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, December 18, 2019** at the Los Osos Community Services District office at 2122 9th St, Los Osos, CA 93402. **Please note the location for this meeting. BMC meetings are often held at the South Bay Community Center.**

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, all possible accommodations will be made for individuals with disabilities, so they may attend and participate in meetings.

BASIN MANAGEMENT COMMITTEE BOARD OF DIRECTORS AGENDA

1. **CALL TO ORDER**

2. **PLEDGE OF ALLEGIANCE**

3. **ROLL CALL**

4. **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.

5. **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 However, any Director may request that any item be withdrawn from the Consent Agenda and moved to the "Action Items" portion of the Agenda to permit discussion or to change the recommended course of action.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 September 18, 2019 meeting**
   b. **Approval of Warrants, Budget Update and Invoice Register through November 2019.**

6. **EXECUTIVE DIRECTOR'S REPORT**

7. **ACTION ITEMS**

   a. **Update on Status of Basin Plan Infrastructure Projects**

      Recommendation: Receive report and provide input to staff for future action.

   b. **Review and Approve Contract with MKN for Soil Aquifer Treatment Analysis for the Los Osos Creek Discharge Project**

      Recommendation: Approve proposal from MKN in an amount not to exceed $50,000.

c. **Discussion of CHG Report on Lower Aquifer Nitrate Concentrations Trends Review and LA11 Seawater Intrusion Evaluation.**

Recommendation: Receive draft report and provide input to staff for future action.

d. **Discussion of 2020 Priorities and Budget**

Recommendation: Receive report and provide input to staff for future action.

8. 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.

9. ADJOURNMENT

BASIN MANAGEMENT COMMITTEE BOARD OF DIRECTORS

Agenda Item 5a: Minutes of the Meeting of September 18th, 2019

Agenda Item	Discussion or Action
1. CALL TO ORDER **2. PLEDGE OF ALLIGANCE** **3. ROLL CALL**	Chairperson Zimmer called the meeting to order at 1:30 pm and led the Pledge of Allegiance. Mr. Miller, acting Clerk, called roll to begin the meeting. Director Cote, S&T Mutual Water Co, and the S&T Alternate were absent. Director Cesena, Director Gibson, and Chairperson Zimmer were present.
4. Board Member Comments	No Comments.
5a. Minutes of the Meeting of July 17th, 2019 **5b. Approval of Budget update and Invoice Register through April 2019**	Director Zimmer: On the Agenda, for Item 7A, I don't want to pull it, I do have some comments but will wait until we go over that item. **<u>Public Comment</u>** None. Director Gibson: Move approval of the consent agenda. Director Cesena: Second **Ayes: Director Gibson, Director Cesena, and Chairperson Zimmer** **Nays: None** **Abstain: None** **Absent: Director Cote**

6. Executive Director's Report	Executive Director, Rob Miller, provided a verbal overview of the written content of the Executive Director's report. Director Gibson: In terms of the staff interactions looking forward for financing and scheduling projects, we should look at what each entity has done, as well as what they've spent. We should look backward, as well as a look forward, but when do you think we'd be ready to do that? Mr. Miller: Some of that is reflected in the next agenda item in putting the spent dollar amounts on some of those projects. Director Gibson: So, that comes out of some of these recent discussions, okay. I think one of the meetings we did have that was important was County Staff meeting with Coastal Commission Staff and introducing them to the Basin Management Staff. It will be interesting to see what they think because I don't think they are used to the level of detailed work that's been done on our basin. Director Cesena: How many cannabis proposals are coming in this area and is hemp a part of this picture, because that could be a lot of new water use. I would like more information on that. Mr. Miller: A lot of my information is coming from either County Planning or community members who keep me in the loop so I'm not sure if I have a comprehensive picture on that. Maybe Director Gibson would know if the County Cannabis team and Hemp team are the same team now or are there two separate groups. Director Gibson: There's a cannabis enforcement group and the Planners are dealing with all sorts of projects. Hemp is regulated differently although there is an ordinance in place banning new hemp grows for the foreseeable future. However, the water use with hemp is close to that of wine grapes. Mr. Miller: Going forward we will bring those new applications forward and keep a running list of those. Director Zimmer: Regarding the funding for the projects and financing programs, you mentioned the staff discussions. Will that come back before the board and be in a presentation form? Mr. Miller: We need to have a structure in place in time to get funding secured and flowing by the end of next year. I'm hoping by the November meeting we'll have enough to have an agenda item to discuss a full status update. Director Zimmer: Regarding the JPA, we haven't fully determined the necessity for that. Do we need to add that complexity and another level of governance? If we needed to go that route Golden State would need some time to implement that. Mr. Miller: I think dovetailing that with the community plan schedule is going to be important, so we don't end up with a big-time gap and without a firm plan. Director Zimmer: Regarding the facilities, that is more difficult situation for Golden State to expand on our existing nitrate removal system. It is expandable, but there may not be a way to do through the PUC process. Mr. Miller: The one thing Golden State has going for it is a site where the activity is

	occurring. **<u>Public Comment</u>** Mr. Edwards: I have concerns about any complex governing structure for the BMC because the management needs of the basin are simple, I don't think we need a JPA. Sea Pines is receiving treated effluent and I would like to know how much they are paying for that. I see that the August volume is about 42% of the daily effluent so, I have concerns about sending too much water that way. Mr. Miller mentioned that there are no new rebates, which speaks to the need to consolidate the conservation programs. Regarding cannabis and hemp in the valley, the basin management plan and the court stipulated judgement allows 800-acre feet for agriculture and I believe they are at that limit right now. I think this issue needs a full discussion. Director Zimmer: We will receive and file the Executive Director Report.
7a. Update on Status of Basin Plan Infrastructure Projects	Mr. Miller: Gave a detailed overview of the Update on Status of Basin Plan Infrastructure Projects. Director Gibson: The new upper aquifer wells are going to need denitrification, does that fit within the existing capacity of denitrifying aquifer water? Mr. Miller: That's a good question, the new one will be okay to blend without denitrification. That could change over the years, but at this point we are okay for straight blending. Director Zimmer: We look at these projects on this table and I know we previously removed the dollar amounts, but I feel it would be important to add them back in so people can see what the purveyors are putting into these projects. Director Gibson: With the completion of that well are we then able to claim some credit for increased safe yield in the basin? Mr. Miller: Once we start pumping that well, yes. Director Zimmer: In our Program U, thank you for adding that Creek Discharge Program on there. I did want to point out the dollar amount and the comment about funding. The comment of funding through BMC and grants, I think we should differentiate what money has been approved, as well as reference $580,000 so we see this as a bigger project that still needs funding. Mr. Miller: I think that's a very good comment, maybe we could add two columns: a funding needed, and funding secured. <u>Public Comment</u> No Comments.

7b. Review and Approve Contract with MKN for Soil Aquifer Treatment Analysis for the Los Osos Creek Discharge Project	Mr. Miller: Gave a detailed overview of the Contract with MKN for Soil Aquifer Treatment Analysis for the Los Osos Creek Discharge Project. Director Gibson: So that is a revised staff recommendation? Mr. Miller: It is, after I talked with County Staff. Director Cesena: You mentioned that other jurisdictions have projects like this and you made the comment that some of them are spending their own money, that kind of implies that there's grant money that's being spent on some of these projects? Mr. Miller: They are getting some grants, but they generally get those after they get going and have shown that it's a feasible project. It is hard to get money just to do the feasibility stage. Director Cesena: So, we wouldn't be looking at any outside help for the first half million dollars? Mr. Miller: Yes, I think that is reality, others are spending their own money on that step. Director Zimmer: Let's say the results of this are favorable, and the project is feasible, what would anticipate being the next step? Mr. Miller: This $5000 is to make sure the testing protocols and the inconveniences to County staff wouldn't result in a different scope or fatal flaw. So, we're asking to approve $5,000 today and when we come back in November, we'd ask to approve the remaining $45,000, then we would discuss how to proceed from there. Director Zimmer: I think tying this to our staff discussion on funding, that should be part of the discussion as well. Mr. Miller: After public comment, staff's recommendation is to approve the initial $5,000 scope to be brought back with those results in November. <u>Public Comment</u> Jeff Edwards: I do support the Creek Discharge Project it's a seasonal discharge and I think it's a great way to mitigate sea water intrusion. I also support approving the $5,000 today. Since this will be a multimillion-dollar project, I think long term this would be a good fit for new development. <u>Board Comments</u> Director Gibson: I move to approve the initial $5,000 scope to be brought back at the November meeting prior to the next $45,000. Director Cesena: Second **Ayes: Director Gibson, Director Cesena, and Chairperson Zimmer** **Nays: None** **Abstain: None** **Absent: Director Cote**

7c. Approve BMC Selection of Executive Director and Review Proposed Scope and Fees	Mr. Miller: Gave details on the Selection of Executive Director and Review Proposed Scope and Fees. We just want to get any feedback you might have, or you can follow up with feedback on scope and fee, but also, authorize a $5,000 budget using 2019 contingency funds for him to participate with me in November. Director Gibson: Our we sealing an agreement today? Mr. Miller: We just want to get authorization for an initial scope just for November. Director Gibson: How we do it now is more of a pay as you go, not a lump sum contract? Mr. Miller: Correct. Director Zimmer: The line item in our budget is item 1, under the Administration for $50,000, that's currently what we approve today, moving forward we can look at roughly a $20,000 increase in our budget for 2020. Mr. Miller: You are correct. <u>Public Comment</u> None. Director Gibson: I motion to authorize an initial $5,000 expenditure. Director Cesena: I second that. This is with the understanding that as we move forward in the process, we'll determine how the interview process occurs. **Ayes: Director Gibson, Director Cesena, and Chairperson Zimmer** **Nays: None** **Abstain: None** **Absent: Director Cote**
8. PUBLIC COMMENTS ON ITEMS NOT APPEARING ON THE AGENDA	<u>Public Comment</u> Mr. Edwards: I would like to list off a few items that we might consider for future agenda items: Policy on East and West, S&T and Golden State Water Intertie or possibility of Annexation, Community Plan and EIR, Buildout, as well as an intertie between Morro Bay and Los Osos.
9. ADJOURNMENT	Meeting was adjourned at 2:31 pm. The next meeting will be on November 20th at the South Bay Community Center in Los Osos at 1:30 pm.

TO: **Los Osos Basin Management Committee**

FROM: **Rob Miller, Interim Executive Director**

DATE: **December 18, 2019**

SUBJECT: **Item 5b – Approval of Warrants, Budget Update and Invoice Register through November 2019**

Recommendations

Staff recommends that the Committee review and approve the report.

Discussion

Staff has prepared a summary of costs incurred as compared to the adopted budget through December 2019 (see Attachment 1). A running invoice register is also provided as Attachment 2. Staff recommends that the Committee approve all pending invoices, outlined in Attachment 3. Payment of invoices will continue to be processed through Brownstein Hyatt as noted in previous meetings.

Note that the Los Osos CSD has administered the construction phase of the completed Cuesta by the Sea monitoring well on Lupine Avenue. The total cost incurred by the District, exclusive of the CHG work billed through the BMC, came to $86,393.00 through the end of construction. A separate request for reimbursement will be issued to each party directly from the LOCSD, along with supporting documentation.

Attachment 1: Cost Summary (Year to Date- Nov. 2019) for Calendar Year 2019

Item	Description	Budget Amount	Costs Incurred	Percent Incurred	Remaining Budget
1	Monthly meeting administration, including preparation, staff notes, and attendance	$50,000	$41,455.81	82.9%	$8,544
2	Meeting expenses - facility rent (if SBCC needed for larger venue)	$1,000	$300.00	30.0%	$700
3	Meeting expenses - audio and video services	$6,000	$5,300.00	88.3%	$700
4	Adaptive Management - Groundwater Modeling & Well Head Surveying	$15,000	$8,472.50	56.5%	$6,528
5	Semi annual seawater intrusion monitoring	$29,200	$23,490.10	80.4%	$5,710
6	2018 Annual Report	$33,500	$32,810.00	97.9%	$690
7	Grant writing (outside consultant)	$5,000	$0.00	0.0%	$5,000
8	Creek Recharge and Replenishment Studies	$50,000	$9,267.50	18.5%	$40,733
9	Cuesta by the Sea Monitoring well	$115,000	$1,650.00	1.4%	$113,350
10	Stormwater and Perched Water Recovery Project - Feasibility Study	$15,000	$0.00	0.0%	$15,000
	Subtotal	$319,700	$122,746		$196,954
	5% Contingency (rounded to nearest $100)	$16,500	$0.00		
	Total	**$336,200**	**$122,746**	**36.5%**	**$213,454**
	LOCSD (38%)	$127,756			
	GSWC (38%)	$127,756			
	County of SLO (20%)	$67,240			
	S&T Mutual (4%)	$13,448			

Attachment 2: Invoice Register for Los Osos BMC for Calendar Year 2019 (through Nov. 2019)

Vendor	Invoice No.	Amount	Month of Service	Description	Budget Item	Date BMC. Approved
WG	47601	$1,181.75	Dec '18	Monthly meeting administration	1	Jan-19
CHG	20190103	$8,300.00	Jan.	2018 Annual Report Preparations	6	Mar-19
CHG	20190203	$6,240.00	Feb.	2018 Annual Report Preparations	6	Mar-19
CHG	20190204	$1,200.00	Feb.	Cuesta by the Sea Monitoring well	9	Mar-19
CHG	20190205	$900.00	Feb.	Adaptive Management	4	Mar-19
SBCC	122	$120.00	Jan.	Meeting expenses - facility rent	2	Mar-19
WG	47758	$5,124.33	Jan.	Monthly meeting administration	1	Mar-19
AGP	7697	$725.00	Mar	Meeting expenses - audio and video services	3	May-19
CHG	20190305	$10,920.00	Mar	2018 Annual Report Preparations	6	May-19
CHG	20190403	$7,350.00	Apr	2018 Annual Report Preparations	6	May-19
CHG	20190404	$450.00	Apr	Cuesta by the Sea Monitoring well	9	May-19
CHG	20190405	$10,963.06	Apr	Semi-Annual Groundwater Monitoring	5	May-19
CHG	20190306	$2,580.00	Mar	Semi-Annual Groundwater Monitoring	5	May-19
WG	47948	$3,271.25	Feb.	Monthly meeting administration	1	May-19
WG	48141	$5,593.87	Mar	Monthly meeting administration	1	May-19
AGP	7615	$675.00	Jan.	Meeting expenses - audio and video services	3	Mar-19
AGP	7799	$725.00	Jun	Meeting expenses - audio and video services	3	19-Jun
CHG	20190502	$1,680.00	May	Semi annual seawater intrusion monitoring	5	19-Jun
CHG	20190503	$1,080.00	May	Adaptive Management - Groundwater Modeling & Well Head Surveying	4	19-Jun
CHG	20190604	$192.50	June	Adaptive Management - Groundwater Modeling & Well Head Surveying	4	19-Jun
CHG	20190624	$330.00	June	Semi-Annual Groundwater Monitoring	5	19-Jun
WG	48365	$2,572.74	April	Monthly meeting administration	1	19-Jun

WG	48565	$5,889.46	May	Monthly meeting administration	1	19-Jun
AGP	7764	$800.00	May	Meeting expenses - audio and video services	3	19-Jun
SBCC	136	$90.00	June	Meeting expenses - facility rent	2	19-Sep
SBCC	138	$90.00	July	Meeting expenses - facility rent	2	19-Sep
AGP	7842	$800.00	July	Meeting expenses - audio and video services	3	19-Sep
CHG	20190803	$4,500.00	August	Adaptive Management - Groundwater Modeling & Well Head Surveying	4	19-Sep
WG	48992	$5,350.83	July	Monthly meeting administration, including preparation, staff notes, and attendance	1	19-Sep
WG	48781	$3,684.08	June	Monthly meeting administration, including preparation, staff notes, and attendance	1	19-Sep
CHG	20191002	$9,267.50	Oct	Cuesta by the Sea Monitoring well	9	
CHG	20191003	$7,937.04	Oct	Semi annual seawater intrusion monitoring	5	
CHG	20191004	$1,800.00	Oct	Adaptive Management - Groundwater Modeling & Well Head Surveying	4	
WG	49687	$1,605.33	Oct	Monthly meeting administration	1	
WG	49414	$4,235.42	Sept	Monthly meeting administration	1	
WG	TBD	$4,128.50	Nov	Monthly meeting administration	1	
AGP	7568	$800.00	Nov	Meeting expenses - audio and video services	3	
AGP	7893	$775.00	Sept	Meeting expenses - audio and video services	3	
Total		**$123,927.66**				

		To be approved
Total 2019	**$122,745.91**	not included in total- applied to 2018

ATTACHMENT 3

Current Invoices Subject to Approval for Payment (Warrant List as of Nov. 2019):

Vendor	Invoice #	Amount of Inv.	Date of Services
CHG	20191002	$9,267.50	Oct
CHG	20191003	$7,937.04	Oct
CHG	20191004	$1,800.00	Oct
WG	49687	$1,605.33	Oct
WG	49414	$4,235.42	Sept
WG	TBD	$4,128.50	Nov
AGP	7568	$800.00	Nov
AGP	7893	$775.00	Sept

TO: **Los Osos Basin Management Committee**

FROM: **Rob Miller, Interim Executive Director**

DATE: **December 18, 2019**

SUBJECT: **Item 6 – Executive Director's Report**

Recommendations

Staff recommends that the Committee receive and file the report and provide staff with any direction for future discussions.

