
1:30 PM	40	950	7.28	20.1	clear, colorless, odorless
2:04 PM	60	1060	7.20	20.2	clear, colorless, odorless
2:36 PM	80	1100	7.16	20.8	slightly turbid, light grey odorless
2:52 PM	90	1147	7.52	20.1	turbid, light brown, odorless
3:15 PM	100	1138	7.52	19.9	slightly turbid, light grey, odorless
3:31 PM	110	1148	7.23	20.1	slightly turbid, light grey, odorless
3:48 PM	120	1155	7.20	20.0	slightly turbid, light grey, odorless
4:11 PM	130	1164	7.20	19.7	slightly turbid, colorless, odorless
4:25 PM	140	1125	7.21	20.1	slightly turbid, colorless, odorless
Purge stopped at 4:25 PM 11/6/19 and continued at 8:52 AM 11/7/2019					
8:52 AM	150	1162	7.22	18.30	clear, colorless, odorless
9:10 AM	160	1158	7.14	19.0	clear, colorless, odorless
9:42 AM	180	1149	7.13	19.8	clear, colorless, odorless
10:18 AM	200	1145	7.09	20.7	clear, colorless, odorless
10:36 AM	210	1145	7.09	20.8	clear, colorless, odorless
10:58 AM	220	1158	7.46	20.8	clear, colorless, odorless
					Sampled @ 10:59 AM

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

November 14, 2019

Lab ID : CC 1983664-001
Customer ID : 8-514

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401
Description : 20A2 (FW26) FW-26
Project : Los Osos BMC Monitoring

Sampled On : October 16, 2019-12:01
Sampled By : James Carlson
Received On : October 16, 2019-12:51
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	231	--	mg/L		200.7	10/19/19:212105	200.7	10/22/19:216609
Calcium	35	1	mg/L		200.7	10/19/19:212105	200.7	10/22/19:216609
Magnesium	35	1	mg/L		200.7	10/19/19:212105	200.7	10/22/19:216609
Potassium	1	1	mg/L		200.7	10/19/19:212105	200.7	10/22/19:216609
Sodium	36	1	mg/L		200.7	10/19/19:212105	200.7	10/22/19:216609
Total Cations	6.2	--	meq/L		200.7	10/19/19:212105	200.7	10/22/19:216609
Boron	ND	0.1	mg/L		200.7	10/19/19:212105	200.7	10/22/19:216609
Copper	ND	10	ug/L		200.7	10/19/19:212105	200.7	10/22/19:216609
Iron	1810	30	ug/L		200.7	10/19/19:212105	200.7	10/22/19:216609
Manganese	480	10	ug/L		200.7	10/19/19:212105	200.7	10/22/19:216609
Zinc	ND	20	ug/L		200.7	10/19/19:212105	200.7	10/22/19:216609
SAR	1.0	--	--		200.7	10/19/19:212105	200.7	10/22/19:216609
Total Alkalinity (as CaCO3)	180	10	mg/L		2320B	10/28/19:212412	2320B	10/28/19:216932
Hydroxide as OH	ND	10	mg/L		2320B	10/28/19:212412	2320B	10/28/19:216932
Carbonate as CO3	ND	10	mg/L		2320B	10/28/19:212412	2320B	10/28/19:216932
Bicarbonate as HCO3	220	10	mg/L		2320B	10/28/19:212412	2320B	10/28/19:216932
Sulfate	29.4	0.5	mg/L		300.0	10/17/19:212068	300.0	10/17/19:216357
Chloride	80	1	mg/L		300.0	10/17/19:212068	300.0	10/17/19:216357
Nitrate as NO3	ND	0.4	mg/L		300.0	10/17/19:212068	300.0	10/17/19:216357
Nitrite as N	ND	0.2	mg/L		300.0	10/17/19:212068	300.0	10/17/19:216357
Nitrate + Nitrite as N	ND	0.1	mg/L		300.0	10/17/19:212068	300.0	10/17/19:216357
Fluoride	ND	0.1	mg/L		300.0	10/17/19:212068	300.0	10/17/19:216357
Total Anions	6.5	--	meq/L		2320B	10/28/19:212412	2320B	10/28/19:216932
pH	6.7	--	units		4500-H B	10/22/19:212040	4500HB	10/22/19:216538
Specific Conductance	675	1	umhos/cm		2510B	10/29/19:212481	2510B	10/29/19:216956
Total Dissolved Solids	370	20	mg/L		2540CE	10/18/19:212086	2540C	10/21/19:216445
MBAS Screen	Negative	0.1	mg/L		5540C	10/17/19:212288	5540C	10/17/19:216631
Aggressiveness Index	10.9	--	--		4500-H B	10/22/19:212040	4500HB	10/22/19:216538
Langelier Index (20°C)	-1.0	--	--		4500-H B	10/22/19:212040	4500HB	10/22/19:216538
Nitrate Nitrogen	ND	0.1	mg/L		300.0	10/17/19:212068	300.0	10/17/19:216357

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

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA ELAP Certification No. 1573

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

October 23, 2019

Lab ID : CC 1983504-002
Customer ID : 8-514

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

Sampled On : October 3, 2019-11:22
Sampled By : Andrea Berge
Received On : October 3, 2019-14:59
Matrix : Ground Water

Description : 20M2 (FW28) FW-28
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	393	--	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Calcium	67	1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Magnesium	55	1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Potassium	1	1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Sodium	38	1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Total Cations	9.5	--	meq/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Boron	0.1	0.1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Copper	ND	10	ug/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Iron	420	30	ug/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Manganese	50	10	ug/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Zinc	ND	20	ug/L		200.7	10/16/19:211980	200.7	10/16/19:216320
SAR	0.8	--	--		200.7	10/16/19:211980	200.7	10/16/19:216320
Total Alkalinity (as CaCO3)	310	10	mg/L		2320B	10/15/19:211921	2320B	10/15/19:216188
Hydroxide as OH	ND	10	mg/L		2320B	10/15/19:211921	2320B	10/15/19:216188
Carbonate as CO3	ND	10	mg/L		2320B	10/15/19:211921	2320B	10/15/19:216188
Bicarbonate as HCO3	380	10	mg/L		2320B	10/15/19:211921	2320B	10/15/19:216188
Sulfate	102	0.5	mg/L		300.0	10/04/19:211547	300.0	10/04/19:215622
Chloride	64	1	mg/L		300.0	10/04/19:211547	300.0	10/04/19:215622
Nitrate as NO3	ND	0.4	mg/L		300.0	10/04/19:211547	300.0	10/04/19:215622
Nitrite as N	ND	0.2	mg/L		300.0	10/04/19:211547	300.0	10/04/19:215622
Nitrate + Nitrite as N	ND	0.1	mg/L		300.0	10/04/19:211547	300.0	10/04/19:215622
Fluoride	0.3	0.1	mg/L		300.0	10/04/19:211547	300.0	10/04/19:215622
Total Anions	10.2	--	meq/L		2320B	10/15/19:211921	2320B	10/15/19:216188
pH	7.4	--	units		4500-H B	10/10/19:211741	4500HB	10/10/19:215893
Specific Conductance	965	1	umhos/cm		2510B	10/17/19:212060	2510B	10/17/19:216340
Total Dissolved Solids	600	20	mg/L		2540CE	10/08/19:211617	2540C	10/09/19:215826
MBAS Screen	Negative	0.1	mg/L		5540C	10/04/19:211571	5540C	10/04/19:215650
Aggressiveness Index	12.1	--	--		4500-H B	10/10/19:211741	4500HB	10/10/19:215893
Langelier Index (20°C)	0.2	--	--		4500-H B	10/10/19:211741	4500HB	10/10/19:215893
Nitrate Nitrogen	ND	0.1	mg/L		300.0	10/04/19:211547	300.0	10/04/19:215622

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

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA ELAP Certification No. 1573

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

November 7, 2019

Lab ID : CC 1983629-002
Customer ID : 8-514

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

Sampled On : October 14, 2019-10:45
Sampled By : Zac Reineke
Received On : October 14, 2019-14:35
Matrix : Ground Water

Description : 13F4 Skyline UA-3
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	112	--	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Calcium	20	1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Magnesium	15	1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Potassium	1	1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Sodium	49	1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Total Cations	4.4	--	meq/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Boron	ND	0.1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Copper	ND	10	ug/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Iron	ND	30	ug/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Manganese	ND	10	ug/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Zinc	ND	20	ug/L		200.7	10/16/19:211980	200.7	10/16/19:216320
SAR	2.0	--	--		200.7	10/16/19:211980	200.7	10/16/19:216320
Total Alkalinity (as CaCO3)	60	10	mg/L		2320B	10/23/19:212280	2320B	10/23/19:216690
Hydroxide as OH	ND	10	mg/L		2320B	10/23/19:212280	2320B	10/23/19:216690
Carbonate as CO3	ND	10	mg/L		2320B	10/23/19:212280	2320B	10/23/19:216690
Bicarbonate as HCO3	70	10	mg/L		2320B	10/23/19:212280	2320B	10/23/19:216690
Sulfate	24.2	0.5	mg/L		300.0	10/15/19:211931	300.0	10/15/19:216165
Chloride	63	1	mg/L		300.0	10/15/19:211931	300.0	10/15/19:216165
Nitrate as NO3	78.9	0.4	mg/L		300.0	10/15/19:211931	300.0	10/15/19:216165
Nitrite as N	ND	0.2	mg/L		300.0	10/15/19:211931	300.0	10/15/19:216165
Nitrate + Nitrite as N	17.8	0.1	mg/L		300.0	10/15/19:211931	300.0	10/15/19:216165
Fluoride	ND	0.1	mg/L		300.0	10/15/19:211931	300.0	10/15/19:216165
Total Anions	4.7	--	meq/L		2320B	10/23/19:212280	2320B	10/23/19:216690
pH	6.7	--	units		4500-H B	10/17/19:212020	4500HB	10/17/19:216300
Specific Conductance	527	1	umhos/cm		2510B	10/26/19:212410	2510B	10/26/19:216829
Total Dissolved Solids	370	20	mg/L		2540CE	10/16/19:211940	2540C	10/17/19:216301
MBAS Screen	Negative	0.1	mg/L		5540C	10/15/19:212284	5540C	10/15/19:216627
Aggressiveness Index	10.2	--	--		4500-H B	10/17/19:212020	4500HB	10/17/19:216300
Langelier Index (20°C)	-1.7	--	--		4500-H B	10/17/19:212020	4500HB	10/17/19:216300
Nitrate Nitrogen	17.8	0.1	mg/L		300.0	10/15/19:211931	300.0	10/15/19:216165

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

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA ELAP Certification No. 1573

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

November 7, 2019

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401
Description : 13F4 Skyline UA-3
Project : Los Osos BMC Monitoring

Lab ID : CC 1983629-002
Customer ID : 8-514

Sampled On : October 14, 2019-10:45
Sampled By : Zac Reineke
Received On : October 14, 2019-14:35
Matrix : Ground Water

Sample Result - Support

Constituent	Result	PQL	Units	Note	Sample Preparation		Sample Analysis	
					Method	Date/ID	Method	Date/ID
Field Test								
Temperature	64.5		°F			10/14/19 10:45	2550B	10/14/19 10:45
Conductivity	507		umhos/cm			10/14/19 10:45	2510B	10/14/19 10:45

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

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA ELAP Certification No. 1573

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

November 7, 2019

Lab ID : CC 1983629-005
Customer ID : 8-514

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

Sampled On : October 14, 2019-12:35
Sampled By : Zac Reineke
Received On : October 14, 2019-14:35
Matrix : Ground Water

Description : 18K3 Lo#3 UA-9
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	82.7	--	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Calcium	15	1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Magnesium	11	1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Potassium	1	1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Sodium	27	1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Total Cations	2.9	--	meq/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Boron	ND	0.1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Copper	ND	10	ug/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Iron	ND	30	ug/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Manganese	ND	10	ug/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Zinc	ND	20	ug/L		200.7	10/16/19:211980	200.7	10/16/19:216320
SAR	1.3	--	--		200.7	10/16/19:211980	200.7	10/16/19:216320
Total Alkalinity (as CaCO3)	50	10	mg/L		2320B	10/23/19:212280	2320B	10/23/19:216690
Hydroxide as OH	ND	10	mg/L		2320B	10/23/19:212280	2320B	10/23/19:216690
Carbonate as CO3	ND	10	mg/L		2320B	10/23/19:212280	2320B	10/23/19:216690
Bicarbonate as HCO3	60	10	mg/L		2320B	10/23/19:212280	2320B	10/23/19:216690
Sulfate	8.2	0.5	mg/L		300.0	10/15/19:211941	300.0	10/15/19:216184
Chloride	42	1	mg/L		300.0	10/15/19:211941	300.0	10/15/19:216184
Nitrate as NO3	41.1	0.4	mg/L		300.0	10/15/19:211941	300.0	10/15/19:216184
Nitrite as N	ND	0.2	mg/L		300.0	10/15/19:211941	300.0	10/15/19:216184
Nitrate + Nitrite as N	9.3	0.1	mg/L		300.0	10/15/19:211941	300.0	10/15/19:216184
Fluoride	ND	0.1	mg/L		300.0	10/15/19:211941	300.0	10/15/19:216184
Total Anions	3.0	--	meq/L		2320B	10/23/19:212280	2320B	10/23/19:216690
pH	7.0	--	units		4500-H B	10/17/19:212020	4500HB	10/17/19:216300
Specific Conductance	333	1	umhos/cm		2510B	10/26/19:212410	2510B	10/26/19:216829
Total Dissolved Solids	240	20	mg/L		2540CE	10/16/19:211940	2540C	10/17/19:216301
MBAS Screen	Negative	0.1	mg/L		5540C	10/15/19:212284	5540C	10/15/19:216627
Aggressiveness Index	10.3	--	--		4500-H B	10/17/19:212020	4500HB	10/17/19:216300
Langelier Index (20°C)	-1.6	--	--		4500-H B	10/17/19:212020	4500HB	10/17/19:216300
Nitrate Nitrogen	9.3	0.1	mg/L		300.0	10/15/19:211941	300.0	10/15/19:216184

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

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA ELAP Certification No. 1573

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

November 7, 2019

Lab ID : CC 1983629-005
Customer ID : 8-514

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

Sampled On : October 14, 2019-12:35
Sampled By : Zac Reineke
Received On : October 14, 2019-14:35
Matrix : Ground Water

Description : 18K3 Lo#3 UA-9
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	65.7		°F			10/14/19 12:35	2550B	10/14/19 12:35
Conductivity	324		umhos/cm			10/14/19 12:35	2510B	10/14/19 12:35

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

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA ELAP Certification No. 1573

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

October 16, 2019

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 ID : CC 1983436-004
Customer ID : 8-514

Sampled On : October 2, 2019-12:34
Sampled By : James Carlson
Received On : October 2, 2019-14:53
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	165	--	mg/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Calcium	25	1	mg/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Magnesium	25	1	mg/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Potassium	1	1	mg/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Sodium	42	1	mg/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Total Cations	5.2	--	meq/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Boron	0.1	0.1	mg/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Copper	ND	10	ug/L		200.7	10/04/19:211494	200.7	10/08/19:215799
Iron	ND	30	ug/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Manganese	ND	10	ug/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Zinc	20	20	ug/L		200.7	10/04/19:211494	200.7	10/08/19:215735
SAR	1.4	--	--		200.7	10/04/19:211494	200.7	10/08/19:215735
Total Alkalinity (as CaCO3)	100	10	mg/L		2320B	10/14/19:211819	2320B	10/15/19:216120
Hydroxide as OH	ND	10	mg/L		2320B	10/14/19:211819	2320B	10/15/19:216120
Carbonate as CO3	ND	10	mg/L		2320B	10/14/19:211819	2320B	10/15/19:216120
Bicarbonate as HCO3	120	10	mg/L		2320B	10/14/19:211819	2320B	10/15/19:216120
Sulfate	25.5	0.5	mg/L		300.0	10/03/19:211467	300.0	10/04/19:215513
Chloride	60	1	mg/L		300.0	10/03/19:211467	300.0	10/04/19:215513
Nitrate as NO3	69.6	0.4	mg/L		300.0	10/03/19:211467	300.0	10/04/19:215513
Nitrite as N	ND	0.2	mg/L		300.0	10/03/19:211467	300.0	10/04/19:215513
Nitrate + Nitrite as N	15.7	0.1	mg/L		300.0	10/03/19:211467	300.0	10/04/19:215513
Fluoride	ND	0.1	mg/L		300.0	10/03/19:211467	300.0	10/04/19:215513
Total Anions	5.3	--	meq/L		2320B	10/14/19:211819	2320B	10/15/19:216120
pH	7.4	--	units		4500-H B	10/15/19:211902	4500HB	10/15/19:216106
Specific Conductance	559	1	umhos/cm		2510B	10/10/19:211747	2510B	10/10/19:215900
Total Dissolved Solids	360	20	mg/L		2540CE	10/04/19:211481	2540C	10/07/19:215640
MBAS Screen	Negative	0.1	mg/L		5540C	10/03/19:211570	5540C	10/03/19:215649
Aggressiveness Index	11.2	--	--		4500-H B	10/15/19:211902	4500HB	10/15/19:216106
Langelier Index (20°C)	-0.7	--	--		4500-H B	10/15/19:211902	4500HB	10/15/19:216106
Nitrate Nitrogen	15.7	0.1	mg/L		300.0	10/03/19:211467	300.0	10/04/19:215513

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

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA ELAP Certification No. 1573

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

October 23, 2019

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 ID : CC 1983520-001
Customer ID : 8-514

Sampled On : October 7, 2019-10:00
Sampled By : Andrea Berge
Received On : October 7, 2019-11:03
Matrix : Ground Water

Sample Result - Inorganic

Constituent	Result	PQL	Units	Note	Sample Preparation		Sample Analysis	
					Method	Date/ID	Method	Date/ID
General Mineral								
Total Hardness as CaCO3	95.0	--	mg/L		200.7	10/16/19:211980	200.7	10/17/19:216320
Calcium	15	1	mg/L		200.7	10/16/19:211980	200.7	10/17/19:216320
Magnesium	14	1	mg/L		200.7	10/16/19:211980	200.7	10/17/19:216320
Potassium	1	1	mg/L		200.7	10/16/19:211980	200.7	10/17/19:216320
Sodium	37	1	mg/L		200.7	10/16/19:211980	200.7	10/17/19:216320
Total Cations	3.5	--	meq/L		200.7	10/16/19:211980	200.7	10/17/19:216320
Boron	ND	0.1	mg/L		200.7	10/16/19:211980	200.7	10/17/19:216320
Copper	20	10	ug/L		200.7	10/16/19:211980	200.7	10/17/19:216320
Iron	ND	30	ug/L		200.7	10/16/19:211980	200.7	10/17/19:216320
Manganese	ND	10	ug/L		200.7	10/16/19:211980	200.7	10/17/19:216320
Zinc	ND	20	ug/L		200.7	10/16/19:211980	200.7	10/17/19:216320
SAR	1.7	--	--		200.7	10/16/19:211980	200.7	10/17/19:216320
Total Alkalinity (as CaCO3)	50	10	mg/L		2320B	10/17/19:212029	2320B	10/17/19:216403
Hydroxide as OH	ND	10	mg/L		2320B	10/17/19:212029	2320B	10/17/19:216403
Carbonate as CO3	ND	10	mg/L		2320B	10/17/19:212029	2320B	10/17/19:216403
Bicarbonate as HCO3	60	10	mg/L		2320B	10/17/19:212029	2320B	10/17/19:216403
Sulfate	14.4	0.5	mg/L		300.0	10/08/19:211668	300.0	10/08/19:215805
Chloride	77	1	mg/L		300.0	10/08/19:211668	300.0	10/08/19:215805
Nitrate as NO3	34.2	0.4	mg/L		300.0	10/08/19:211668	300.0	10/08/19:215805
Nitrite as N	ND	0.2	mg/L		300.0	10/08/19:211668	300.0	10/08/19:215805
Nitrate + Nitrite as N	7.7	0.1	mg/L		300.0	10/08/19:211668	300.0	10/08/19:215805
Fluoride	ND	0.1	mg/L		300.0	10/08/19:211668	300.0	10/08/19:215805
Total Anions	4.0	--	meq/L		2320B	10/17/19:212029	2320B	10/17/19:216403
pH	7.6	--	units		4500-H B	10/15/19:211902	4500HB	10/15/19:216106
Specific Conductance	446	1	umhos/cm		2510B	10/17/19:212060	2510B	10/17/19:216340
Total Dissolved Solids	250	20	mg/L		2540CE	10/09/19:211679	2540C	10/10/19:215890
MBAS Screen	Negative	0.1	mg/L		5540C	10/08/19:211873	5540C	10/08/19:216057
Aggressiveness Index	10.9	--	--		4500-H B	10/15/19:211902	4500HB	10/15/19:216106
Langelier Index (20°C)	-1.0	--	--		4500-H B	10/15/19:211902	4500HB	10/15/19:216106
Nitrate Nitrogen	7.7	0.1	mg/L		300.0	10/08/19:211668	300.0	10/08/19:215805

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

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA ELAP Certification No. 1573

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

November 7, 2019

Lab ID : CC 1983629-003
Customer ID : 8-514

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

Sampled On : October 14, 2019-11:30
Sampled By : Zac Reineke
Received On : October 14, 2019-14:35
Matrix : Ground Water

Description : 13J1 Rosina LA-10
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	332	--	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Calcium	54	1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Magnesium	48	1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Potassium	1	1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Sodium	33	1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Total Cations	8.1	--	meq/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Boron	ND	0.1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Copper	ND	10	ug/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Iron	140	30	ug/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Manganese	ND	10	ug/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Zinc	ND	20	ug/L		200.7	10/16/19:211980	200.7	10/16/19:216320
SAR	0.8	--	--		200.7	10/16/19:211980	200.7	10/16/19:216320
Total Alkalinity (as CaCO3)	70	10	mg/L		2320B	10/23/19:212280	2320B	10/23/19:216690
Hydroxide as OH	ND	10	mg/L		2320B	10/23/19:212280	2320B	10/23/19:216690
Carbonate as CO3	ND	10	mg/L		2320B	10/23/19:212280	2320B	10/23/19:216690
Bicarbonate as HCO3	80	10	mg/L		2320B	10/23/19:212280	2320B	10/23/19:216690
Sulfate	12.7	0.5	mg/L		300.0	10/15/19:211931	300.0	10/15/19:216165
Chloride	229	5*	mg/L		300.0	10/15/19:211931	300.0	10/16/19:216165
Nitrate as NO3	8.7	0.4	mg/L		300.0	10/15/19:211931	300.0	10/15/19:216165
Nitrite as N	ND	0.2	mg/L		300.0	10/15/19:211931	300.0	10/15/19:216165
Nitrate + Nitrite as N	2.0	0.1	mg/L		300.0	10/15/19:211931	300.0	10/15/19:216165
Fluoride	ND	0.1	mg/L		300.0	10/15/19:211931	300.0	10/15/19:216165
Total Anions	8.2	--	meq/L		2320B	10/23/19:212280	2320B	10/23/19:216690
pH	7.1	--	units		4500-H B	10/17/19:212020	4500HB	10/17/19:216300
Specific Conductance	961	1	umhos/cm		2510B	10/26/19:212410	2510B	10/26/19:216829
Total Dissolved Solids	830	20	mg/L		2540CE	10/16/19:211940	2540C	10/17/19:216301
MBAS Screen	Negative	0.1	mg/L		5540C	10/15/19:212284	5540C	10/15/19:216627
Aggressiveness Index	11.1	--	--		4500-H B	10/17/19:212020	4500HB	10/17/19:216300
Langelier Index (20°C)	-0.8	--	--		4500-H B	10/17/19:212020	4500HB	10/17/19:216300
Nitrate Nitrogen	2.0	0.1	mg/L		300.0	10/15/19:211931	300.0	10/15/19:216165

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

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA ELAP Certification No. 1573

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

November 7, 2019

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401
Description : 13J1 Rosina LA-10
Project : Los Osos BMC Monitoring

Lab ID : CC 1983629-003
Customer ID : 8-514

Sampled On : October 14, 2019-11:30
Sampled By : Zac Reineke
Received On : October 14, 2019-14:35
Matrix : Ground Water

Sample Result - Support

Constituent	Result	PQL	Units	Note	Sample Preparation		Sample Analysis	
					Method	Date/ID	Method	Date/ID
Field Test								
Temperature	68.1		°F			10/14/19 11:30	2550B	10/14/19 11:30
Conductivity	977		umhos/cm			10/14/19 11:30	2510B	10/14/19 11:30

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

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA ELAP Certification No. 1573

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

October 16, 2019

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401
Description : 12J1 (LA11) LA-11
Project : Los Osos BMC Monitoring

Lab ID : CC 1983436-001
Customer ID : 8-514

Sampled On : October 2, 2019-11:32
Sampled By : James Carlson
Received On : October 2, 2019-14:53
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	570	--	mg/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Calcium	80	1	mg/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Magnesium	90	1	mg/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Potassium	5	1	mg/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Sodium	91	1	mg/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Total Cations	15.5	--	meq/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Boron	0.3	0.1	mg/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Copper	ND	10	ug/L		200.7	10/04/19:211494	200.7	10/08/19:215799
Iron	130	30	ug/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Manganese	40	10	ug/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Zinc	ND	20	ug/L		200.7	10/04/19:211494	200.7	10/08/19:215735
SAR	1.7	--	--		200.7	10/04/19:211494	200.7	10/08/19:215735
Total Alkalinity (as CaCO3)	290	10	mg/L		2320B	10/14/19:211819	2320B	10/15/19:216120
Hydroxide as OH	ND	10	mg/L		2320B	10/14/19:211819	2320B	10/15/19:216120
Carbonate as CO3	50	10	mg/L		2320B	10/14/19:211819	2320B	10/15/19:216120
Bicarbonate as HCO3	250	10	mg/L		2320B	10/14/19:211819	2320B	10/15/19:216120
Sulfate	189	0.5	mg/L		300.0	10/03/19:211476	300.0	10/04/19:215514
Chloride	187	5*	mg/L		300.0	10/03/19:211476	300.0	10/04/19:215514
Nitrate as NO3	ND	0.4	mg/L		300.0	10/03/19:211476	300.0	10/04/19:215514
Nitrite as N	ND	0.2	mg/L		300.0	10/03/19:211476	300.0	10/04/19:215514
Nitrate + Nitrite as N	ND	0.1	mg/L		300.0	10/03/19:211476	300.0	10/04/19:215514
Fluoride	0.1	0.1	mg/L		300.0	10/03/19:211476	300.0	10/04/19:215514
Total Anions	15.0	--	meq/L		2320B	10/14/19:211819	2320B	10/15/19:216120
pH	7.6	--	units		4500-H B	10/10/19:211741	4500HB	10/10/19:215893
Specific Conductance	1520	1	umhos/cm		2510B	10/10/19:211747	2510B	10/10/19:215900
Total Dissolved Solids	1000	20	mg/L		2540CE	10/04/19:211481	2540C	10/07/19:215640
MBAS Screen	Negative	0.1	mg/L		5540C	10/03/19:211570	5540C	10/03/19:215649
Aggressiveness Index	12.4	--	--		4500-H B	10/10/19:211741	4500HB	10/10/19:215893
Langelier Index (20°C)	0.5	--	--		4500-H B	10/10/19:211741	4500HB	10/10/19:215893
Nitrate Nitrogen	ND	0.1	mg/L		300.0	10/03/19:211476	300.0	10/04/19:215514

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

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA ELAP Certification No. 1573

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

October 16, 2019

Lab ID : CC 1983436-002
Customer ID : 8-514

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

Sampled On : October 2, 2019-11:59
Sampled By : James Carlson
Received On : October 2, 2019-14:53
Matrix : Ground Water

Description : 7Q3 (LA12) LA-12
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	312	--	mg/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Calcium	49	1	mg/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Magnesium	46	1	mg/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Potassium	2	1	mg/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Sodium	56	1	mg/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Total Cations	8.7	--	meq/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Boron	0.2	0.1	mg/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Copper	ND	10	ug/L		200.7	10/04/19:211494	200.7	10/08/19:215799
Iron	90	30	ug/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Manganese	50	10	ug/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Zinc	ND	20	ug/L		200.7	10/04/19:211494	200.7	10/08/19:215735
SAR	1.4	--	--		200.7	10/04/19:211494	200.7	10/08/19:215735
Total Alkalinity (as CaCO3)	280	10	mg/L		2320B	10/14/19:211819	2320B	10/15/19:216120
Hydroxide as OH	ND	10	mg/L		2320B	10/14/19:211819	2320B	10/15/19:216120
Carbonate as CO3	20	10	mg/L		2320B	10/14/19:211819	2320B	10/15/19:216120
Bicarbonate as HCO3	290	10	mg/L		2320B	10/14/19:211819	2320B	10/15/19:216120
Sulfate	50.9	0.5	mg/L		300.0	10/03/19:211476	300.0	10/04/19:215514
Chloride	91	1	mg/L		300.0	10/03/19:211476	300.0	10/04/19:215514
Nitrate as NO3	ND	0.4	mg/L		300.0	10/03/19:211476	300.0	10/04/19:215514
Nitrite as N	ND	0.2	mg/L		300.0	10/03/19:211476	300.0	10/04/19:215514
Nitrate + Nitrite as N	ND	0.1	mg/L		300.0	10/03/19:211476	300.0	10/04/19:215514
Fluoride	ND	0.1	mg/L		300.0	10/03/19:211476	300.0	10/04/19:215514
Total Anions	9.0	--	meq/L		2320B	10/14/19:211819	2320B	10/15/19:216120
pH	8.0	--	units		4500-H B	10/15/19:211902	4500HB	10/15/19:216106
Specific Conductance	877	1	umhos/cm		2510B	10/10/19:211747	2510B	10/10/19:215900
Total Dissolved Solids	530	20	mg/L		2540CE	10/04/19:211481	2540C	10/07/19:215640
MBAS Screen	Negative	0.1	mg/L		5540C	10/03/19:211570	5540C	10/03/19:215649
Aggressiveness Index	12.5	--	--		4500-H B	10/15/19:211902	4500HB	10/15/19:216106
Langelier Index (20°C)	0.7	--	--		4500-H B	10/15/19:211902	4500HB	10/15/19:216106
Nitrate Nitrogen	ND	0.1	mg/L		300.0	10/03/19:211476	300.0	10/04/19:215514

