

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 **Board Meeting** at **1:30 P.M.** on **Wednesday, September 20, 2017** at the South Bay Community Center, 2180 Palisades Ave, Los Osos, CA, 93402.

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 However, any Director may request that any item be withdrawn from the Consent Agenda and moved to the "Action Items" portion of the Agenda to permit discussion or to change the recommended course of action.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 July 19, 2017 Meeting**
- b. **Approval of Warrants, Budget Update and Invoice Register through August 2017**

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. **Water Conservation Program Update**

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

- c. **Award of Contract to Cleath Harris Geologists for the Design of Cuesta by the Sea Lower Aquifer Monitoring Well**

Recommendation: Award contract for the design of the proposed lower aquifer monitoring well.

d. Creek Discharge Plan Technical Memo

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.

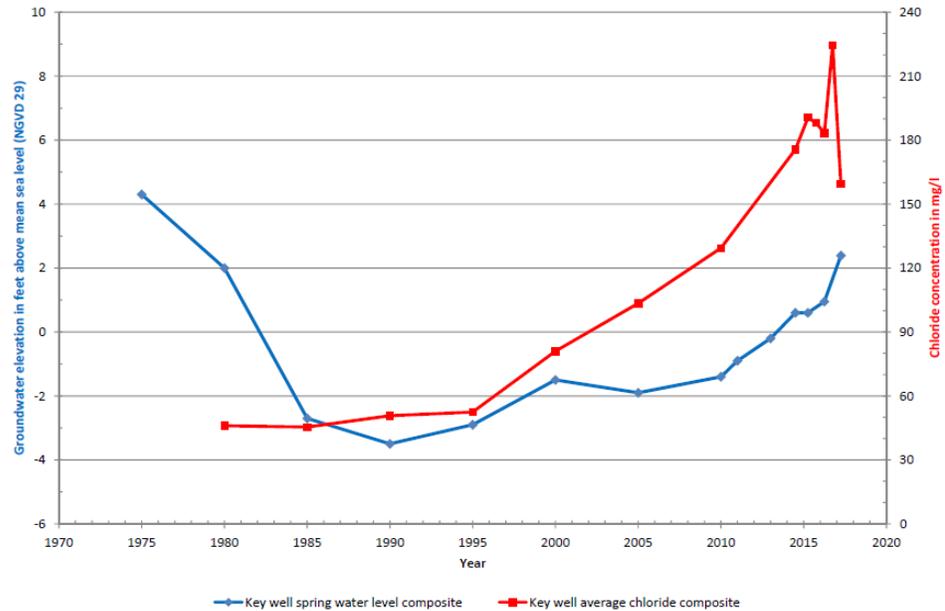
9. ADJOURNMENT

BASIN MANAGEMENT COMMITTEE BOARD OF DIRECTORS

Agenda Item 5a: Minutes of the Meeting of July 19th, 2017

Agenda Item	Discussion or Action
<p>1. CALL TO ORDER</p> <p>2. PLEDGE OF ALLIGANCE</p> <p>3. ROLL CALL</p>	<p>Director Ochylski serving as chair called the meeting to order at 1:35pm and led the Pledge of Allegiance.</p> <p>Mr. Miller, acting Clerk, called roll to begin the meeting. Director Zimmer, Director Garfinkel, Director Alternative Hutchinson, and Chairperson Ochylski, were all present.</p>
<p>4. Board Member Comments</p>	<p>No Comments.</p>
<p>5a. Minutes of the Meeting of May 17th, & June 21st, 2017</p> <p>5b. Approval of Budget update and Invoice Register through June 30,2017</p>	<p>Director Alternative Hutchinson: I was only present for one of the meetings.</p> <p>Director Garfinkel: Under 5b the attachment 1 chart, on line 5, it says 40.3% and the math is wrong.</p> <p>Mr. Miller: You're right, we will get that corrected.</p> <p>Committee Accepted Items 5a and 5b. <u>Public Comment</u> No public comment on consent agenda.</p> <p>Director Zimmer: Motion to approve consent agenda as amended. Director Garfinkel: Second, consent agenda.</p> <p>Ayes: Unanimous Nays: None Abstain: None Absent: None</p>
<p>6. Executive Director's Report</p>	<p>Executive Director, Rob Miller, provided a verbal overview of the written content of the Executive Director's report.</p>