Discussion

This report was prepared to summarize administrative matters not covered in other agenda items and also 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 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.

IRWM: 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 is being submitted later this month (December, 2019) and awards are expected to be announced in mid-2020.

Prop 1 SWGP: The concept of urban storm water recovery at 8th and El Moro was ranked in the draft County Stormwater Resource Plan, and future grant opportunities may be available through the Prop 1 Storm Water Grant Program (SWGP). The draft Stormwater Resource Plan can be found here: https://www.slocounty.ca.gov/Departments/Public-Works/Forms-Documents/Committees-Programs/Stormwater-Resource-Plan/Documents/2018-09-10-SWRP-Public-Draft.aspx

WRFP: The State Water Resource Control Board (SWRCB) recently increased the amount for Recycled Water Facilities Planning Studies (RWFPS) 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 Plan and Funding Plan

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.

Three staff level meetings have been held since the September 2019 BMC meeting. Discussion topics included the following items. Decisions that arise from these discussions will come before the BMC in subsequent meetings.

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	

As indicated in previously 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.

- **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.)

- **Program D**: Staff level discussions included the potential to defer implementation of Program D through adaptive management. Deferral decision could be reviewed on an annual or bi-annual basis.

- **Program M**: GSWC legal staff are preparing a simple operational agreement that will provide multi-party access to the new Cuesta by the Sea monitoring well.

Land Use Planning Process Update

Los Osos Community Plan: UPDATE - Los Osos Community Plan Update from Kerry Brown (12/4/2019). 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 are 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. Planning Commission hearings will start in early 2020.

Habitat Conservation Plan: UPDATE - Los Osos Habitat Conservation Plan from Kerry Brown (12/4/2019). 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. Planning Commission hearings will start in early 2020.

Accessory Dwelling Units (ADU): it is our understanding that County Planning Staff will be bringing an ordinance to the Board of Supervisors on January 28, 2020 to discuss ADU construction in Los Osos. Staff may recommend that ADU development be delayed until water

is available for new development, but a staff report has not yet been released. An update will be provided at the January 2020 BMC meeting.

Los Osos Wastewater Project Flow and Connection Update

Wastewater Flows: Influent flows to the treatment facility averaged 0.47 MGD.

Recycled Water: Sea Pines Golf Course received 4,552,200 gallons of recycled water in October and 2,365,700 gallons of recycled water in November.

Effluent Disposal: Effluent disposal was 48.38 AF to Broderson and 1.43 AF to Bayridge Leach Fields for the month of October, and 39.75 AF to Broderson and 1.05 AF to Bayridge for the month of November. The cumulative effluent disposal for the calendar year as of 10/31/2019 was 507.02 AF.

Enforcement: As of 11/25/2019, the sewer service area has a 99.1% connection status. Of the 47 unconnected properties, Code Enforcement has issued 23 cases and are tasked with notifying properties with a Notice of Violation and impending fines. The other properties have expired building permits which have their own noticing process through the Planning and Building Department.

Water Conservation Update

Rebate Update: For this fiscal year, there have been rebates for six (6) toilets, one (1) showerhead, three (3) washing machines and (1) one hot water recirculatory. (source used: Water Conservation Rebate Forms)

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 for cannabis cultivation. 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 concept of urban area retrofits to address agricultural area cannabis has not been discussed by the BMC. Staff can bring this issue back for a more detailed discussion if desired.

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
Adaptive management – nitrate contamination in lower aquifer, Zone E chloride concerns, with summary description of Zone D/E management	Draft completed – see Item 7c	Previously budgeted
Recruitment for permanent Executive Director	Q3 of 2019	Complete
Seawater intrusion imaging in coordination with Cal Poly	Pending land owner approval	Minor – staff time only
8th/El Moro urban storm water recovery project	Staff is reviewing a draft proposal, which will be discussed at the January 2020 BMC meeting	Included in proposed 2020 budget
Creek discharge project	SAT Consultant Contract selected and contract approved at September 2019 BMC Meeting. Additional authorization proposed in Item 7b	Included in proposed 2020 budget

Sustainable Groundwater Management Act (SGMA)

SGMA Overview: The Sustainable Groundwater Management Act 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 Boundary Modifications: On February 11, 2019, DWR published the 2019 Basin Boundary Modifications (BBM) to update the Bulletin 118 basin boundaries. A summary of DWR's Final BBM recommendations for the Los Osos Basin are listed below (see basin maps)**:**

- DWR approved two jurisdictional subbasins:
  - Los Osos Area Subbasin – This subbasin includes the adjudicated area and the minor northern fringe area (outside of the adjudicated area)[3].
  - Warden Creek Subbasin – This subbasin is east of the adjudicated area.

[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.

[3] DWR denied the removal of the minor northern fringe area in the 2019 Basin Boundary Modifications for Los Osos Basin.

- DWR approved the removal of the southern fringe area including Montana de Oro State Park

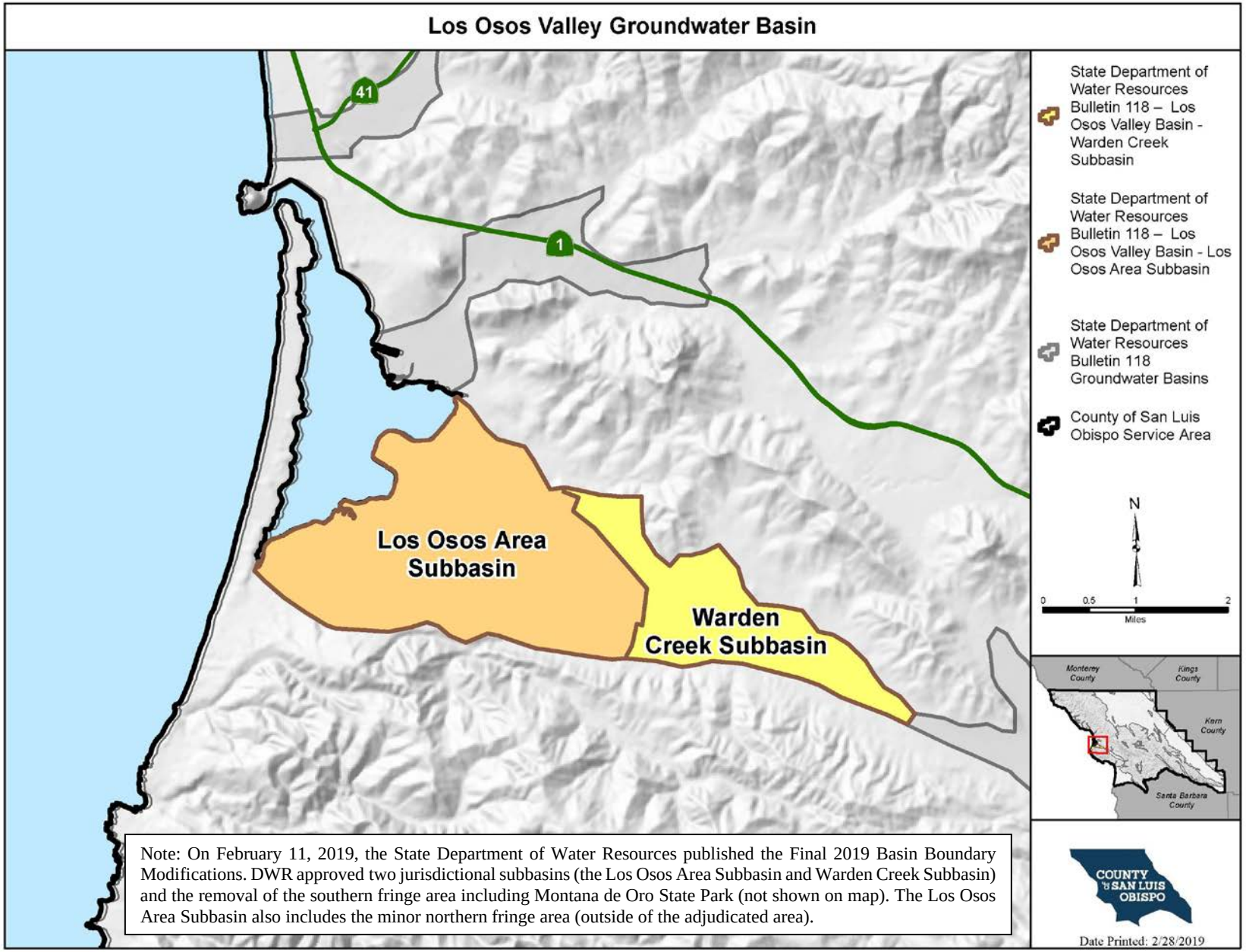
Basin Prioritization: SGMA requires DWR to reassess groundwater basin prioritization any time it updates Bulletin 118 basin boundaries. On April 30, 2019, DWR published the Draft SGMA 2019 Basin Prioritizations based on the 2019 Basin Boundary Modifications. Basins or subbasins reassessed to low or very low priority basins or subbasins are not subject to SGMA regulations. A summary of DWR's Draft SGMA Prioritizations for the Los Osos Area Subbasin and Warden Creek Subbasin are listed below:

- Los Osos Area Subbasin is listed as **very low** priority for SGMA[4] and in critical conditions of overdraft [5]
  - 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[4]

It is anticipated that DWR will release the Final SGMA 2019 Basin Prioritizations in early 2020. For more information on DWR's basin boundary modification and prioritization process, please visit:
https://water.ca.gov/Programs/Groundwater-Management/Basin-Boundary-Modifications
https://water.ca.gov/Programs/Groundwater-Management/Basin-Prioritization

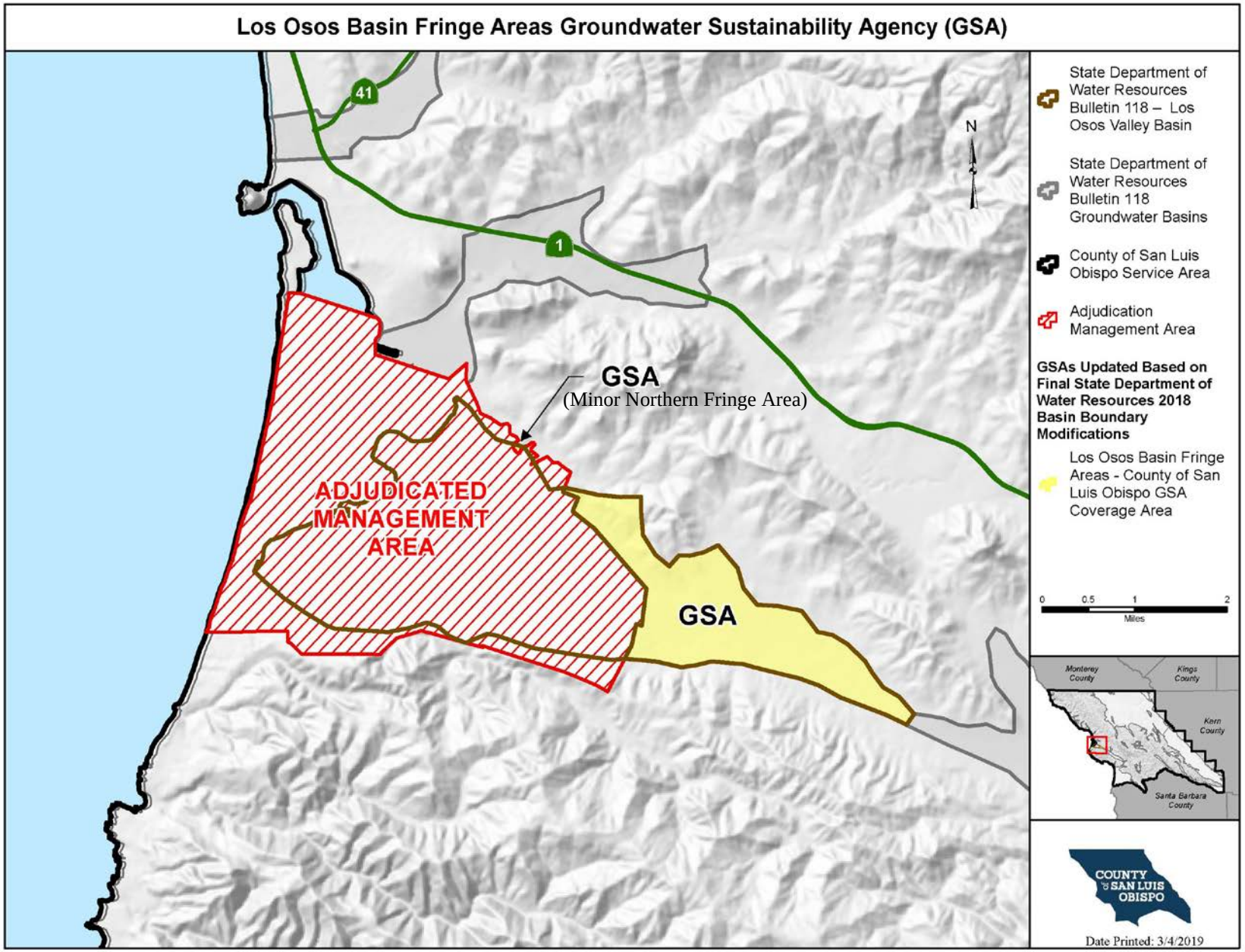
[4] As noted by DWR, the priority for the subbasin has been set to very low (0 total priority points) as a result of conditions being met under sub-component C of the Draft SGMA 2019 Basin Prioritizations.
[5] Critical conditions of overdraft have been identified in 21 groundwater basins as described 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."

LOS OSOS VALLEY GROUNDWATER BASIN (DWR No. 3-008)



Note: On February 11, 2019, the State Department of Water Resources published the Final 2019 Basin Boundary Modifications. DWR approved two jurisdictional subbasins (the Los Osos Area Subbasin and Warden Creek Subbasin) and the removal of the southern fringe area including Montana de Oro State Park (not shown on map). The Los Osos Area Subbasin also includes the minor northern fringe area (outside of the adjudicated area).

LOS OSOS VALLEY GROUNDWATER BASIN (DWR No. 3-008)



TO: **Los Osos Basin Management Committee**

FROM: **Rob Miller, Interim Executive Director**

DATE: **December 18, 2019**

SUBJECT: **Item 7a – Update on Status of Basin Plan Infrastructure Projects**

Recommendations
Receive report and provide input to staff for future action.

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 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. 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.

Project Name	Parties Involved	Funding Status	Capital Cost	Status
Program A				
Water Systems Interconnection	LOCSD/ GSWC	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 selected for IRWM matching funds which will be available in Q2 of 2020. Bidding will take place in Q1 of 2020, with completion of construction by Q4 2020.
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	Partial, GSWC portion funded	GSWC: $1.23 mil	GSWC's Program A Blending Project allows for incremental expansion of the nitrate facility and can be considered a first phase in Program B.

Project Name	Parties Involved	Funding Status	Capital Cost	Status
Program C				
Expansion Well No. 1 (Los Olivos)	GSWC	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. Four sites are currently being reviewed and a community workshop was held on 8/30/2018. Due to community concerns over siting, environmental review and permitting is expected to be on going through Q1 of 2020, with construction complete by Q1 of 2021. The LOCSD authorized the preparation of bid documents for a test well at Site A (Los Osos Middle School) at their 11/1/18 meeting. School District approved the Right of Entry Agreement on 8/21/2019. Bidding has been completed and a contract has been awarded. Drilling will commence as soon as a well drilling permit is issued by SLO County, which is expected to be in late December or early January 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
Program M				
New Zone D/E lower aquifer monitoring well in Cuesta by the Sea	All Parties	Funded through BMC Budget	$115,000	Completed. Initial monitoring data for the new well is provided under Agenda Item 7c.

Program U				
Creek Discharge Program	All Parties	Partially funded	$582,000 through feasibility phase required, $50k budgeted through 2020	The 2019 budget includes funding for limited baseline monitoring and Soil Aquifer Treatment evaluation in the amount of $50,000. This item will continue through the beginning of 2020.
8th and El Moro Urban Storm Water Recovery Project	All Parties	BMC funding for initial study only	$15,000 for initial study. Capital cost to be determined.	Staff is reviewed a draft proposal from CHG, and the proposal will be considered in the January 2020 agenda.

TO: **Los Osos Basin Management Committee**

FROM: **Rob Miller, Interim Executive Director**

DATE: **December 18, 2019**

SUBJECT: Item 7b: Review and Approve Contract with MKN for Soil Aquifer Treatment Analysis for the Los Osos Creek Discharge Project

Recommendations

Staff recommends that the Committee approve the proposal from MKN in an amount not to exceed $50,000

Discussion

Item 8 in the adopted 2019 BMC budget includes $50,000 of funding to advance the proposed Groundwater Replenishment and Recharge Project (GRRP) in Los Osos Creek. Previous studies indicated that the total funding required to advance the project to final feasibility would exceed $500,000 due to the extensive baseline water quality monitoring and studies required. Staff has elected to focus efforts on the project components that are the most critical to determining feasibility. Other GRRP projects that are currently being pursued in SLO County are located in areas that have access to an ocean outfall for brine disposal. The availability of brine disposal facilities is a critical prerequisite to the implementation of reverse osmosis technology for advanced treatment, which is a component of many GRRP projects. Given that brine disposal is not currently viable in Los Osos, advanced treatment will be limited to processes that do not use reverse osmosis. In order to establish overall feasibility, the supplemental treatment that can be expected from the Los Osos Creek alluvium must be analyzed, which is the subject of the attached proposal from MKN.