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

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA ELAP Certification No. 1573

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

October 16, 2019

Lab ID : CC 1983436-005
Customer ID : 8-514

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401
Description : 1862 (LA15) LA-15
Project : Los Osos BMC Monitoring

Sampled On : October 2, 2019-12:43
Sampled By : James Carlson
Received On : October 2, 2019-14:53
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	137	--	mg/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Calcium	22	1	mg/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Magnesium	20	1	mg/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Potassium	1	1	mg/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Sodium	29	1	mg/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Total Cations	4.0	--	meq/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Boron	ND	0.1	mg/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Copper	ND	10	ug/L		200.7	10/04/19:211494	200.7	10/08/19:215799
Iron	ND	30	ug/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Manganese	ND	10	ug/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Zinc	ND	20	ug/L		200.7	10/04/19:211494	200.7	10/08/19:215735
SAR	1.1	--	--		200.7	10/04/19:211494	200.7	10/08/19:215735
Total Alkalinity (as CaCO3)	80	10	mg/L		2320B	10/14/19:211819	2320B	10/15/19:216120
Hydroxide as OH	ND	10	mg/L		2320B	10/14/19:211819	2320B	10/15/19:216120
Carbonate as CO3	ND	10	mg/L		2320B	10/14/19:211819	2320B	10/15/19:216120
Bicarbonate as HCO3	100	10	mg/L		2320B	10/14/19:211819	2320B	10/15/19:216120
Sulfate	13.4	0.5	mg/L		300.0	10/03/19:211467	300.0	10/04/19:215513
Chloride	44	1	mg/L		300.0	10/03/19:211467	300.0	10/04/19:215513
Nitrate as NO3	30.0	0.4	mg/L		300.0	10/03/19:211467	300.0	10/04/19:215513
Nitrite as N	ND	0.2	mg/L		300.0	10/03/19:211467	300.0	10/04/19:215513
Nitrate + Nitrite as N	6.8	0.1	mg/L		300.0	10/03/19:211467	300.0	10/04/19:215513
Fluoride	ND	0.1	mg/L		300.0	10/03/19:211467	300.0	10/04/19:215513
Total Anions	3.6	--	meq/L		2320B	10/14/19:211819	2320B	10/15/19:216120
pH	7.3	--	units		4500-H B	10/10/19:211741	4500HB	10/10/19:215893
Specific Conductance	389	1	umhos/cm		2510B	10/10/19:211747	2510B	10/10/19:215900
Total Dissolved Solids	270	20	mg/L		2540CE	10/04/19:211481	2540C	10/07/19:215640
MBAS Screen	Negative	0.1	mg/L		5540C	10/03/19:211570	5540C	10/03/19:215649
Aggressiveness Index	10.9	--	--		4500-H B	10/10/19:211741	4500HB	10/10/19:215893
Langelier Index (20°C)	-0.9	--	--		4500-H B	10/10/19:211741	4500HB	10/10/19:215893
Nitrate Nitrogen	6.8	0.1	mg/L		300.0	10/03/19:211467	300.0	10/04/19:215513

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

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA ELAP Certification No. 1573

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

November 7, 2019

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 ID : CC 1983602-001
Customer ID : 8-514

Sampled On : October 9, 2019-12:26
Sampled By : James Carlson
Received On : October 9, 2019-15:22
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	253	--	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Calcium	52	1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Magnesium	30	1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Potassium	2	1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Sodium	26	1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Total Cations	6.2	--	meq/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Boron	ND	0.1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Copper	ND	10	ug/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Iron	ND	30	ug/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Manganese	80	10	ug/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Zinc	ND	20	ug/L		200.7	10/16/19:211980	200.7	10/16/19:216320
SAR	0.7	--	--		200.7	10/16/19:211980	200.7	10/16/19:216320
Total Alkalinity (as CaCO3)	240	10	mg/L		2320B	10/21/19:212160	2320B	10/21/19:216546
Hydroxide as OH	ND	10	mg/L		2320B	10/21/19:212160	2320B	10/21/19:216546
Carbonate as CO3	ND	10	mg/L		2320B	10/21/19:212160	2320B	10/21/19:216546
Bicarbonate as HCO3	290	10	mg/L		2320B	10/21/19:212160	2320B	10/21/19:216546
Sulfate	40.5	0.5	mg/L		300.0	10/10/19:211760	300.0	10/10/19:216025
Chloride	33	1	mg/L		300.0	10/10/19:211760	300.0	10/10/19:216025
Nitrate as NO3	ND	0.4	mg/L		300.0	10/10/19:211760	300.0	10/10/19:216025
Nitrite as N	ND	0.2	mg/L		300.0	10/10/19:211760	300.0	10/10/19:216025
Nitrate + Nitrite as N	ND	0.1	mg/L		300.0	10/10/19:211760	300.0	10/10/19:216025
Fluoride	0.3	0.1	mg/L		300.0	10/10/19:211760	300.0	10/10/19:216025
Total Anions	6.5	--	meq/L		2320B	10/21/19:212160	2320B	10/21/19:216546
pH	7.9	--	units		4500-H B	10/15/19:211902	4500HB	10/15/19:216106
Specific Conductance	647	1	umhos/cm		2510B	10/19/19:212107	2510B	10/19/19:216398
Total Dissolved Solids	390	20	mg/L		2540CE	10/11/19:211780	2540C	10/14/19:216039
MBAS Screen	Negative	0.1	mg/L		5540C	10/10/19:211888	5540C	10/10/19:216621
Aggressiveness Index	12.4	--	--		4500-H B	10/15/19:211902	4500HB	10/15/19:216106
Langelier Index (20°C)	0.5	--	--		4500-H B	10/15/19:211902	4500HB	10/15/19:216106
Nitrate Nitrogen	ND	0.1	mg/L		300.0	10/10/19:211760	300.0	10/10/19:216025

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

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA ELAP Certification No. 1573

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

November 7, 2019

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401
Description : 17N10 South Bay LA-20
Project : Los Osos BMC Monitoring

Lab ID : CC 1983629-001
Customer ID : 8-514

Sampled On : October 14, 2019-09:20
Sampled By : Zac Reineke
Received On : October 14, 2019-14:35
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	221	--	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Calcium	34	1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Magnesium	33	1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Potassium	2	1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Sodium	40	1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Total Cations	6.2	--	meq/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Boron	ND	0.1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Copper	ND	10	ug/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Iron	ND	30	ug/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Manganese	ND	10	ug/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Zinc	ND	20	ug/L		200.7	10/16/19:211980	200.7	10/16/19:216320
SAR	1.2	--	--		200.7	10/16/19:211980	200.7	10/16/19:216320
Total Alkalinity (as CaCO3)	240	10	mg/L		2320B	10/23/19:212280	2320B	10/23/19:216690
Hydroxide as OH	ND	10	mg/L		2320B	10/23/19:212280	2320B	10/23/19:216690
Carbonate as CO3	ND	10	mg/L		2320B	10/23/19:212280	2320B	10/23/19:216690
Bicarbonate as HCO3	290	10	mg/L		2320B	10/23/19:212280	2320B	10/23/19:216690
Sulfate	29.0	0.5	mg/L		300.0	10/15/19:211931	300.0	10/15/19:216165
Chloride	41	1	mg/L		300.0	10/15/19:211931	300.0	10/15/19:216165
Nitrate as NO3	3.0	0.4	mg/L		300.0	10/15/19:211931	300.0	10/15/19:216165
Nitrite as N	ND	0.2	mg/L		300.0	10/15/19:211931	300.0	10/15/19:216165
Nitrate + Nitrite as N	0.7	0.1	mg/L		300.0	10/15/19:211931	300.0	10/15/19:216165
Fluoride	0.2	0.1	mg/L		300.0	10/15/19:211931	300.0	10/15/19:216165
Total Anions	6.6	--	meq/L		2320B	10/23/19:212280	2320B	10/23/19:216690
pH	7.2	--	units		4500-H B	10/17/19:212020	4500HB	10/17/19:216300
Specific Conductance	626	1	umhos/cm		2510B	10/26/19:212410	2510B	10/26/19:216829
Total Dissolved Solids	380	20	mg/L		2540CE	10/16/19:211940	2540C	10/17/19:216301
MBAS Screen	Negative	0.1	mg/L		5540C	10/15/19:212284	5540C	10/15/19:216627
Aggressiveness Index	11.5	--	--		4500-H B	10/17/19:212020	4500HB	10/17/19:216300
Langelier Index (20°C)	-0.3	--	--		4500-H B	10/17/19:212020	4500HB	10/17/19:216300
Nitrate Nitrogen	0.7	0.1	mg/L		300.0	10/15/19:211931	300.0	10/15/19:216165

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

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA ELAP Certification No. 1573

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

November 7, 2019

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401
Description : 17N10 South Bay LA-20
Project : Los Osos BMC Monitoring

Lab ID : CC 1983629-001
Customer ID : 8-514

Sampled On : October 14, 2019-09:20
Sampled By : Zac Reineke
Received On : October 14, 2019-14:35
Matrix : Ground Water

Sample Result - Support

Constituent	Result	PQL	Units	Note	Sample Preparation		Sample Analysis	
					Method	Date/ID	Method	Date/ID
Field Test								
Temperature	68.9		°F			10/14/19 09:20	2550B	10/14/19 09:20
Conductivity	640		umhos/cm			10/14/19 09:20	2510B	10/14/19 09:20

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

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA ELAP Certification No. 1573

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

November 7, 2019

Lab ID : CC 1983602-002
Customer ID : 8-514

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

Sampled On : October 9, 2019-14:37
Sampled By : James Carlson
Received On : October 9, 2019-15:22
Matrix : Ground Water

Description : 17E8 (LA22) LA-22
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	155	--	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Calcium	24	1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Magnesium	23	1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Potassium	1	1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Sodium	28	1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Total Cations	4.3	--	meq/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Boron	ND	0.1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Copper	ND	10	ug/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Iron	ND	30	ug/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Manganese	ND	10	ug/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Zinc	ND	20	ug/L		200.7	10/16/19:211980	200.7	10/16/19:216320
SAR	1.0	--	--		200.7	10/16/19:211980	200.7	10/16/19:216320
Total Alkalinity (as CaCO3)	120	10	mg/L		2320B	10/21/19:212160	2320B	10/21/19:216546
Hydroxide as OH	ND	10	mg/L		2320B	10/21/19:212160	2320B	10/21/19:216546
Carbonate as CO3	ND	10	mg/L		2320B	10/21/19:212160	2320B	10/21/19:216546
Bicarbonate as HCO3	150	10	mg/L		2320B	10/21/19:212160	2320B	10/21/19:216546
Sulfate	14.9	0.5	mg/L		300.0	10/10/19:211760	300.0	10/10/19:216025
Chloride	49	1	mg/L		300.0	10/10/19:211760	300.0	10/10/19:216025
Nitrate as NO3	30.8	0.4	mg/L		300.0	10/10/19:211760	300.0	10/10/19:216025
Nitrite as N	ND	0.2	mg/L		300.0	10/10/19:211760	300.0	10/10/19:216025
Nitrate + Nitrite as N	7.0	0.1	mg/L		300.0	10/10/19:211760	300.0	10/10/19:216025
Fluoride	ND	0.1	mg/L		300.0	10/10/19:211760	300.0	10/10/19:216025
Total Anions	4.6	--	meq/L		2320B	10/21/19:212160	2320B	10/21/19:216546
pH	7.3	--	units		4500-H B	10/17/19:212020	4500HB	10/17/19:216300
Specific Conductance	485	1	umhos/cm		2510B	10/19/19:212107	2510B	10/19/19:216398
Total Dissolved Solids	270	20	mg/L		2540CE	10/11/19:211780	2540C	10/14/19:216039
MBAS Screen	Negative	0.1	mg/L		5540C	10/10/19:211888	5540C	10/10/19:216621
Aggressiveness Index	11.2	--	--		4500-H B	10/17/19:212020	4500HB	10/17/19:216300
Langelier Index (20°C)	-0.7	--	--		4500-H B	10/17/19:212020	4500HB	10/17/19:216300
Nitrate Nitrogen	7.0	0.1	mg/L		300.0	10/10/19:211760	300.0	10/10/19:216025

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

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA ELAP Certification No. 1573

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

October 23, 2019

Lab ID : CC 1983504-001
Customer ID : 8-514

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

Sampled On : October 3, 2019-10:25
Sampled By : Andrea Berge
Received On : October 3, 2019-14:59
Matrix : Ground Water

Description : 20H1 (LA30) LA-30
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	363	--	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Calcium	63	1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Magnesium	50	1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Potassium	2	1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Sodium	37	1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Total Cations	8.9	--	meq/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Boron	0.1	0.1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Copper	ND	10	ug/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Iron	1000	30	ug/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Manganese	160	10	ug/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Zinc	ND	20	ug/L		200.7	10/16/19:211980	200.7	10/16/19:216320
SAR	0.8	--	--		200.7	10/16/19:211980	200.7	10/16/19:216320
Total Alkalinity (as CaCO3)	310	10	mg/L		2320B	10/15/19:211921	2320B	10/15/19:216188
Hydroxide as OH	ND	10	mg/L		2320B	10/15/19:211921	2320B	10/15/19:216188
Carbonate as CO3	ND	10	mg/L		2320B	10/15/19:211921	2320B	10/15/19:216188
Bicarbonate as HCO3	380	10	mg/L		2320B	10/15/19:211921	2320B	10/15/19:216188
Sulfate	82.3	0.5	mg/L		300.0	10/04/19:211547	300.0	10/04/19:215622
Chloride	59	1	mg/L		300.0	10/04/19:211547	300.0	10/04/19:215622
Nitrate as NO3	ND	0.4	mg/L		300.0	10/04/19:211547	300.0	10/04/19:215622
Nitrite as N	ND	0.2	mg/L		300.0	10/04/19:211547	300.0	10/04/19:215622
Nitrate + Nitrite as N	ND	0.1	mg/L		300.0	10/04/19:211547	300.0	10/04/19:215622
Fluoride	0.2	0.1	mg/L		300.0	10/04/19:211547	300.0	10/04/19:215622
Total Anions	9.6	--	meq/L		2320B	10/15/19:211921	2320B	10/15/19:216188
pH	7.5	--	units		4500-H B	10/10/19:211741	4500HB	10/10/19:215893
Specific Conductance	981	1	umhos/cm		2510B	10/14/19:211887	2510B	10/14/19:216076
Total Dissolved Solids	530	20	mg/L		2540CE	10/08/19:211617	2540C	10/09/19:215826
MBAS Screen	Negative	0.1	mg/L		5540C	10/04/19:211571	5540C	10/04/19:215650
Aggressiveness Index	12.2	--	--		4500-H B	10/10/19:211741	4500HB	10/10/19:215893
Langelier Index (20°C)	0.3	--	--		4500-H B	10/10/19:211741	4500HB	10/10/19:215893
Nitrate Nitrogen	ND	0.1	mg/L		300.0	10/04/19:211547	300.0	10/04/19:215622

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

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA ELAP Certification No. 1573

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

October 23, 2019

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 ID : CC 1983504-003
Customer ID : 8-514

Sampled On : October 3, 2019-12:28
Sampled By : Andrea Berge
Received On : October 3, 2019-14:59
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	574	--	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Calcium	90	1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Magnesium	85	1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Potassium	4	1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Sodium	340	1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Total Cations	26.4	--	meq/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Boron	0.2	0.1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Copper	ND	10	ug/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Iron	40	30	ug/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Manganese	ND	10	ug/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Zinc	ND	20	ug/L		200.7	10/16/19:211980	200.7	10/16/19:216320
SAR	6.2	--	--		200.7	10/16/19:211980	200.7	10/16/19:216320
Total Alkalinity (as CaCO3)	50	10	mg/L		2320B	10/15/19:211921	2320B	10/15/19:216188
Hydroxide as OH	ND	10	mg/L		2320B	10/15/19:211921	2320B	10/15/19:216188
Carbonate as CO3	ND	10	mg/L		2320B	10/15/19:211921	2320B	10/15/19:216188
Bicarbonate as HCO3	70	10	mg/L		2320B	10/15/19:211921	2320B	10/15/19:216188
Sulfate	169	0.5	mg/L		300.0	10/04/19:211547	300.0	10/04/19:215622
Chloride	827	17*	mg/L		300.0	10/04/19:211547	300.0	10/05/19:215622
Nitrate as NO3	2.9	0.4	mg/L		300.0	10/04/19:211547	300.0	10/04/19:215622
Nitrite as N	ND	0.2	mg/L		300.0	10/04/19:211547	300.0	10/04/19:215622
Nitrate + Nitrite as N	0.7	0.1	mg/L		300.0	10/04/19:211547	300.0	10/04/19:215622
Fluoride	ND	0.1	mg/L		300.0	10/04/19:211547	300.0	10/04/19:215622
Total Anions	28.0	--	meq/L		2320B	10/15/19:211921	2320B	10/15/19:216188
pH	7.4	--	units		4500-H B	10/10/19:211741	4500HB	10/10/19:215893
Specific Conductance	3120	1	umhos/cm		2510B	10/17/19:212060	2510B	10/17/19:216340
Total Dissolved Solids	2120	20	mg/L		2540CE	10/08/19:211617	2540C	10/09/19:215826
MBAS Screen	Negative	0.1	mg/L		5540C	10/04/19:211571	5540C	10/04/19:215650
Aggressiveness Index	11.5	--	--		4500-H B	10/10/19:211741	4500HB	10/10/19:215893
Langelier Index (20°C)	-0.5	--	--		4500-H B	10/10/19:211741	4500HB	10/10/19:215893
Nitrate Nitrogen	0.7	0.1	mg/L		300.0	10/04/19:211547	300.0	10/04/19:215622

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

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA ELAP Certification No. 1573

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

October 16, 2019

Lab ID : CC 1983436-003
Customer ID : 8-514

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

Sampled On : October 2, 2019-12:18
Sampled By : James Carlson
Received On : October 2, 2019-14:53
Matrix : Ground Water

Description : 18K9 (LA32) LA-32
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	185	--	mg/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Calcium	28	1	mg/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Magnesium	28	1	mg/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Potassium	1	1	mg/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Sodium	35	1	mg/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Total Cations	5.2	--	meq/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Boron	0.1	0.1	mg/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Copper	ND	10	ug/L		200.7	10/04/19:211494	200.7	10/08/19:215799
Iron	ND	30	ug/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Manganese	ND	10	ug/L		200.7	10/04/19:211494	200.7	10/08/19:215735
Zinc	ND	20	ug/L		200.7	10/04/19:211494	200.7	10/08/19:215735
SAR	1.1	--	--		200.7	10/04/19:211494	200.7	10/08/19:215735
Total Alkalinity (as CaCO3)	180	10	mg/L		2320B	10/14/19:211819	2320B	10/15/19:216120
Hydroxide as OH	ND	10	mg/L		2320B	10/14/19:211819	2320B	10/15/19:216120
Carbonate as CO3	ND	10	mg/L		2320B	10/14/19:211819	2320B	10/15/19:216120
Bicarbonate as HCO3	200	10	mg/L		2320B	10/14/19:211819	2320B	10/15/19:216120
Sulfate	24.7	0.5	mg/L		300.0	10/03/19:211467	300.0	10/04/19:215513
Chloride	36	1	mg/L		300.0	10/03/19:211467	300.0	10/04/19:215513
Nitrate as NO3	6.3	0.4	mg/L		300.0	10/03/19:211467	300.0	10/04/19:215513
Nitrite as N	ND	0.2	mg/L		300.0	10/03/19:211467	300.0	10/04/19:215513
Nitrate + Nitrite as N	1.4	0.1	mg/L		300.0	10/03/19:211467	300.0	10/04/19:215513
Fluoride	0.1	0.1	mg/L		300.0	10/03/19:211467	300.0	10/04/19:215513
Total Anions	4.9	--	meq/L		2320B	10/14/19:211819	2320B	10/15/19:216120
pH	7.4	--	units		4500-H B	10/10/19:211741	4500HB	10/10/19:215893
Specific Conductance	531	1	umhos/cm		2510B	10/10/19:211747	2510B	10/10/19:215900
Total Dissolved Solids	310	20	mg/L		2540CE	10/04/19:211481	2540C	10/07/19:215640
MBAS Screen	Negative	0.1	mg/L		5540C	10/03/19:211570	5540C	10/03/19:215649
Aggressiveness Index	11.5	--	--		4500-H B	10/10/19:211741	4500HB	10/10/19:215893
Langelier Index (20°C)	-0.3	--	--		4500-H B	10/10/19:211741	4500HB	10/10/19:215893
Nitrate Nitrogen	1.4	0.1	mg/L		300.0	10/03/19:211467	300.0	10/04/19:215513

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

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA ELAP Certification No. 1573

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

November 7, 2019

Lab ID : CC 1983629-004
Customer ID : 8-514

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

Sampled On : October 14, 2019-12:20
Sampled By : Zac Reineke
Received On : October 14, 2019-14:35
Matrix : Ground Water

Description : 18K Lo#5 LA-39
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	225	--	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Calcium	34	1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Magnesium	34	1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Potassium	1	1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Sodium	41	1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Total Cations	6.3	--	meq/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Boron	ND	0.1	mg/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Copper	ND	10	ug/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Iron	ND	30	ug/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Manganese	ND	10	ug/L		200.7	10/16/19:211980	200.7	10/16/19:216320
Zinc	ND	20	ug/L		200.7	10/16/19:211980	200.7	10/16/19:216320
SAR	1.2	--	--		200.7	10/16/19:211980	200.7	10/16/19:216320
Total Alkalinity (as CaCO3)	240	10	mg/L		2320B	10/23/19:212280	2320B	10/23/19:216690
Hydroxide as OH	ND	10	mg/L		2320B	10/23/19:212280	2320B	10/23/19:216690
Carbonate as CO3	ND	10	mg/L		2320B	10/23/19:212280	2320B	10/23/19:216690
Bicarbonate as HCO3	300	10	mg/L		2320B	10/23/19:212280	2320B	10/23/19:216690
Sulfate	28.6	0.5	mg/L		300.0	10/15/19:211941	300.0	10/15/19:216184
Chloride	37	1	mg/L		300.0	10/15/19:211941	300.0	10/15/19:216184
Nitrate as NO3	ND	0.4	mg/L		300.0	10/15/19:211941	300.0	10/15/19:216184
Nitrite as N	ND	0.2	mg/L		300.0	10/15/19:211941	300.0	10/15/19:216184
Nitrate + Nitrite as N	ND	0.1	mg/L		300.0	10/15/19:211941	300.0	10/15/19:216184
Fluoride	0.1	0.1	mg/L		300.0	10/15/19:211941	300.0	10/15/19:216184
Total Anions	6.6	--	meq/L		2320B	10/23/19:212280	2320B	10/23/19:216690
pH	7.2	--	units		4500-H B	10/17/19:212020	4500HB	10/17/19:216300
Specific Conductance	628	1	umhos/cm		2510B	10/26/19:212410	2510B	10/26/19:216829
Total Dissolved Solids	370	20	mg/L		2540CE	10/16/19:211940	2540C	10/17/19:216301
MBAS Screen	Negative	0.1	mg/L		5540C	10/15/19:212284	5540C	10/15/19:216627
Aggressiveness Index	11.5	--	--		4500-H B	10/17/19:212020	4500HB	10/17/19:216300
Langelier Index (20°C)	-0.3	--	--		4500-H B	10/17/19:212020	4500HB	10/17/19:216300
Nitrate Nitrogen	ND	0.1	mg/L		300.0	10/15/19:211941	300.0	10/15/19:216184

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

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA ELAP Certification No. 1573

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

November 7, 2019

Cleath-Harris Geologists
Attn: Spencer Harris
75 Zaca Lane
Suite 110
San Luis Obispo, CA 93401
Description : 18K Lo#5 LA-39
Project : Los Osos BMC Monitoring

Lab ID : CC 1983629-004
Customer ID : 8-514

Sampled On : October 14, 2019-12:20
Sampled By : Zac Reineke
Received On : October 14, 2019-14:35
Matrix : Ground Water

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	70.2		°F			10/14/19 12:20	2550B	10/14/19 12:20
Conductivity	652		umhos/cm			10/14/19 12:20	2510B	10/14/19 12:20

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

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA ELAP Certification No. 1573

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

December 4, 2019

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

Lab ID : CC 1983911-001
Customer ID : 8-514

Sampled On : November 6, 2019-11:49
Sampled By : Spencer Harris
Received On : November 6, 2019-14:15
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	2090	--	mg/L		200.7	11/12/19:213078	200.7	11/18/19:218087
Calcium	388	1	mg/L		200.7	11/12/19:213078	200.7	11/18/19:218087
Magnesium	272	1	mg/L		200.7	11/12/19:213078	200.7	11/18/19:218087
Potassium	6	1	mg/L		200.7	11/12/19:213078	200.7	11/18/19:218087
Sodium	182	1	mg/L		200.7	11/12/19:213078	200.7	11/18/19:218087
Total Cations	49.8	--	meq/L		200.7	11/12/19:213078	200.7	11/18/19:218087
Boron	ND	0.1	mg/L		200.7	11/12/19:213078	200.7	11/18/19:218087
Copper	ND	10	ug/L		200.7	11/12/19:213078	200.7	11/19/19:218124
Iron	ND	30	ug/L		200.7	11/12/19:213078	200.7	11/18/19:218087
Manganese	60	10	ug/L		200.7	11/12/19:213078	200.7	11/18/19:218087
Zinc	ND	20	ug/L		200.7	11/12/19:213078	200.7	11/18/19:218087
SAR	1.7	--	--		200.7	11/12/19:213078	200.7	11/18/19:218087
Total Alkalinity (as CaCO3)	170	10	mg/L		2320B	11/19/19:213362	2320B	11/20/19:218198
Hydroxide as OH	ND	10	mg/L		2320B	11/19/19:213362	2320B	11/20/19:218198
Carbonate as CO3	ND	10	mg/L		2320B	11/19/19:213362	2320B	11/20/19:218198
Bicarbonate as HCO3	210	10	mg/L		2320B	11/19/19:213362	2320B	11/20/19:218198
Sulfate	224	4*	mg/L		300.0	11/25/19:213623	300.0	11/25/19:218466
Chloride	1460	20*	mg/L		300.0	11/25/19:213623	300.0	11/25/19:218466
Nitrate as NO3	5.9	0.9	mg/L		4500NO3F	11/07/19:212865	4500NO3F	11/07/19:217486
Nitrite as N	0.3	0.1	mg/L		4500NO2F	11/07/19:212866	4500NO3F	11/07/19:217482
Nitrate + Nitrite as N	1.6	0.2	mg/L		4500NO3F	11/07/19:212865	4500NO3F	11/07/19:217486
Fluoride	ND	0.1	mg/L		300.0	11/25/19:213623	300.0	11/25/19:218466
Total Anions	49.4	--	meq/L		2320B	11/19/19:213362	2320B	11/20/19:218198
pH	7.0	--	units		4500-H B	11/21/19:213466	4500HB	11/21/19:218274
Specific Conductance	5330	1	umhos/cm		2510B	11/27/19:213676	2510B	11/27/19:218554
Total Dissolved Solids	4750	20*	mg/L		2540CE	11/08/19:212915	2540C	11/11/19:217645
MBAS Screen	Negative	0.1	mg/L		5540C	11/07/19:213304	5540C	11/07/19:218029
Aggressiveness Index	12.2	--	--		4500-H B	11/21/19:213466	4500HB	11/21/19:218274
Langelier Index (20°C)	0.2	--	--		4500-H B	11/21/19:213466	4500HB	11/21/19:218274
Nitrate Nitrogen	1.3	0.2	mg/L		4500NO3F	11/07/19:212865	4500NO3F	11/07/19:217486

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

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA ELAP Certification No. 1573

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

November 26, 2019

Lab ID : CC 1983936-001
Customer ID : 8-514

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

Sampled On : November 7, 2019-10:59
Sampled By : James Carlson
Received On : November 7, 2019-12:47
Matrix : Ground Water

Description : Lupine Zone D (LA41) LA-41
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	312	--	mg/L		200.7	11/12/19:213078	200.7	11/18/19:218087
Calcium	69	1	mg/L		200.7	11/12/19:213078	200.7	11/18/19:218087
Magnesium	34	1	mg/L		200.7	11/12/19:213078	200.7	11/18/19:218087
Potassium	4	1	mg/L		200.7	11/12/19:213078	200.7	11/18/19:218087
Sodium	140	1	mg/L		200.7	11/12/19:213078	200.7	11/18/19:218087
Total Cations	12.4	--	meq/L		200.7	11/12/19:213078	200.7	11/18/19:218087
Boron	ND	0.1	mg/L		200.7	11/12/19:213078	200.7	11/18/19:218087
Copper	ND	10	ug/L		200.7	11/12/19:213078	200.7	11/19/19:218124
Iron	1370	30	ug/L		200.7	11/12/19:213078	200.7	11/18/19:218087
Manganese	60	10	ug/L		200.7	11/12/19:213078	200.7	11/18/19:218087
Zinc	ND	20	ug/L		200.7	11/12/19:213078	200.7	11/18/19:218087
SAR	3.4	--	--		200.7	11/12/19:213078	200.7	11/18/19:218087
Total Alkalinity (as CaCO3)	170	10	mg/L		2320B	11/20/19:213413	2320B	11/21/19:218260
Hydroxide as OH	ND	10	mg/L		2320B	11/20/19:213413	2320B	11/21/19:218260
Carbonate as CO3	ND	10	mg/L		2320B	11/20/19:213413	2320B	11/21/19:218260
Bicarbonate as HCO3	210	10	mg/L		2320B	11/20/19:213413	2320B	11/21/19:218260
Sulfate	188	0.5	mg/L		300.0	11/08/19:212977	300.0	11/08/19:217611
Chloride	136	3*	mg/L		300.0	11/08/19:212977	300.0	11/09/19:217611
Nitrate as NO3	13.6	0.4	mg/L		300.0	11/08/19:212977	300.0	11/08/19:217611
Nitrite as N	0.3	0.2	mg/L		300.0	11/08/19:212977	300.0	11/08/19:217611
Nitrate + Nitrite as N	3.4	0.1	mg/L		300.0	11/08/19:212977	300.0	11/08/19:217611
Fluoride	0.1	0.1	mg/L		300.0	11/08/19:212977	300.0	11/08/19:217611
Total Anions	11.4	--	meq/L		2320B	11/20/19:213413	2320B	11/21/19:218260
pH	7.7	--	units		4500-H B	11/21/19:213466	4500HB	11/21/19:218274
Specific Conductance	1310	1	umhos/cm		2510B	11/21/19:213483	2510B	11/21/19:218294
Total Dissolved Solids	760	20	mg/L		2540CE	11/11/19:213001	2540C	11/12/19:217714
MBAS Screen	Negative	0.1	mg/L		5540C	11/08/19:213305	5540C	11/08/19:218030
Aggressiveness Index	12.2	--	--		4500-H B	11/21/19:213466	4500HB	11/21/19:218274
Langelier Index (20°C)	0.3	--	--		4500-H B	11/21/19:213466	4500HB	11/21/19:218274
Nitrate Nitrogen	3.1	0.1	mg/L		300.0	11/08/19:212977	300.0	11/08/19:217611

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

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA ELAP Certification No. 1573

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

CEC Testing

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 10/16/2019
Operator: A. Berge, J. Carlson
Well number and location: 30S/11E-13Q2 (FW5)
Site and wellhead conditions: Overcast and cold. Well secure and locked, one bolt missing.