Chloride and Water Level Metric Lower Aquifer



Questions from the Board

Director Garfinkel: I have a question on the letter that you sent to the Coastal Commission. The final portion that was the BMC recommendations, “further development should not occur until some of the metrics have been met...” and that is now removed.

Mr. Miller: We had gone through several iterations, but the version that has been published is the one we ended up agreeing to.

Director Garfinkel: It makes no reference to meeting the metrics.

Mr. Miller: There is general language there but they took out some of that specific language.

Director Ochylski: My recollection was that there was language prior to that in the letter that addressed the issue, Supervisor Gibson was the driver behind that language.

Mr. Miller: If you (Director Garfinkel) have something specific you want to email me, we can bring it back, but the version that’s posted is the one that we agreed on.

Director Alternative Hutchinson: Regarding the significant slowing of connections, it’s important to point out, so people are aware, we have scheduled a meeting with the Board on August 15th. The meeting will be on how to move forward with encouraging those who are now out of compliance with County Code, to get those lateral connections in place.

Director Ochylski: I would like to point out that the date on the front page should be July 19th not July 14th.

Public Comment

Ms. Owen: Why would we see such a rise in the water level and a drop in the chlorides? Is there any update on how the sewer is working? When will Broderson begin sharing that

water with places that are more needed?

Mr. Best: What is the condition of the water that is going to Broderson? Does it meet the irrigation requirements and what residential/commercial uses will be allowed? Also, what fees will be charged for that water and who will be collecting and using those fees?

Response from the BMC

Mr. Miller: In response to Ms. Owen on the graph, the last 3 extreme data points reflect the chlorides from seawater intrusion. These wells are right on the boundary and the Rosina well is weighted at a factor of two. The blue line or water level is a modest increase. Don't be surprised if those chlorides jump back up in the fall with less rain fall and perhaps less conservation due to media indicating we may be out of the drought. Concerning the operation of the County system, I can speak to the quality of the effluent, and it's still good. I have seen some crews out on the collection system. I'm not sure if that is maintenance or repair though.

Director Alternative Hutchinson: I'm not aware that there's any major maintenance or repairs on the collection systems. We've been doing a lot of work on the pocket pump stations at the end of the number streets to make those work more efficiently and to make sure that we don't get rainwater inflow into the system. Regarding the sales of the water, we are in discussion with customers, the three water purveyors in town, the golf course, as well as some farmers. The County is not in a position to deliver water to other water company's customers, that is a violation of state law. So, we will deliver the water to one of the three water purveyors. They will in turn have recycled water customers. Any money derived from the sale of recycled water benefits the waste water project, and it stays in that project. The only case that money would go out of the fund is to repay loans from the County General Fund which seeded the initial operating costs of that system.

Mr. Miller: When I worked on the CSD's rate analysis for the sale of that recycled water, we were expecting a nominal discount to the schools. The condition of the water meets all the definitions within Title 22 for a tertiary disinfected recycled water. The water can be used for turf irrigation at schools, and for commercial properties but residential uses are very limited in the state right now.

Director Ochylski: Just want to clarify that state law precludes this water from being used at single family residences unless there's an HOA. We have no control over that restriction.

7a. Update on Status of Basin Plan Infrastructure Projects

Mr. Miller: Gave Brief overview and updates on projects under Programs A & C.