The BMC approved an initial expenditure of $5,000 at the September 2019 meeting, in order to confirm the logistics of sampling and testing with County operations staff at the Wastewater Reclamation Facility. This coordination has been completed, and no adjustments in scope are warranted. As a result, staff recommends that the BMC approve the full contract amount of $50,000.

Financial Considerations

The adopted Committee budget for calendar year 2019 includes a specific line item for the proposed work as described above. This line item also appears on the draft 2020 budget.

MKN & Associates, Inc.
P O Box 1604
Arroyo Grande, CA 93421
805.904.6530

August 30, 2019

Rob Miller, PE
Interim Executive Director
Los Osos Basin Management Committee
(Submitted Electronically)

RE: Proposal for Assessing Soil Aquifer Treatment, Los Osos Creek Recycled Water Project

Dear Rob,

PROJECT UNDERSTANDING

Michael K. Nunley & Associates, Inc. (MKN) is pleased to provide this proposal to the Los Osos Basin Management Committee (Committee) to complete an assessment of the soil aquifer treatment (SAT) potential associated with a possible future groundwater replenishment reuse project (GRRP) for Los Osos. The GRRP concept is to use recycled water from the Los Osos Water Recycling Facility (LOWRF), add advanced treatment if required, and discharge it to Los Osos Creek, which naturally recharges the Los Osos Groundwater Basin. Recycled water would be discharged during periods with very low or no flow in the Creek, in order to maximize the natural recharge of storm water. We have partnered with GSI Water Solutions, Inc. and the Civil and Environmental Engineering Department at California Polytechnic State University to develop this proposal for the next phase of work to evaluate the potential of a GRRP for Los Osos.

The GRRP may require treatment beyond the tertiary disinfected recycled water levels achieved at the LOWRF. To some extent these requirements may be fulfilled by retention time of the recharged water as it migrates downgradient in the aquifer between the points of application and extraction through SAT. The extent of this depends upon the water quality, retention time, as well as the physical and geochemical composition of the aquifer. The treatment which naturally occurs in the aquifer vadose zone is referred to as 'soil aquifer treatment'. While additional advanced treatment may be required to meet the GRRP regulatory requirements, it is also possible that the treatment requirements may be satisfied between the existing LOWRF tertiary treatment process and SAT.

In November 2017, MKN submitted the Los Osos Creek Groundwater Replenishment Reuse Project Treatment Evaluation Workplan (Workplan). The Workplan summarized results from the June 2016 Los Osos Creek GRRP Feasibility Study (Feasibility Study), also prepared by MKN, and described the required and recommended processes to develop the foundation for a robust and cost-effective design for the Los Osos Creek GRRP. Based on MKN's previous analysis, several work efforts were identified to complete the treatment evaluation. These efforts were divided into two phases of work in the 2017 Workplan and this proposal is for a portion of the Phase 1 recommended tasks consisting of completing a soil aquifer treatment (SAT) evaluation.

SCOPE OF WORK

If authorized, the MKN team will perform the following services for this project:

Task 1 – Coordinate with DDW Staff

GRRP regulations require that the SAT evaluation be approved by California Department of Drinking Water (DDW). It is important to ensure the SAT evaluation meets DDW's expectations. MKN, along with our subconsultant, GSI Water Solutions, Inc. (GSI), will coordinate with DDW on the current regulatory testing requirements for SAT evaluations and options to comply with GRRP regulations including any guidance based on recent testing for similar projects. This will be done concurrent with development of the SAT column testing procedures, described in Task 2.

Task 2 – Develop Procedures for SAT Column Testing

Based on input from DDW, GSI will develop procedures for SAT column testing. The procedures will be developed to mimic the interaction that will occur between the recycled water and the uppermost layers of the creek bed soil. We assume that the SAT column testing will be conducted with the current LOWRF tertiary-treated recycled water. The soil columns will be sized per regulatory requirements and are anticipated to be on the order of 10 inches in diameter and 6 to 10 feet tall. Water samples from each soil column will be collected at regular intervals (daily to weekly) to determine the rate of attenuation of total organic carbon (TOC) as a surrogate for other indicator compounds. It is assumed the column testing will include the following:

- Collection of bulk soil samples from the Los Osos Creek bed sediments and representative water samples from the LOWRF effluent;
- Preparation of SAT column apparatus to allow for uninterrupted flow of Los Osos recycled water through multiple, appropriately-sized SAT columns for a period of 2 to 3 months, and
- Preparation of a summary report in coordination with Cal Poly faculty.

Task 3 – Conduct SAT Column Testing

The proposed bench-top analytical testing will be coordinated by GSI staff and conducted by Dr. Rebekah Oulton of Cal Poly San Luis Obispo's Civil and Environmental Engineering department. GSI staff will coordinate soil and water sampling, documentation of the approved testing and analysis procedures with Cal Poly Civil and Environmental Engineering labs. Dr. Oulton has experience conducting similar studies and SAT column testing related to removal of contaminants during water & wastewater treatment. Dr. Oulton's laboratory is outfitted with appropriately-configured soil columns in which to conduct the testing.

Task 4 – Document Results of the Analysis

Following completion of the above testing, GSI will compile data, determine results and prepare a summary report to document the effectiveness of the SAT for TOC removal. MKN will review the findings from the summary report, compare the results to the SAT factors assumed in Feasibility Study, and provide the recommended next steps for the project development.

SCHEDULE

Table 1 outlines the anticipated project schedule. Time for DDW review and approval is unknown. The schedule assumes two weeks for the LOBMC review of the draft summary report. SAT column testing is anticipated to take three to four months, but this could vary depending on direction from DDW.

Table 1: Project Schedule		
Project Task	**Duration**	**Time from Notice to Proceed**
Meet with DDW staff	2 weeks	2 weeks
Develop SAT Evaluation Workplan	4 weeks	6 weeks
Obtain approval from DDW (assumed)	4 weeks	10 weeks
Collect recycled water and soil (in coordination with LOWRF staff)	2 weeks	12 weeks
Complete SAT Column Testing	12 – 16 weeks	28 weeks
Draft Report	4 weeks	32 weeks
LOBMC Review	2 weeks	34 weeks
Final Report	2 weeks	36 weeks

BUDGET

MKN proposes to complete this work on a time and materials basis in accordance with the attached Fee Schedule, with a not-to-exceed budget of $50,000. A breakdown of costs is provided below.

Project Task	Budget
Task 1 – Coordinate with DDW Staff	$5,990
Task 2 – Develop Procedures for SAT Column Testing	$5,250
Task 3 – Conduct SAT Column Testing	$27,300
Task 4 – Document Results of the Analysis	$11,460
Total	$50,000

The budget will not be exceeded unless prior written authorization is granted by the LOBMC. Rates are attached but may be revised annually. Subconsultants will be charged with a 5% markup.

Thank you for providing MKN with the opportunity to provide professional services for your project. If you have any questions regarding this proposal, please contact me at eshields@mknassociates.us or by phone at (805) 904-6530.

Sincerely,

Eileen Shields, PE
Principal

Attachments: 2019 Fee Schedule, Proposal from GSI Water Solutions, Inc.

MKN & Associates, Inc.
PO Box 1604
Arroyo Grande, CA 93421
805 904 6530

FEE SCHEDULE FOR PROFESSIONAL SERVICES

ENGINEERS AND TECHNICAL SUPPORT STAFF

Project Director/ Operations Manager	$200/HR
Principal Engineer	$185/HR
Senior Project Engineer	$175/HR
Project Engineer/ Senior Scientist	$152/HR
Water Resources Planner	$142/HR
GIS Specialist	$135/HR
Assistant Engineer II	$130/HR
Assistant Engineer I	$110/HR
GIS Technician	$112/HR
Supervising Drafter	$125/HR
Drafting/Design Technician II	$118/HR
Drafting/Design Technician I	$95/HR
Administrative Assistant	$60/HR

Routine office expenses such as computer usage, software licenses and fees, telephone charges, office equipment and supplies, incidental postage, copying, and faxes are included as a 3% fee on labor cost.

DIRECT PROJECT EXPENSES

Outside Reproduction	Cost + 10%
Subcontracted or Subconsultant Services	Cost + 10%
Travel & Subsistence (other than mileage)	Cost
Auto Mileage	Current IRS Rate - $.58/mi.

Scope of Work for Assessing Soil Aquifer Treatment, Los Osos Creek Recycled Water Project

To: Eileen Shields, PE
Principal Engineer
MKN & Associates

From: Tim Nicely, CHg
Tim Thompson, CHg

Date: August 30, 2019

Introduction

This scope of work identifies tasks to assess the benefits of a natural process known as soil aquifer treatment (SAT) as a preliminary step in a larger and future effort to fully determine the feasibility of implementing a groundwater recharge project in Los Osos Creek using recycled water from the Los Osos Water Recycling Facility (LOWRF). The work will be conducted collaboratively with GSI Water Solutions and MKN & Associates. Laboratory analyses for SAT column testing (discussed further below) will be performed by Dr. Rebekah Oulton of California Polytechnic State University's (Cal Poly's) Civil and Environmental Engineering department.

The proposed project has been categorized by the State Division of Drinking Water (DDW) as a Groundwater Replenishment Reuse Project (GRRP). Initial work by MKN (*Los Osos Creek Discharge Study* dated June 16, 2016) identified the use advanced-tertiary treated recycled water as the recharge source, relying on the seasonal flows of the Los Osos Creek to constitute the so-called 'diluent' water. Infiltration of the Creek water constitutes the principal recharge component to the Los Osos Groundwater Basin, and has been estimated to contribute an average of 600 acre-feet of water to the basin (Cleath Harris Geologists, *Recycled Water Discharges to Los Osos Creek*, dated March 18, 2014). It is anticipated that the tertiary-treated recycled water from the LOWRF will require additional treatment with ozone followed by biologically activated carbon to reduce TOC concentrations to meet regulatory requirements. Further reduction in the total organic carbon (TOC) concentration via SAT will occur within the surface and underlying vadose zone sediments. This proposed SAT testing will evaluate the magnitude of TOC removal that occurs via the SAT process.

Scope of Work

This scope of work presents the tasks required to evaluate of the water quality benefits of SAT and assess regulatory implications. During the evaluation we will:

1. Coordinate with DDW staff to ensure the proposed scope of work will meet both project and regulatory requirements,
2. Develop procedures for conducting SAT column testing,
3. Conduct the SAT column testing, and
4. Document results of the analysis.

Task 1 - Coordinate with DDW Staff

Concurrent with the development of the column testing procedures (discussed below), we will coordinate with DDW staff on the current regulatory testing requirements for SAT evaluations. In addition to the details about the SAT column testing being proposed, we will explore options with DDW staff to comply with GRRP regulations including any recent guidance with regard to testing for similar projects, the applicability of analogous testing for those projects and whether any recent lessons-learned from those analyses are applicable to this project.

This coordination will inform the design of the SAT column testing and overall GRRP development. The current testing will determine the degree to which SAT will reduce TOC sufficiently to fulfill the requirements for GRRP without further treatment of the LOWRF's recycled water. Pending coordination with DDW staff, we assume that this proposed SAT column testing will be conducted with the LOWRF's current advanced-tertiary treated recycled water without further treatment (ozone and biologically activated carbon).

Task 2 - Develop Procedures for SAT Column Testing

SAT column testing procedures will be developed based on DDW coordination to mimic the interaction that will occur in the uppermost two meters of soil, where the introduced recycled water is anticipated to remain well-aerated. The proposed column testing has been conducted on similar GRRP projects within the state in response to DDW regulations to aid in the establishment of a SAT factor, which will be used to estimate the TOC removal efficiency that occurs as the recharged water passes through the vadose zone.

In response to the regulatory requirements, appropriately-sized soil columns (on the order of 10-inches in diameter and 6- to 10-feet tall) will be prepared at Cal Poly's lab to mimic the interaction between the LOWRF water and creek soil to accomplish the TOC reduction goal. Inflow into the columns will be chosen to approximate the anticipated rate of percolation of the LOWRF water through the soil. Water samples from the end of each column will be collected at regular intervals (daily to weekly) to determine the rate of attenuation of TOC as a surrogate for other indicator compounds[1].

SAT column testing procedures vary with each GRRP in response to specific DDW requirements. Based on our review of similar recent projects occurring throughout the region, and more importantly, the input of DDW staff, the testing procedures will be refined to achieve the project's goals. Using LOWRF effluent and Los Osos Creek soil material, the proposed column testing will estimate the degree to which SAT is effective at removing TOC and other selected constituents.

This column testing will include the following:

- Collection of bulk soil samples from the Los Osos Creek bed sediments and representative water samples from the LOWRF effluent;
- Preparation of SAT column apparatus to allow for uninterrupted flow of Los Osos recycled water through multiple, appropriately-sized SAT columns for a period of 2 to 3 months, and
- Preparation of a summary report in coordination with Cal Poly faculty.

The proposed bench-top analytical testing will be coordinated by GSI staff and conducted by Dr. Rebekah Oulton of Cal Poly San Luis Obispo's Civil and Environmental Engineering department. Dr. Oulton has experience conducting similar studies and SAT column testing related to removal of contaminants during water & wastewater treatment. Dr. Oulton's laboratory is outfitted with appropriately-configured soil columns in which to conduct the SAT testing.

The analytical results of the column testing will be documented by the Cal Poly faculty into a format for inclusion in a later report (discussed below).

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[1] Indicator compounds used at other sites have included: caffeine, DEET, sucralose, NDMA, gemfibrozil and others) and any surrogate parameters as approved by DDW.

Task 3 – Conduct SAT Column Testing

GSI staff will coordinate soil and water sampling, documentation of the approved testing and analysis procedures with Cal Poly Civil and Environmental Engineering labs. The column testing will be performed at Cal Poly's labs under the direction of Dr. Oulton, two of her graduate students and staff from the Cal Poly Foundation. Following completion of the testing, the results will be provided in tabular and report format from the laboratory.

The turn-around time for this testing is tentatively expected to be between 3 and 4 months, pending the details of the procedure as determined by DDW staff.

Task 4 – Document Results of the Analysis

Following completion of the above tasks, GSI will compile data and results and prepare a summary report to document the effectiveness of the SAT for TOC removal as determined based on results from column testing. The report will present our analyses, which will provide a recommended SAT factor, which will in turn will be used to estimate the removal efficiency of SAT along Los Osos Creek.

Preliminary Cost Estimate & Schedule for Design

Our proposed fee to complete the tasks on a time-and-materials basis are presented below. This fee estimate includes a 10 percent markup on subconsultant work (Cal Poly and BC Labs).

	Labor Cost	Outside Services	Direct Expenses	Total
Task 1 - Coordinate with DDW Staff	**$5,000**	**$0**	**$0**	**$5,000**
Task 2 - Develop Procedures for SAT Column Testing	**$5,000**	**$0**	**$0**	**$5,000**
Task 3 – Conduct SAT Column Testing	**$5,000**	**$20,000**	**$1,000**	**$26,000**
Task 4 - Document Results of the Analysis	**$10,000**	**$0**	**$0**	**$10,000**
Project Totals	**$25,000**	**$20,000**	**$1,000**	**$46,000**

Note: The budget assumes the costs for DDW staff time for coordination of this testing will be paid directly by the Los Osos Basin Management Committee. We recommend budgeting $3000 - $5000 for Department of Drinking Water staff.

Schedule

We will meet with DDW staff within 2 weeks of notice to proceed. Following that meeting, we will:

- Develop a work plan and coordinate with Cal Poly: 1 month,
- Collect recycled water and soil in coordination with LOWRF staff: 2 weeks,
- Conduct SAT column testing: 3 to 4 months, and
- Document results of the analysis: 1 month.

TO: **Los Osos Basin Management Committee**

FROM: **Rob Miller, Interim Executive Director**

DATE: **December 18, 2019**

SUBJECT: **Item 7c – Discussion of CHG Report on Lower Aquifer Nitrate Concentrations Trends Review and LA11 Seawater Intrusion Evaluation**

Recommendation
Receive draft report and provide input to staff for future action.

Discussion
In July 2019, the BMC retained Cleath Harris Geologists (CHG) to prepare a study evaluating nitrate trends in the lower aquifer and continued seawater intrusion evidence at monitoring well LA11 (Pasadena Avenue). The draft results of this study are presented in the attached technical memorandum for BMC review and input. In addition, a current raw data set of lower aquifer chloride data has been received from the fall 2019 monitoring event, including the recently drilled Cuesta by the Sea monitoring well on Lupine Avenue. While additional analysis will be forthcoming, staff felt that the data would be instructive in the context of the draft CHG study. Staff will provide an overview of the technical memo for the BMC and public at the meeting. As in previous adaptive management efforts, this memo will come back in subsequent meetings for discussion and input.