Static water depth (feet): 81.87
Well depth (feet): 105
Water column (feet): 23.13
Casing diameter (inches): 2
Minimum purge volume (gal) 11.31
Purge rate (gpm): 1.5
Pumping water level (feet): --
Pump setting (feet): 100
Minimum purge time (min): 35
Time begin purge: 10:01 AM

Time	Gallons	EC (µS/cm)	pH	Temp. (°C)	Comments*
10:02	1	943.2	7.84	18	Orange, cloudy, odorless
10:06	5	950	6.92	18.5	Cloudy, odorless
10:10	10	967.7	6.67	18.6	Slightly colorless, odorless
0:00	15	976.1	6.50	19	Clear, colorless, odorless
10:24	20	980.2	6.48	19.1	Clear, colorless, odorless
10:30	25	989.8	6.32	19	Clear, colorless, odorless
10:37	30	993	6.39	18.9	Clear, colorless, odorless
10:42	35	989.4	6.32	18.8	Clear, colorless, odorless
					Sampled @ 10:46 AM

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

Groundwater Monitoring Field Log
LOBP Monitoring Program

Date: 10/16/2019
Operator: A. Berge, J. Carlson
Well number and location: 30S/11E-20A2 (FW26)
Site and wellhead conditions: Sunny and cool. Well clear and static

Static water depth (feet):	19.55
Well depth (feet):	60
Water column (feet):	40.45
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:	11:35 AM

Time	Gallons	EC (µS/cm)	pH	Temp. (°C)	Comments*
11:35	3	642	7.04	16.8	Clear, colorless, sulfur odor
11:37	10	637	7.04	17.6	Clear, colorless, sulfur odor
11:38	20	635.4	7.04	17	Clear, colorless, sulfur odor
11:39	30	632	7.07	17	Clear, colorless, sulfur odor
11:40	40	630.8	7.04	17	Clear, colorless, odorless
11:42	60	630.7	7.12	17	Clear, colorless, odorless
11:44	80	628.9	7.16	16.8	Clear, colorless, odorless
11:46	100	628.3	7.14	17	Clear, colorless, odorless
11:51	150	628.1	7.10	17	Clear, colorless, faint sulfur odor
11:56	200	627.3	7.11	17.1	Clear, colorless, odorless
12:01	250	627.2	7.13	17	Clear, colorless, odorless
					Sampled @ 12:01 PM

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

WECK LABORATORIES, INC.

Certificate of Analysis

FINAL REPORT

Work Orders:	9J17045	**Report Date:**	1/28/2020
		Received Date:	10/17/2019
Project:	Los Osos Groundwater CECs	**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:**	

ELAP-CA #1132 • EPA-UCMR #CA00211 • Guam-EPA #17-008R • HW-DOH # • ISO17025 ANAB #L2457.01 • LACSD #10143 • NELAP-CA #04229CA • NELAP-OR #4047 • NJ-DEP #CA015 • NV-DEP #NAC 445A • SCAQMD #93LA1006

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 10/17/19 with the Chain-of-Custody document. The samples were received in good condition, at 2.0 °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

14859 Clark Avenue,City of Industry CA, 91745 | Phone: (626) 336-2139 | Fax: (626) 336-2634
www.wecklabs.com

WECK LABORATORIES, INC.

Certificate of Analysis

FINAL REPORT

Cleath-Harris Geologists, Inc.
75 Zaca Lane, Suite 110
San Luis Obispo, CA 93401

Project Number: Los Osos Groundwater CECs

Project Manager: Spencer Harris

Reported:
01/28/2020 14:51

Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
QA1- Clean Water/ Travel Blank	A. BERGE	9J17045-01	Water	10/16/19 09:17	
QA2- Equipment Blank	A. BERGE	9J17045-02	Water	10/16/19 09:43	
FW5 (13Q2)	A.Berge	9J17045-03	Water	10/16/19 10:46	
FW26 (20A1)	A.Berge	9J17045-04	Water	10/16/19 12:01	

Analyses Accreditation Summary

Analyte	CAS #	Not By NELAP	ANAB ISO 17025
SM 5910B in Water			
UV 254		✓	

14859 Clark Avenue,City of Industry CA, 91745 | Phone: (626) 336-2139 | Fax: (626) 336-2634
www.wecklabs.com

WECK LABORATORIES, INC.

Certificate of Analysis

FINAL REPORT

Cleath-Harris Geologists, Inc.
75 Zaca Lane, Suite 110
San Luis Obispo, CA 93401

Project Number: Los Osos Groundwater CECs

Project Manager: Spencer Harris

Reported: 01/28/2020 14:51

Sample Results

Sample: QA1- Clean Water/ Travel Blank — 9J17045-01 (Water) — Sampled: 10/16/19 9:17 by A. BERGE

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
PPCPs - Hormones by LC/MSMS-APCI						
Method: EPA 1694M-APCI **Batch ID:** W9L1349 **Instr:** LCMS02 **Prepared:** 11/12/19 09:35 **Analyst:** kan						
17-b-Estradiol	ND	1.0	ng/l	1	11/15/19	
PPCPs - Pharmaceuticals by LC/MSMS-ESI-						
Method: EPA 1694M-ESI- **Batch ID:** W9K0617 **Instr:** LCMS02 **Prepared:** 11/12/19 09:37 **Analyst:** kan						
Gemfibrozil	ND	1.0	ng/l	1	12/03/19	
Iopromide	ND	5.0	ng/l	1	12/03/19	
Triclosan	ND	2.0	ng/l	1	12/03/19	
PPCPs - Pharmaceuticals by LC/MSMS-ESI+						
Method: EPA 1694M-ESI+ **Batch ID:** W9K0619 **Instr:** LCMS02 **Prepared:** 11/12/19 09:38 **Analyst:** kan						
Caffeine	ND	1.0	ng/l	1	12/18/19	
DEET	**1.9**	1.0	ng/l	1	12/18/19	B
Sucralose	ND	65	ng/l	1	12/18/19	R-01

Sample: QA2- Equipment Blank — 9J17045-02 (Water) — Sampled: 10/16/19 9:43 by A. BERGE

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
PPCPs - Hormones by LC/MSMS-APCI						
Method: EPA 1694M-APCI **Batch ID:** W9L1349 **Instr:** LCMS02 **Prepared:** 11/12/19 09:35 **Analyst:** kan						
17-b-Estradiol	ND	1.0	ng/l	1	11/15/19	
PPCPs - Pharmaceuticals by LC/MSMS-ESI-						
Method: EPA 1694M-ESI- **Batch ID:** W9K0617 **Instr:** LCMS02 **Prepared:** 11/12/19 09:37 **Analyst:** kan						
Gemfibrozil	ND	1.0	ng/l	1	12/03/19	
Iopromide	ND	5.0	ng/l	1	12/03/19	
Triclosan	ND	2.0	ng/l	1	12/03/19	
PPCPs - Pharmaceuticals by LC/MSMS-ESI+						
Method: EPA 1694M-ESI+ **Batch ID:** W9K0619 **Instr:** LCMS02 **Prepared:** 11/12/19 09:38 **Analyst:** kan						
Caffeine	**1.8**	1.0	ng/l	1	12/18/19	B
DEET	**2.4**	1.0	ng/l	1	12/18/19	B
Sucralose	ND	5.0	ng/l	1	12/18/19	

14859 Clark Avenue,City of Industry CA, 91745 | Phone: (626) 336-2139 | Fax: (626) 336-2634
www.wecklabs.com

Cleath-Harris Geologists, Inc.
75 Zaca Lane, Suite 110
San Luis Obispo, CA 93401

Project Number: Los Osos Groundwater CECs

Project Manager: Spencer Harris

Reported: 01/28/2020 14:51

Sample Results

(Continued)

Sample: FW5 (13Q2) — Sampled: 10/16/19 10:46 by A.Berge
9J17045-03 (Water)

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods						
Method: EPA 350.1 — **Batch ID:** W9J1639 — **Instr:** AA06 — **Prepared:** 10/28/19 11:07 — **Analyst:** ymt						
Ammonia as N	ND	0.10	mg/l	1	10/28/19	
Method: EPA 353.2 — **Batch ID:** W9J1081 — **Instr:** AA01 — **Prepared:** 10/17/19 11:06 — **Analyst:** sar						
Nitrate as N	**33**	1.0	mg/l	5	10/17/19 12:33	
Method: SM 2510B — **Batch ID:** W9K0029 — **Instr:** AA02 — **Prepared:** 11/01/19 12:22 — **Analyst:** sbn						
Specific Conductance (EC)	**1100**	2.0	umhos/cm	1	11/01/19	
Method: SM 5310B — **Batch ID:** W9J1139 — **Instr:** TOC02 — **Prepared:** 10/18/19 09:41 — **Analyst:** jlp						
Total Organic Carbon (TOC)	**1.2**	0.30	mg/l	1	10/18/19	
Method: SM 5910B — **Batch ID:** W9J1120 — **Instr:** UVVIS04 — **Prepared:** 10/17/19 17:38 — **Analyst:** ssi						
UV 254	**0.016**	0.009	1/cm	1	10/17/19 19:04	
Nitrosamines by isotopic dilution GC/MS CI Mode						
Method: EPA 1625M — **Batch ID:** W9J1127 — **Instr:** GCMS09 — **Prepared:** 10/18/19 16:30 — **Analyst:** mld						
N-Nitrosodimethylamine	ND	2.0	ng/l	1	11/11/19	
PPCPs - Hormones by LC/MSMS-APCI						
Method: EPA 1694M-APCI — **Batch ID:** W9L1349 — **Instr:** LCMS02 — **Prepared:** 11/12/19 09:35 — **Analyst:** kan						
17-b-Estradiol	ND	1.0	ng/l	1	11/15/19	
PPCPs - Pharmaceuticals by LC/MSMS-ESI-						
Method: EPA 1694M-ESI- — **Batch ID:** W9K0617 — **Instr:** LCMS02 — **Prepared:** 11/12/19 09:37 — **Analyst:** kan						
Gemfibrozil	ND	1.0	ng/l	1	12/03/19	
Iopromide	ND	5.0	ng/l	1	12/03/19	
Triclosan	ND	2.0	ng/l	1	12/03/19	
PPCPs - Pharmaceuticals by LC/MSMS-ESI+						
Method: EPA 1694M-ESI+ — **Batch ID:** W9K0619 — **Instr:** LCMS02 — **Prepared:** 11/12/19 09:38 — **Analyst:** kan						
Caffeine	ND	1.0	ng/l	1	12/18/19	
DEET	**2.3**	1.0	ng/l	1	12/18/19	B
Sucralose	**190**	5.0	ng/l	1	12/18/19	

WECK LABORATORIES, INC.

Certificate of Analysis

FINAL REPORT

Cleath-Harris Geologists, Inc.
75 Zaca Lane, Suite 110
San Luis Obispo, CA 93401

Project Number: Los Osos Groundwater CECs

Project Manager: Spencer Harris

Reported: 01/28/2020 14:51

Sample Results

(Continued)

Sample: FW26 (20A1) — 9J17045-04 (Water) — Sampled: 10/16/19 12:01 by A.Berge

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods						
Method: EPA 350.1 **Batch ID:** W9J1639 **Instr:** AA06 **Prepared:** 10/28/19 11:07 **Analyst:** ymt						
Ammonia as N	**0.21**	0.10	mg/l	1	10/28/19	
Method: EPA 353.2 **Batch ID:** W9J1081 **Instr:** AA01 **Prepared:** 10/17/19 11:06 **Analyst:** sar						
Nitrate as N	ND	0.20	mg/l	1	10/17/19 12:34	
Method: SM 2510B **Batch ID:** W9K0029 **Instr:** AA02 **Prepared:** 11/01/19 12:22 **Analyst:** sbn						
Specific Conductance (EC)	**650**	2.0	umhos/cm	1	11/01/19	
Method: SM 5310B **Batch ID:** W9J1139 **Instr:** TOC02 **Prepared:** 10/18/19 09:41 **Analyst:** jlp						
Total Organic Carbon (TOC)	**1.8**	0.30	mg/l	1	10/18/19	
Method: SM 5910B **Batch ID:** W9J1120 **Instr:** UVVIS04 **Prepared:** 10/17/19 17:38 **Analyst:** ssi						
UV 254	**0.035**	0.009	1/cm	1	10/17/19 19:04	
Nitrosamines by isotopic dilution GC/MS CI Mode						
Method: EPA 1625M **Batch ID:** W9J1127 **Instr:** GCMS09 **Prepared:** 10/18/19 16:30 **Analyst:** mld						
N-Nitrosodimethylamine	ND	2.0	ng/l	1	11/09/19	
PPCPs - Hormones by LC/MSMS-APCI						
Method: EPA 1694M-APCI **Batch ID:** W9L1349 **Instr:** LCMS02 **Prepared:** 11/12/19 09:35 **Analyst:** kan						
17-b-Estradiol	ND	1.0	ng/l	1	11/15/19	
PPCPs - Pharmaceuticals by LC/MSMS-ESI-						
Method: EPA 1694M-ESI- **Batch ID:** W9K0617 **Instr:** LCMS02 **Prepared:** 11/12/19 09:37 **Analyst:** kan						
Gemfibrozil	ND	1.0	ng/l	1	12/03/19	
Iopromide	ND	5.0	ng/l	1	12/03/19	
Triclosan	ND	2.0	ng/l	1	12/03/19	
PPCPs - Pharmaceuticals by LC/MSMS-ESI+						
Method: EPA 1694M-ESI+ **Batch ID:** W9K0619 **Instr:** LCMS02 **Prepared:** 11/12/19 09:38 **Analyst:** kan						
Caffeine	ND	1.0	ng/l	1	12/18/19	
DEET	**12**	1.0	ng/l	1	12/18/19	
Sucralose	**21**	5.0	ng/l	1	12/18/19	

14859 Clark Avenue,City of Industry CA, 91745 | Phone: (626) 336-2139 | Fax: (626) 336-2634

www.wecklabs.com

Cleath-Harris Geologists, Inc.
75 Zaca Lane, Suite 110
San Luis Obispo, CA 93401

Project Number: Los Osos Groundwater CECs

Project Manager: Spencer Harris

Reported: 01/28/2020 14:51

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: W9J1081 - EPA 353.2										
Blank (W9J1081-BLK1)				**Prepared & Analyzed: 10/17/19**						
Nitrate as N	ND	0.20	mg/l							
LCS (W9J1081-BS1)				**Prepared & Analyzed: 10/17/19**						
Nitrate as N	0.964	0.20	mg/l	1.00		96	90-110			
Matrix Spike (W9J1081-MS1)	**Source: 9J16100-01**			**Prepared & Analyzed: 10/17/19**						
Nitrate as N	7.73	0.20	mg/l	2.00	5.78	97	90-110			
Matrix Spike Dup (W9J1081-MSD1)	**Source: 9J16100-01**			**Prepared & Analyzed: 10/17/19**						
Nitrate as N	7.78	0.20	mg/l	2.00	5.78	100	90-110	0.6	20	
Batch: W9J1120 - SM 5910B										
Blank (W9J1120-BLK1)				**Prepared & Analyzed: 10/17/19**						
UV 254	ND	0.009	1/cm							
Blank (W9J1120-BLK2)				**Prepared: 10/17/19 Analyzed: 11/04/19**						
UV 254	ND	0.009	1/cm							
LCS (W9J1120-BS1)				**Prepared & Analyzed: 10/17/19**						
UV 254	0.095	0.009	1/cm	0.0880		108	90-110			
LCS (W9J1120-BS2)				**Prepared: 10/17/19 Analyzed: 11/04/19**						
UV 254	0.089	0.009	1/cm	0.0880		101	90-110			
Duplicate (W9J1120-DUP1)	**Source: 9J17045-03**			**Prepared & Analyzed: 10/17/19**						
UV 254	0.017	0.009	1/cm		0.016			6	10	
Batch: W9J1139 - SM 5310B										
Blank (W9J1139-BLK1)				**Prepared & Analyzed: 10/18/19**						
Total Organic Carbon (TOC)	ND	0.30	mg/l							
LCS (W9J1139-BS1)				**Prepared & Analyzed: 10/18/19**						
Total Organic Carbon (TOC)	0.928	0.30	mg/l	1.00		93	85-115			
Matrix Spike (W9J1139-MS1)	**Source: 9J14013-13**			**Prepared & Analyzed: 10/18/19**						
Total Organic Carbon (TOC)	6.34	0.30	mg/l	5.00	1.30	101	76-115			
Matrix Spike Dup (W9J1139-MSD1)	**Source: 9J14013-13**			**Prepared & Analyzed: 10/18/19**						
Total Organic Carbon (TOC)	6.15	0.30	mg/l	5.00	1.30	97	76-115	3	20	
Batch: W9J1639 - EPA 350.1										
Blank (W9J1639-BLK1)				**Prepared & Analyzed: 10/28/19**						
Ammonia as N	ND	0.10	mg/l							
Blank (W9J1639-BLK2)				**Prepared & Analyzed: 10/28/19**						
Ammonia as N	ND	0.10	mg/l							
LCS (W9J1639-BS1)				**Prepared & Analyzed: 10/28/19**						
Ammonia as N	0.257	0.10	mg/l	0.250		103	90-110			
LCS (W9J1639-BS2)				**Prepared & Analyzed: 10/28/19**						
Ammonia as N	0.258	0.10	mg/l	0.250		103	90-110			
Matrix Spike (W9J1639-MS1)	**Source: 9J17055-01**			**Prepared & Analyzed: 10/28/19**						

14859 Clark Avenue,City of Industry CA, 91745 | Phone: (626) 336-2139 | Fax: (626) 336-2634
www.wecklabs.com

Cleath-Harris Geologists, Inc.
75 Zaca Lane, Suite 110
San Luis Obispo, CA 93401

Project Number: Los Osos Groundwater CECs

Project Manager: Spencer Harris

Reported: 01/28/2020 14:51

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: W9J1639 - EPA 350.1 (Continued)										
Matrix Spike (W9J1639-MS1)	**Source: 9J17055-01**			**Prepared & Analyzed: 10/28/19**						
Ammonia as N	0.255	0.10	mg/l	0.250	ND	102	90-110			
Matrix Spike (W9J1639-MS2)	**Source: 9J17055-02**			**Prepared & Analyzed: 10/28/19**						
Ammonia as N	0.274	0.10	mg/l	0.250	0.0166	103	90-110			
Matrix Spike Dup (W9J1639-MSD1)	**Source: 9J17055-01**			**Prepared & Analyzed: 10/28/19**						
Ammonia as N	0.256	0.10	mg/l	0.250	ND	102	90-110	0.4	15	
Matrix Spike Dup (W9J1639-MSD2)	**Source: 9J17055-02**			**Prepared & Analyzed: 10/28/19**						
Ammonia as N	0.274	0.10	mg/l	0.250	0.0166	103	90-110	0.3	15	
Batch: W9K0029 - SM 2510B										
Blank (W9K0029-BLK1)				**Prepared & Analyzed: 11/01/19**						
Specific Conductance (EC)	ND	2.0	umhos/cm							
LCS (W9K0029-BS1)				**Prepared & Analyzed: 11/01/19**						
Specific Conductance (EC)	179	2.0	umhos/cm	180		99	95-105			
Duplicate (W9K0029-DUP1)	**Source: 9J11007-01**			**Prepared & Analyzed: 11/01/19**						
Specific Conductance (EC)	650	2.0	umhos/cm		649			0.2	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: W9J1127 - EPA 1625M										
Blank (W9J1127-BLK1)				**Prepared: 10/18/19 Analyzed: 11/07/19**						
N-Nitrosodimethylamine	ND	2.0	ng/l							
Blank (W9J1127-BLK2)				**Prepared: 10/18/19 Analyzed: 11/08/19**						
N-Nitrosodimethylamine	ND	2.0	ng/l							QC-2
Blank (W9J1127-BLK3)				**Prepared: 10/18/19 Analyzed: 11/11/19**						
N-Nitrosodimethylamine	ND	2.0	ng/l							QC-2
LCS (W9J1127-BS1)				**Prepared: 10/18/19 Analyzed: 11/07/19**						
N-Nitrosodimethylamine	1.94	2.0	ng/l	2.00		97	50-150			
LCS (W9J1127-BS2)				**Prepared: 10/18/19 Analyzed: 11/08/19**						
N-Nitrosodimethylamine	1.89	2.0	ng/l	2.00		94	50-150			QC-2
LCS (W9J1127-BS3)				**Prepared: 10/18/19 Analyzed: 11/11/19**						
N-Nitrosodimethylamine	1.91	2.0	ng/l	2.00		95	50-150			QC-2
LCS Dup (W9J1127-BSD1)				**Prepared: 10/18/19 Analyzed: 11/07/19**						
N-Nitrosodimethylamine	2.08	2.0	ng/l	2.00		104	50-150	7	50	
LCS Dup (W9J1127-BSD2)				**Prepared: 10/18/19 Analyzed: 11/08/19**						
N-Nitrosodimethylamine	2.01	2.0	ng/l	2.00		101	50-150	6	50	QC-2
LCS Dup (W9J1127-BSD3)				**Prepared: 10/18/19 Analyzed: 11/11/19**						
N-Nitrosodimethylamine	2.04	2.0	ng/l	2.00		102	50-150	7	50	QC-2

14859 Clark Avenue,City of Industry CA, 91745 | Phone: (626) 336-2139 | Fax: (626) 336-2634
www.wecklabs.com

Cleath-Harris Geologists, Inc.
75 Zaca Lane, Suite 110
San Luis Obispo, CA 93401

Project Number: Los Osos Groundwater CECs

Project Manager: Spencer Harris

Reported: 01/28/2020 14:51

Quality Control Results (Continued)

PPCPs - Hormones by LC/MSMS-APCI

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W9L1349 - EPA 1694M-APCI										
Blank (W9L1349-BLK1)				**Prepared: 11/12/19 Analyzed: 11/15/19**						
17-b-Estradiol	ND	1.0	ng/l							
LCS (W9L1349-BS1)				**Prepared: 11/12/19 Analyzed: 11/15/19**						
17-b-Estradiol	14.9	1.0	ng/l	10.0		149	65-146			Q-08
LCS Dup (W9L1349-BSD1)				**Prepared: 11/12/19 Analyzed: 11/15/19**						
17-b-Estradiol	11.1	1.0	ng/l	10.0		111	65-146	29	30	

Quality Control Results (Continued)

PPCPs - Pharmaceuticals by LC/MSMS-ESI-

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W9K0617 - EPA 1694M-ESI-										
Blank (W9K0617-BLK1)				**Prepared: 11/12/19 Analyzed: 12/03/19**						
Bisphenol A	13.3	1.0	ng/l							B
Diclofenac	ND	1.0	ng/l							
Gemfibrozil	ND	1.0	ng/l							
Ibuprofen	ND	1.0	ng/l							
Iopromide	ND	5.0	ng/l							
Naproxen	ND	1.0	ng/l							
Salicylic Acid	ND	50	ng/l							
Triclosan	ND	2.0	ng/l							
LCS (W9K0617-BS1)				**Prepared: 11/12/19 Analyzed: 12/03/19**						
Bisphenol A	17.9	1.0	ng/l	10.0		179	53-168			BS-H
Diclofenac	6.63	1.0	ng/l	10.0		66	37-218			
Gemfibrozil	11.9	1.0	ng/l	10.0		119	76-122			
Ibuprofen	7.63	1.0	ng/l	10.0		76	67-139			
Iopromide	6.65	5.0	ng/l	50.0		13	0.1-163			
Naproxen	8.64	1.0	ng/l	10.0		86	64-138			
Salicylic Acid	148	50	ng/l	100		148	56-229			
Triclosan	12.0	2.0	ng/l	10.0		120	76-139			
LCS Dup (W9K0617-BSD1)				**Prepared: 11/12/19 Analyzed: 12/03/19**						
Bisphenol A	18.7	1.0	ng/l	10.0		187	53-168	4	30	BS-H
Diclofenac	5.37	1.0	ng/l	10.0		54	37-218	21	30	
Gemfibrozil	11.7	1.0	ng/l	10.0		117	76-122	2	30	
Ibuprofen	7.82	1.0	ng/l	10.0		78	67-139	2	30	
Iopromide	10.3	5.0	ng/l	50.0		21	0.1-163	43	30	Q-12
Naproxen	8.54	1.0	ng/l	10.0		85	64-138	1	30	
Salicylic Acid	149	50	ng/l	100		149	56-229	0.7	30	
Triclosan	13.4	2.0	ng/l	10.0		134	76-139	11	30	

14859 Clark Avenue,City of Industry CA, 91745 | Phone: (626) 336-2139 | Fax: (626) 336-2634
www.wecklabs.com

Cleath-Harris Geologists, Inc.
75 Zaca Lane, Suite 110
San Luis Obispo, CA 93401

Project Number: Los Osos Groundwater CECs

Project Manager: Spencer Harris

Reported: 01/28/2020 14:51

Quality Control Results (Continued)