Project Name	Parties Involved	Funding Status	Capital Cost	Status
Program A				
Water Systems Interconnection	LOCSD/GSWC	Fully Funded	Construction Value: \$103,550	Project completed February 2017, with final approval in March 2017
Upper Aquifer Well (8 th Street)	LOCSD	Fully Funded	\$250,000	Well was drilled and cased in December 2016. Budget remaining \$250,000 to equip the well. Design RFP was issued in April, and a consultant was retained in June 2017. Project to be completed by June 2018 or earlier if possible.
South Bay Well Nitrate Removal	LOCSD			Completed
Palisades Well Modifications	LOCSD			Completed
Blending Project (Skyline Well)	GSWC	Fully Funded	Previously funded through rate case	Blending of Skyline Well and Rosina Well Project was completed. Project required modifications to include a new nitrate removal unit. Permits and equipment secured. Delivery of the treatment unit has occurred, and start-up is anticipated in August 2017.
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	First phase combined with GSWC Program A	GSWC's Program A Blending Project allows for incremental expansion of the nitrate facility and can be considered a first phase in Program B.
Program C				
Expansion Well No. 1 (Los Olivos)	GSWC	Fully Funded	Previously funded through rate case	Well is now fully operational as of the end of June 2017.

Project Name	Parties Involved	Funding Status	Capital Cost	Status
Expansion Well No. 2	GSWC/LOCSD	Cooperative Funding	BMP: \$2.0 mil	Property acquisition phase is on-going through efforts of LOCSD. Two sites are currently being reviewed, and both appear to be viable for new east side lower aquifer wells, Environmental studies initiated in December 2016 for expansion well #2.
Expansion Well 3 and LOVR Water Main Upgrade	GSWC/LOCSD	Cooperative Funding	BMP: \$1.6 mil	Property acquisition phase is on-going through efforts of LOCSD. Two sites are currently being reviewed, and both appear to be viable for new east side lower aquifer wells.
LOVR Water Main Upgrade	GSWC	Pending Funding Vote	BMP: \$1.53 mil	Project not initiated
S&T/GSWC Interconnection	S&T/GSWC	Pending	BMP: \$30,000	Conceptual design
Program M				
New Zone D/E lower aquifer monitoring well in Cuesta by the Sea	All Parties	Not funded	\$100,000	Pending funding plan – See agenda item 7c

Response from the BMC

Director Garfinkel: Regarding the implemented CSD rate increase, is that for all the projects or just certain projects?

Mr. Miller: Our portion of all the projects.

Director Garfinkel: I thought we were up around \$11 Million?

Mr. Miller: It's the Programs A & C that are the projects that we fully budgeted for within the CSD's capital program. That doesn't mean we have all the cash, but that we're targeting net revenues sufficient to accomplish those projects either by pay as you go or debt service.

Director Zimmer: I think it's really fortunate for the community to be moving along on these projects, it's a big effort on both of the water purveyors to properly fund and

	<p>prepare and make these investments in the community. On the LOVR main upgrade it says pending funding vote. Should we change that status since we may be removing some of the funding for that vote?</p> <p>That water main, when we first modeled and conceptualized it, the flows were greater. If we do revisit it, it could be deferred to program D, or otherwise re-scoped.</p> <p><u>Public Comment</u></p> <p>No public comment.</p> <p><u>Response from the BMC</u></p> <p>None.</p>
<p>7b. Options for Formation of a Conservation Subcommittee for Public Outreach</p>	<p>Ms. Stuckey: Gave brief comments as well as options for the BMC to establish a public outreach subcommittee.</p> <p>Director Ochylski: Just for clarification, in the recommendation at the beginning, the wording should be an “<i>ad hoc</i> advisory subcommittee of the Committee of two (2) directors whose combined voting percentages do not exceed 50%.”</p> <p>Director Garfinkel: Options 1 & 2 make it mandatory S&T is one of the members of this committee. Does it have to be the director or could I appoint someone?</p> <p>Ms. Stuckey: It would need to be you. There is no case law to help, but we would recommend it be the committee members.</p> <p>Mr. Miller: I wanted to share the recently adopted new rebates under the County Wastewater Project. It might be difficult to get these public rebates to people who are not aware of them. This is some of the information we would be trying to get disseminated if there is public outreach.</p>