Water Quality Results - Lower Aquifer Monitoring

Station ID	Well Name	Basin Plan Well ID	Aquifer Zone	Date	HCO3	Total Hardness	Cond	pH	TDS	Cl	NO3-N	SO4	Ca	Mg	K	Na
					mg/l	mg/l	umhos/cm		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
30S/10E-11A2	Sand Spit #1 East	LA2	D	3/14/2005	180	4600	16000	7.3	8900	5400	ND	430	770	640	20	1300
				10/21/2015	150	6640	17700	7.4	13100	6300	ND	740	1030	990	31	1560
30S/10E-12J1	MBO5 DWR Obs.	LA11	E	2/14/2005	350	370	1300	8.1	840	77	ND	190	51	58	6.1	110
				11/20/2009	300	360	1150	7.5	732	83	ND	190	51	58	4.4	95
				7/24/2014	360	489	1290	7.7	780	105	ND	212	69	77	5	88
				4/22/2015	360	475	1290	7.8	810	112	ND	189	65	76	5	88
				10/1/2015	250	486	1280	7.3	840	117	ND	188	68	77	4	85
				4/20/2016	330	524	1370	n/a	840	151	ND	193	73	40	5	83
				10/10/2016	350	497	1370	7.1	930	173	ND	189	69	79	4	81
				4/11/2017	350	541	1380	7.5	880	167	ND	186	75	86	4	81
				10/4/2017	300	543	1370	7	850	162	ND	191	76	86	5	90
				4/10/2018	350	595	1390	7.6	820	173	ND	192	85	93	5	97
				10/2/2018	350	497	1340	7.4	870	160	ND	160	69	79	3	87
				4/9/2019	350	539	1430	7.4	860	196	ND	189	76	85	4	85
				10/2/2019	250	290	1520	7.6	1000	**187**	ND	189	80	90	5	91
30S/10E-13Bb	Lupine Zone D	LA41	D	11/7/2019	210	312	1310	7.7	760	**136**	3.1	188	69	34	4	140
30S/10E-13Ba	Lupine Zone E	LA40	E	11/6/2019	210	2090	5330	7	4750	**1460**	1.3	224	388	272	6	182
30S/10E-13J1* Highlighted chloride values have been adjusted for wellbore leakage	GSWC Rosina	LA10	D,E	12/20/2004	72	230	720	7.1	410	150	1.6	14	38	33	1.4	29
				1/14/2010	35	260	778	6	435	200	1.6	13	41	38	1.5	33
				7/24/2014	80	418	1200	7.3	910	303	1.7	16	67	61	2	39
				4/22/2015	80	431	1230	7.1	750	331	1.9	20	69	63	2	39
				10/5/2015	70	460	1280	7	950	329	1.7	19	74	67	2	41
				4/26/2016	80	412	1170	7.1	840	299	1.8	18	66	60	2	37
				10/12/2016	60	509	1430	6.8	1100	389	1.8	27	82	74	2	44
				4/10/2017	80	327	957	6.9	720	300	2.6	15	52	48	2	35
				10/12/2017	80	245	702	6.9	510	220	3.4	13	39	36	2	33
				4/24/2018	70	188	620	7.4	400	190	4.3	12	29	28	1	29
				10/9/2018	70	265	730	7.1	450	210	3.2	13	42	39	2	34
				4/15/2019	80	251	744	7	600	174	1.9	10	38	38	2	31
				10/14/2019	80	332	961	7.1	830	**229**	2	13	54	48	1	33
30S/10E-13M2	Howard East	LA31	C,D	11/22/2004	51	810	2900	7.3	1500	810	0.5	140	60	120	4.7	210
				12/9/2009	55	1100	3740	7.1	2170	1100	0.5	220	160	160	4.8	370
				8/4/2014	60	757	3340	7.1	2450	990	0.6	178	117	113	5	382
				4/21/2015	60	739	3430	7.3	1930	950	0.6	178	117	113	5	382
				10/6/2015	30	756	3370	7.1	2140	960	0.5	185	115	114	5	342
				4/20/2016	50	726	3520	7.2	2190	941	0.7	179	113	108	5	400
				10/19/2016	70	722	3420	7.4	2190	943	0.6	182	113	107	4	398
				4/17/2017	60	733	3380	6.8	2060	907	0.6	178	114	109	4	413
				10/5/2017	60	738	3350	7.5	2190	960	0.7	160	116	109	5	411
				4/24/2018	70	664	3370	7.2	2020	946	0.6	2.8	103	99	4	367
				10/17/2018	60	740	3400	7.3	2180	834	0.6	153	115	110	5	414
				4/3/2019	70	640	3290	7.8	2010	940	0.6	179	103	93	4	341
				10/3/2019	70	574	3120	7.4	2120	**827**	0.7	169	90	85	4	340

Water Quality Results - Lower Aquifer Monitoring

Station ID	Well Name	Basin Plan Well ID	Aquifer Zone	Date	HCO3	Total Hardness	Cond	pH	TDS	Cl	NO3-N	SO4	Ca	Mg	K	Na
					mg/l	mg/l	umhos/cm		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
30S/10E-13N	S&T #5	LA8	D	11/23/2004	42	80	390	6.9	200	67	5.9	9.2	13	12	1.7	38
				11/19/2009	41	89	386	6.8	267	73	6.1	11	15	13	1.4	38
				7/24/2014	50	100	438	7.4	270	76	7	10	17	14	2	38
				4/21/2015	50	98	445	6.9	280	77	7.7	11	16	14	2	38
				10/6/2015	40	98	422	7.2	310	75	6.8	10	16	14	1	38
				4/20/2016	20	97.5	446	7	320	76	7.2	12	16	14	1	38
				10/13/2016	50	104	470	8	320	79	7.2	12	17	15	1	40
				4/11/2017	50	100	434	7.4	270	77	7.3	12	17	14	1	38
				10/2/2017	30	95	438	7.2	290	78	7.6	13	15	14	1	36
				4/11/2018	60	104	440	7	260	79	7.9	14	17	15	1	39
				10/3/2018	60	107	430	6.5	340	66	6.7	13	18	15	2	40
				4/3/2019	50	100	434	6.3	250	75	7.3	13	17	14	1	36
				10/7/2019	60	95	446	7.6	250	77	7.7	14	15	14	1	37
30S/10E-14B2	Sand Spit #3 Deep	LA3	D	3/15/2005	100	3600	30000	8	17000	8500	ND	960	1200	130	34	4300
				10/21/2015	ND	7140	29500	11	24700	10000	ND	530	2830	20	80	4040
30S/10E-24C1	GSWC Cabrillo	LA9	D	12/20/2004	64	130	610	7	310	110	4.5	19	22	19	1.6	50
				11/20/2009	60	150	611	7.1	347	130	4.1	22	23	22	1.6	52
				7/24/2014	40	69	339	7.6	240	46	8.4	6	11	10	1	32
				4/22/2015	70	117	530	7.3	320	95	5.5	16	19	17	2	45
				10/5/2015	50	75	349	7.6	270	50	7.6	7	12	11	1	34
				4/26/2016	70	115	499	7	300	90	5.6	16	18	17	2	44
				10/12/2016	70	111	506	7.1	320	93	5.5	15	18	16	1	44
				4/10/2017	70	111	490	7	310	89	5.7	16	18	16	1	43
				10/12/2017	70	117	484	7	270	89	6	16	19	17	2	46
				4/24/2018	70	115	486	7.8	300	90	6.2	17	18	17	1	43
				10/9/2018	60	135	477	6.9	280	76	5.8	17	21	20	2	50
				4/15/2019	70	112	488	7.1	310	92	5.7	16	17	17	2	45
				10/14/2019	no sample (off-line)											
30S/11E-7Q3	LOCSD 8th St.	LA12	D	11/18/2004	250	270	790	7.5	410	73	ND	39	44	40	2.3	48
				11/19/2009	220	290	782	7.4	465	92	ND	46	46	42	1.9	53
				7/23/2014	290	303	876	7.6	460	91	ND	43	49	44	2	54
				4/21/2015	290	305	897	7.7	500	101	ND	55	48	45	2	59
				10/6/2015	280	298	828	7.4	490	91	ND	46	47	44	2	55
				4/20/2016	190	307	907	7.7	520	91	ND	49	49	45	2	54
				10/11/2016	280	278	827	4.9	490	93	ND	46	44	41	2	52
				4/10/2017	300	294	839	7.3	480	91	ND	50	47	43	2	54
				10/4/2017	220	305	826	6.5	470	92	ND	45	48	45	2	56
				4/10/2018	300	319	814	7.7	440	93	ND	46	52	46	2	56
				10/2/2018	290	283	822	7.3	470	78	ND	50	46	41	1	53
				4/9/2019	300	301	844	7.5	480	94	ND	50	48	44	2	53
				10/2/2019	290	312	877	8	530	91	ND	51	49	46	2	56

Water Quality Results - Lower Aquifer Monitoring

Station ID	Well Name	Basin Plan Well ID	Aquifer Zone	Date	HCO3	Total Hardness	Cond	pH	TDS	Cl	NO3-N	SO4	Ca	Mg	K	Na
					mg/l	mg/l	umhos/cm		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
30S/11E-17E8	So. Bay Obs. Middle	LA22	D	1/14/2005	150	150	440	7.5	290	34	2.2	11	24	22	1.4	28
				11/20/2009	120	160	455	7.3	255	42	4.3	12	25	23	1.3	29
				7/23/2014	150	166	500	7.6	270	43	6.3	10	27	24	2	28
				4/21/2015	150	157	481	7.6	270	49	7.1	13	25	23	1	28
				10/1/2015	120	164	475	7.4	290	44	6.6	10	26	24	1	28
				4/19/2016	150	164	476	6.9	290	45	6.9	12	26	24	1	29
				10/13/2016	140	161	521	7.3	290	46	6.9	12	25	24	1	29
				4/13/2017	150	164	466	7.3	300	46	6.7	13	26	24	1	29
				10/11/2017	150	168	476	7.7	260	47	7.2	14	26	25	1	29
				4/16/2018	150	165	473	6.4	310	47	6.7	14	25	25	1	29
				10/10/2018	150	160	471	7.5	250	43	6.1	15	26	23	1	28
				4/10/2019	180	153	466	7.2	290	46	5.8	14	25	22	1	28
				10/9/2019	150	155	485	7.3	270	**49**	7	15	24	23	1	28
30S/11E-17N10	GSWC So. Bay #1	LA20	C,D,E	Jan 2003	250	--	510	7.1	290	37	ND	21	41	25	1.3	35
				11/20/2009	230	220	638	7.3	357	41	0.5	30	35	33	1.7	37
				7/24/2014	280	232	646	7.7	370	37	0.5	24	37	34	2	41
				4/22/2015	290	234	653	7.4	360	43	0.6	27	36	35	2	42
				10/5/2015	280	227	614	7.2	370	38	0.5	23	35	34	2	41
				4/26/2016	230	227	629	7.1	360	39	0.6	27	35	34	2	40
				10/12/2016	290	221	631	7	370	40	0.6	25	34	33	2	40
				4/10/2017	280	227	624	7.2	380	39	0.6	27	35	34	2	40
				10/12/2017	260	240	583	6.6	320	41	0.7	28	37	36	2	43
				4/24/2018	200	166	515	7.4	330	43	3.2	23	27	24	2	31
				10/9/2018	290	273	632	7.2	340	38	0.6	29	42	41	3	47
				4/15/2019	200	181	559	7.4	310	42	3.1	22	28	27	2	34
				10/14/2019	290	221	626	7.2	380	**41**	0.7	29	34	33	2	40
30S/11E-18K8	10th St. Obs. East (Deep)	LA18	E	1/19/2005	260	290	650	7.5	370	33	ND	38	62	33	2.5	28
				11/20/2009	230	220	620	7.5	378	32	ND	40	51	24	1.8	23
				7/24/2014	290	271	647	7.5	380	28	ND	34	56	32	2	27
				4/21/2015	290	265	634	7.7	400	33	ND	39	55	31	2	27
				10/19/2015	230	256	621	7.3	370	29	ND	33	53	30	2	26
				4/20/2016	190	265	700	7.5	390	31	ND	38	55	31	2	26
				10/18/2016	290	256	615	6.8	370	31	ND	36	53	30	2	26
				4/12/2017	290	274	616	7.5	450	31	ND	38	57	32	2	27
				10/10/2017	220	271	619	7.8	350	30	ND	36	56	32	2	27
				4/17/2018	290	260	625	7.3	390	33	ND	40	53	31	2	27
				10/10/2018	290	254	608	7.5	360	31	ND	40	54	29	2	26
				4/10/2019	290	245	620	7.6	380	32	ND	37	52	28	2	25
				10/9/2019	290	253	647	7.9	390	**33**	ND	41	52	30	2	26

Water Quality Results - Lower Aquifer Monitoring

Station ID	Well Name	Basin Plan Well ID	Aquifer Zone	Date	HCO3	Total Hardness	Cond	pH	TDS	Cl	NO3-N	SO4	Ca	Mg	K	Na
					mg/l	mg/l	umhos/cm		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
30S/11E-18K9	LOCSD 10th St.	LA32	C,D	May 2002	250	--	550	6.9	320	37	0.2	26	31	32	--	39
				11/20/2009	180	160	539	7.2	307	36	1	27	27	24	1.3	32
				7/23/2014	220	190	546	7.7	300	32	1	20	30	28	1	35
				4/21/2015	190	108	504	7.6	270	38	1.6	20	17	16	1	27
				10/6/2015	50	62	248	7.2	190	31	5.9	3	10	9	ND	21
				4/20/2016	130	121	382	7.5	220	32	3.3	12	19	18	1	27
				10/11/2016	200	168	511	6.6	270	36	1.2	22	26	25	1	34
				4/10/2017	190	155	461	7.3	270	35	1.9	19	24	23	1	31
				10/9/2017	200	168	493	7.6	270	36	1.4	23	26	25	1	33
				4/10/2018	50	75.2	256	7.7	150	35	6.5	29	12	11	ND	23
				10/2/2018	210	168	492	7.3	270	36	1.3	22	26	25	ND	33
				4/9/2019	200	172	474	7.6	270	34	1.6	22	26	26	1	33
				10/2/2019	200	185	531	7.4	310	**36**	1.4	25	28	28	1	35
30S/11E-18K	GSWC Los Olivos #5	LA39	D	4/15/2019	290	230	619	8.1	350	38	ND	27	33	36	2	41
				10/14/2019	300	225	628	7.2	370	**37**	ND	29	34	34	1	41
30S/11E-18L2**	LOCSD Palisades	LA15	D,E	11/18/2004	220	330	880	7.3	420	120	ND	31	54	48	2.2	40
				11/19/2009	200	590	1460	7.2	890	360	0.4	39	94	86	2	44
			D	7/23/2014	250	293	783	7.8	390	90	0.4	26	48	42	2	40
				4/29/2015	80	78	348	7.4	230	43	5	10	13	11	ND	30
				10/28/2015	230	288	782	7.4	420	104	0.6	29	46	42	ND	36
				4/27/2016	230	264	796	7.3	450	93	0.9	28	43	38	2	43
				10/11/2016	200	221	694	7	380	91	1.7	26	36	32	1	35
				10/5/2017	180	306	768	7.6	400	102	0.7	27	50	44	2	40
				4/10/2018	250	311	767	7.3	420	100	0.8	32	52	44	2	40
				10/23/2018	250	288	772	7.7	440	83	0.6	31	48	41	1	38
				4/9/2019	250	301	774	7.4	460	102	0.8	29	48	44	1	38
				11/14/2019	210	303	806	7.8	430	**107**	0.7	33	49	44	2	39

ND = Not Detected

Chloride Metric Wells in Green (13J1 weighted x2); current chloride concentrations in red

*Chloride concentrations at 13J1 can vary seasonally by 100+ mg/l and are affected by well production and borehole leakage, so fluctuations are expected.

**Water from 18L2 affected by wellbore leakage/upper aquifer influence when inactive

Legend and Detection Limits

Constituent	Description	Practical Quantitation Limit*
HCO3	Bicarbonate Alkalinity in mg/L CaCO3	10.0
Total Hardness	Total Hardness in mg/L CaCO3	--
Cond	Electrical Conductance in µmhos/cm	1.0
pH	pH in pH units	--
TDS	Total Dissolved Solids in mg/L	20.0
Cl	Chloride concentration in mg/L	1.0
NO3-N	Nitrate as Nitrogen concentration in mg/L	0.1
SO4	Sulfate concentration in mg/L	2.0
Ca	Calcium concentration in mg/L	1.0
Mg	Magnesium concentration in mg/L	1.0
K	Potassium concentration in mg/L	1.0
Na	Sodium concentration in mg/L	1.0

*where dilution not required

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Technical Memorandum

Date: November 6, 2019

From: Spencer Harris, HG 633

To: Rob Miller, PE, Interim Executive Director
Los Osos Groundwater Basin Management Committee

SUBJECT: Lower Aquifer nitrate concentrations trends review and LA11 seawater intrusion evaluation.

Dear Mr. Miller:

As part of adaptive management for 2019, Cleath-Harris Geologists (CHG) has performed a review of trends in nitrate concentrations at various Lower Aquifer wells, along with an evaluation of the potential for seawater intrusion at Lower Aquifer well LA11 (Zone E; Pasadena Drive). The purpose of these efforts is to provide the Los Osos Basin Management Committee (BMC) with information and recommendations for making adjustments to the Los Osos Basin Plan (LOBP)[1], as appropriate. This memorandum presents the results of the adaptive management review.

Lower Aquifer Nitrate Trends

The 2018 Annual Report evaluated Upper Aquifer influence and associated increases in nitrate concentrations due to wellbore leakage in Lower Aquifer well LA10. As noted in Appendix J of that report, wellbore leakage is not the only mechanism for Upper Aquifer influence at Lower Aquifer wells. In fact, leakage of Upper Aquifer groundwater through the regional aquitard is one of the main sources of recharge to the Lower Aquifer.