PPCPs - Pharmaceuticals by LC/MSMS-ESI+

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W9K0619 - EPA 1694M-ESI+										
Blank (W9K0619-BLK1)				**Prepared: 11/12/19 Analyzed: 12/18/19**						
Acetaminophen	ND	20	ng/l							
Amoxicillin	ND	10	ng/l							
Atenolol	ND	1.0	ng/l							
Atorvastatin	ND	1.0	ng/l							
Azithromycin	ND	10	ng/l							
Caffeine	2.23	1.0	ng/l							B
Carbamazepine	ND	1.0	ng/l							
Ciprofloxacin	ND	5.0	ng/l							
Cotinine	40.1	2.0	ng/l							B
DEET	1.80	1.0	ng/l							B
Diazepam	ND	1.0	ng/l							
Fluoxetine	ND	1.0	ng/l							
Galaxolide (HHCB)	34.9	10	ng/l							B
Meprobamate	9.57	1.0	ng/l							B
Methadone	ND	1.0	ng/l							
Oxybenzone	2.87	1.0	ng/l							B-06
Phenytoin (Dilantin)	ND	1.0	ng/l							
Praziquantel	ND	1.0	ng/l							
Primidone	ND	1.0	ng/l							
Quinoline	ND	1.0	ng/l							
Sulfamethoxazole	ND	1.0	ng/l							
TCEP	ND	1.0	ng/l							
TCPP	19.4	1.0	ng/l							B
TDCPP	10.1	1.0	ng/l							B
Trimethoprim	ND	1.0	ng/l							
Blank (W9K0619-BLK2)				**Prepared: 11/12/19 Analyzed: 12/18/19**						
Sucralose	ND	5.0	ng/l							QC-2
LCS (W9K0619-BS1)				**Prepared: 11/12/19 Analyzed: 12/18/19**						
Acetaminophen	108	20	ng/l	200		54	66-156			BS-04
Amoxicillin	50.4	10	ng/l	100		50	14-167			
Atenolol	16.2	1.0	ng/l	10.0		162	56-164			
Atorvastatin	18.8	1.0	ng/l	10.0		188	0.1-173			BS-04
Azithromycin	149	10	ng/l	100		149	52-166			
Caffeine	11.1	1.0	ng/l	10.0		111	55-152			
Carbamazepine	9.15	1.0	ng/l	10.0		92	60-135			
Ciprofloxacin	73.3	5.0	ng/l	50.0		147	51-168			
Cotinine	18.1	2.0	ng/l	10.0		181	68-155			BS-04
DEET	11.7	1.0	ng/l	10.0		117	45-135			
Diazepam	9.89	1.0	ng/l	10.0		99	58-127			

14859 Clark Avenue,City of Industry CA, 91745 | Phone: (626) 336-2139 | Fax: (626) 336-2634
www.wecklabs.com

Cleath-Harris Geologists, Inc.
75 Zaca Lane, Suite 110
San Luis Obispo, CA 93401

Project Number: Los Osos Groundwater CECs

Project Manager: Spencer Harris

Reported: 01/28/2020 14:51

Quality Control Results

(Continued)

PPCPs - Pharmaceuticals by LC/MSMS-ESI+ (Continued)

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W9K0619 - EPA 1694M-ESI+ (Continued)										
LCS (W9K0619-BS1)				**Prepared: 11/12/19 Analyzed: 12/18/19**						
Fluoxetine	6.36	1.0	ng/l	10.0		64	55-150			
Galaxolide (HHCB)	134	10	ng/l	50.0		268	50-150			Q-10
Meprobamate	36.3	1.0	ng/l	10.0		363	11-166			Q-10
Methadone	11.1	1.0	ng/l	10.0		111	62-137			
Oxybenzone	15.7	1.0	ng/l	10.0		157	50-150			Q-08
Phenytoin (Dilantin)	10.5	1.0	ng/l	10.0		105	69-138			
Praziquantel	25.3	1.0	ng/l	10.0		253	50-150			Q-08
Primidone	10.6	1.0	ng/l	10.0		106	54-147			
Quinoline	4.56	1.0	ng/l	10.0		46	50-150			BS-04
Sulfamethoxazole	12.7	1.0	ng/l	10.0		127	60-133			
TCEP	4.55	1.0	ng/l	10.0		46	25-149			
TCPP	27.8	1.0	ng/l	10.0		278	24-149			Q-10
TDCPP	3.65	1.0	ng/l	10.0		36	20-158			
Trimethoprim	10.8	1.0	ng/l	10.0		108	67-139			
LCS (W9K0619-BS2)				**Prepared: 11/12/19 Analyzed: 12/18/19**						
Sucralose	46.9	5.0	ng/l	50.0		94	50-150			QC-2
LCS Dup (W9K0619-BSD1)				**Prepared: 11/12/19 Analyzed: 12/18/19**						
Acetaminophen	275	20	ng/l	200		138	66-156	87	30	A-01a
Amoxicillin	204	10	ng/l	100		204	14-167	121	30	BS-04
Atenolol	10.3	1.0	ng/l	10.0		103	56-164	45	30	Q-12
Atorvastatin	16.2	1.0	ng/l	10.0		162	0.1-173	15	30	
Azithromycin	164	10	ng/l	100		164	52-166	10	30	
Caffeine	11.4	1.0	ng/l	10.0		114	55-152	3	30	
Carbamazepine	10.7	1.0	ng/l	10.0		107	60-135	16	30	
Ciprofloxacin	78.9	5.0	ng/l	50.0		158	51-168	7	30	
Cotinine	11.0	2.0	ng/l	10.0		110	68-155	49	30	A-01
DEET	11.4	1.0	ng/l	10.0		114	45-135	3	30	
Diazepam	9.66	1.0	ng/l	10.0		97	58-127	2	30	
Fluoxetine	6.22	1.0	ng/l	10.0		62	55-150	2	30	
Galaxolide (HHCB)	121	10	ng/l	50.0		242	50-150	10	30	Q-10
Meprobamate	28.6	1.0	ng/l	10.0		286	11-166	24	30	Q-10
Methadone	10.7	1.0	ng/l	10.0		107	62-137	4	30	
Oxybenzone	15.4	1.0	ng/l	10.0		154	50-150	2	30	Q-08
Phenytoin (Dilantin)	10.2	1.0	ng/l	10.0		102	69-138	3	30	
Praziquantel	25.0	1.0	ng/l	10.0		250	50-150	1	30	Q-08
Primidone	9.51	1.0	ng/l	10.0		95	54-147	11	30	
Quinoline	6.71	1.0	ng/l	10.0		67	50-150	38	30	A-01
Sulfamethoxazole	11.4	1.0	ng/l	10.0		114	60-133	11	30	
TCEP	4.81	1.0	ng/l	10.0		48	25-149	6	30	

14859 Clark Avenue,City of Industry CA, 91745 | Phone: (626) 336-2139 | Fax: (626) 336-2634
www.wecklabs.com

Cleath-Harris Geologists, Inc.
75 Zaca Lane, Suite 110
San Luis Obispo, CA 93401

Project Number: Los Osos Groundwater CECs

Project Manager: Spencer Harris

Reported: 01/28/2020 14:51

Quality Control Results (Continued)

PPCPs - Pharmaceuticals by LC/MSMS-ESI+ (Continued)

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W9K0619 - EPA 1694M-ESI+ (Continued)										
LCS Dup (W9K0619-BSD1)				**Prepared: 11/12/19 Analyzed: 12/18/19**						
TCPP	26.0	1.0	ng/l	10.0		260	24-149	7	30	Q-10
TDCPP	6.50	1.0	ng/l	10.0		65	20-158	56	30	Q-12
Trimethoprim	12.5	1.0	ng/l	10.0		125	67-139	15	30	

14859 Clark Avenue,City of Industry CA, 91745 | Phone: (626) 336-2139 | Fax: (626) 336-2634
www.wecklabs.com

Notes and Definitions

Item	Definition
A-01	The RPD value for BS/BSD was outside of QC acceptance limit due to failing BS recovery . Samples results were accepted based on percent recovery of BSD.
A-01a	The RPD value for BS/BSD was outside of QC acceptance limit due to failing BS recovery. Samples results were accepted based on percent recovery of BSD.
B	Blank contamination. The analyte was found in the associated blank as well as in the sample.
B-06	This analyte was found in the method blank, which was possibly contaminated during sample preparation. The batch was accepted since this analyte was either not detected or more than 10 times of the blank value for all the samples in the batch.
BS-04	The recovery of this analyte in LCS or LCSD was outside control limit. Sample was accepted based on the remaining LCS, LCSD or LCS-LL.
BS-H	The recovery of this analyte in the BS/LCS was over the control limit. Sample result is suspect.
Q-08	High bias in the QC sample does not affect sample result since analyte was not detected or below the reporting limit.
Q-10	This analyte is high bias in QC samples, sample result is suspect.
Q-12	The RPD result exceeded the QC control limits; however, both percent recoveries were acceptable. Sample results for the QC batch were accepted based on the percent recoveries and/or other acceptable QC data.
QC-2	This QC sample was reanalyzed to complement samples that require re-analysis on different date. See analysis date.
R-01	The Reporting Limit for this analyte has been raised to account for matrix interference.
% Rec	Percent Recovery
Dil	Dilution
dry	Sample results reported on a dry weight basis
MDA	Minimum Detectable Activity
MDL	Method Detection Limit
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.
NR	Not Reportable
RPD	Relative Percent Difference
Source	Sample that was matrix spiked or duplicated.
TIC	Tentatively Identified Compound (TIC) using mass spectrometry. The reported concentration is relative concentration based on the nearest internal standard. If the library search produces no matches at, or above 85%, the compound is reported as unknown.

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

An Absence of Total Coliform meets the drinking water standards as established by the California State Water Resources Control Board (SWRCB)

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.

14859 Clark Avenue,City of Industry CA, 91745 | Phone: (626) 336-2139 | Fax: (626) 336-2634
www.wecklabs.com

APPENDIX D

Lupine Avenue Monitoring Well Documentation

APPENDIX D

Lupine Avenue Monitoring Well

Summary

The Lupine Avenue monitoring well was proposed as a nested Zone C/D/E well in the 2015 LOBP to fill a data gap near the bay. In 2019, an existing well was added to the monitoring network (FW33) to fill the Upper Aquifer Zone C data gap, and the Lupine Avenue monitoring well was constructed to monitor Lower Aquifer Zone D and Zone E.

Nested Monitoring well LA40 (Zone E) was cased with 2.5-inch diameter Schedule 80 PVC to 490 feet depth, with the well screen positioned from 390-410 feet depth. The extra 80 feet of blank casing below the screen will be used for induction and gamma geophysical logging to track vertical movement of the seawater intrusion front (every three years). A chloride concentration of 1,460 mg/L was reported at LA40 in Fall 2019.

Nested Monitoring well LA40 (Zone D) was cased with 2.5-inch diameter Schedule 80 PVC to 350 feet depth, with the well screen positioned from 310-330 feet depth. A chloride concentration of 136 mg/L was reported at LA40 in Fall 2019.

Well documentation and results interpretation attached herein include the following:

- Well Location Figure
- Well Completion Report
- Lithologic Log
- Geophysical log summaries with well construction and aquifer zone correlation
- Updated Basin cross-section E-E' with estimated extent of Zone E seawater intrusion
- Refinement of Zone D seawater intrusion front and difference between repositioned front with and without LA41
- Available information on Zone E seawater intrusion front and existing wells where modification can increase Zone E monitoring locations.

Groundwater monitoring results from LA40 and LA41 for the Fall 2019 monitoring event are included in Table 8 and Table 11, with laboratory reports in Appendix C of this Annual Report.

Discussion

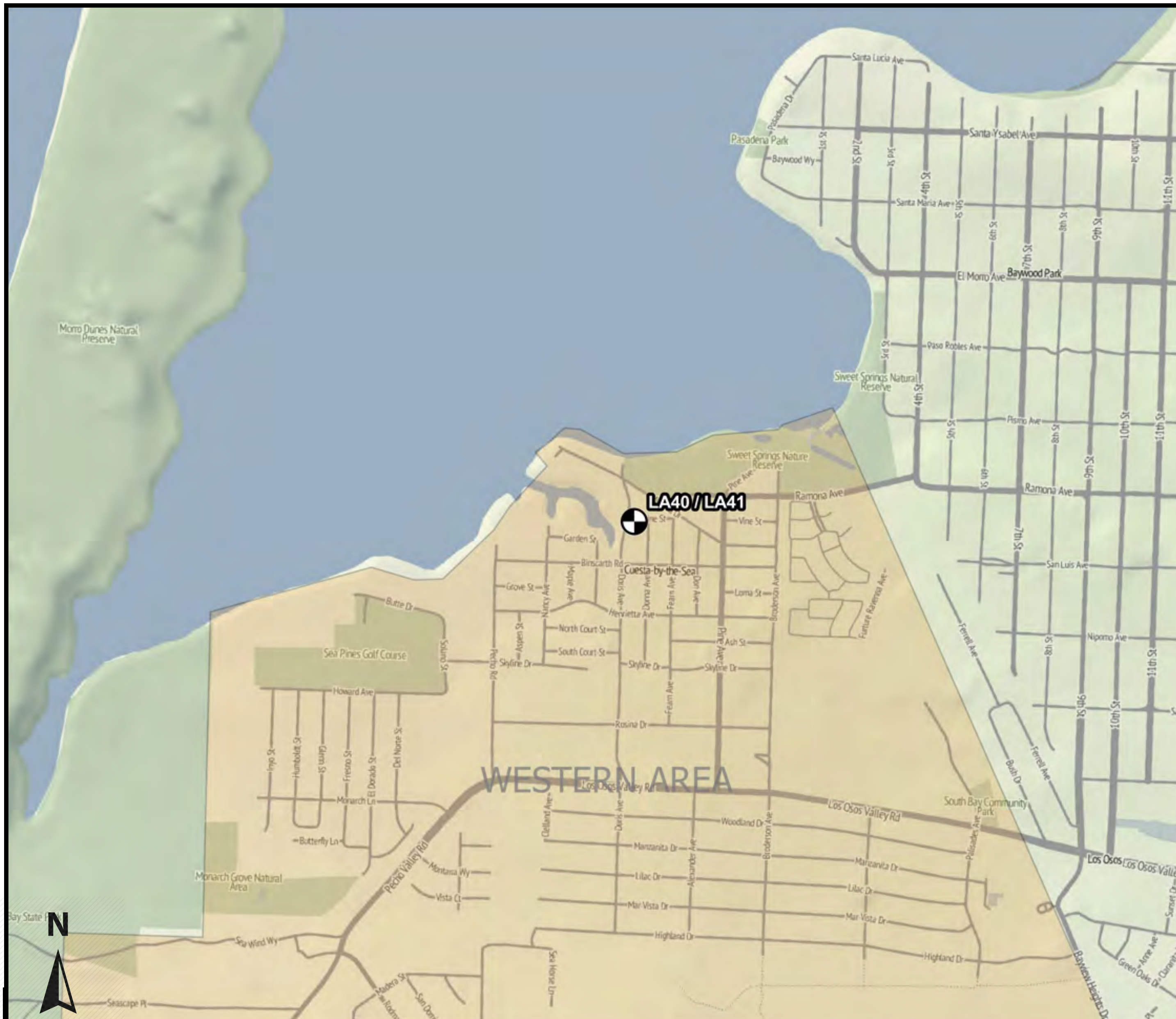
The Lupine Avenue nested monitoring well improves the delineation of seawater intrusion along the bay front. LA41 and LA40 provide new monitoring locations in Lower Aquifer Zone D and Zone E, respectively (Figure D-1). The screened intervals are correlated to Basin aquifers in Figure D-2, with additional geophysical logs shown in Figure D-3.

Monitoring results from Fall 2019 show the chloride concentration in groundwater from Zone D at 136 mg/L, which is below the 250 mg/L threshold for seawater intrusion. Chloride in Zone E, however, is 1,460 mg/L. Basin cross-section E-E' (Figure D-4) has been modified to incorporate the Lupine Avenue monitoring well results, and includes an estimated extent of seawater intrusion in Zone E, based on the limited available data.

The extent of seawater intrusion in Zone D has been refined using new data from LA41. Figure D5 compares the 250 mg/L chloride concentration contour for Fall 2018 to the contour for Fall 2019 with and without LA41. As shown in the figure, filling the data gap along the bay with LA41 repositions the seawater intrusion front up to 1,400 feet toward the coast, compared to Fall 2018. Without data from LA41, the Fall 2019 intrusion front would plot roughly 200 feet east of the Fall 2018 position. Therefore, while the overall position of the intrusion front in Zone D is interpreted to be closer to the coast after filling the data gap, there was some landward encroachment of the front between Fall 2018 and Fall 2019.

The extent of the seawater intrusion in Zone E has also been presented using new information from LA40. Figure D6 shows the available water quality data from Zone E from various years, with an estimate of the generalized location of the seawater intrusion front. Zone E water quality is available for three wells near the bay: LA4, LA11, and the new LA40. Only one other well, LA18, provides Zone E water quality data useful in delineating the intrusion front. Given the limited data, Zone E had been interpreted in prior Annual Reports as having effectively intruded most of the Western Area, and the new information from LA40 supports that conclusion.

There are some locations where existing wells could potentially be modified to provide Zone E water quality data (Figure D6). One type of modification would consist of inserting a well liner to isolate Zone E and then sealing off Zone D (LA13 and LA16). At LA14, installation of a packer may be sufficient to isolate Zone E, while at LA17, modification to bypass a section of collapsed casing would be necessary. Evaluating the feasibility and costs of these modifications is recommended.



Base Image: Stamen-Terrain

0 1,500 3,000 ft

Scale: 1 inch ≈ 1,500 feet

Explanation

Monitoring Well LA40 / LA41

WESTERN AREA

Figure D1
Lupine Avenue Monitoring Well (LA40/LA41) Location

Los Osos Groundwater Basin
2019 Annual Report

Cleath-Harris Geologists

Lupine Avenue Monitoring Well

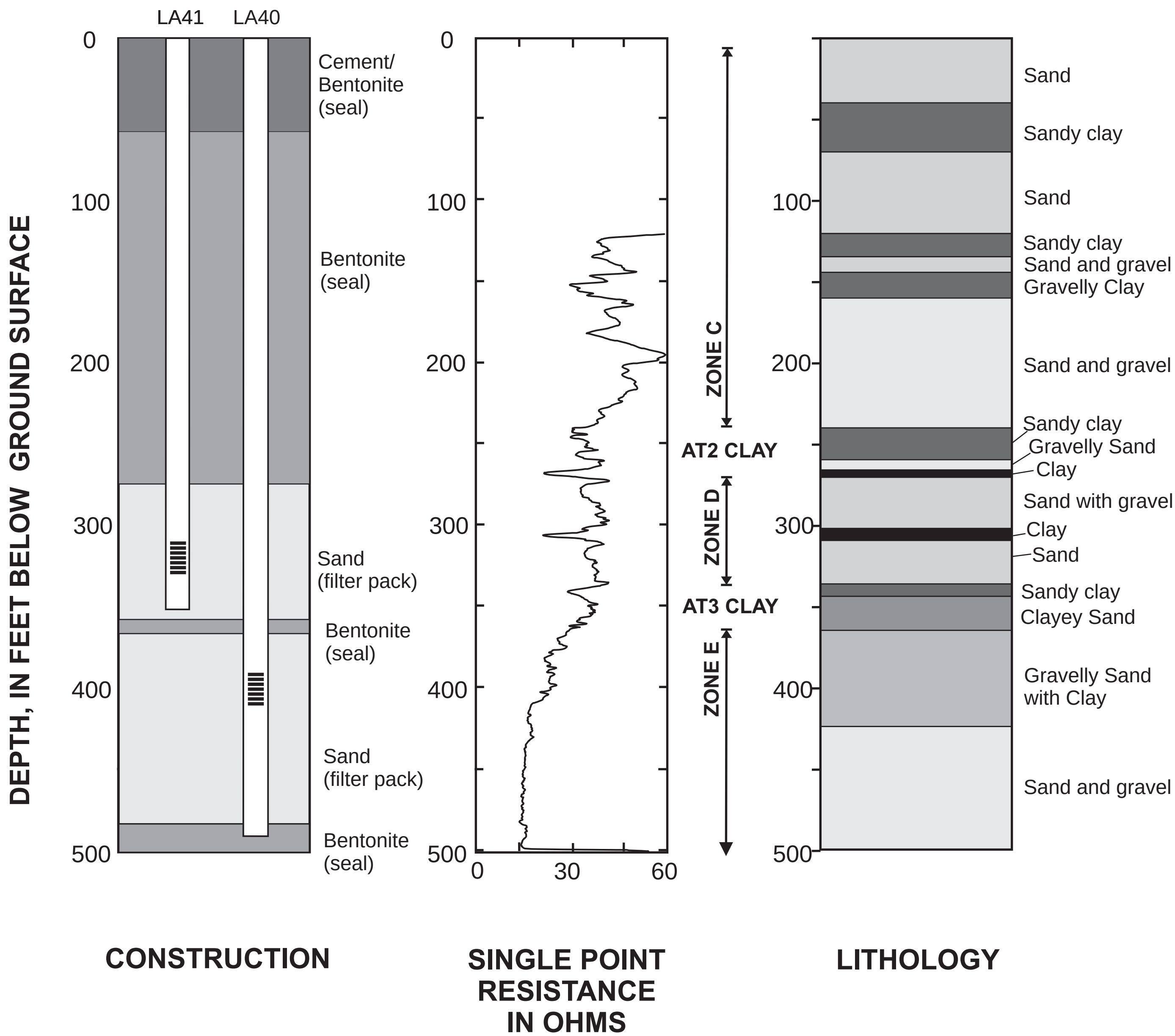


Figure D2
Lupine Avenue Aquifer Zone Correlation
Los Osos Groundwater Basin
2019 Annual Report

Cleath-Harris Geologists

Lupine Avenue Monitoring Well

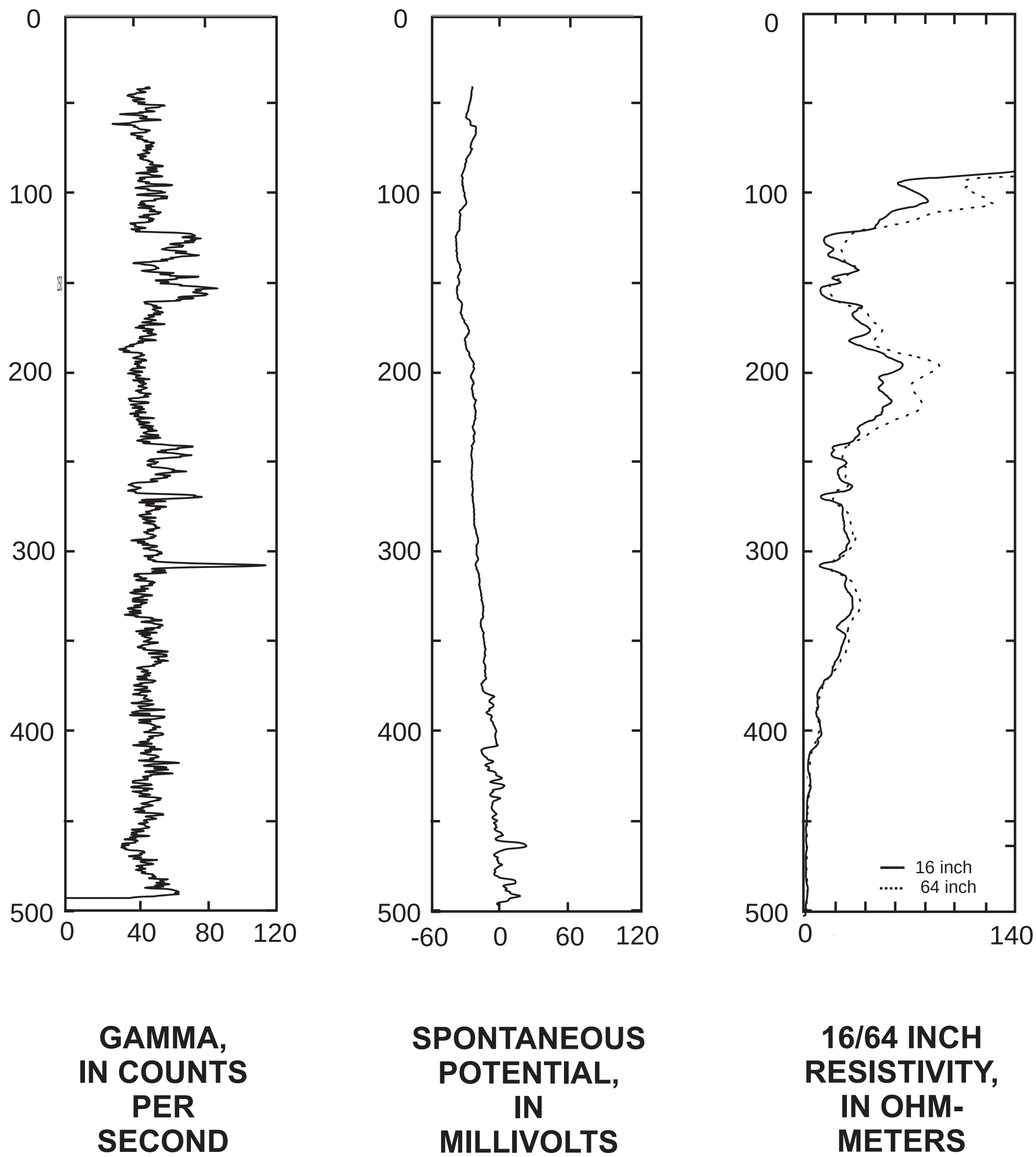
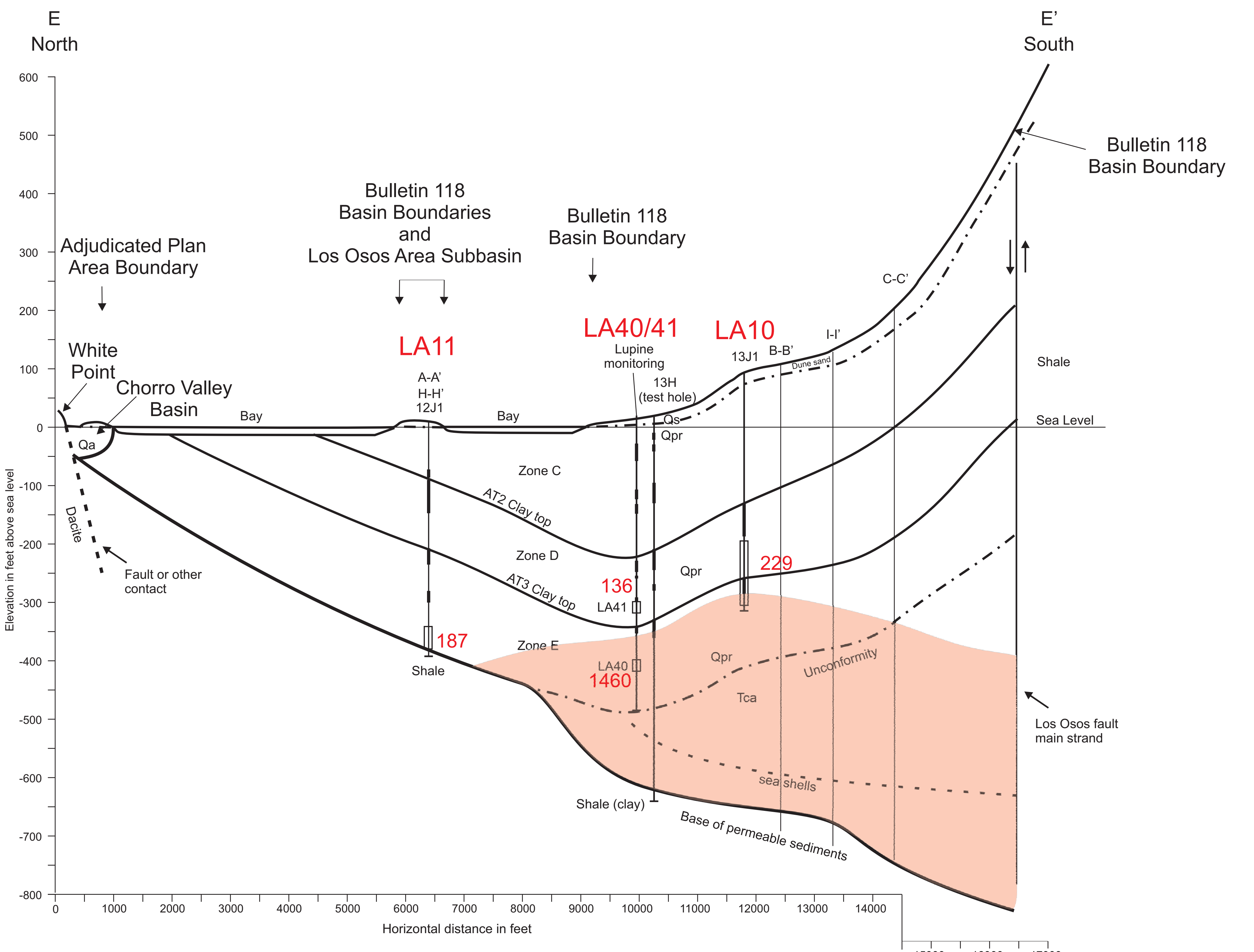


Figure D3
Lupine Avenue Geophysics
Los Osos Groundwater Basin
2019 Annual Report

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
12J1 Well ID
Clay layer
Well screen

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

Cross-secgtion alignment shown in Figure 1

187 - Chloride concentration in mg/L (Fall 2019)

Estimated extent of Zone E seawater intrusion (Fall 2019)

Figure D4

Cross-Section E-E'
Los Osos Groundwater Basin
2019 Annual Report

Cleath-Harris Geologsts

Base Image: Stamen-Terrain

0 1,500 3,000 ft

Scale: 1 inch ≈ 1,500 feet

Explanation

Well with Lower Aquifer chloride concentration in milligrams per liter (mg/L)

- Previously existing program well
- New program well (Lupine Avenue)

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

- Fall 2018
- Fall 2019 (LA41 Not Used)
- Fall 2019 (LA41 Used)

Figure D5
Seawater intrusion front with LA41
Western Area
Lower Aquifer Zone D

Los Osos Groundwater Basin
2019 Annual Report

Cleath-Harris Geologists

Base Image: Stamen-Terrain

0 1,500 3,000 ft

Scale: 1 inch ≈ 1,500 feet

Explanation

Monitoring program well - Zone E with chloride concentration and year

Potential Zone E water quality monitoring well (with well modification)

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

Figure D6
Seawater Intrusion Front
Western Area
Lower Aquifer Zone E

Los Osos Groundwater Basin
2019 Annual Report

Cleath-Harris Geologists

APPENDIX E

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. http://www.water.ca.gov/groundwater/casgem/pdfs/CASGEM%20DWR%20GW%20Guidelines%20Final%20121510.pdf
- 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. http://www.water.ca.gov/groundwater/casgem/pdfs/PSW_addendum.pdf
- 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: $\mathbf{d = k - h}$ 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. https://www.epa.gov/sites/production/files/2015-06/documents/fieldsamp- ertsops.pdf
- 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

<u>Non-equipped wells</u>

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 F

Land Use and Water Use Areas
(from LOBP)

Figure 5. Land Uses in the Plan Area

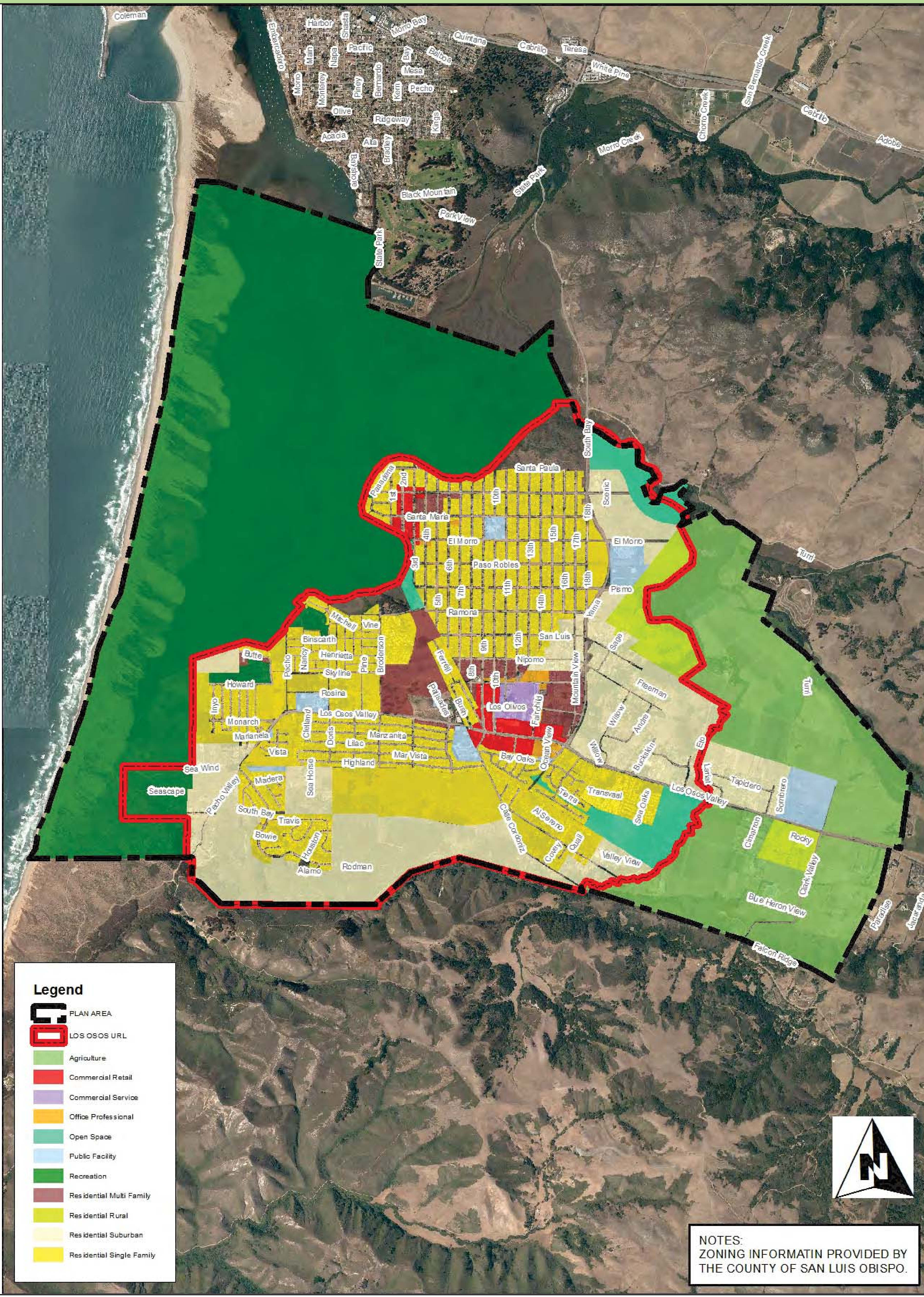
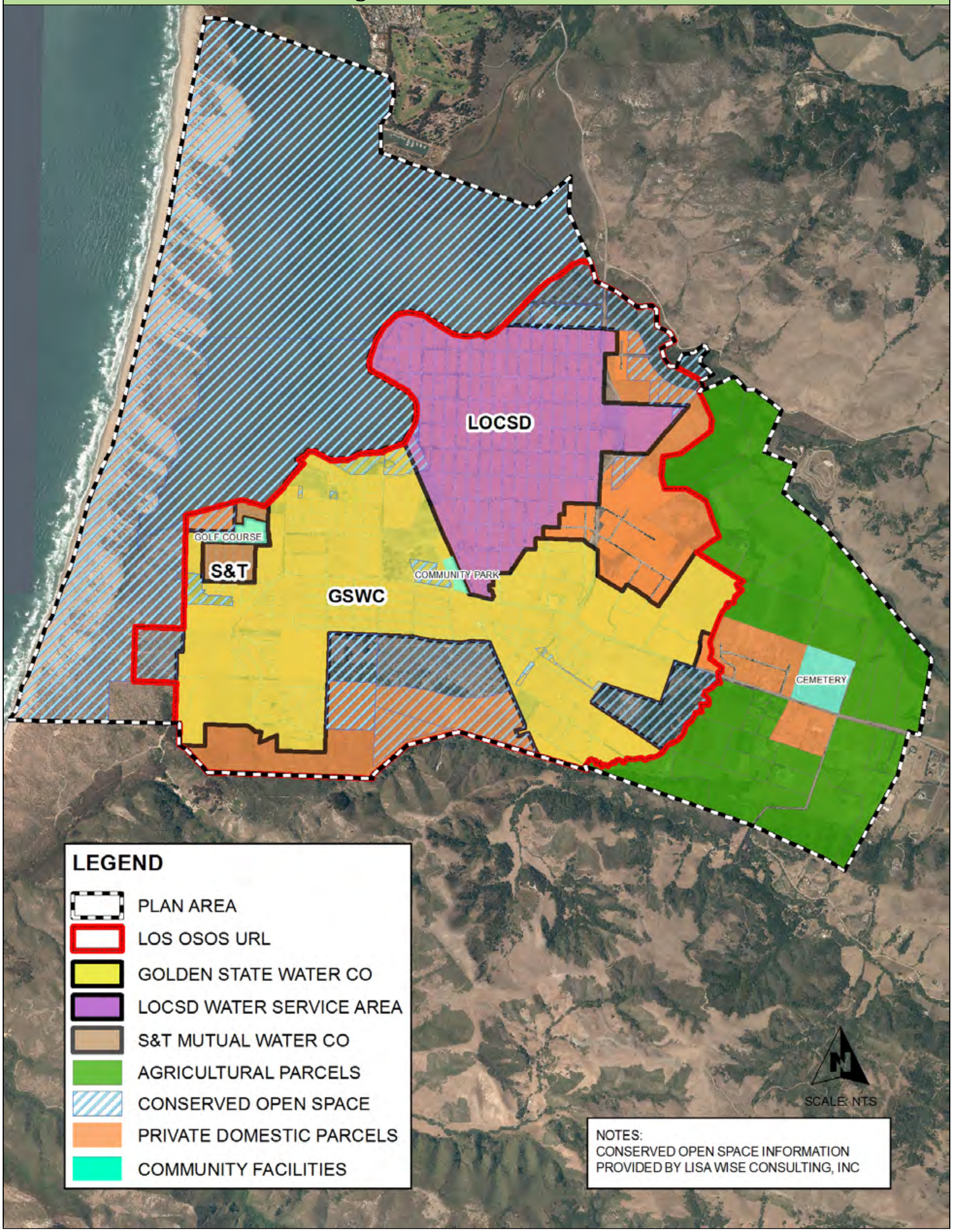


Figure 10. Water Use Areas



APPENDIX G

2019 Agricultural Water Use Estimates

Agriculture and Turf Applied Irrigation Water Estimate - 2019

Groundwater production estimates for agriculture and turf irrigation were developed using a daily soil-moisture budget with local data input. Sources of data included:

- The most recent land use survey by the County for estimating irrigated acreages (2019).
- 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):

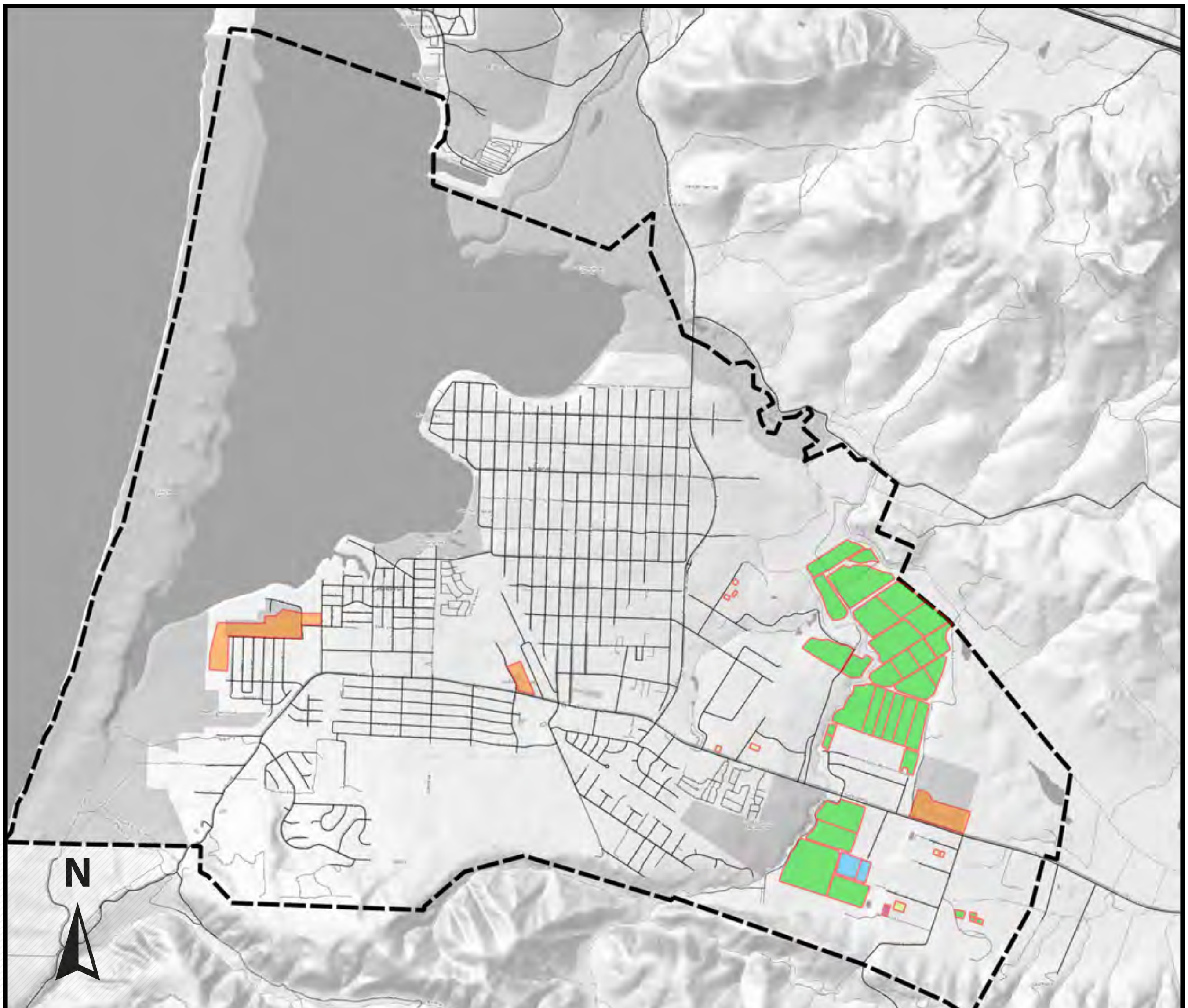
Applied Irrigation Water = (ETc - ER) / (EF)

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.

Crop data used in this annual report comes from a GIS shapefile provided by the SLO County Agricultural Commissioner's office and represents irrigated agricultural acreage for 2018. This data includes areas of irrigated fields, orchards and greenhouses and is verified by the County using aerial photography and site visits. The data is generally released after the summer following the year for which the data is compiled and prepared. This 2018 dataset was used as the basis for irrigated acreage in the adjudicated area and updated for 2019 using Normalized Difference Vegatation Index (NDVI) satellite images. Irrigated fields that were included in previous Ag Commissioner's datasets but were not included in the most recently available (2018) dataset and showed evidence of irrigation in 2019 NDVI images were added to a modified 2019 shapefile. 2019 crop acreages were then estimated using this updated dataset for use in soil moisture budget modeling.

A land use survey map for 2019 is shown in Figure G-1. Tabulation of the irrigated acreages is presented in Table G-1 below.



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 - 2018 County of SLO Data (Modified for 2019)

- Nursery
- Pasture
- Vegetables
- Vineyard

- Adjudicated Plan Area

- Community Facilities with Turf Areas

Figure G1

2019 Crop Types
Los Osos Groundwater Basin

2019 Annual Report

Cleath-Harris Geologists

Table G-1
2019 County Crop Survey
Eastern Area

Crop Type	Acres
Nursery	3.6
Pasture[1]	8.7
Vegetables	277
Vineyard	0.8
Total	290

[1]Sod farm listed as nursery in survey

Crop acreages listed in Table G-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 G-2 presents these areas below.

Table G-2
Community Irrigated Turf Areas

Location	Acres
Memorial Park	12.5
Community Park	1.2
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.

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. An efficiency factor of 92 percent was estimated by calibrating 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 (CHG, 2009b). Results of the soil-moisture budget method for estimating applied irrigation for agriculture and community facilities are included in tables below.

Tables G-3 and G-4 present irrigation demand as crop evapotranspiration for calendar years 2018 and 2019. The soil-moisture budget results show crop evapotranspiration for vegetables and pasture/turf in 2019 as slightly less than 2018, reflecting greater rainfall during the 2019 calendar year.

Table G-3
Soil-Moisture Budget Results (Vegetables)

Year	Irrigation demand	ETo	ETc	Precip*
	(inches)			
2018	24.55	53.04	34.19	18.08
2019	23.83	51.11	33.33	25.03

*calendar year

Table G-4
Soil-Moisture Budget Results (Pasture/Turf)

Year	Irrigation demand	ETo	ETc	Precip*
	(inches)			
2018	38.99	53.04	53.04	18.08
2019	37.09	51.11	51.11	25.03

*calendar year

Table G-5 summarizes the estimated applied irrigation for the various agricultural land uses. Due to the relatively minor acreage involved, vineyard and nursery 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 2019 is 630 acre-feet (a reduction of 40 acre-feet from 2018).

Table G-5
Applied Irrigation for Agriculture

Description	Units	2018	2019
Irrigation demand vegetables	inches	24.55[1]	23.71[1]
Irrigation demand pasture	inches	38.99[2]	36.79[2]
Irrigation Efficiency Factor[3]	factor	0.92	0.92
Applied irrigation vegetables	feet	2.22	2.15
Applied irrigation pasture	feet	3.53	3.33
Vegetables acreage[4]	acres	286.5	281.6
Vegetables applied water	acre-feet	636	605.4
Pasture acreage[4]	acres	8.7	8.7
Pasture applied water	acre-feet	30.7	29.1
TOTAL applied agricultural irrigation (closest 10 acre-feet)	acre-feet	670	630

[1]From Table G-3;
[2]From Table G-4;
[3] From 2006-2009 calibration (CHG 2018a)
[4]2019 acreage from County GIS 2018 (vineyard and nursery acres counted as 4.6 acres in vegetables, based on equivalent water demand conversion using 2012 County Master Water Plan Table A1 [Carollo, 2012]).
[5]From Table G-1

Table G-6 summarizes the estimated applied irrigation for community facilities. The total estimated water demand for community facilities in the 2019 calendar year was 127 acre-feet.

Table G-6
2019 Applied Irrigation for Community Facilities

Description	Units	Memorial Park	Sea Pines Golf*	Community Park	Total
Turf Area (from Table G-2)	acres	12.5	24	1.2	37.7
Applied Irrigation (from Table G-5)	feet	3.36	3.36	3.36	3.36
TOTAL Applied Irrigation	acre-feet	42	80.6	4	127

*includes estimated 71 acre-feet of recycled water (10 acre-feet net production)

APPENDIX H

Precipitation and Streamflow Data

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 - 2019-2020

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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average	0.13	0.02	0.07	0.89	1.06	2.48	3.80	2.89	2.51	0.82	0.37	0.10	15.14
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
2019-2020	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2018-2019	0.00	0.00	0.00	0.43	3.74	1.14	6.14	6.89	3.94	0.08	1.54	0.00	23.90
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

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		0.08		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

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
Total	0.00	0.00	0.00	0.43	3.74	1.14	6.14	6.89	3.94	0.08	1.54	0.00	
Cum. Total	0.00	0.00	0.00	0.43	4.17	5.31	11.46	18.35	22.28	22.36	23.90	23.90	

Season Total **23.90**

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

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
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

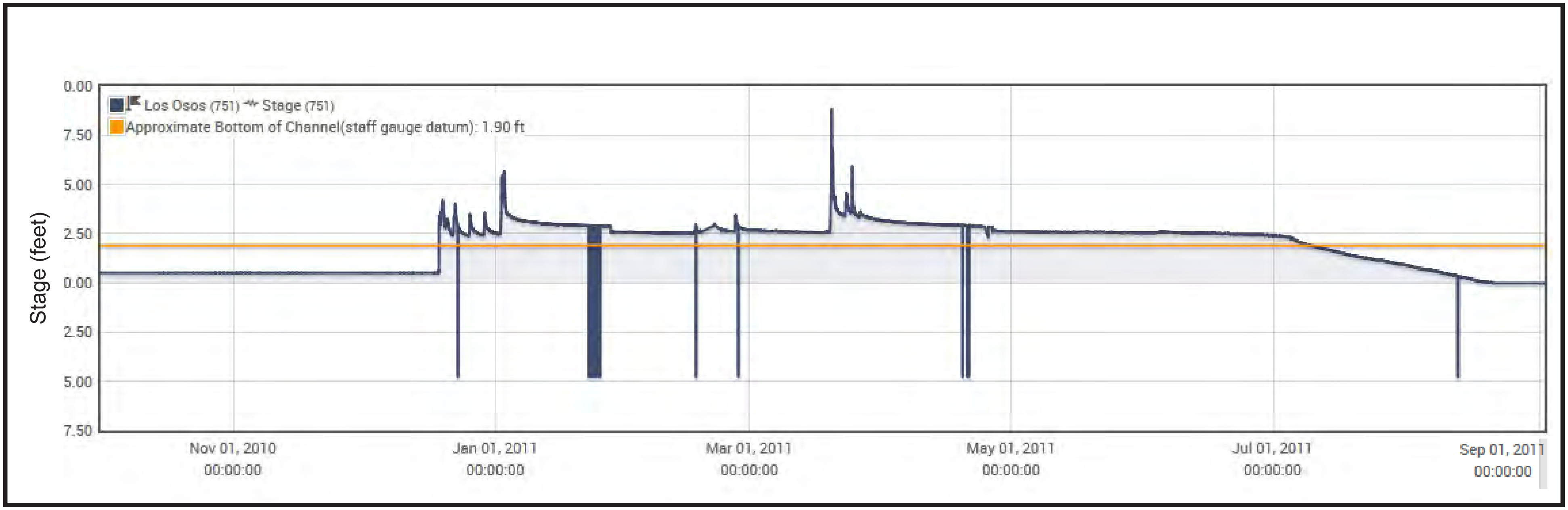
(inches)

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**

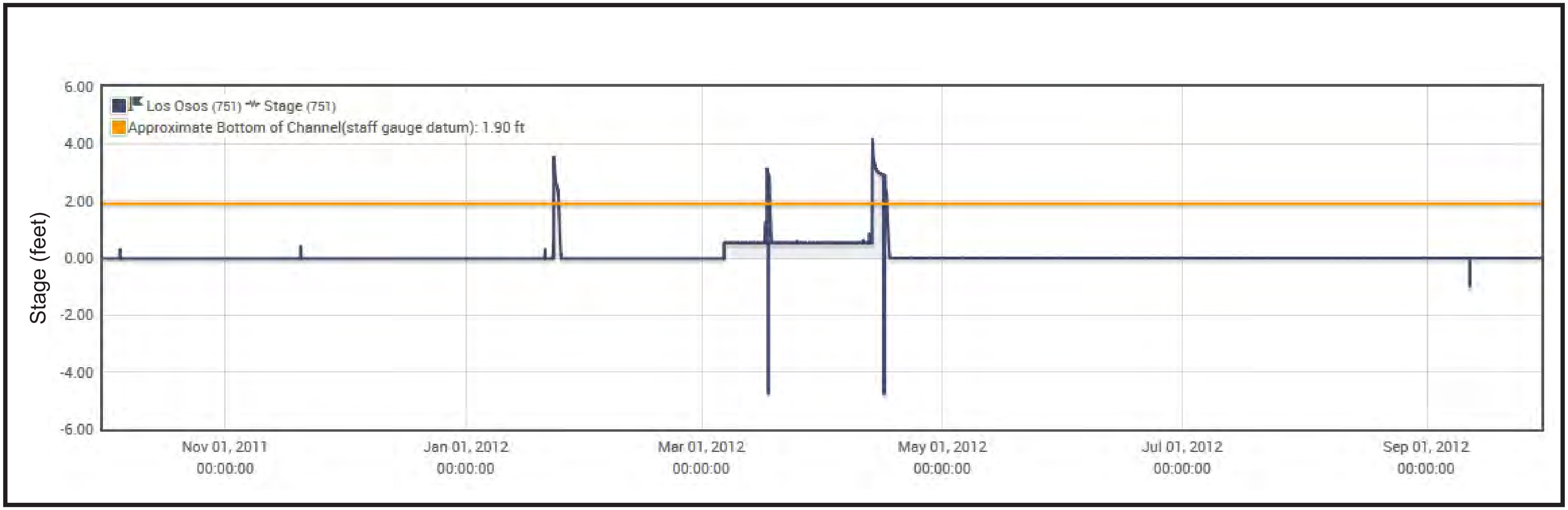
Total	0.04	0.20	0.63	0.24	0.75	2.52	4.45	3.70	3.90	3.70	2.64	0.00	
Cum. Total	0.04	0.24	0.87	1.10	1.85	4.37	8.82	12.52	16.42	20.12	22.76	22.76	

Season Total **22.76**



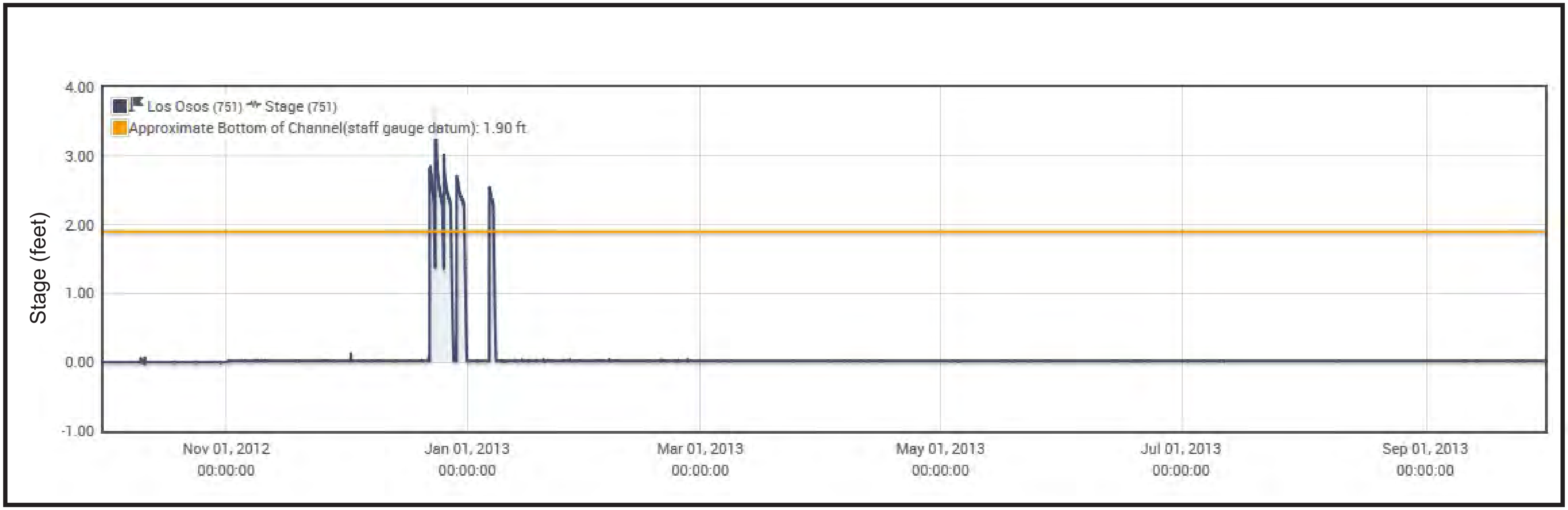
Source: County of San Luis Obispo Public Works Department, Stream Gage #751

Figure H1
Stream Stage for 2011 Water Year
Los Osos Creek, Gage #751



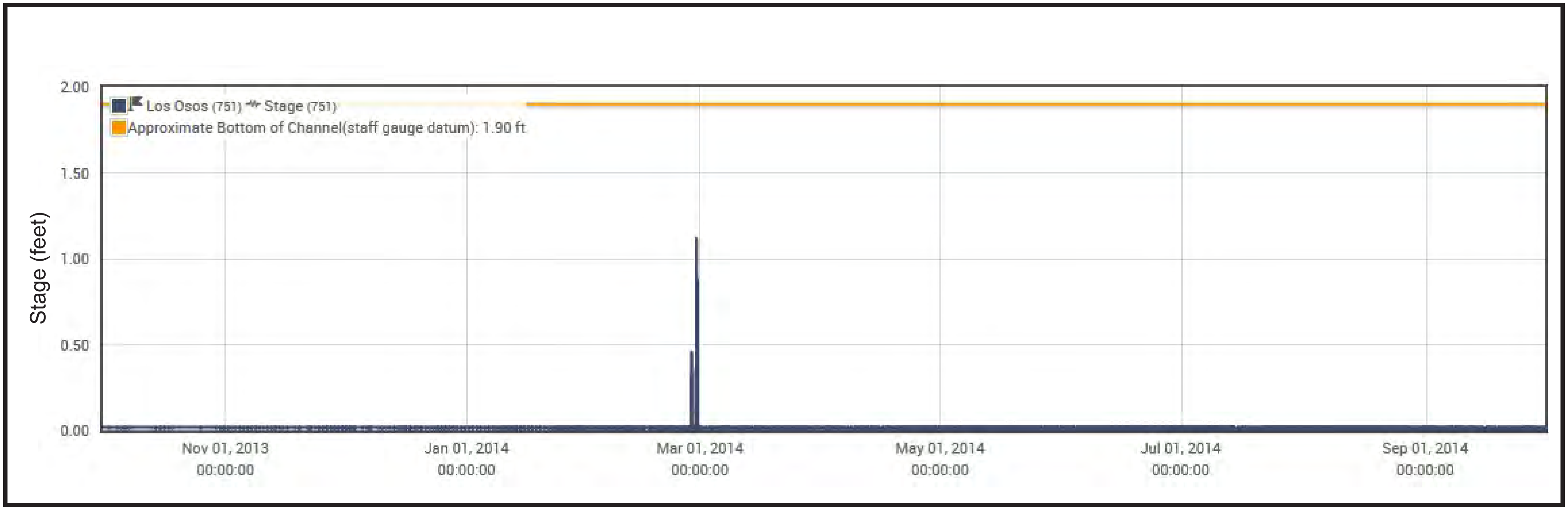
Source: County of San Luis Obispo Public Works Department, Stream Gage #751