For example, under current wastewater project conditions with no further development (LOPB Figure 74, Attachment A), recharge to the Lower Aquifer is estimated to average 680 acre-feet per year from Upper Aquifer leakage and 240 acre-feet per year of subsurface inflow from the Los Osos Creek valley. Historically, Upper Aquifer leakage was also the primary component of recharge to the Lower Aquifer. The estimated ratio of Upper Aquifer leakage to subsurface inflow from Los Osos Creek valley prior to the wastewater project ranged from approximately 60:40 to 70:30.[2]

[1]Updated Basin Plan for the Los Osos Groundwater Basin, January 2015.
[2]Cleath & Associates, 2005, Sea Water Intrusion Assessment and Lower Aquifer Source Investigation of the Los Osos Valley Groundwater Basin, October 2005.

Prior Studies

Two prior studies that projected future nitrate concentrations in groundwater over time have been performed, one using a solute transport model[3] and the other based on mass balance calculations.[4] The solute transport model study concluded that nitrate concentrations in several Lower Aquifer wells would continue to rise following wastewater project implementation, as existing nitrate concentrations in the Upper Aquifer are drawn into the Lower Aquifer zones. Mass balance calculations for the Salt/Nutrient Management Plan also indicate Lower Aquifer nitrate concentrations also projected to rise in the Central and Western Areas under wastewater project conditions. The solute transport study projected variable increases in Lower Aquifer nitrate concentrations, while the mass balance calculations projected roughly 2 milligrams per liter (mg/L) over 25 years following wastewater project implementation, equivalent to 0.08 mg/L per year. Attachment B includes graphical results of the two prior studies (Figure 23 from the solute transport study and Figures E11 and E15 from the Salt/Nutrient Management Plan).

The Los Osos Wastewater Project significantly reduces nitrogen loading to the Basin. Raw water influent to the Los Osos Water Recycling Facility averages over 50 mg/L as ammonia-nitrogen, while treated wastewater discharges to Broderson were initially close to 7 mg/L NO_3-N in 2016, and dropped below 2 mg/L in October 2018 as inflows to the treatment plant increased and the treatment process stabilized.[5,6]

The long-term equilibrium of NO_3-N concentrations in the basin salt/nutrient mass balance is projected to be approximately 5 mg/L (Figure E11, Attachment B), and assumes treated wastewater contains 6 mg/L NO_3-N. By comparison, the solute transport modeling in 2003 shows maximum NO_3-N concentrations at community supply wells approaching 7 mg/L under wastewater project conditions, and assumes NO_3-N in treated wastewater was also 7 mg/L (Figure 23, Attachment B). With lower average NO_3-N concentrations being achieved by the treatment plant, long-term basin equilibrium would be expected below 5 mg/L NO_3-N (less than half the State drinking water standard).

Nitrate Trends at Specific Wells

Historical nitrate data over time has been reviewed for Lower Aquifer community supply wells and monitoring wells. A summary of trends is presented in Table 1 below, followed by trend details for each well. Well locations are shown in Figure 1. Plots of nitrate-nitrogen (NO_3-N) over time with linear regression trend lines are shown in Figures 2, 3 and 4.

[3]Yates and Williams, 2003, Simulated Effects of a Proposed Sewer project on Nitrate Concentrations in the Los Osos Valley Groundwater Basin.
[4]CHG, 2017, Los Osos Groundwater Basin Assimilative Capacity and Antidegradation Analysis, prepared for San Luis Obispo County Public Works *in* Salt/Nutrient Management Plan for the Los Osos Groundwater Basin, Appendix C.
[5] Ibid
[6] CHG, 2018 Annual Groundwater Monitoring Report for the Los Osos Groundwater Basin, June 2019

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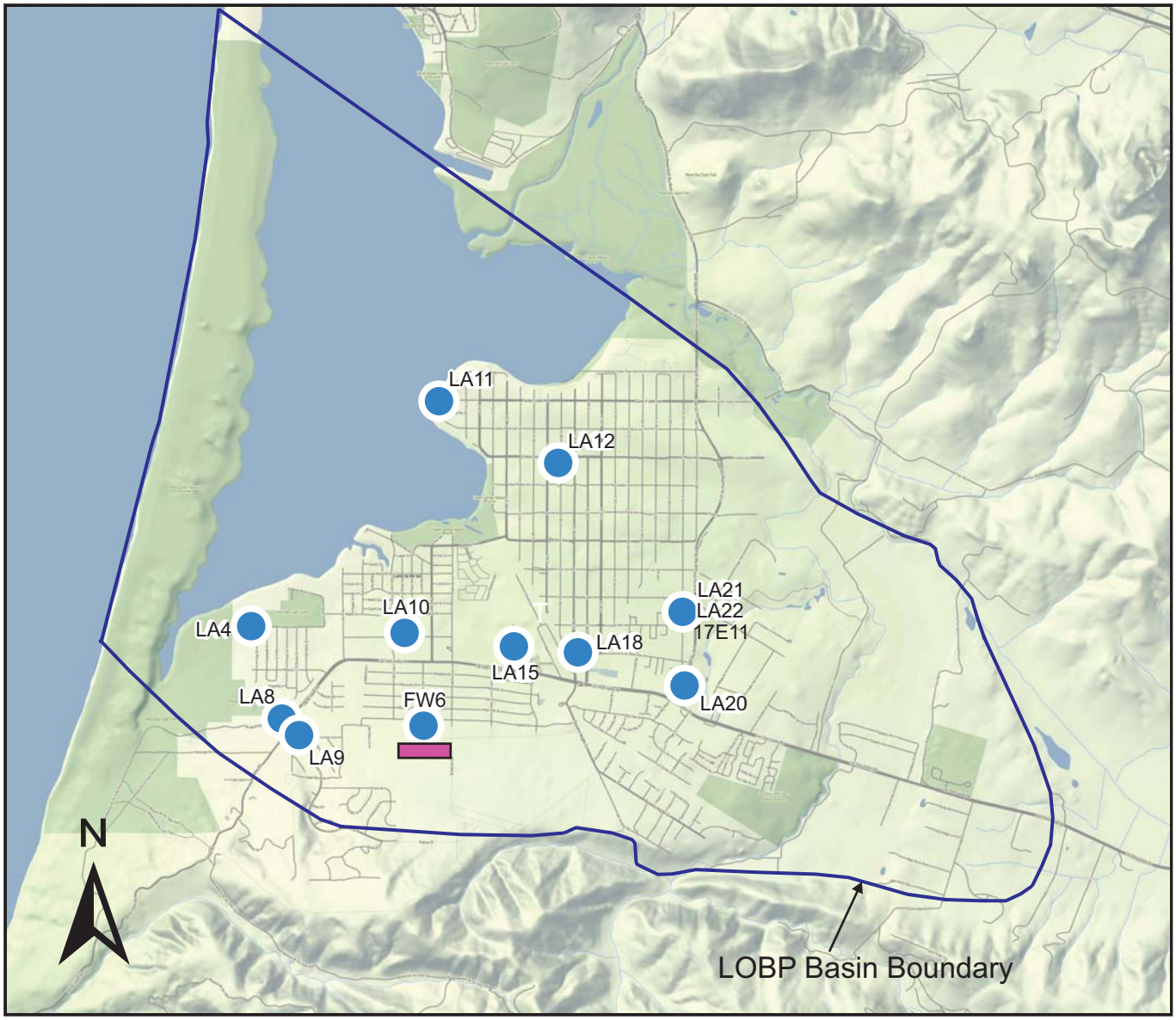

Base Image: Stamen-Terrain

0 2000 4000 6000 8000 ft

Scale: 1 inch ≈ 4,000 feet

Explanation

- LOBP Monitoring Locations referenced in text
- Broderson Site

Figure 1
Referenced Well Locations
Los Osos Groundwater Basin
2019 Adaptive Management TM

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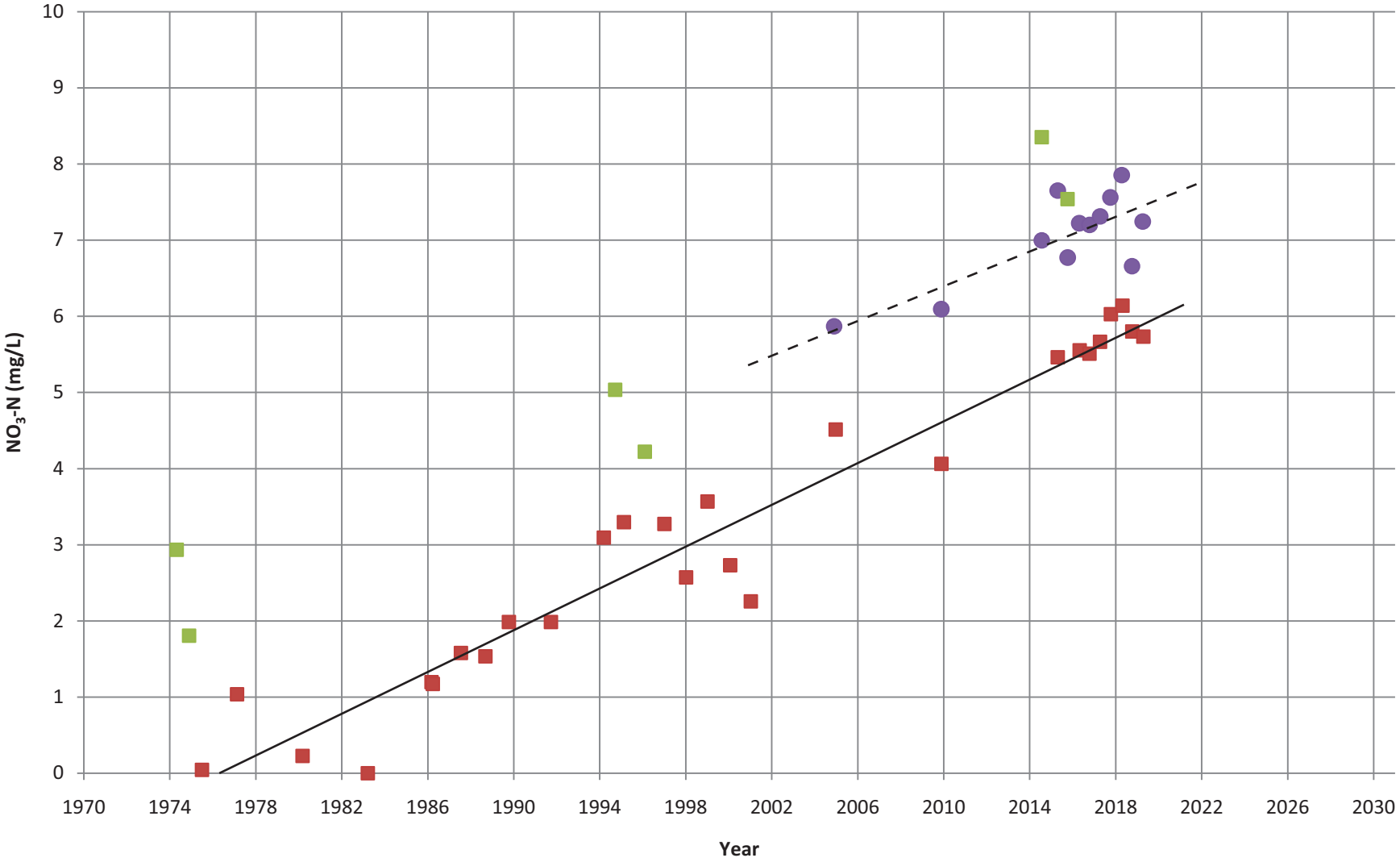
Nitrate-Nitrogen Concentration Trends
LA8 and LA9



Explanation

LA8 – – – – (linear regression trend line)

LA9 ——— (linear regression trend line)

LA9 (wellbore leakage) - data excluded from linear regression trend line

Figure 2
Nitrate-Nitrogen Concentrations
LA8 and LA9
2019 Adaptive Management TM

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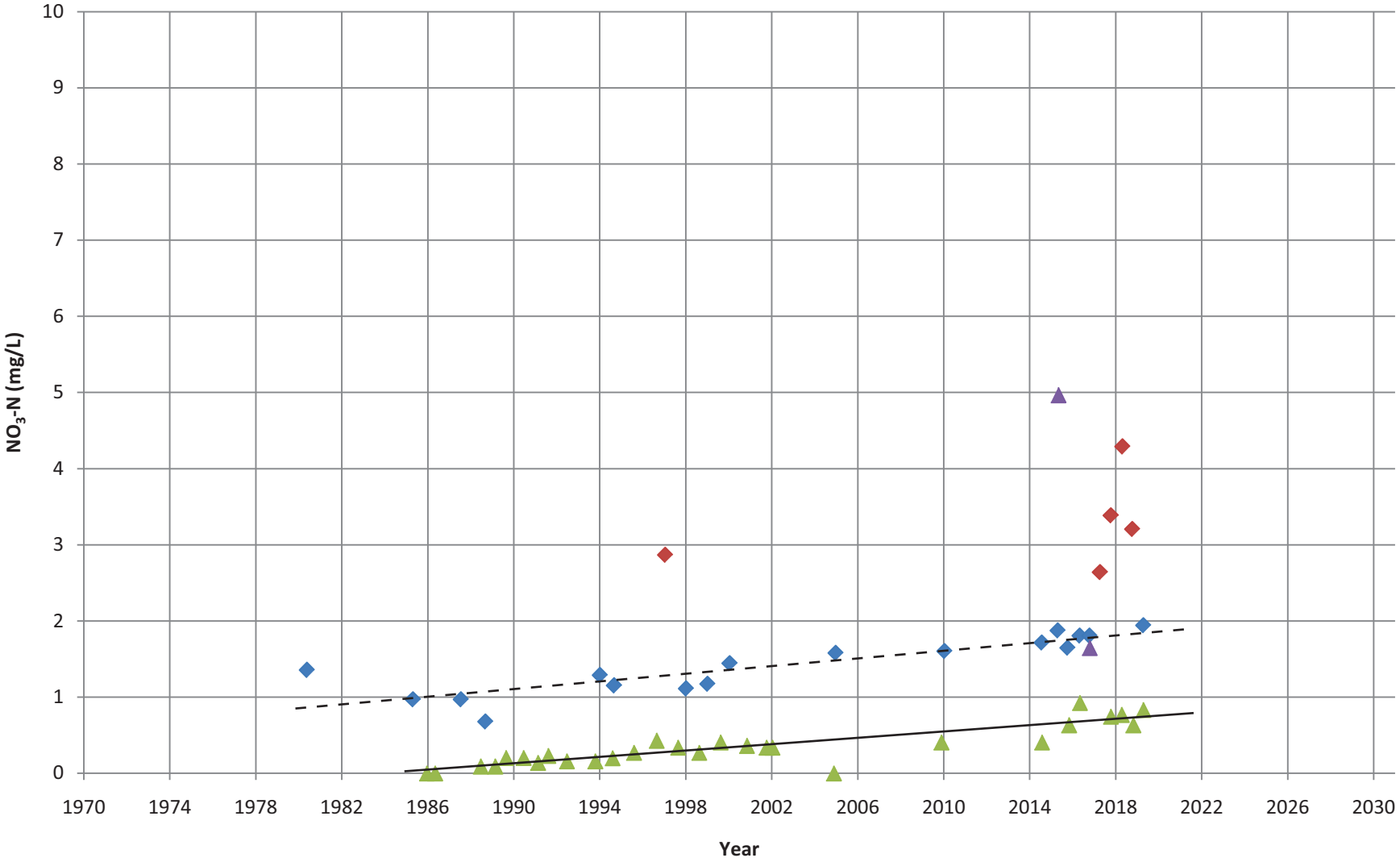
Nitrate-Nitrogen Concentration Trends
LA10 and LA15



Explanation

- LA10 (linear regression trend line)
- LA15 (linear regression trend line)
- LA10 (wellbore leakage)
- LA15 (wellbore leakage)

> data excluded from linear regression trend lines

Figure 3
Nitrate-Nitrogen Concentrations
LA10 and LA15
2019 Adaptive Management TM