Figure H2
Stream Stage for 2012 Water Year
Los Osos Creek, Gage #751



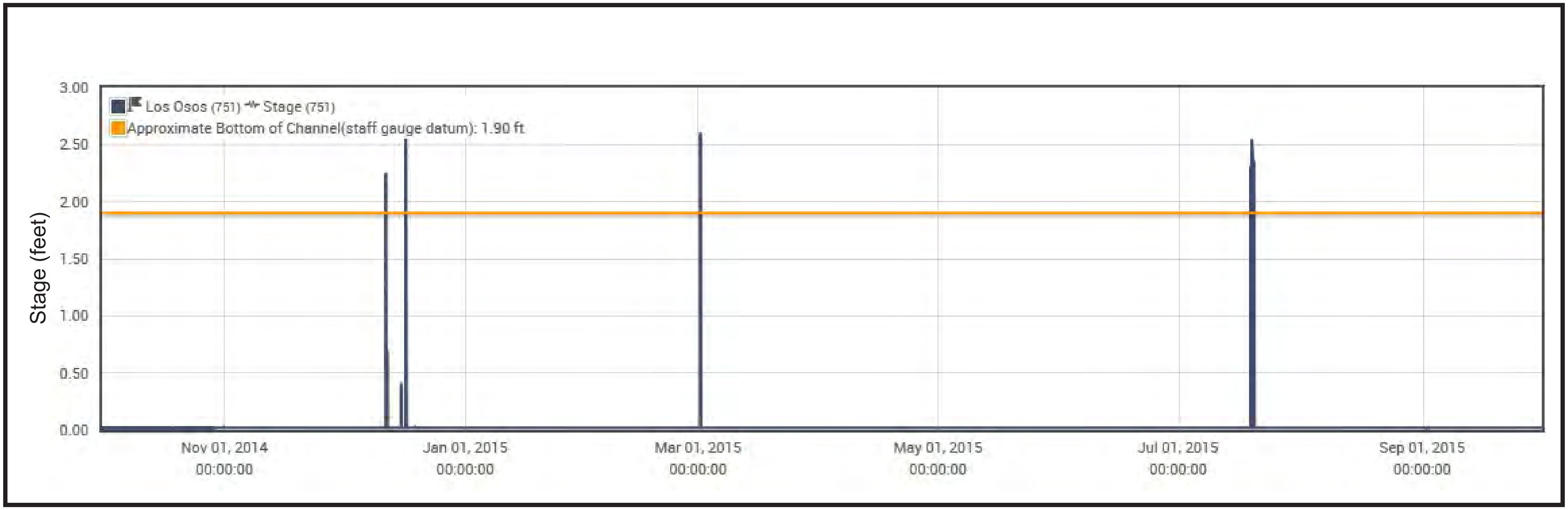
Source: County of San Luis Obispo Public Works Department, Stream Gage #751

Figure H3
Stream Stage for 2013 Water Year
Los Osos Creek, Gage #751



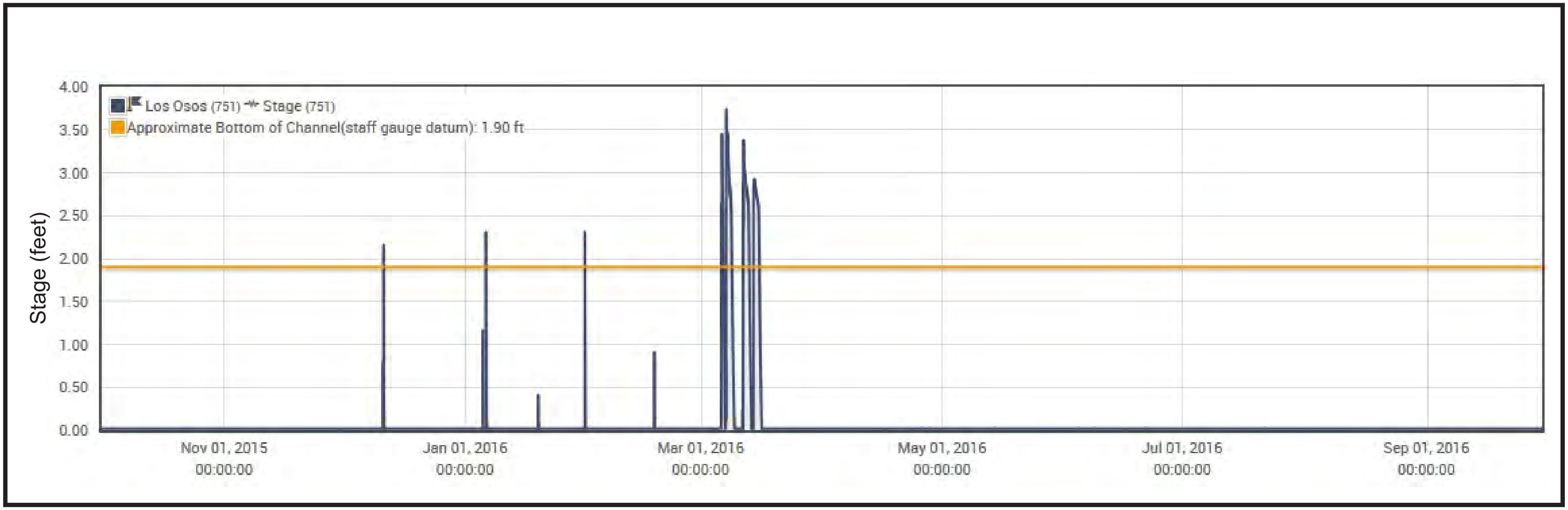
Source: County of San Luis Obispo Public Works Department, Stream Gage #751

Figure H4
Stream Stage for 2014 Water Year
Los Osos Creek, Gage #751



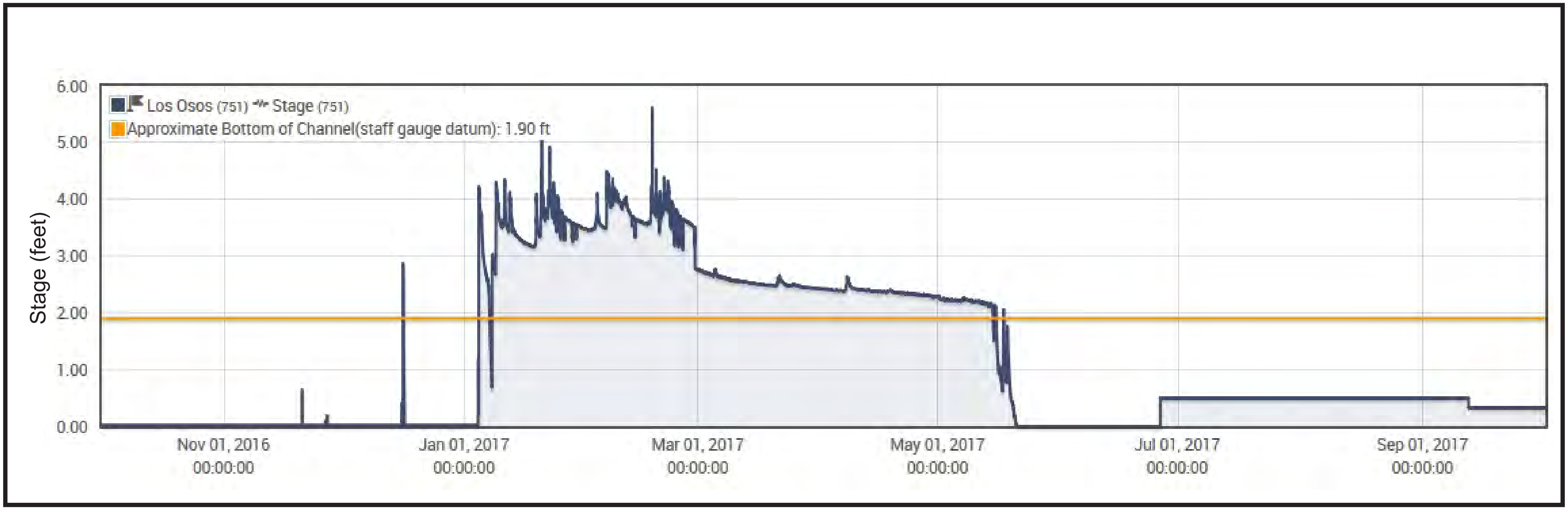
Source: County of San Luis Obispo Public Works Department, Stream Gage #751

Figure H5
Stream Stage for 2015 Water Year
Los Osos Creek, Gage #751



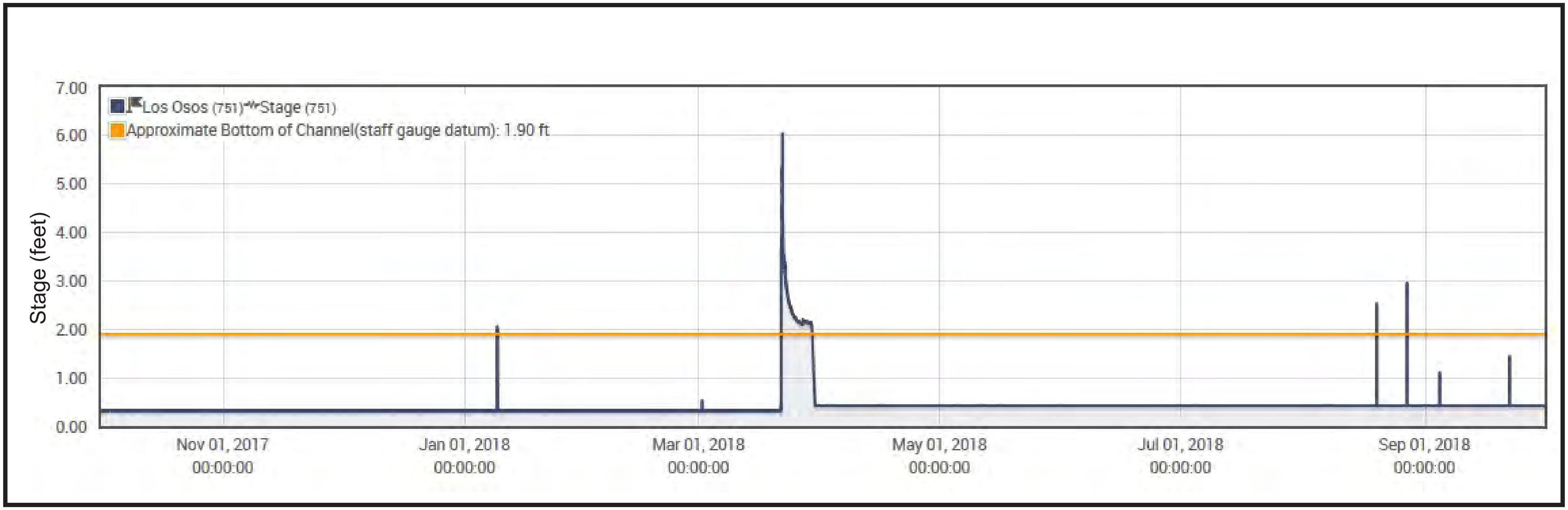
Source: County of San Luis Obispo Public Works Department, Stream Gage #751

Figure H6
Stream Stage for 2016 Water Year
Los Osos Creek, Gage #751



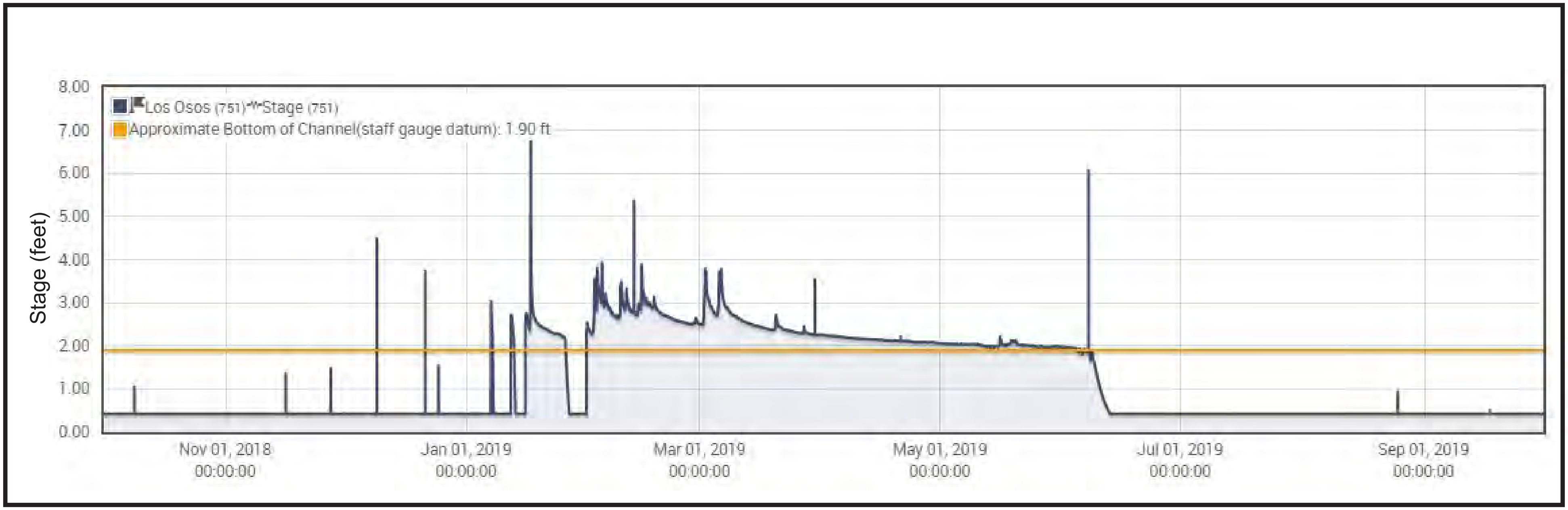
Source: County of San Luis Obispo Public Works Department, Stream Gage #751

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

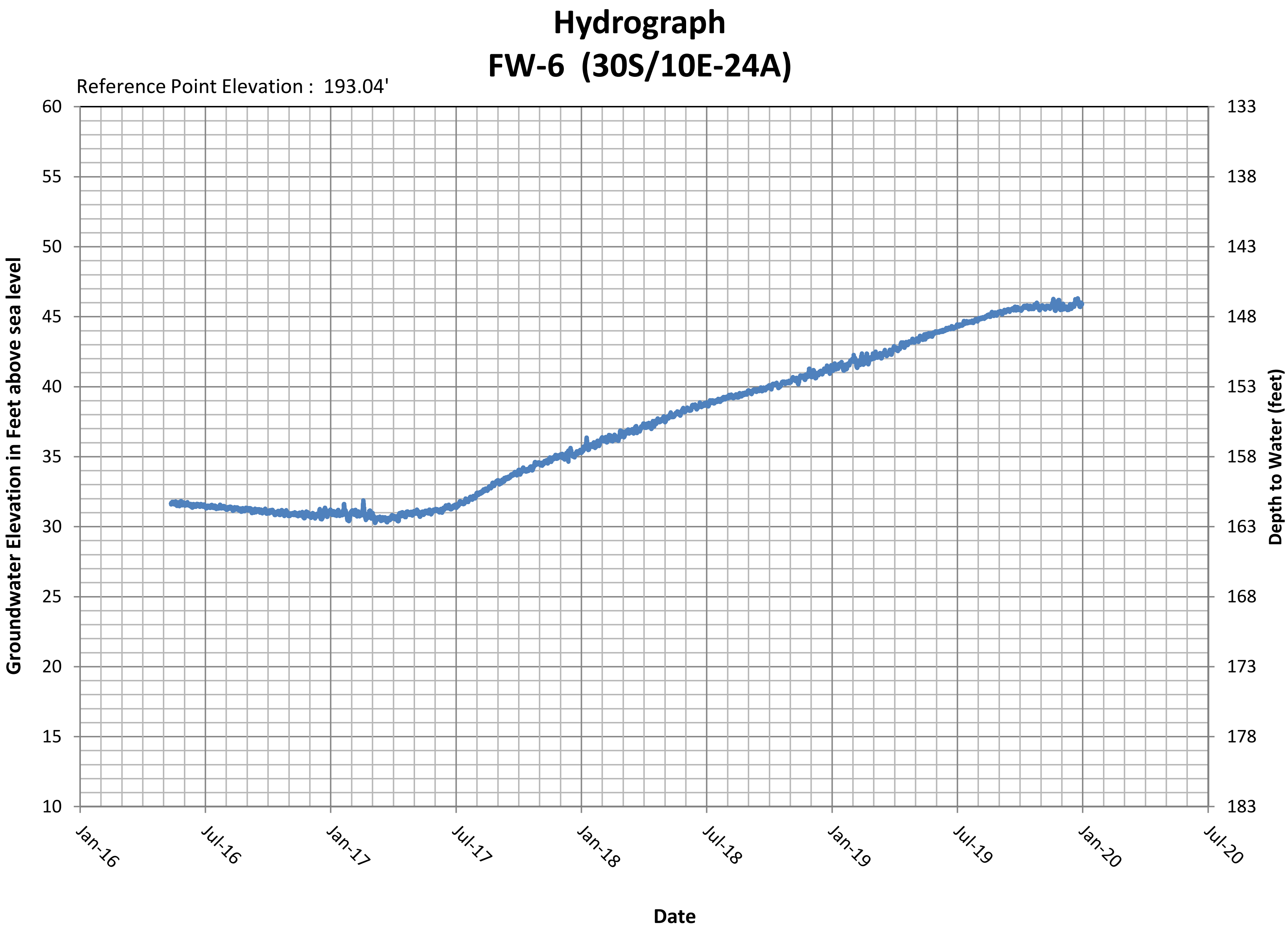


Source: County of San Luis Obispo Public Works Department, Stream Gage #751

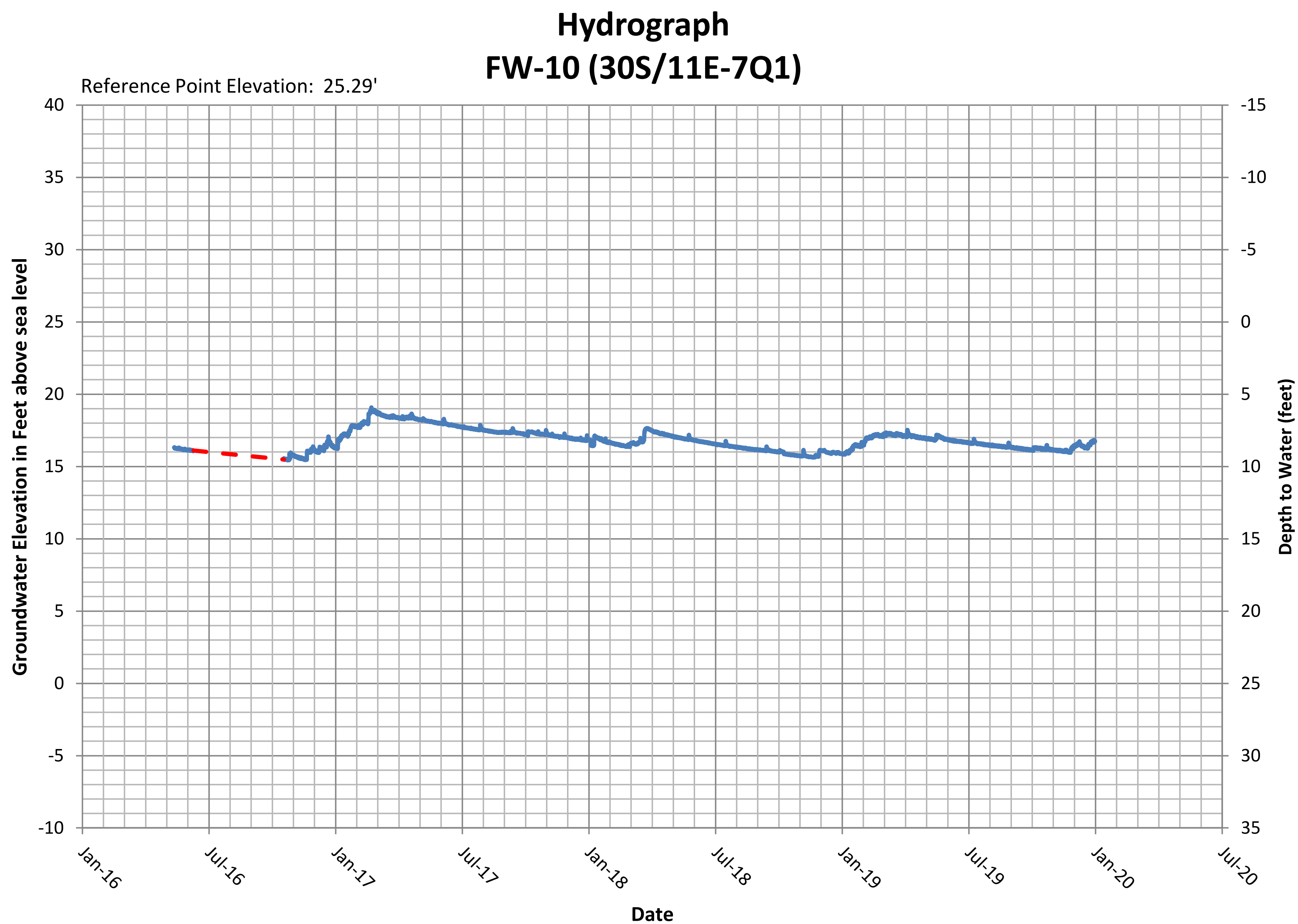
Figure H9
Stream Stage for 2019 Water Year
Los Osos Creek, Gage #751

APPENDIX I

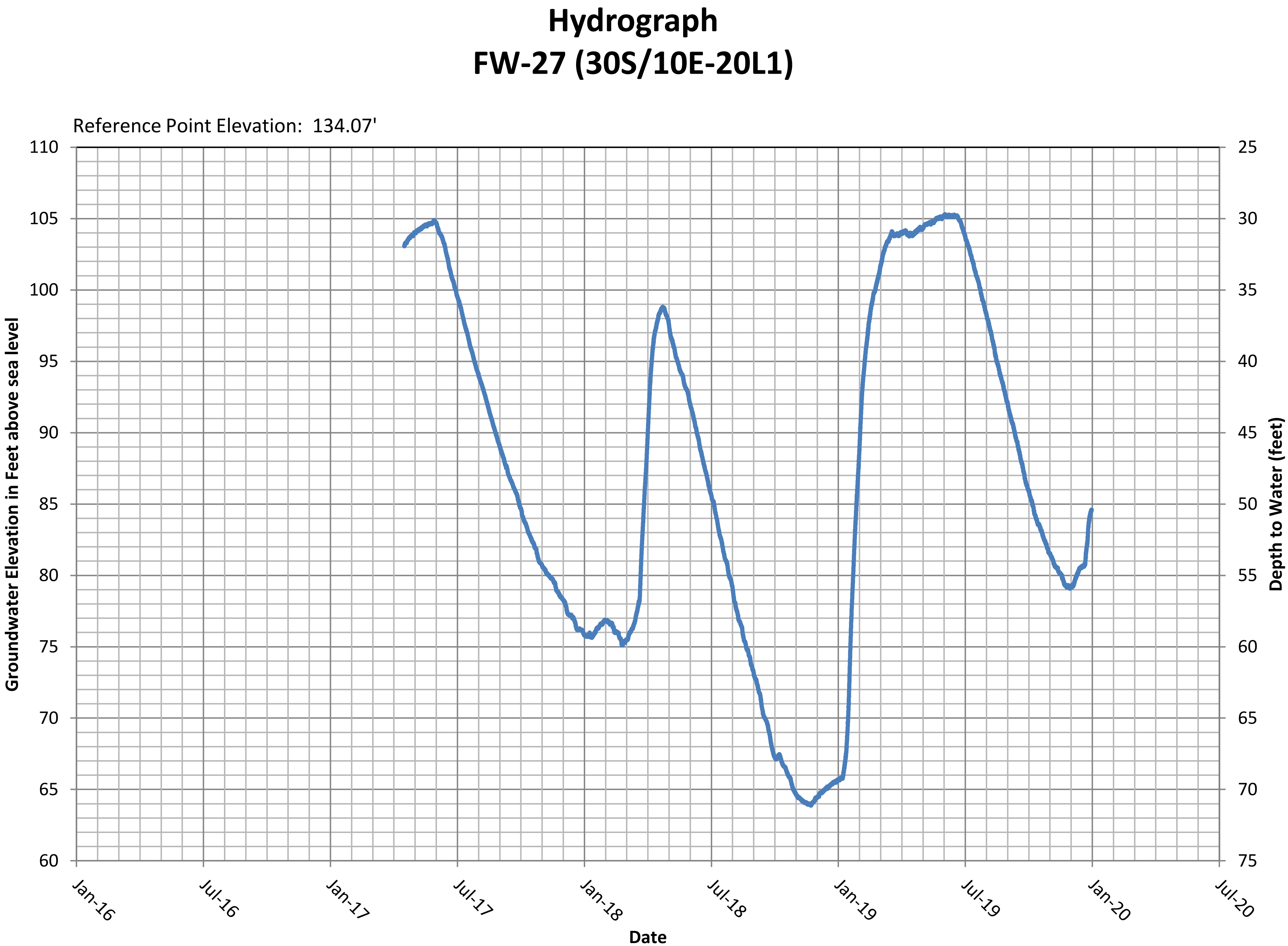
Transducer Hydrographs



Hydrograph
FW-6 (30S/10E-24A)
Reference Point Elevation : 193.04'
Groundwater Elevation in Feet above sea level
Depth to Water (feet)
Date
60
55
50
45
40
35
30
25
20
15
10
133
138
143
148
153
158
163
168
173
178
183
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20
Jul-20

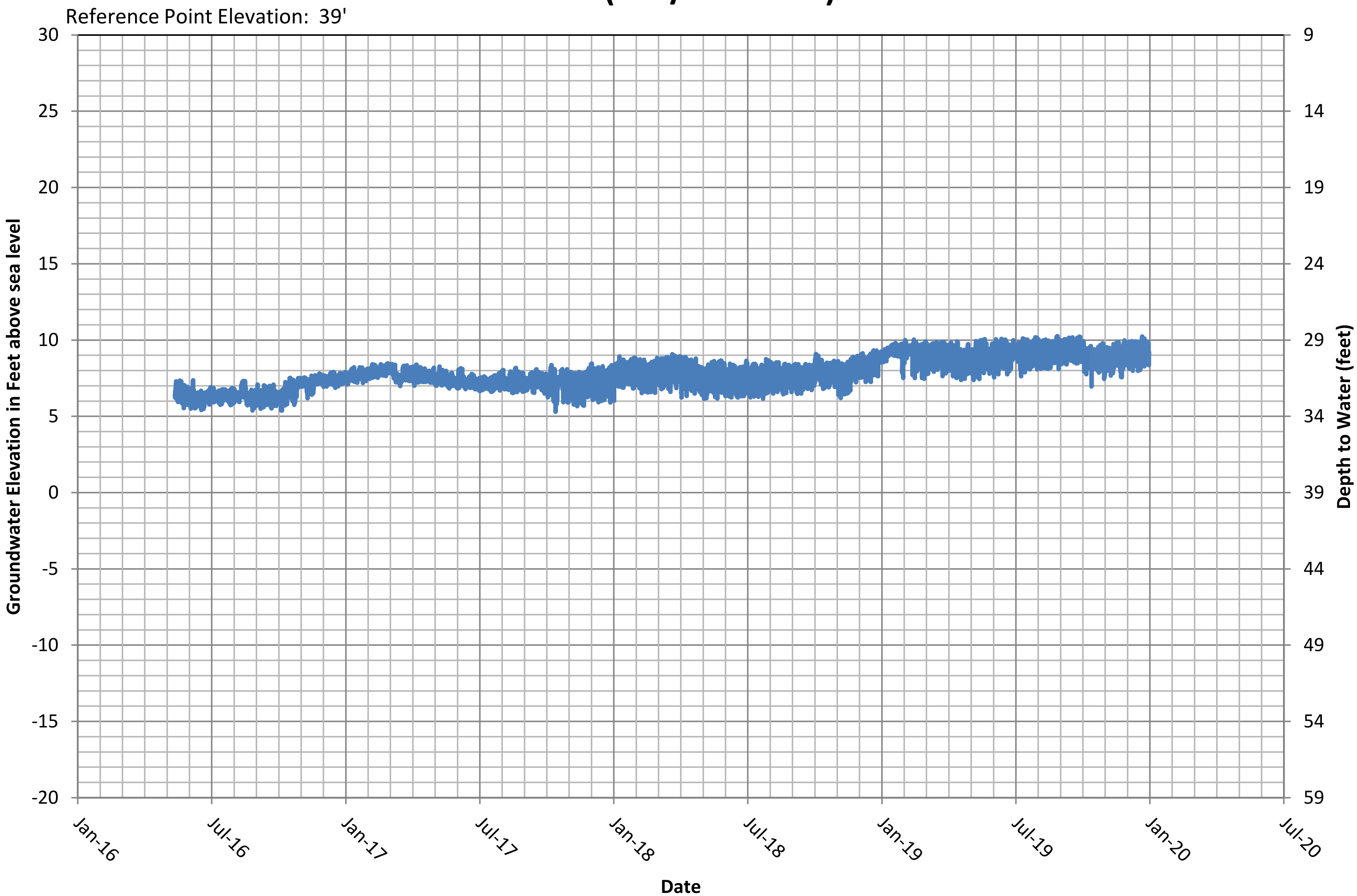


Hydrograph
FW-10 (30S/11E-7Q1)
Reference Point Elevation: 25.29'
Groundwater Elevation in Feet above sea level
Depth to Water (feet)
Date
40
35
30
25
20
15
10
5
0
-5
-10
-15
-10
-5
0
5
10
15
20
25
30
35
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20
Jul-20