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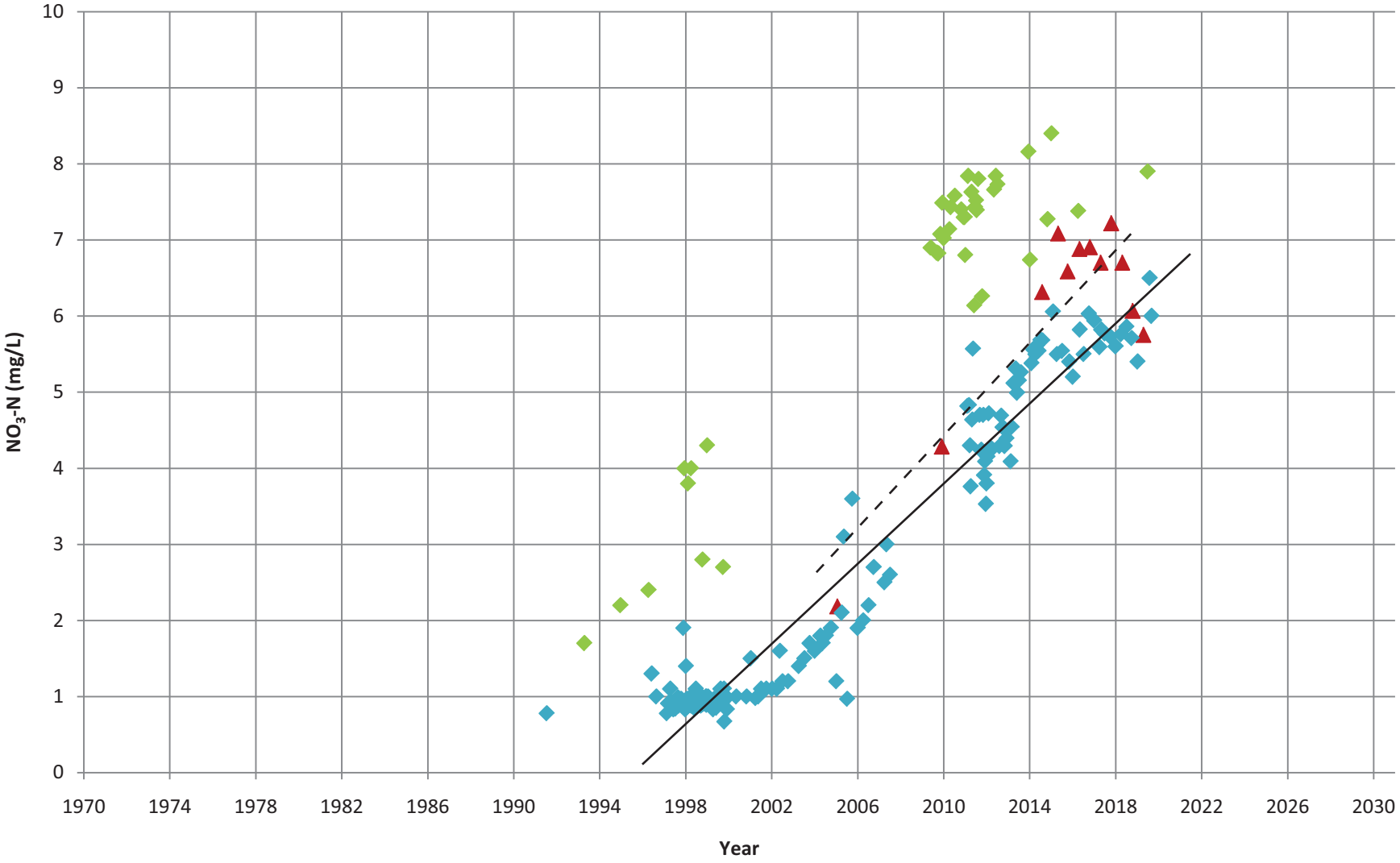
Nitrate-Nitrogen Concentration Trends
LA22 and 17E11



Explanation

▲ LA22 – – – – (linear regression trend line)

◆ 30S/11E-17E11 ——— (linear regression trend line)

◆ 30S/11E017E11 (wellbore leakage) - data excluded from linear regression trend lines

Figure 4
Nitrate-Nitrogen Concentrations
LA22 and 17E11
2019 Adaptive Management TM

Cleath-Harris Geologists

Table 1
Lower Aquifer NO_3-N Concentration Trends

Program ID	Name/Location	Basin Area	Aquifer Zone		NO_3-N trend	
			Zone D	Zone E	Direction	Rate (mg/L per year)
LA8	S&T Mutual #5	Western	x		increasing	0.12
LA9	GSWC Cabrillo	Western	x		increasing	0.14
LA10	GSWC Rosina	Western	x	x	increasing	0.025
LA11	Morro Bay Observation #5	Central		x	flat (no nitrate)	none
LA12	LOCSD 8th St. Lower	Central	x		flat (no nitrate)	none
LA15	LOCSD Palisades	Western	x		increasing	0.025
LA18	10th St. Observation East	Central		x	flat (no nitrate)	none
LA22	So. Bay Blvd Observation #2	Central	x		increasing	0.3
17E11*	LOCSD South Bay Lower	Central	x		increasing	0.26

*not a Program Well – ID taken from State Well Number 30S/11E-17E11

LA8 and LA9

LA8 is a Zone D supply well located in the Western Area (Figure 1). Nitrate-nitrogen (NO_3-N) concentrations have increased at an average rate of approximately 0.12 mg/L per year since 2004, and measured 7.2 mg/L in April 2019 (Figure 2). Projected average NO_3-N concentrations at LA8 would exceed the primary Maximum Contaminant level (MCL) in drinking water of 10 mg/L in approximately 20 years. Fluctuations from the average may result in exceeding the nitrate MCL much sooner, however.

LA9 is a Zone D supply well located in the Western Area (Figure 1). NO_3-N concentrations have increased at an average rate of approximately 0.14 mg/L per year since 1974, and measured 5.7 mg/L in April 2019 (Figure 2). Projected average NO_3-N concentrations at LA9 would exceed the primary MCL in drinking water of 10 mg/L in approximately 30 years, although fluctuations may result in exceeding the nitrate MCL much sooner. Data points at LA9 that are interpreted to be elevated due to wellbore leakage (short-term fluctuations of 2-3 mg/L) are shown in Figure 2 and excluded from the trend line.

LA9 and LA8 have similar NO_3-N concentration trends. These wells are hydraulically downgradient of Cabrillo Estates, a residential subdivision with septic systems (sources of nitrogen loading to groundwater). The short-term fluctuations in NO3-N concentrations at the wells, particularly LA9, are likely due to localized Upper Aquifer influence from wellbore leakage. The long-term nitrate trends, however, are attributable to broader Upper Aquifer leakage through the regional aquitard.

LA10 and LA15

LA10 is a Zone D/E supply well located in the Western Area (Figure 1) and was the subject of a wellbore leakage evaluation in 2018 (Appendix J of 2018 Annual Report). NO_3-N concentrations interpreted to be associated with Upper Aquifer water moving through the regional aquitard (as opposed to wellbore leakage) have increased at an average rate of approximately 0.025 mg/L per year since 1980 (Figure 3). A concentration of 1.9 mg/L NO_3-N was reported in April 2019. Lower Aquifer NO_3-N concentrations at LA10 are not expected to exceed the primary MCL.

LA15 is a Zone D supply well located in the Western Area (Figure 1). The NO_3-N concentration in groundwater produced by the well has been increasing at an average rate of 0.025 mg/l per year since 1985, and was reported at 3.7 mg/L in April 2019 (Figure 3). Lower Aquifer NO_3-N concentrations at LA10 are not expected to exceed the primary MCL.

LA10 and LA15 have similar NO_3-N concentration trends. Short-term fluctuations in NO_3-N concentrations at LA10 due to localized Upper Aquifer influence from wellbore leakage has been previously reported.[7] Evidence of wellbore leakage has also been reported at LA15, including 5 mg/L NO_3-N with 41 mg/L chloride in Spring 2015 after the well had been out-of-service for a few months.[8] The long-term nitrate trends shown in Figure 3 exclude elevated nitrate results due to wellbore leakage.

LA11, LA12, and LA18

LA11 is a Zone E monitoring well located in the Central Area (Pasadena Drive) and is also being evaluated herein for evidence of seawater intrusion. NO_3-N concentrations have generally been below detection levels in groundwater collected from LA11 since the well was constructed in 1970. No increasing trend in NO_3-N concentrations is present at this well.

LA12 is a Zone D community supply well located in the Central Area (LOCSD 8th Street Lower). NO_3-N concentrations have generally been below detection levels in groundwater collected from LA12 since the well was constructed in 1986. No increasing trend in NO_3-N concentrations is present at this well.

LA15 is a Zone E monitoring well located in the Central Area (10th Street at Los Olivos Avenue). NO_3-N concentrations have been below detection levels in groundwater collected from LA15 since water quality monitoring at the well started in 2005. No increasing trend in NO_3-N concentrations is present at this well.

[7] Appendix J of 2018 Annual Groundwater Monitoring Report for the Los Osos Groundwater Basin, June 2019.
[8] CHG, 2015, October 2015 Lower Aquifer Monitoring Technical Memorandum, Los Osos Groundwater Basin, December 28, 2015.

LA22 and 17E11

LA22 is a Zone D monitoring well located in the Central Area at the LOCSD South Bay yard. NO_3-N concentrations have increased at an average rate of approximately 0.3 mg/L per year since 2005, and measured 5.8 mg/L in April 2019 (Figure 4). Projected average NO_3-N concentrations at LA8 would exceed the primary MCL of 10 mg/L in approximately 8 years, although concentrations have steadily declined over the last two years from a high of 7.2 mg/L in October 2017 (Figure 4).

17E11 is a Zone D community supply well located adjacent to LA22 in the Central Area (Figure 1). NO_3-N concentrations have increased at an average rate of approximately 0.26 mg/L per year since the well was constructed in 1991, and measured 6 mg/L in August 2019 (Figure 2). Projected average NO_3-N concentrations at 17E11 would exceed the primary MCL in drinking water of 10 mg/L in approximately 14 years. Fluctuations from the average may result in exceeding the nitrate MCL sooner, however.

LA22 and 17E11 have similar NO_3-N concentration trends. The short-term fluctuations in NO_3-N concentrations of up to 3 mg/L at 17E11 are likely due to localized Upper Aquifer influence from wellbore leakage. The long-term nitrate trends, however, are attributable to broader Upper Aquifer leakage through the regional aquitard. A greater rate of NO_3-N increase in Lower Aquifer groundwater at the South Bay yard, compared to the other sites evaluated, is interpreted to be due to locally permeable sand zones within the regional aquitard. The upper screen interval for 17E11 taps fine sands which are interbedded with the regional aquitard clay, and there is less than 10 feet of separation between base of the Upper Aquifer and the top of the well screen.

Nitrate Trends Discussion

The monitoring data show trends of increasing nitrate concentrations at several Lower Aquifer wells ranging from 0.025 mg/L to 0.3 mg/L NO_3-N per year, while concentrations at other wells remain low to non-detected for nitrate. Overall increases in Lower Aquifer nitrate concentrations were expected, since the Upper Aquifer, which has elevated nitrate concentrations, provides a significant amount of recharge to the Lower Aquifer. Spatial differences in nitrate trends and nitrate concentrations are controlled by many factors, including nitrogen loading areas, recharge areas, dilution through dispersion, and subsurface porosity and permeability.

The location where monitoring data show Lower Aquifer nitrate concentrations having the greatest potential to exceed the drinking water standard is at well 17E11, a community supply well in the LOCSD South Bay yard (Figure 1). There is also an Upper Aquifer community supply well at the yard, along with an existing nitrate removal system. Results of solute transport modeling for nitrates in 2003 (Figure 23, Attachment B) indicted that without the Los Osos Wastewater Project, NO_3-N concentrations at 17E11 would increase by approximately 0.2 mg/L per year (actual increases have averaged 0.26 mg/L).

Two other Lower Aquifer supply wells where nitrate concentrations have the potential to exceed the drinking water standard are LA8 and LA9 in the Western Area (Figure 1). Neither of these locations have nitrate removal systems currently available. Solute transport modeling (Figure 23, Attachment B) indicted that NO_3-N concentrations would increase by 0.04 mg/L to 0.08 mg/L per year without the wastewater project, and by 0.08 mg/L to 0.17 mg/L per year with the wastewater project (actual increases have been 0.12 mg/L to 0.14 mg/L per year). The increased impact to NO_3-N concentrations in groundwater at LA8 and LA9 under wastewater project conditions was attributed in part to anticipated increases in pumping volumes and changes in local flow patterns, including a more westerly hydraulic gradient following the development of the Broderson groundwater mound.[9]

The LOBP does not specifically discuss a potential threat to water quality from increasing nitrate concentrations in Lower Aquifer groundwater. Mitigation with respect to the threat of elevated basin nitrate concentrations is focused on the Upper Aquifer, although the same mitigation could apply to the Lower Aquifer. LOBP infrastructure programs have addressed basin nitrate issues through blending, nitrate removal, and water system interties.

Based on the nitrate trends currently identified in Lower Aquifer groundwater, provisions for future nitrate removal at LA8, LA9, and 17E11 and/or blending with low-nitrate water from other wells through an interconnected community water system are recommended. To the extent that these provisions may not be included in the existing infrastructure programs, modifications to the LOBP would be appropriate. Long-term NO_3-N concentrations in Lower Aquifer groundwater are expected to equilibrate below 5 mg/L (less than half the drinking water standard), but will peak at higher concentrations in the above production wells before declining.

Seawater Intrusion at LA11

LA11 is a monitoring well located along the bay in the Central Area (Pasadena Drive) and is screened in Lower Aquifer Zone E (Figure 1). The well was constructed in October 1970, reportedly flowing under artesian conditions in November and December 1970 with pressure heads of about 10 feet above sea level.[10] By comparison the groundwater elevation was measured at 3.1 feet above sea level in Spring 2019. LA11 is of particular interest because it serves as a sentry well for community supply well LA12, which taps zone D at the LOCSD 8th Street yard in Baywood Park.

[9] Yates and Williams, 2003, Simulated Effects of a Proposed Sewer project on Nitrate Concentrations in the Los Osos Valley Groundwater Basin.
[10] Department of Water Resources, 1972, Sea Water Intrusion: Morro Bay Area, San Luis Obispo County, February 1972.

Aquifer Zone E

The Lower Aquifer has been divided into two zones based on a relatively continuous clay bed (AT3 Clay) which parallels the regional aquitard, but at greater depth. Zone E is thicker than Zone D in the Western and Central Areas, and includes sands and gravels of the Paso Robles Formation underlain by Careaga Formation marine sands with sea shells.

Due to the greater density of seawater compared to freshwater, the difference in pressure between seawater and freshwater increases with basin depth. As a result, seawater intrusion into the deeper Zone E is more extensive than into Zone D, both in area and concentration. Zone E monitoring well LA4, located on Sea Pines Golf Course at the west end of Howard Avenue, has produced seawater since construction in 1985.[11] The farthest inland extent of seawater intrusion in the basin was observed at LA15 (Palisades Avenue), where Zone E chloride concentrations reached 1,910 mg/L in November 2012.[12] By comparison, chloride concentrations in Zone D at LA15 measured 85 mg/L following well modification in April 2013[13], and measured 102 mg/L in April 2019.

There are four monitoring wells specific to Zone E west of Los Osos Creek. LA4, mentioned above, is surveyed with downhole geophysics every three years to measure vertical changes in the seawater intrusion front.[14] Well LA21, located at the LOCSD South Bay yard, has unique water quality characteristics (elevated pH with carbonate alkalinity) and is not currently used for seawater intrusion monitoring.[15]

The two remaining Zone E monitoring wells, LA11 and LA18, are strategically positioned and monitored for seawater intrusion. LA18 (LOCSD 10th Street yard) is between water supply well LA15 (Palisades Avenue) and supply well LA20 to the east. Water quality at LA18 has been stable historically and has not shown evidence of seawater intrusion. LA11 (Pasadena Drive) is located on the bay, northwest of water supply well LA12. Seawater intrusion in Zone E is moving toward LA11, and is the focus of this adaptive management review.

Chloride Concentrations and Ion Ratios

Chloride concentration trends and ion concentration ratios are useful for interpreting seawater intrusion trends. Sodium and chloride are the main dissolved constituents in seawater. Sodium is a cation (positively charged ion) which interacts with the soil matrix through ion exchange, while chloride is an anion (negatively charged ion) and does not interact with the soil matrix.

[11] Yates and Wiese, 1988, Hydrogeology and Water Resources of the Los Osos Valley Ground-Water Basin. U.S.G.S. Water Resources Investigations Reoprt 88-4081.
[12] CHG, 2013, Palisades well chloride source testing and mitigation plan, Technical Memorandum, January 11, 2013.
[13] CHG, Palisades Well Modification, Technical Memorandum, June 18, 2013.
[14] CHG, 2018 Annual Groundwater Monitoring Report, June 2019.
[15] CHG, 2014 Seawater Intrusion Monitoring, Los Osos Valley Groundwater Basin, TM dated October 7, 2014.

Increasing chloride concentration is a simple indicator of seawater intrusion, but may also result from other sources of chloride (such as water softener and wastewater discharges).

The sodium-to-chloride ion ratio can be diagnostic of active seawater intrusion when the ion ratio drops below that of seawater (0.86 molar) due to ion exchange activity. Other major cations (calcium and magnesium) that are present in Basin fresh water have a greater valence and associated electrical charge than the sodium cations, and are preferentially sorbed to the ion exchange sites in the soil matrix (such as clay surfaces) prior to intrusion. The high concentration of sodium in seawater (compared to other cations) however, increases the sodium exchange potential, resulting in significant sodium ion replacement for calcium and magnesium ions in the soil matrix.[16]

Figure 5 shows the chloride concentration trends for LA11 and LA12. Sodium-to-chloride ion ratio trends for the wells are shown in Figure 6. Both LA11 and LA12 are shown because intrusion at LA11 represents a potential threat to supply well LA12.

The chloride concentration trend at community supply well LA12 (Zone D) has been increasing at approximately 1.8 mg/L per year since the well was constructed in 1986. By comparison, the chloride concentration at monitoring well LA11 (Zone E) was stable between 1970 and 2009, but has been increasing at 16.7 mg/L per year since then (Figure 5). The sodium-to-chloride ion ratio shows a decreasing trend at LA12 with stabilization close to 0.86 beginning in 2009, while the LA11 ratio is relatively stable through 2005, decreasing sharply to a low of 0.72 in October 2016 and 0.67 in April 2019 (Figure 6).