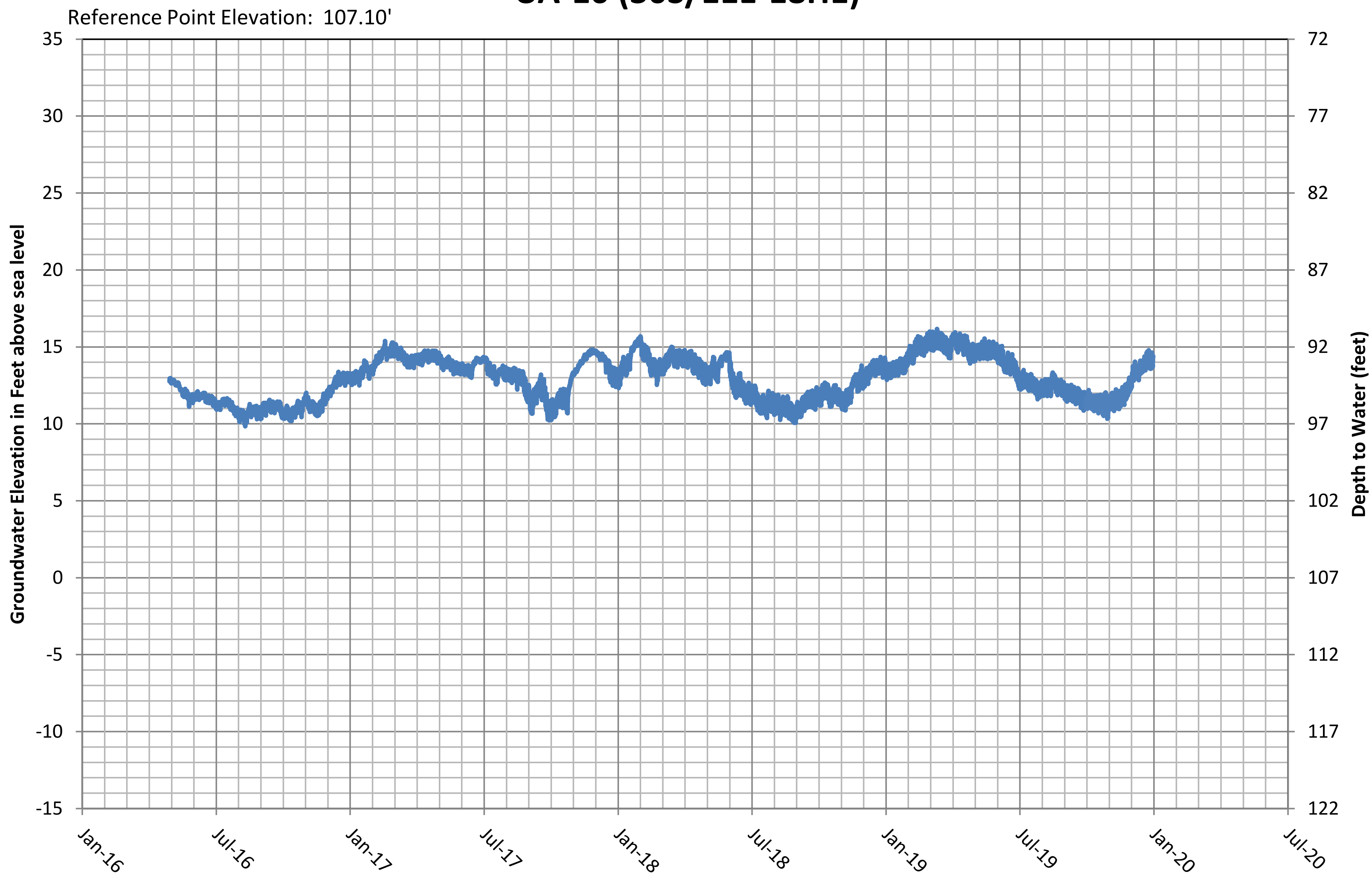


Hydrograph
FW-27 (30S/10E-20L1)
Reference Point Elevation: 134.07'
Groundwater Elevation in Feet above sea level
Depth to Water (feet)
Date
110
105
100
95
90
85
80
75
70
65
60
25
30
35
40
45
50
55
60
65
70
75
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20
Jul-20

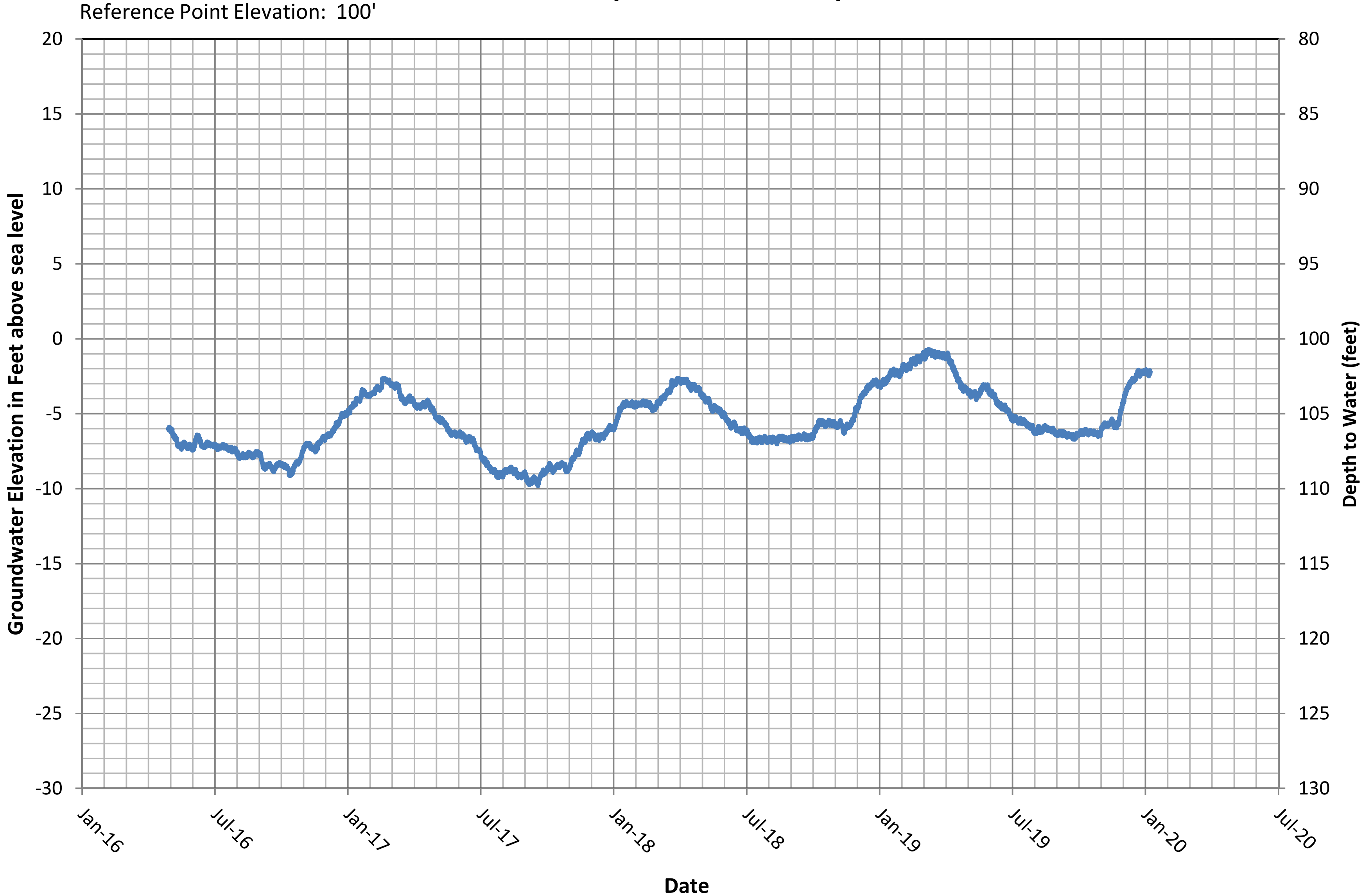
Hydrograph
UA-4 (30S/10E-13L1)



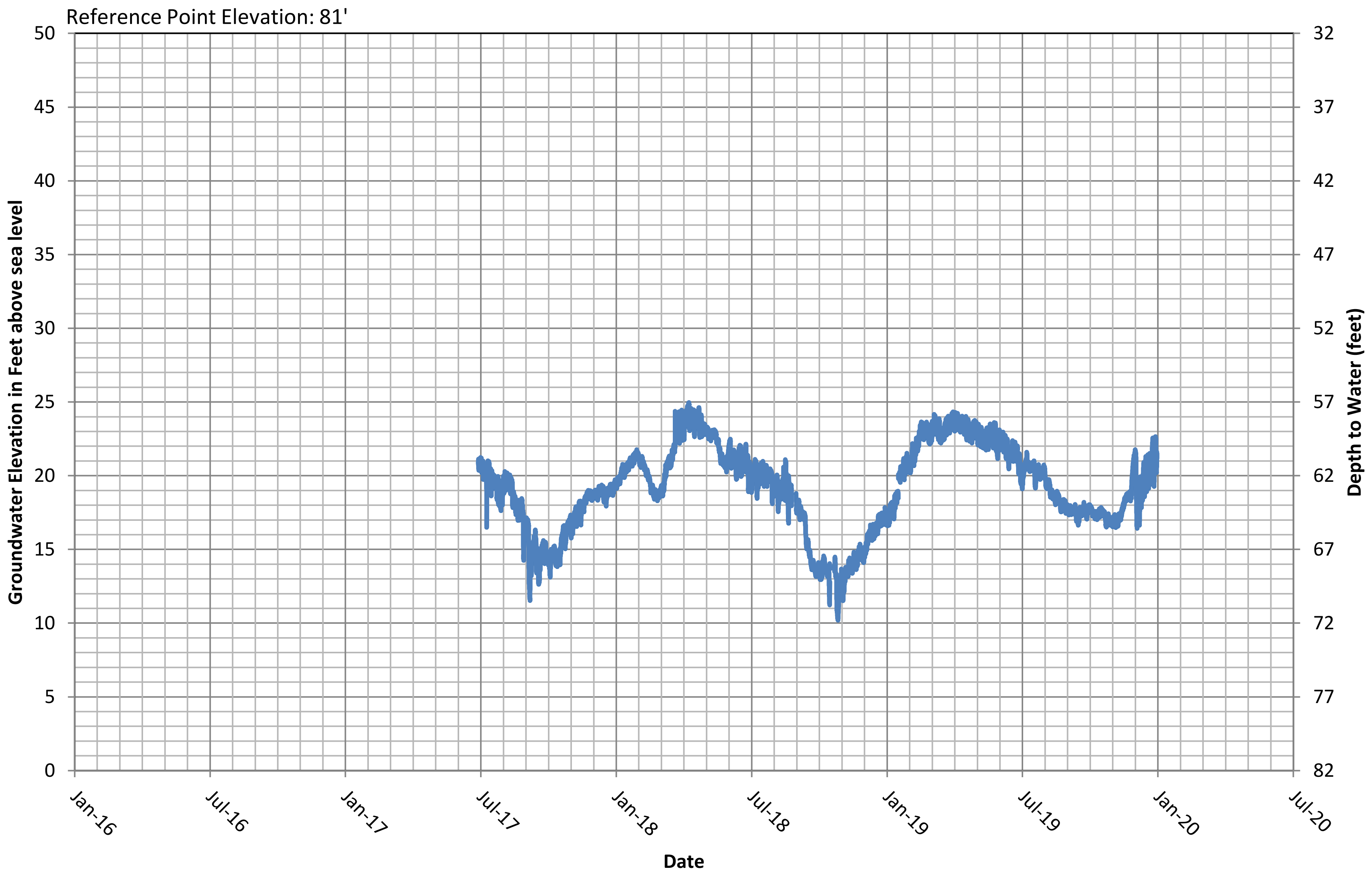
Hydrograph
UA-10 (30S/11E-18H1)



Hydrograph
LA-13 (30S/11E-18F2)



Hydrograph
LA-37 (30S/11E-21B1)



APPENDIX J

Groundwater Storage Calculation Example and Specific Yield Estimates

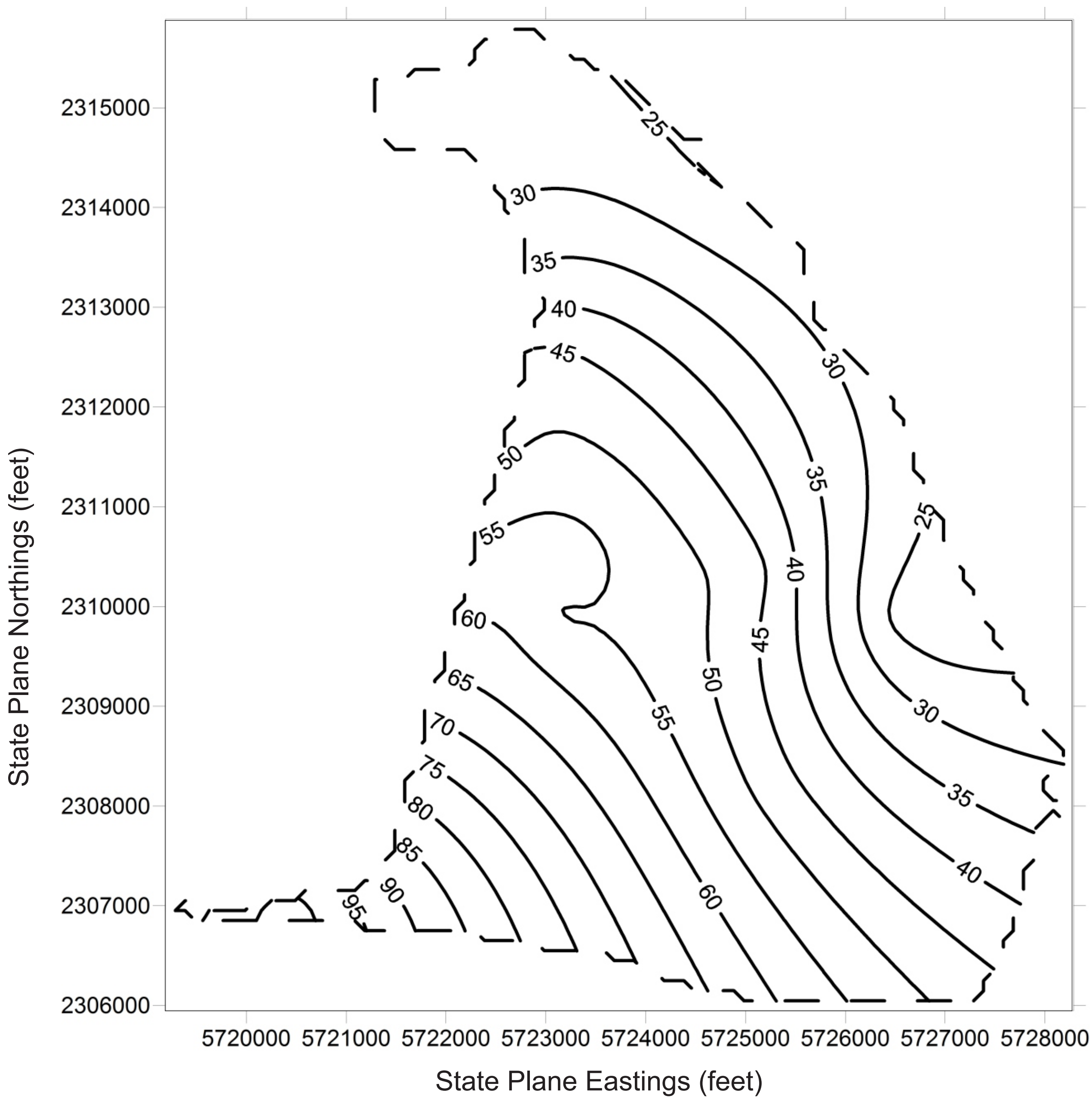
WELLS USED FOR GROUNDWATER ELEVATION CONTOURS
2019 GROUNDWATER STORAGE CALCULATIONS

FIRST WATER		UPPER AQUIFER		LOWER AQUIFER	
SPRING	FALL	SPRING	FALL	SPRING	FALL
FW2	FW2	UA1	UA1	LA1	LA1
FW3	FW3	UA2	UA2	LA2	LA2
FW4	FW4	UA3	UA3	LA3	LA3
FW5	FW5	UA4	UA4	LA4	LA4
FW6	FW6	UA5	UA5	LA5	LA5
FW8	FW8	UA6	UA6	LA6	LA6
FW9	FW9	UA8	UA8	LA8	LA8
FW10	FW10	UA9	UA9	LA9	LA9
FW11	FW11	UA10	UA10	LA10	LA10
FW12	FW12	UA12	UA12	LA11	LA11
FW13	FW13	UA16	UA16	LA12	LA12
FW15	FW15	UA17	UA17	LA13	LA13
FW17	FW17	FW2	FW2	LA14	LA14
FW18	FW18	FW3	FW3	LA15	LA15
FW19	FW19	FW4	FW4	LA16	LA16
FW20	FW20	FW5	FW5	LA18	LA18
FW21	FW21	FW6	FW6	LA19	LA19
FW22	FW22	FW8	FW8	LA20	LA20
FW23	FW23	FW9	FW9	LA21	LA21
FW24	FW24	FW10	FW10	LA24	LA24
FW26	FW26	FW11	FW11	LA25	LA25
FW27	FW27	FW12	FW12	LA26	LA26
FW28	FW28	FW15	FW15	LA27	LA27
FW29	FW29	FW24	FW24	LA28	LA28
FW30	FW30	FW26	FW26	LA29	LA29
FW31	FW31	FW27	FW27	LA30	LA30
FW32	FW32	FW29	FW29	LA33	LA33
FW33	FW33	FW32	FW32	LA34	LA34
LA34	LA34	FW33	FW33	LA35	LA35
LA35	LA35	LA34	LA34	LA36	LA37
LA36	LA37	LA35	LA35	LA37	LA38
LA37	LA38	LA37	LA37	LA38	LA39
LA38		LA38	LA38	LA39	LA41
				FW27	FW27

NOTE: Wells LA34, LA35, LA37, and LA38 represent the shallowest available water level data in the Eastern Area, and are included in the First Water and Upper Aquifer contour data sets for improved lateral control. Well FW27 is located where maximum recharge to lower aquifer from stream seepage likely occurs and provides control for all aquifers locally.

EXAMPLE STORAGE CALCULATION FOR EASTERN AREA:

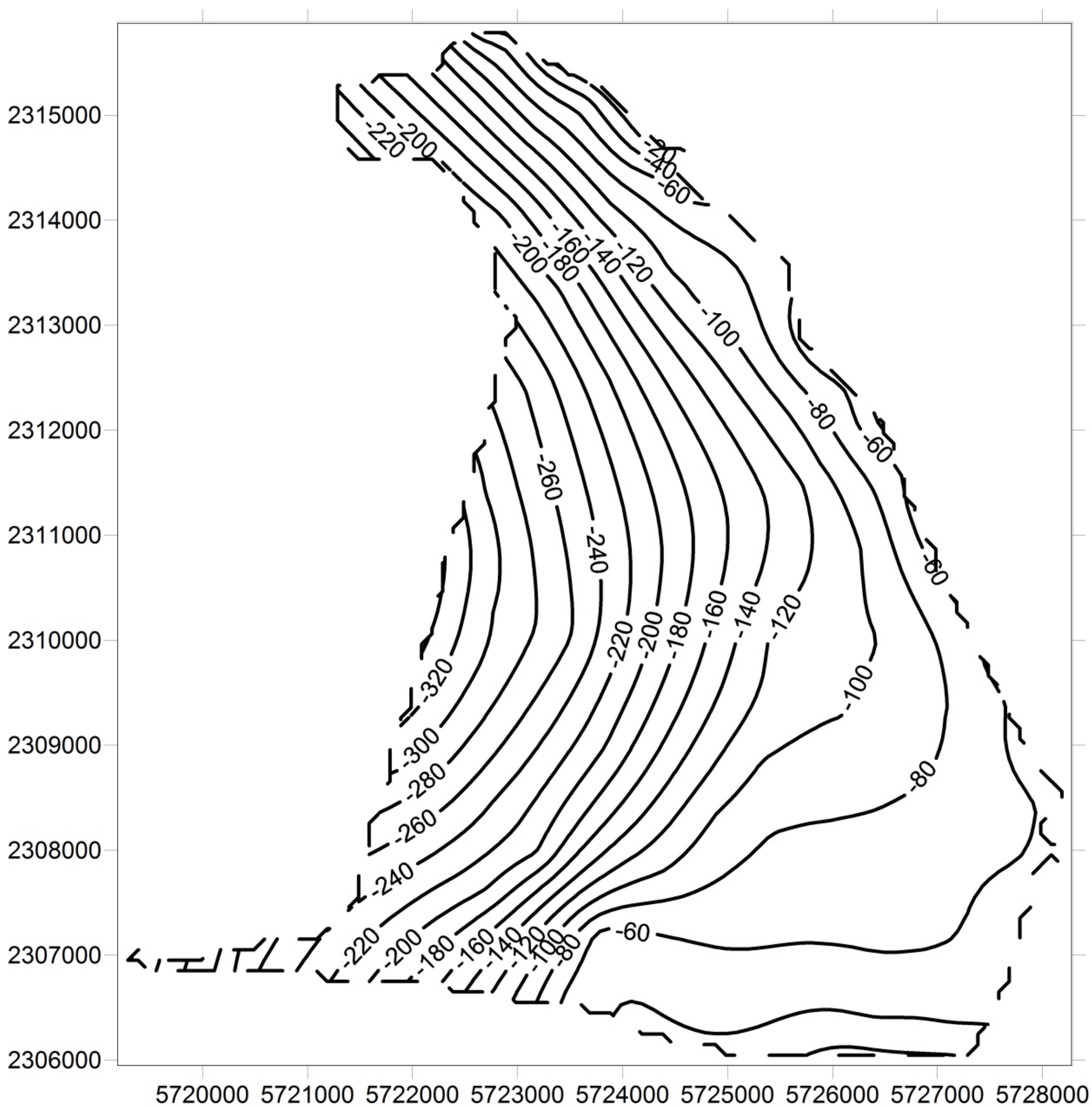
STEP 1: GRID AND TRIM WATER LEVEL CONTOURS



Spring 2019
Eastern Area Water Levels
Alluvial Aquifer and Lower Aquifer

EXAMPLE STORAGE CALCULATION FOR EASTERN AREA:

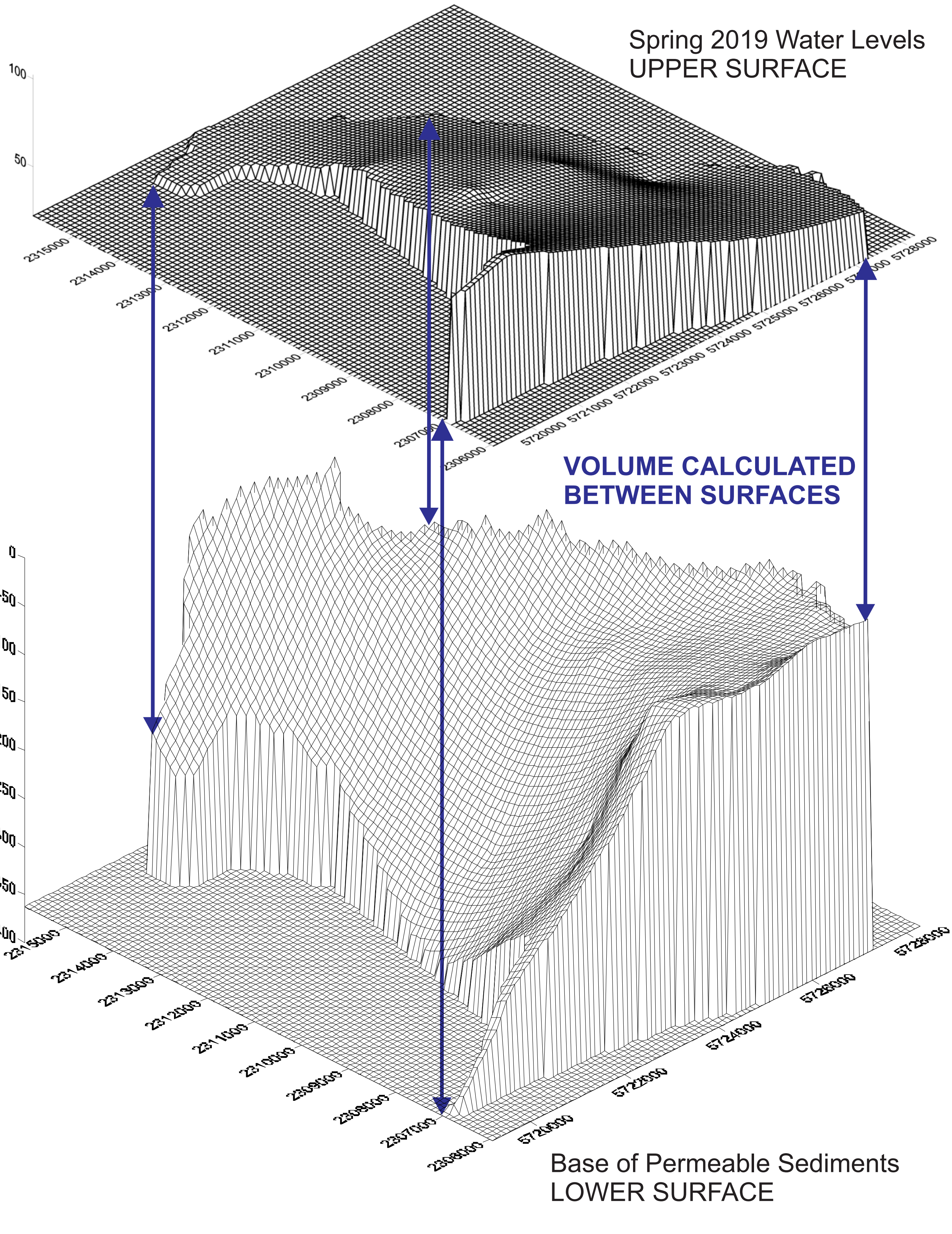
STEP 2: GRID AND TRIM BASE OF PERMEABLE SEDIMENTS



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

Thu Apr 30 11:36:49 2020

Upper Surface

Grid File Name: C:\Users\HP TITAN\Desktop\Projects\Los Osos BMC\2019\BMC 2019 Annual Report\Working Data - REPORT\Contouring and Storage\BLANKED FILES\EASTERN\UpperEasternSpring2019_2.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:	21.943506011439
Z Maximum:	105.61618312288

Lower Surface

Grid File Name: C:\Users\HP TITAN\Desktop\Projects\Los Osos BMC\2019\BMC 2019 Annual Report\Working Data - REPORT\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

Volumes

Z Scale Factor: 1

Total Volumes by:

Trapezoidal Rule:	8357283464.7463
Simpson's Rule:	8352776080.7164
Simpson's 3/8 Rule:	8349030749.8172

EXAMPLE STORAGE CALCULATION FOR EASTERN AREA:

STEP 5: CALCULATE GROUNDWATER IN STORAGE

Cut & Fill Volumes

Positive Volume [Cut]:	8357283464.7463
Negative Volume [Fill]:	0
Net Volume [Cut-Fill]:	8357283464.7463

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]:	41787568.574995
Negative Surface Area [Fill]:	0

STORAGE CALCULATION

Positive Volume: 8,357,283,464.75 ft^3 * 0.101 specific yield ÷ 43,560 acre-feet per ft^3 = 19,377 acre-feet

BINSCARTH TEST HOLE (C&A, 2005)						
Lithology	***Start Depth***	***End Depth***	***Thickness***	***Specific Yield (percent)****	***Zone***	***Weighted Specific Yields (percent)***
						Weighted Specific Yield
sand	0	33	33	20	C	
clayey sand	33	38	5	10		
sand	38	48	10	20		
clayey sand	48	56	8	10		
sand	56	114	58	20		
clayey sand	114	152	38	10		Weighted Specific Yield
sand and gravel	152	214	62	18		17
clayey sand	214	228	14	10	D	
sandy clay	228	234	6	5		
clayey sand	234	254	20	10		
sandy clay	254	262	8	5		
sand	262	288	26	20		
sandy clay	288	298	10	5		
clayey sand	298	320	22	10		Weighted Specific Yield
sand	320	346	26	20		13
clayey sand	346	364	18	10	E	
sand	364	378	14	20		
clay	378	386	8	3		
sand and gravel	386	510	124	18		
sandstone with gravel	510	550	40	15		Weighted Specific Yield
sandstone	550	580	30	15		16.1
siltstone	580	640	60		BEDROCK	
silty clay	640	660	20			
Total Depth	660	**BOREHOLE WEIGHTED SPECIFIC YIELD (PERCENT)**				**15.7**

Cleath & Assoc., Seawater Intrusion Assessment and Lower Aquifer Source Investigation of the Los Osos Valley Groundwater Basin , October 2005