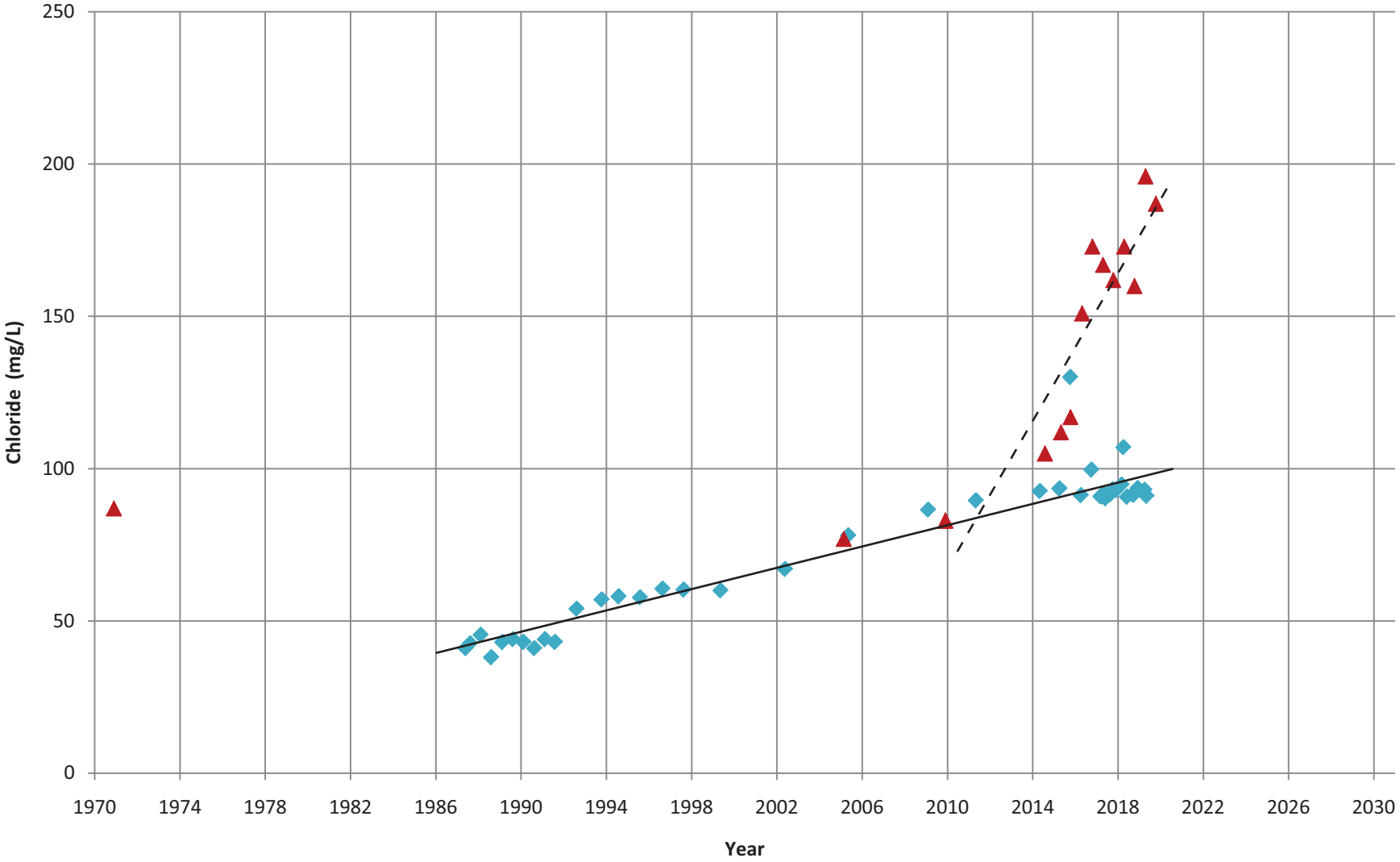
The data indicate that precursors to seawater intrusion in Zone D have been developing at LA12 in Baywood Park since 1986, although there appears to be stabilization in the ion ratios beginning in 2009. Overall chloride concentrations at LA12 are generally below 100 mg/L, and the increasing trend, at 1.8 mg/L per year, is not an imminent threat to water quality. The recommended secondary standard for chloride in drinking water is 250 mg/L.

Data at LA11, however, indicates that Zone E is experiencing active intrusion toward the well, with sodium-to-chloride molar ratios below the seawater value, and chloride approaching 200 mg/L. Seawater intrusion in Zone E has the capability to move beneath LA12, and to impact the well through upconing (rising into Zone D during pumping).

[16] Cleath & Associates, 2005, Sea Water Intrusion Assessment and Lower Aquifer Source Investigation of the Los Osos Valley Groundwater Basin, October 2005, *after* Bear, J., Cheng, A.H.-D., Sorek, S., Ouazar, D., and Herrera, I., editors, 1999, Seawater Intrusion in Coastal Aquifers – Concepts, Methods, and Practices, Kluwer Academic Publishers, Norwell MA, 625 p.

DRAFT

Chloride Concentration Trends
LA11 and LA12



Explanation

▲ LA11 – – – – (linear regression trend line)

◆ LA12 ——— (linear regression trend line)

Figure 5
Chloride Conecentrations
LA11 and LA12
2019 Adaptive Management TM

Cleath-Harris Geologists

DRAFT

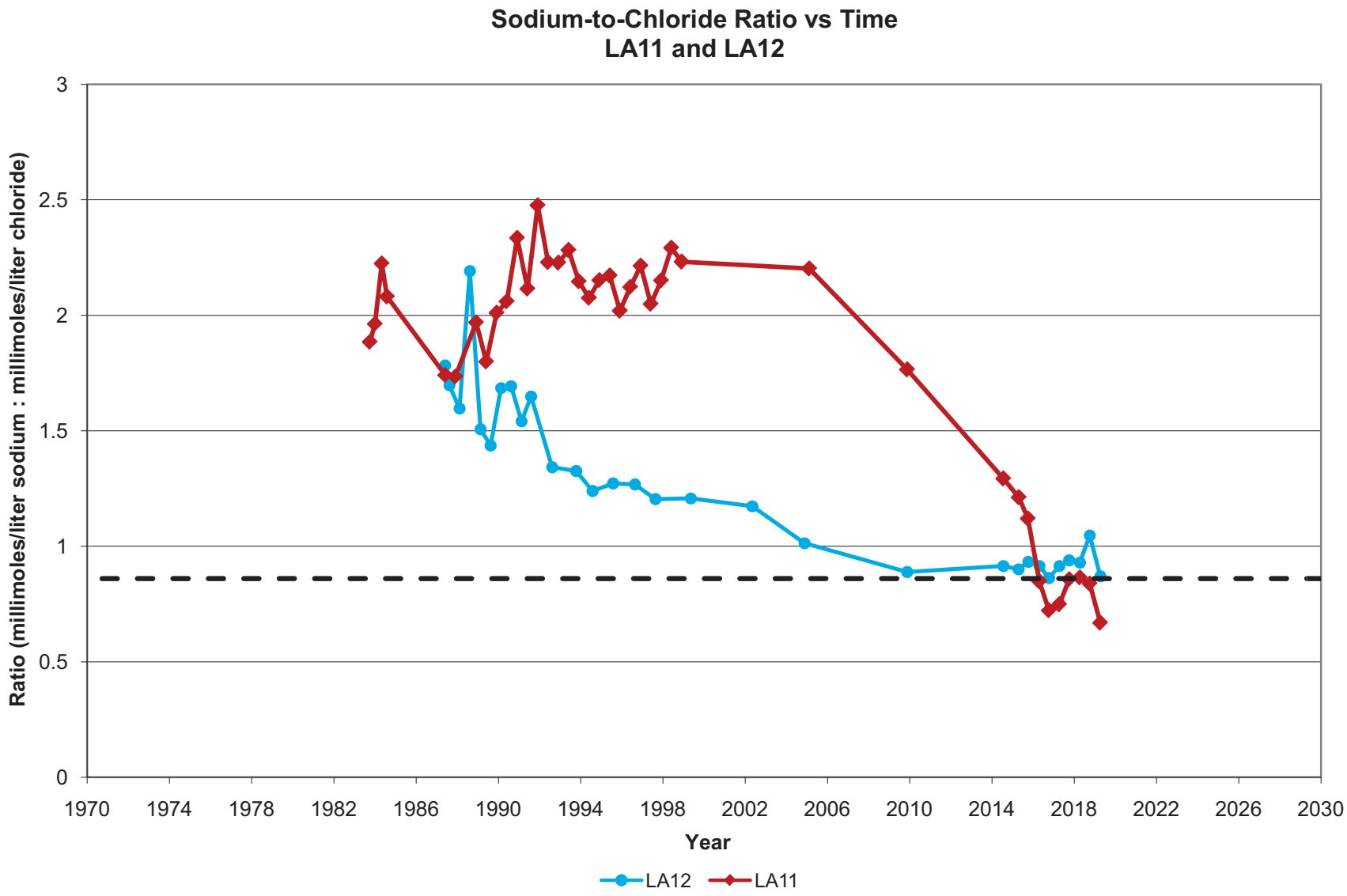


Figure 6
Sodium-to-Chloride Ion Ratios
LA11 and LA12
2019 Adaptive Management TM

Cleath-Harris Geologists

Basin Model Scenarios

The Basin Model allows a comparison between long-term (steady-state) conditions for various infrastructure programs and pumping distributions in the basin. The 2018 adaptive management analysis for LOBP infrastructure Program C included a 2017 sustainable yield scenario and a 2017 pumping distribution scenario.[17] Results of these scenarios indicated that a maximum sustainable yield of 2,760 acre-feet per year (afy) had been developed, and that the level of basin water demand (2,070 afy in 2017) was sustainable without any additional expansion wells.

Seawater intrusion in Zone E at monitoring well LA11 would be expected and is predicted by the Model for the 2017 sustainable yield scenario, which is at Basin Yield Metric (BYM) 100. By definition, BYM 100 scenarios are optimized so that no pumping well exceeds 250 mg/L chloride.[18] Since there are no pumping wells between LA11 and the coast, chloride concentrations at LA11 will exceed 250 mg/L under BYM 100 pumping. For the 2017 sustainable yield scenario, the chloride concentration in Zone E at LA11 stabilizes at approximately 4,200 mg/L, which is over ten times the recommended drinking water standard, whereas the chloride concentration in community supply Zone D at LA12 to the east stabilizes at 250 mg/L.

BYM 100 scenarios, however, are not used for planning future basin conditions in the LOBP. BYM 80 is the maximum level of pumping allowed under the LOBP, and the Basin Model predicts that the seawater front under BYM 80 conditions will retreat toward the coast before stabilizing. Under the 2017 pumping distribution, which is equivalent to BYM 75, chloride concentrations in Zone E at LA11 stabilize in the Basin Model at 50 mg/L.

The sustainability of the 2017 infrastructure and pumping distribution depends in large part on discharges to the Broderson community leachfield, which over time will create a groundwater mound to push water through the regional aquitard and into the Lower Aquifer. Basin Model scenarios operate under steady-state flow conditions, where the Broderson site has a fully developed mound, even though the mound will take several years to develop. Therefore, the trend of increasing chloride at LA11 reflects the current condition, which has not reached steady-state. Without Broderson operating, chloride concentrations at LA11 under the 2017 BYM 75 scenario stabilize at 2,800 mg/L in the Basin Model.

Seawater Intrusion Discussion

The seawater intrusion front, based on contouring the 250 mg/L chloride isopleth between Lower Aquifer wells in the Western and Central Areas, has retreated toward the coast in both 2017 and 2018.[19] However, as noted in the 2018 Annual Report, contours are a simplification of Basin

[17] CHG, Los Osos Basin Plan Metric Trends Review and Infrastructure Program C Evaluation, TM dated February 28, 2019.
[18] 2015 Los Osos Bain Plan Update
[19] CHG, 2018, Annual Groundwater Monitoring Report for the Los Osos Valley Groundwater Basin, June 2019.

conditions, and the calculated position of the intrusion front can vary significantly from year to year, and from Spring to Fall due to localized chloride fluctuations, particularly at Well LA10. Continued advance of seawater in Zone E toward LA11 is a reminder that the basin is still recovering from the effects of decades of overdraft, and the groundwater mound beneath the Broderson site is still years away from becoming fully functional as a means of mitigating seawater intrusion in the Lower Aquifer.

Upper Aquifer water levels at monitoring well FW6 (adjacent to the Broderson site) are rising at approximately 5.5 feet per year. The Basin model projects steady-state equilibrium in the Upper Aquifer will be reached at groundwater elevations that are approximately 30-40 feet higher than present under the Broderson site, which would be reached in 5-7 years. Until a known rate of increase in the Lower Aquifer attributable to Broderson mounding is measured, the timing of recovery will be uncertain. The Lower Aquifer water level metric is currently rising at approximately 0.4 feet per year, which projects basin water level metric recovery (to the target level of 8 feet above sea level) by 2033.[20] Lower Aquifer water levels are expected to begin rising at a faster rate once the influence of the Broderson groundwater mound takes effect.

One adaptive management action that would help provide early detection of Broderson influence on Lower Aquifer water levels would be to expand the pressure transducer network, both in the Upper Aquifer and the Lower Aquifer downgradient of the Broderson site. Now that the transducer at UA6 has confirmed groundwater is mounding on the regional aquitard, further characterize of mound development is recommended.

A second adaptive management action would be to construct a fully transient Basin Model, which would simulate variable density flow (seawater intrusion) with both seasonal and long-term basin flow conditions. This action would allow the Basin Model to provide better input on the timing of Basin recovery. In addition, an upgraded Basin Model could be used for nitrate solute transport simulations, which would be useful for projecting nitrate trends. The LOBP includes consideration for upgrading the Basin Model, particularly if grant funding becomes available from the state or federal governments.

The above adaptive management actions involve monitoring and interpretation, but do not change the actual Basin condition. A third action that would improve the Basin condition with respect to seawater intrusion mitigation would be to complete LOBP infrastructure Program B. Program B involves drilling new Upper Aquifer wells to allow further reductions in Lower Aquifer pumping. The greatest expense for Program B is a centralized treatment plant for nitrate removal. Implementing Program B may also be used to address the increasing nitrate trends at Lower Aquifer wells.

[20] CHG, 2018, Los Osos Basin Plan Trends Review and Infrastructure Program C Evaluation, February 28, 2019.

Conclusions and Recommendations

The following conclusions were reached during the Lower Aquifer nitrate trend review and LA11 seawater intrusion evaluation:

- Trends of increasing nitrate concentrations at several Lower Aquifer wells range from 0.025 mg/L to 0.3 mg/L NO_3-N per year, while concentrations at other wells remain low to non-detected for nitrate.

- Nitrate concentrations at three Lower Aquifer community supply wells (LA8, LA9, and 17E11) are projected to exceed the State drinking water standard in the future based on current trends. Long-term NO_3-N concentrations in Lower Aquifer groundwater are expected to equilibrate below 5 mg/L (less than half the drinking water standard), but will peak at higher concentrations in the above production wells before declining.

- Lower Aquifer Zone E is experiencing active seawater intrusion toward well LA11, with chloride concentrations approaching 200 mg/L and increasing by close to 17 mg/L per year. Seawater intrusion moving past LA11 in Zone E has the potential to continue southeast and adversely impact Zone D community supply well LA12.

- Seawater intrusion mitigation depends in large part on discharges to the Broderson community leachfield, which over time will create a groundwater mound to push water through the regional aquitard and into the Lower Aquifer. The Basin Model indicates that when fully developed, the Broderson groundwater mound will reverse seawater intrusion at LA11 and throughout the Western Area. Based on water level trends at monitoring well FW6, the mound will take several more years to develop in the Upper Aquifer, and longer in the Lower Aquifer. The trend of increasing chloride at LA11 reflects the current condition.

The following adaptive management recommendations are based on the above conclusions:

- Provisions for future nitrate removal at LA8, LA9, and 17E11, and/or blending with low-nitrate water from other wells through an interconnected community water system are recommended. To the extent that these provisions may not be included in the existing infrastructure programs, modifications to the LOBP would be appropriate.

- Expansion of the pressure transducer network is recommended to allow better characterization of the groundwater mound developing beneath the Broderson site and early detection of its anticipated influence on Lower Aquifer water levels.

- Consider initiating existing LOBP actions related to upgrading the Basin Model and completing infrastructure Program B.