ML-2 (Webber, Hayes & Assoc., 2001)						
Lithology	***Start Depth***	***End Depth***	***Thickness***	***Specific Yield (percent)****	***Zone***	***Weighted Specific Yields (percent)***
sand	0	17	17	unsaturated	A+B	
silty sand	17	51	34			
clayey sand	51	62	11	10		
silty sand	62	89	27	10		Weighted Specific Yield
sandy clay	89	94	5	5		9.4
Total Depth	94	**BOREHOLE WEIGHTED SPECIFIC YIELD (PERCENT)**				**9.4**

Webber, Hayes & Assoc., Site Investigation Report, Bear Valley Chevron, August 29, 2001

ML-3 (Webber, Hayes & Assoc., 2001)

Lithology	*Start Depth*	*End Depth*	*Thickness*	*Specific Yield (percent)**	*Zone*	*Weighted Specific Yields (percent)*
sand	0	22	22	unsaturated	A+B	
sand with silt	22	26.5	4.5			
sand	26.5	29	2.5			
silty sand	29	50	21	10		
clayey sand	50	55	5	10		
silty sand	55	91	36	10		
sandy clay	91	92	1	5		Weighted Specific Yield
clay	92	97	5	3		9.4
Total Depth	97	**BOREHOLE WEIGHTED SPECIFIC YIELD (PERCENT)**				**9.4**

ML-4 (Webber, Hayes & Assoc., 2001)

Lithology	*Start Depth*	*End Depth*	*Thickness*	*Specific Yield (percent)**	*Zone*	*Weighted Specific Yields (percent)*
sand	0	22	22	unsaturated	A+B	
silty sand	22	30	8			
sand	30	33	3			
silty sand	33	51	18	10		
clayey sand	51	56.5	5.5	10		
silty sand	56.5	103.5	47	10		Weighted Specific Yield
clay	103.5	107	3.5	3		9.7
clayey gravel	107	109	2		C	
clay	109	110	1			
Total Depth	107	**BOREHOLE WEIGHTED SPECIFIC YIELD (PERCENT)**				**9.7**

ML-7 (Webber, Hayes & Assoc., 2001)

Lithology	*Start Depth*	*End Depth*	*Thicknes s*	*Specific Yield (percent)**	*Zone*	*Weighted Specific Yields (percent)*
sand	0	19	19	unsaturated	A+B	
silty sand	19	32.5	13.5			
sand	32.5	37.5	5			
silty sand	37.5	101.5	64	10		Weighted Specific Yield
clay	101.5	108	6.5	3		9.4
clayey gravel with sand	108	111	3	7	C	
sandy clay	111	115	4	5		
clayey gravel with sand	115	118	3	7		
sandy clay	118	136	18	5		
clayey gravel with sand	136	154	18	7		Weighted Specific Yield
silty sand	154	175	21	10		7.3
Total Depth	175	**BOREHOLE WEIGHTED SPECIFIC YIELD (PERCENT)**				**8.3**

Webber, Hayes & Assoc., Site Investigation Report, Bear Valley Chevron, August 29, 2001

ML-8 (Webber, Hayes & Assoc., 2001)

Lithology	Start Depth	End Depth	Thickness	Specific Yield (percent)*	Zone	Weighted Specific Yields (percent)
sand	0	17	17	unsaturated	A+B	
silty sand	17	26	9			
sand	26	36	10			
silty sand	36	51	15			
clay	51	52	1			
clayey sand with gravel	52	58	6			
silty sand	58	101.5	43.5	10		Weighted Specific Yield
clay	101.5	103	1.5	3		9.8
silty sand	103	105	2	10	C	
sandy clay	105	112	7	5		
clayey gravel with sand	112	114	2	7		
silty sand	114	115.5	1.5	10		
clayey gravel with sand	115.5	118	2.5	7		
sandy clay with gravel	118	120	2	7		
clayey sand	120	132	12	10		
sandy clay with gravel	132	136	4	7		
clayey gravel with sand	136	140	4	7		
clayey sand	140	144	4	10		
clayey gravel with sand	144	150	6	7		Weighted Specific Yield
silty sand	150	175	25	10		8.7
Total Depth	175	**BOREHOLE WEIGHTED SPECIFIC YIELD (PERCENT)**				**9.1**

WELL 30S/11E-7Q03 (LA12)

Lithology	Start Depth	End Depth	Thickness	Specific Yield (percent)*	Zone	Weighted Specific Yields (percent)
sandy brown soil	0	6	6	unsaturated	C	
sand	6	17	11	20		
clay some gravel	17	20	3	7		
sand	20	48	28	20		
clay	48	52	4	3		Weighted Specific Yield
cemented sand	52	127	75	15		16
clay	127	230	103	3	D	
sand some gravel	230	245	15	18		Weighted Specific Yield
gravel	245	276	31	18		7.6
clay	276	325	49	3	E	
sand	325	332	7	20		
clay	332	343	11	3		
sand	343	350	7	20		
sand and gravel	350	356	6	18		
rock	356	357	1	15		Weighted Specific Yield
sand and gravel	357	402	45	18		11.1
clay	402	411	9	3	BEDROCK	
Total Depth	411	**BOREHOLE WEIGHTED SPECIFIC YIELD (PERCENT)**				**11.3**

WELL 30S/10E-12J01 (LA11)						
Lithology	***Start Depth***	***End Depth***	***Thickness***	***Specific Yield (percent)****	***Zone***	***Weighted Specific Yields (percent)***
sand	5	27	22	20	C	
clay	27	32	5	3		
sand and peat	32	70	38	5		
clay	70	72	2	3		Weighted Specific Yield
gravel	72	82	10	18		10.8
clay	82	96	14	3	D	
sand	96	100	4	20		
silt	100	135	35	5		
clay	135	157	22	3		
gravel	157	158	1	18		
sand	158	169	11	20		
sand and clay	169	194	25	5		
gravel	194	205	11	18		Weighted Specific Yield
sand and clay	205	217	12	5		7.3
clay	217	222	5	3	E	
sand and clay	222	245	23	5		
sand and gravel	245	257	12	18		
sand	257	264	7	20		
sand and gravel	264	274	10	18		
sand	274	290	16	20		
sand and silt	290	304	14	5		
sand	304	323	19	20		
sand and clay	323	330	7	5		
clay	330	339	9	3		
sand	339	341	2	20		
clay	341	346	5	3		
sand	346	352	6	20		
sand and clay	352	356	4	5		
sand	356	370	14	20		Weighted Specific Yield
sand and gravel	370	386	16	18		13.4
clay	386	392	6		BEDROCK	
shale	392	402	10			
Total Depth	402	**BOREHOLE WEIGHTED SPECIFIC YIELD (PERCENT)**				**10.5**

** Johnson, A. I., 1967, Specific Yield - Compilation of Specific Yields for Various Materials, U.S. Geological Survey Water Supply Paper 1662-D*

WELL 30S/10E-13L04 (LA6)

Lithology	*Start Depth*	*End Depth*	*Thickness*	*Specific Yield (percent)**	*Zone*	*Weighted Specific Yields (percent)*
top soil	0	19	19	unsaturated	A+B	
clay, some gravel and sand	19	26	7			
gravel, clay and sand	26	41	15			Weighted Specific Yield
fine sand	41	61	20	20		20
clay, sand, small rocks	61	71	10	7	C	
clay, few pebbles	71	75	4	3		
fine gravel and sand	75	81	6	18		
sandy clay	81	95	14	5		
hard clay	95	97	2	3		
fine sand	97	115	18	20		
clay	115	118	3	3		
sand and gravel	118	149	31	18		
reddish brown clay, pebbly	149	164	15	7		
gravel	164	170	6	18		Weighted Specific Yield
sand and clay	170	190	20	5		11.7
tan clay, some gravel	190	210	20	7	D	
hard green clay	210	240	30	3		
tan sand	240	248	8	20		
clay and sand	248	260	12	5		
fine sand	260	277	17	20		
gravel	277	283	6	18		
fine sand	283	293	10	20		
fine gravel	293	310	17	18		
sand and clay	310	340	30	5		
coarse gravel	340	356	16	18		Weighted Specific Yield
gravel and clay	356	370	14	7		10.8
fine sand	370	394	24	20	E	
coarse gravel boulders	394	426	32	18		
gravel	426	456	30	18		
clay sand and gravel	456	500	44	7		
sand clay and gravel	500	570	70	7		
gravel and clay	570	600	30	7		
silt and clay	600	619	19	5		
black mud	619	621	2	3		Weighted Specific Yield
gravel	621	670	49	18		12
hard clay, sandstone	670	675	5		BEDROCK	Weighted Specific Yield
Total Depth	675	**BOREHOLE WEIGHTED SPECIFIC YIELD (PERCENT)**				**11.8**

WELL 30S/11E-16Na (LA28)

Lithology	***Start Depth***	***End Depth***	***Thickness***	***Specific Yield (percent)****	***Zone***	***Weighted Specific Yields (percent)***
soil	0	12	12	unsaturated	Qal	
clay	12	20	8			
fine sand	20	30	10	15		
shale and gravel	30	32	2	21		
fine sand	32	40	8	15		
fine sand and clay	40	57	17	5		Weighted Specific Yield
gravel and wood	57	60	3	21		11.5
clay and sand	60	65	5	5	D	
clay	65	70	5	3		
sand	70	100	30	20		
sand and clay	100	108	8	5		
sand and gravel	108	135	27	18		
clay	135	171	36	3		
clay and sand	171	200	29	5		Weighted Specific Yield
sand	200	207	7	20		10.6
clay	207	225	18	3	E	
fine sand	225	250	25	20		
clay and sand	250	255	5	5		
clay	255	258	3	3		
fine sand and gravel	258	275	17	18		
clay and sand	275	290	15	5		
fine sand	290	320	30	20		Weighted Specific Yield
sandstone gravel	320	340	20	18		14.5
sandstone	340	358	18	15	BEDROCK	Weighted Specific Yield
Total Depth	358	**BOREHOLE WEIGHTED SPECIFIC YIELD (PERCENT)**				**12.3**

WELL 30S/11E-17A01 (LA33)

Lithology	***Start Depth***	***End Depth***	***Thicknes s***	***Specific Yield (percent)****	***Zone***	***Weighted Specific Yields (percent)***
adobe and gravel	0	11	11	unsaturated	Qal	
clay	11	25	14			
gravel	25	28	3	21		
clay and gravel	28	34	6	7		Weighted Specific Yield
gravel	34	38	4	21		14.5
clay	38	70	32	3	D	
sand some gravel	70	71	1	18		
clay	71	78	7	3		
sand and gravel	78	86	8	18		
clay	86	90	4	3		
gravel and sand	90	92	2	18		
hard clay	92	95	3	3		
gravel and sand	95	101	6	18		Weighted Specific Yield
hard clay	101	107	6	3		6.7
Total Depth	107	**BOREHOLE WEIGHTED SPECIFIC YIELD (PERCENT)**				**7.9**

WELL 30S/11E-17C01 (LA23)						
Lithology	***Start Depth***	***End Depth***	***Thickness***	***Specific Yield (percent)****	***Zone***	***Weighted Specific Yields (percent)***
sandy soil	0	3	3	unsaturated	**A+B**	
sand	3	28	25			
sandy clay	28	34	6	5		Weighted Specific Yield
sand	34	48	14	20		15.5
clay	48	52	4	3	**C**	
sand and gravel	52	56	4	18		
clay	56	76	20	3		
clay and gravel	76	80	4	7		
sandy clay	80	91	11	5		
sand	91	104	13	20		
clay	104	108	4	3		Weighted Specific Yield
sand	108	114	6	20		9.4
silty clay	114	148	34	5	**D**	
sandy clay	148	165	17	5		
sand	165	183	18	20		Weighted Specific Yield
sand and gravel	183	230	47	18		12.6
clay	230	236	6	3	**E**	
sandy clay	236	246	10	5		
sand and gravel	246	254	8	18		Weighted Specific Yield
clay	254	270	16	3		6.5
Total Depth	270	**BOREHOLE WEIGHTED SPECIFIC YIELD (PERCENT)**				**11**

WELL 30S/11E-17E7 (LA21)

Lithology	*Start Depth*	*End Depth*	*Thickness*	*Specific Yield (percent)**	*Zone*	*Weighted Specific Yields (percent)*
sand	0	55	55	unsaturated	C	
sandy clay	55	60	5	5		
sand	60	94	34	20		Weighted Specific Yield
sandy clay	94	126	32	5		12.2
sand with gravel	126	136	10	18	D	
sandy clay	136	168	32	5		
silty sand	168	180	12	10		
sandy clay	180	184	4	5		
sand with gravel	184	210	26	18		
silty clay	210	220	10	5		
silty sand	220	230	10	10		
silty /sandy clay	230	270	40	5		
silty sand	270	290	20	10		
clay	290	314	24	3		
silt and sand	314	320	6	10		
sandy / silty clay	320	352	32	5		
clayey sand	352	364	12	10		Weighted Specific Yield
silty sand	364	382	18	10		8.2
sandy clay	382	430	48	5	E	
silty sand	430	434	4	10		
clay	434	442	8	3		
silty sand	442	468	26	10		
sand	468	474	6	20		
sandstone	474	492	18	15		
clay	492	498	6	3		Weighted Specific Yield
sandstone	498	518	20	15		9.4
franciscan	518	560	42		BEDROCK	Weighted Specific Yield
Total Depth	560	**BOREHOLE WEIGHTED SPECIFIC YIELD (PERCENT)**				**9.9**

WELL 30S/11E-17J01 (LA24)

Lithology	Start Depth	End Depth	Thickness	Specific Yield (percent)*	Zone	Weighted Specific Yields (percent)
all inferred from e-log						
no data	0	8	8	unsaturated	C	
clay	8	15	7			
sandy clay	15	37	22	5		
clay	37	40	3	3		
sandy clay	40	48	8	5		Weighted Specific Yield
sand	48	72	24	20		11.2
sandy clay	72	118	46	5	D	
sand	118	128	10	20		
sandy clay	128	150	22	5		
sand	150	163	13	20		
clay	163	168	5	3		Weighted Specific Yield
sand	168	189	21	20		10.6
sandy clay	189	214	25	5	E	
sand	214	220	6	20		
clay with sand beds	220	232	12	5		
sand, some clay	232	244	12	15		
clay	244	262	18	3		
sandy clay	262	271	9	5		
clay	271	278	7	3		
sandy clay	278	291	13	5		
clay	291	297	6	3		
sandy clay and clay	297	315	18	5		
clay	315	319	4	3		Weighted Specific Yield
sand	319	329	10	20		7.1
rock	329	333	4		BEDROCK	
Total Depth	333	**BOREHOLE WEIGHTED SPECIFIC YIELD (PERCENT)**				**9.1**

17N4

Lithology	Start Depth	End Depth	Thickness	Specific Yield (percent)*	Zone	Weighted Specific Yields (percent)
top soil	0	4	4	unsaturated	A+B	
sand	4	25	21	20		
sand	25	38	13	20		
clay	38	40	2	3		Weighted Specific Yield
sand	40	68	28	20		19.5
Total Depth	68	**BOREHOLE WEIGHTED SPECIFIC YIELD (PERCENT)**				**19.5**

WELL 30S/11E-17N10 (LA20)						
Lithology	***Start Depth***	***End Depth***	***Thickness***	***Specific Yield (percent)****	***Zone***	***Weighted Specific Yields (percent)***
fill	0	3	3	unsaturated	A+B	
sand	3	37	34			
clay	37	42	5	3		
gravelly clay	42	50	8	7		
clay	50	58	8	3		
sand and gravel	58	81	23	18		
sand	81	92	11	20		Weighted Specific Yield
sand and gravel	92	98	6	18		13.7
clayey sand	98	120	22	5	C	
sand and gravel	120	150	30	18		
clayey gravel	150	170	20	7		
gravelly sand	170	187	17	18		
gravelly clay	187	197	10	7		Weighted Specific Yield
sandy gravel	197	210	13	18		12.5
clay	210	225	15	3	D	
sand and gravel	225	250	25	18		
sandy clay	250	260	10	5		
sand and gravel	260	270	10	18		
gravelly clay	270	275	5	7		
gravelly sand	275	290	15	18		
sandy clay	290	320	30	5		Weighted Specific Yield
sand	320	400	80	20		14.6
sandy clay	400	480	80	5	E	
gravelly sand	480	530	50	18		
sand / silty sand	530	630	100	5		Weighted Specific Yield
sandy clay	630	750	120	5		6.9
Total Depth	750	**BOREHOLE WEIGHTED SPECIFIC YIELD (PERCENT)**				**9.9**

WELL 30S/11E-18F02 (LA13)

Lithology	***Start Depth***	***End Depth***	***Thickness***	***Specific Yield (percent)****	***Zone***	***Weighted Specific Yields (percent)***
sand	0	45	45	unsaturated	C	
clay	45	65	20			
gravel and sand	65	70	5			
clay	70	80	10			
clay and gravel	80	105	25	7		
clay	105	117	12	3		
shale gravel	117	120	3	18		
sandy clay	120	170	50	5		
sand and gravel	170	180	10	18		
clay	180	245	65	3		Weighted Specific Yield
gravel and sand	245	255	10	18		6.1
clay	255	280	25	3	D	
sand, some gravel	280	285	5	18		
clay	285	300	15	3		
clay, gravel sand	300	340	40	10		
sandy clay	340	420	80	5		Weighted Specific Yield
sandy shale gravel	420	455	35	5		5.9
clay	455	537	82	3	E	
hard sandstone	537	555	18	15		
sand and gravel	555	600	45	18		Weighted Specific Yield
gravel and sea shells	600	610	10	18		9.7
shale	610	645	35		BEDROCK	
Total Depth	645	**BOREHOLE WEIGHTED SPECIFIC YIELD (PERCENT)**				**6.2**

WELL 30S/11E-18K08 (LA18)

Lithology	*Start Depth*	*End Depth*	*Thickness*	*Specific Yield (percent)**	*Zone*	*Weighted Specific Yields (percent)*
Sand	50	110	60	20	A & B	20.00
sandy clay	110	132	22	5	C	
cemented sand	132	151	19	15		
sandy clay	151	158	7	5		
sand	158	195	37	20		
sandy clay	195	200	5	5		
sand	200	225	25	20		
sandy clay	225	235	10	5		
sand	235	254	19	20		
sandy clay	254	260	6	5		Weighted Specific Yield
sand with gravel	260	264	4	18		14.5
sandy clay	264	288	24	5	D	
clayey sand	288	305	17	10		
sandy clay	305	310	5	5		
clayey sand	310	324	14	10		
clay with sand	324	350	26	5		
silty sand	350	370	20	10		
sandy clay	370	380	10	5		
sand	380	386	6	20		
sandy clay	386	395	9	5		Weighted Specific Yield
silty sand	395	490	95	10		8.6
clay sandy clay	490	515	25	3	E	
silty sand	515	592	77	10		Weighted Specific Yield
sand with seashells	592	660	68	20		13
Total Depth	660	**BOREHOLE WEIGHTED SPECIFIC YIELD (PERCENT)**				**12.4**

WELL 30S/11E-18M01 (LA16)

Lithology	*Start Depth*	*End Depth*	*Thickness*	*Specific Yield (percent)**	*Zone*	*Weighted Specific Yields (percent)*
fine brown sand	40	70	30	20	C	
sand, sandy clay	70	160	90	5		Weighted Specific Yield
sand	160	165	5	20		9.2
sandy clay	165	245	80	5	D	
sandy clay with gravel	245	275	30	7		
sandy clay	275	350	75	5		Weighted Specific Yield
sand and gravel	350	372	22	18		6.7
sandy clay with gravel	372	392	20	7	E	
sandy clay	392	460	68	5		
sandy clay with gravel	460	490	30	7		
sandy clay	490	536	46	5		
sand and gravel	536	562	26	18		Weighted Specific Yield
sandy clay with gravel	562	630	68	7		7.2
Total Depth	630	**BOREHOLE WEIGHTED SPECIFIC YIELD (PERCENT)**				**7.4**

WELL 30S/11E-19H2 (LA19)

Lithology	*Start Depth*	*End Depth*	*Thickness*	*Specific Yield (percent)**	*Zone*	*Weighted Specific Yields (percent)*
sand	0	73	73	unsaturated	C	
silty mudstone with gravel	73	93	20			
sand and clay	93	103	10			
gravel	103	180	77			Weighted Specific Yield
gravel, clay, silt	180	220	40			
gravel, clay, silt	220	260	40	15	D	
clay, silt, some sand and gravel	260	290	30	7		Weighted Specific Yield
sand with silty clay	290	380	90	7		9
silty clay	380	460	80	5	E	
silty clay, gravel	460	520	60	15		
gravel and clay	520	535	15	15		
silty fine sand	535	680	145	10		Weighted Specific Yield
silt with clay	680	740	60	5		9.1
Total Depth	740	**BOREHOLE WEIGHTED SPECIFIC YIELD (PERCENT)**				**9.1**

WELL 30S/11E-20Aa (LA25)

Lithology	*Start Depth*	*End Depth*	*Thickness*	*Specific Yield (percent)**	*Zone*	*Weighted Specific Yields (percent)*
soil	0	2	2	unsturated	Qa	
clay	2	18	16			
sand and gravel	18	40	22	21		Weighted Specific Yield
fine sand	40	60	20	15		18.1
clay	60	110	50	3	D	
fine sand	110	123	13	15		
clay	123	130	7	3		
fine sand and gravel	130	133	3	18		
clay	133	135	2	3		
sand and gravel	135	137	2	18		
clay and sand	137	152	15	5		
sand and gravel	152	154	2	18		
clay	154	165	11	3		
fine sand	165	175	10	15		Weighted Specific Yield
fine sand and gravel	175	180	5	18		7.1
clay	180	230	50	3	E	
fine sand	230	240	10	15		Weighted Specific Yield
sand and gravel	240	350	110	18		13.4
sandstone	350	360	10		BEDROCK	Weighted Specific Yield
Total Depth	360	**BOREHOLE WEIGHTED SPECIFIC YIELD (PERCENT)**				**11.7**

WELL 30S/11E-20A02 (FW26)

Lithology	*Start Depth*	*End Depth*	*Thickness*	*Specific Yield (percent)**	*Zone*	*Weighted Specific Yields (percent)*
top soil	0	18	18	unsaturated	Qal	
clay	18	33	15	3		
gravel	33	44	11	21		
clay	44	46	2	3		
gravel and clay	46	58	12	7		Weighted Specific Yield
gravel	58	65	7	21		10.9
clay	65	95	30		D	
Total Depth	95	**BOREHOLE WEIGHTED SPECIFIC YIELD (PERCENT)**				**10.9**

WELL 30S/11E-20G02 (LA26)

Lithology	*Start Depth*	*End Depth*	*Thickness*	*Specific Yield (percent)**	*Zone*	*Weighted Specific Yields (percent)*
silty-clay-soil	0	11	11	unsaturated	Qal	
gravel	11	15	4			
clayey sand	15	53	38	10		Weighted Specific Yield
gravel	53	55	2	21		10.6
clayey sand	55	75	20	10	C	10
clay	75	117	42	3	D	
gravel	117	120	3	18		
sand	120	197	77	20		Weighted Specific Yield
coarse sand and gravel	197	213	16	18		14.6
clayey sand	213	290	77	10	E	
sand	290	315	25	20		Weighted Specific Yield
gravelly sand	315	335	20	18		13.4
bedrock, tight rock	335	380	45	15	BEDROCK	
Total Depth	380	**BOREHOLE WEIGHTED SPECIFIC YIELD (PERCENT)**				**13.3**

WELL 30S/11E-24A2 (LA17)						
Lithology	***Start Depth***	***End Depth***	***Thickness***	***Specific Yield (percent)****	***Zone***	***Weighted Specific Yields (percent)***
					C	
sand	0	207	207	unsaturated		
gravelly clay	207	276	69	7	D	
gravel some clay and sand	276	328	52	18		
sand	328	346	18	20		
clay	346	370	24	3		Weighted Specific Yield
clay and sand	370	380	10	5		11
clay	380	432	52	3	E	
clay and sand	432	650	218	5		
sand and gravel	650	817	167	18		Weighted Specific Yield
sand and gravel	817	960	143	18		11.8
Total Depth	960	**BOREHOLE WEIGHTED SPECIFIC YIELD (PERCENT)**				**11.6**

** Johnson, A. I., 1967, Specific Yield - Compilation of Specific Yields for Various Materials, U.S. Geological Survey Water Supply Paper 1662-D*

TO: Los Osos Basin Management Committee

FROM: Dan Heimel, Executive Director

DATE: June 17, 2020

SUBJECT: Item 6d – Update on Status of Basin Plan Infrastructure Projects

Recommendations

Recommendation: Receive report and provide input to staff on future direction.

Discussion

The Basin Management Plan for the Los Osos Groundwater Basin (Plan) was approved by the Court in October 2015. The Plan provided a list of projects that comprise the Basin Infrastructure Program (Program) that were put forth to address the following immediate and continuing goals:

Immediate Goals

1. Halt or, to the extent possible, reverse seawater intrusion into the Basin.
2. Provide sustainable water supplies for existing residential, commercial, community and agricultural development overlying the Basin.

Continuing Goals

1. Establish a strategy for maximizing the reasonable and beneficial use of Basin water resources.
2. Provide sustainable water supplies for future development within Los Osos, consistent with local land use planning policies.
3. Allocate costs equitably among all parties who benefit from the Basin's water resources, assessing special and general benefits.

The Program is divided into five parts, designated Programs A through D and Program M. 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. Program M was established in the Basin Management Plan 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 December 2020. Program U is the Urban Water Reinvestment Program that addresses the use of recycled water within the Basin. The attached table provides a comprehensive project status and summary.

Update on Status of Basin Plan Infrastructure Projects

Program Name	Project Name	Parties Involved	BMC Budgeted Amount	Funding Status	Anticipated Planning/Pre-Construction Cost	Anticipated Capital Cost	Status/Notes
Program A – Shift groundwater production from Lower Aquifer to Upper Aquifer	Water Systems Interconnection	LOCSD/ GSWC	NA	NA	NA	NA	**Completed**
	Upper Aquifer Well (8th Street)	LOCSD	NA	Fully Funded	NA	$250,000	Well was drilled and cased in December 2016. Budget remaining $250,000 to equip the well. The well equipping was included in an IRWM Grant Application that was preliminarily approved by the Department of Water Resources in May 2020. Final award is anticipated in mid-July, executed agreements in Spring 2021 and construction completed by Summer 2021.
	South Bay Well Nitrate Removal	LOCSD	NA	NA	NA	NA	**Completed**
	Palisades Well Modifications	LOCSD	NA	NA	NA	NA	**Completed**
	Blending Project (Skyline Well)	GSWC	NA	NA	NA	NA	**Completed**
	Water Meters	S&T	NA	NA	NA	NA	**Completed**
Program B - Shift groundwater production from Lower Aquifer to Upper Aquifer	LOCSD Wells (Upper Aquifer)	LOCSD		Not Funded	TBD	BMP: $2.7 mil	Project not initiated
	GSWC Wells (Upper Aquifer)	GSWC		Not Funded	TBD	BMP: $3.2 mil	Project not initiated
	Community Nitrate Removal Facility	LOCSD/GSWC/S&T	TBD	Partial, GSWC portion funded	TBD	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.
Program C - Shift production within the Lower Aquifer from the Western Area to the Central and Eastern Areas	Expansion Well No. 1 (Los Olivos)	GSWC	NA	NA	NA	NA	**Completed**
	Expansion Well No. 2 (Lower Aquifer)	LOCSD is currently leading the project with potential GSWC and S&T involvement, depending on final location		LOCSD is currently leading the project with respect to funding	TBD	BMP: $2.0 mil	Following limited production results from Site A Test Well, LOCSD is initiating an environmental screening of the remaining potential expansion well locations to inform the recommended well site for Expansion Well No. 2. At its May 7th BOD Meeting, the LOCSD awarded SWCA a contract to prepare an environmental constraints analysis for the five remaining sites. The analysis and recommended location are anticipated to be presented to the LOCSD BOD at their August 2020 Meeting.
	Expansion Well 3 (Lower Aquifer) and LOVR Water Main Upgrade	GSWC/LOCSD		Cooperative Funding	TBD	BMP: $1.6 mil	This project has been deferred under Adaptive Management.
	LOVR Water Main Upgrade	GSWC		May be deferred	TBD	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	TBD	BMP: $30,000	In conceptual design

Program Name	Project Name	Parties Involved	BMC Budgeted Amount	Funding Status	Anticipated Planning/Pre-Construction Cost	Anticipated Capital Cost	Status/Notes
Program D - Shift production within the Lower Aquifer from the Western Area to the Central and Eastern Areas							Currently being considered for deferment through Adaptative Management. BMC to review on an annual or semi-annual basis.
Program M – Groundwater Monitoring Plan	New Zone D/E lower aquifer monitoring well in Cuesta by the Sea	All Parties	NA	NA	NA	NA	**Completed**
Program U - Urban Water Reinvestment Program	Creek Discharge Program	All Parties	$50k included and approved in the CY 2019 BMC Budget	Not included in CY 2020 BMC Budget	$582,000 through feasibility phase required	TBD	These activities are currently on hold pending the outcome of the BMC Implementation Plan initiative.
	8th and El Moro Urban Storm Water Recovery Project	All Parties	$15k included in CY 2019 BMC Budget for initial study	Not included in CY 2020 BMC Budget		TBD	These activities are currently on hold pending the outcome of the BMC Implementation Plan initiative.