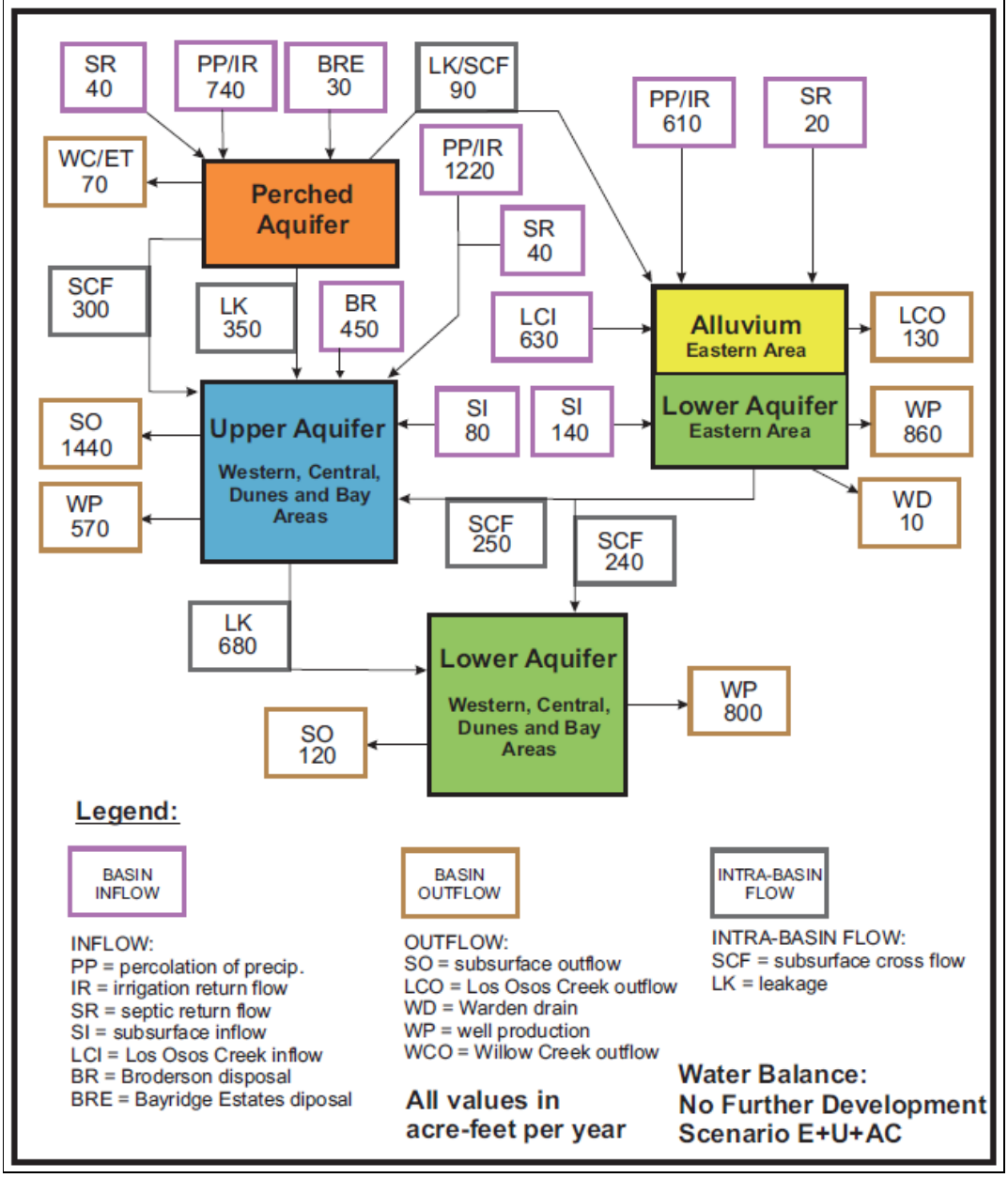
ATTACHMENTS

ATTACHMENT A:

Figure 74

Source:
2015 Los Osos Groundwater Basin Plan Update

Figure 74. Water Balance: No Further Development



Source: 2015 Los Osos Basin Plan Update

ATTACHMENT B

Figure 23

Source:
Yates, G., and Williams, D, 2003, Simulated Effects of a Proposed Sewer Project on Nitrate Concentrations in the Los Osos Valley Groundwater Basin

Figure E11 and Figure E15

Source:
2018 Salt/Nutrient Management Plan for the Los Osos Groundwater Basin

Source: 2003, Simulated Effects of a proposed Sewer Project on Nitrate Concentrations in the Los Osos Valley Groundwater Basin

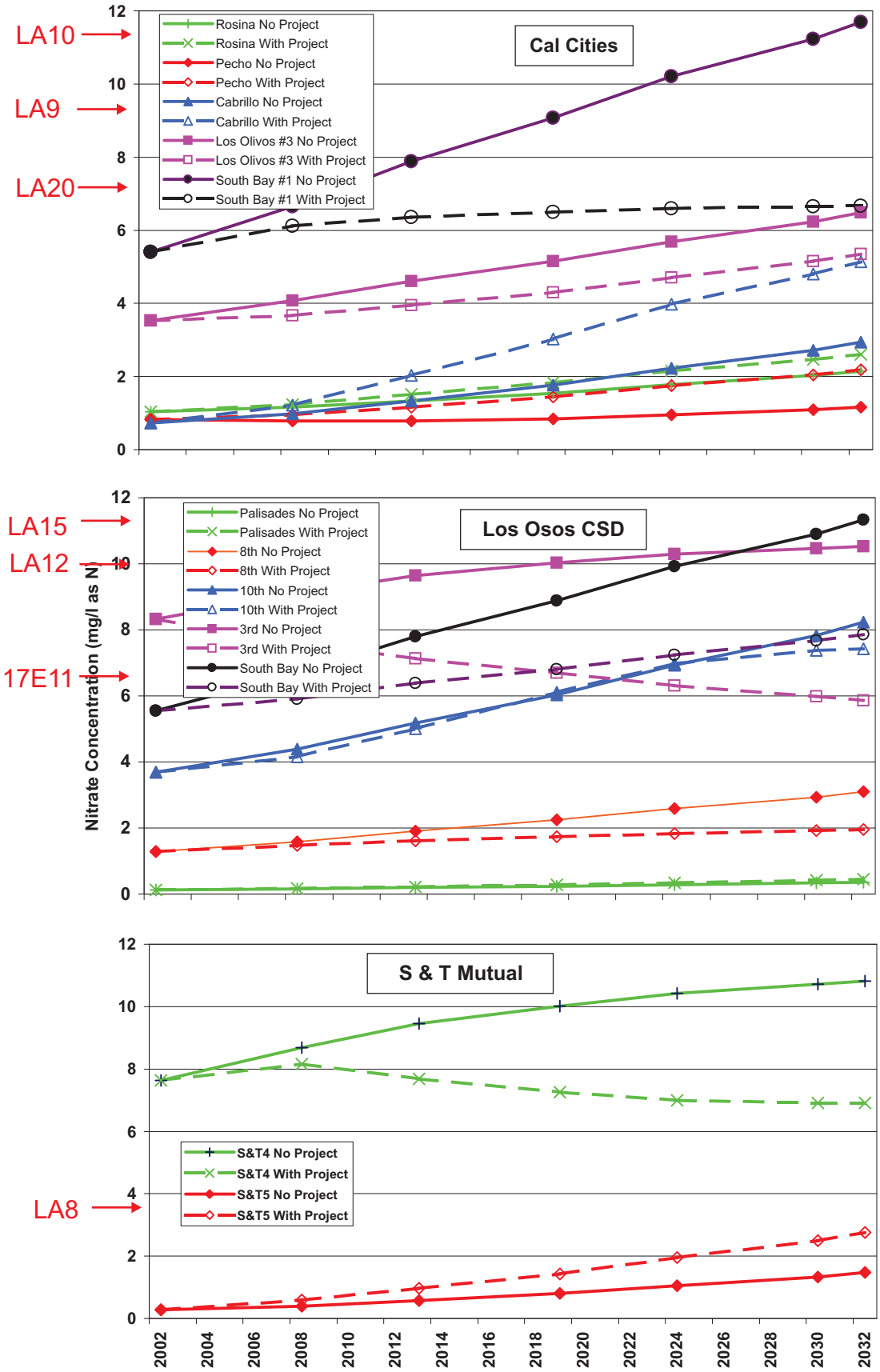
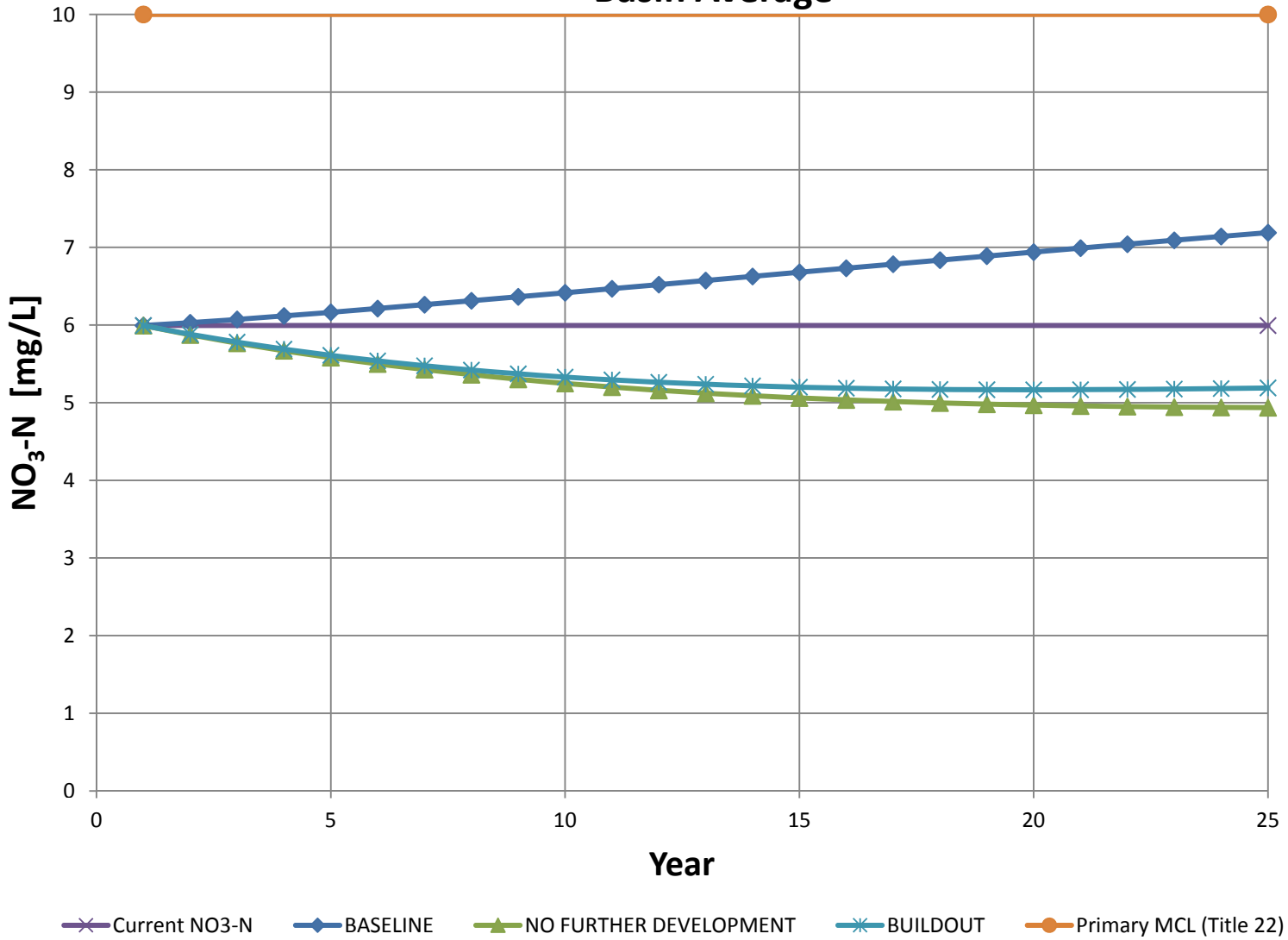


Figure 23. Chemographs of Simulated Nitrate Concentrations in Municipal Wells during 2003-2032, with and without Proposed Sewer Project

LOBP Program IDs added by CHG for 2019 Adaptive Management TM

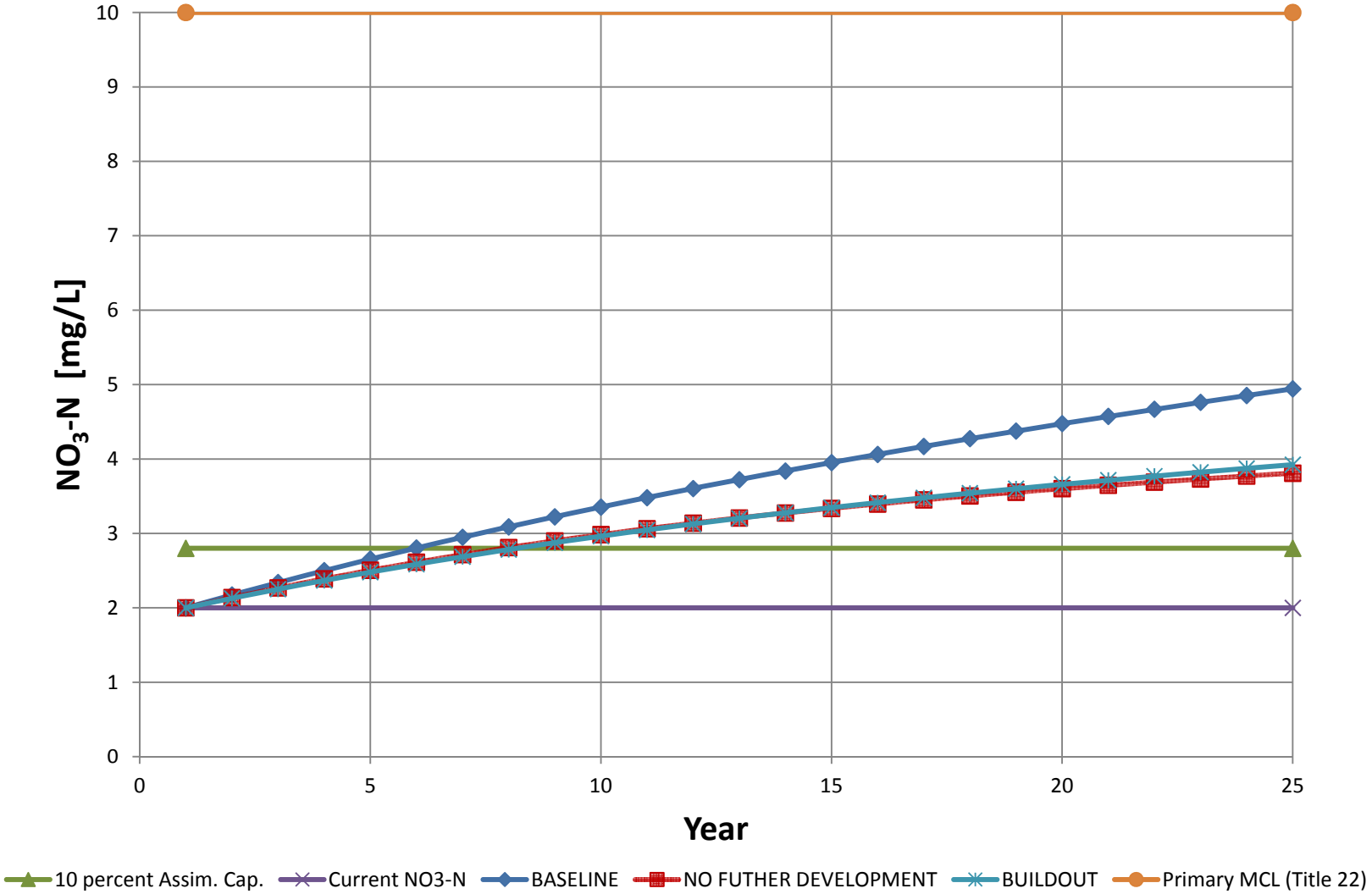
Source: 2018 Salt/Nutrient Management Plan for the Los Osos Groundwater Basin

Figure E11
NO_3-N Concentration Trends
Basin Average



Source: 2018 Salt/Nutrient Management Plan for the Los Osos Groundwater Basin

Figure E15
NO_3-N Concentration Trends
Western and Central Area Lower Aquifer



TO: **Los Osos Basin Management Committee**

FROM: **Rob Miller, Interim Executive Director**

DATE: **December 18, 2019**

SUBJECT: **Item 7d – Discussion of 2020 Priorities and Budget**

Recommendation
Receive report and provide input to staff for future action.

Discussion
The BMC has historically adopted a calendar year budget each year, with the presentation of a draft budget in January. In preparation for 2020, staff has assembled a list of potential priorities as shown in the attached draft budget table. Prior to the January 2020 meeting, BMC directors and agency/company staff are encouraged to provide input to BMC staff for incorporation into the detailed budget discussion.

The budget recommendations are similar to calendar year 2019, with the addition of a recommended allocation for funding and organizational analysis, which will be important to advance the implementation of Program B, Creek Discharge, and other partially funded infrastructure projects. In addition, the administrative budget has been adjusted to $70,000 to accommodate the services provided by the new Executive Director, Dan Heimel/WSC. Staff will provide a brief overview at the meeting.

Table 1: DRAFT BMC 2020 Budget for 12 month period, allocated by fiscal year					
Item	Description	Cost	Projected Total in LOCSD FY 2019/20	Projected Total in LOCSD FY 2020/21	Comments
1	Monthly meeting administration, including preparation, staff notes, and attendance	$70,000	$35,000	$35,000	Assumes 25 hours per month, on average
2	Meeting expenses - facility rent (if SBCC needed for larger venue)	$1,500	$750	$750	$30/hr for non-profit
3	Meeting expenses - audio and video services	$6,000	$3,000	$3,000	
4	Adaptive Management Studies	$15,000	$7,500	$7,500	Analysis of new monitoring well data, Program D deferral, other studies
5	Semi annual seawater intrusion monitoring	$30,000	$15,000	$15,000	
6	2019 Annual Report	$34,000	$28,000	$6,000	Not including services contributed directly from BMC member staff
7	Recycled water planning grant	$5,000	$2,500	$2,500	BMC member staff may also contribute to grant efforts
8	Creek Recharge and Replenishment Studies	$50,000	$40,000	$10,000	Carried over from 2019
9	Stormwater and Perched Water Recovery Project - Feasibility Study	$15,000	$7,500	$7,500	Draft proposal to be considered in January 2020
10	Funding and organizational studies	$40,000	$20,000	$20,000	AB 1600, Program B, JPA
	Subtotal	$266,500			
	5% Contingency (rounded to nearest $100)	$13,300	$8,300	$5,000	
	Total	**$279,800**	**$167,550**	**$112,250**	
	LOCSD (38%)	$106,324	**$63,669**	**$42,655**	
	GSWC (38%)	$106,324			
	County of SLO (20%)	$55,960	$33,510	$22,450	
	S&T Mutual (4%)	$11,192			