Water Conservation Implementation Plan, Los Osos Wastewater Project Proposed Rebate Program <i>changes in italics</i>			
Measures Required for Connection to the Wastewater System			
<i>Fixture or Appliance</i>	<i>Existing Fixture Flow Rate</i>	<i>New Fixture Flow Rate Eligible for Rebate</i>	<i>Rebates</i>
Toilets Residential & Commercial	Greater than 1.6 gpf	1.28 gpf or less	\$250
Showerheads Residential & Commercial	Greater than 2.0 gpm	1.5 gpm or less	\$40
Faucet Aerators Residential	Greater than 1.5 gpm	1.5 gpm or less	\$5
Faucet Aerators Commercial	Greater than 0.5 gpm	0.5 gpm	\$5
Urinals Commercial	Greater than 1.0 gpf	0.5 gpf or less	\$500
Pre-rinse Spray Valves Commercial	Greater than 1.15 gpm	1.15 gpm or less	N/A
Optional Measures Eligible for Rebates (Requires Connection to the Wastewater System and Compliance with Above Measures)			
Toilets Residential & Commercial	Equal to 1.6 gpf	1.0 1.28 gpf or less	\$250
Washers Residential & Commercial	Less than Tier 3, Water Factor 4	Tier 3, Water Factor 4 or Less	\$150 \$450 (1)
<i>Hot Water Recirc System Residential & Commercial</i>	<i>N/A</i>	<i>N/A</i>	<i>\$350</i>
<i>Showerheads Residential & Commercial</i>	<i>1.5 gpm or more</i>	<i>Less than 1.5 gpm</i>	<i>\$40</i>
<i>Complete Gray Water System</i>	<i>N/A</i>	<i>N/A</i>	<i>\$500</i>
<i>Laundry only Gray Water System</i>	<i>N/A</i>	<i>N/A</i>	<i>\$50</i>
<i>Recycled Water Irrigation Commercial & Institutional</i>	<i>N/A</i>	<i>N/A</i>	<i>negotiated</i>
Alternative Measures	1.28 gpf toilet 1.5 gpm showerhead 1.5 gpm faucet aerators	Needs prior approval	\$300

gpf = gallons per flush
gpm = gallons per minute

NOTES: (1) Rebate not retroactive to prior

Director Alternative Hutchinson: Now is the time to start thinking about these because we do need Coastal approval, and don't quite have that yet.

Mr. Miller: Thank you for that clarification. If the committee does prefer one of the options we can talk about that and see if we can't fit that under our current arrangement and keep in budget, and possibly volunteer some time.

Director Garfinkel: Who changed the toilets from 1 or less to 1.28 or less?

Mr. Miller: That came up at one of our previous meetings. The 1.28 are seen by some as functioning better and being less experimental and they wanted to make that reachable for some of the people who didn't feel comfortable going to the 1.0 or the 0.9. When presented public information though, we would want to talk about the benefits of going all the way down to the 1.0 or 0.9 versions.

Director Garfinkel: This is only available to those who have 1.6 installed correct?

Mr. Miller: Correct.

Director Garfinkel: There is very little savings between those two.

Mr. Miller: At five flushes a day, it adds up.

Director Ochylski: There could be some tweaks that could be made to these options. Like under option 3, the committee Chair (or another member) could work with the Executive Director setting this program up. I'll express which one I favor after public comments.

Public Comment

Ms. Owen: Choice 1, would be an *ad hoc* with two directors. So that would not include any community members, and how large would the group be? I would also be interested in knowing if Choice 2 included community members as well. How often would the group meet and what would the goal deadline to comeback with something?

Mr. Best: It appears option 1 does not include public members as part of the committee and option 2 does. I also see the staff doesn't recommend it because it looks like it complicates things. I believe it's important that the community is able to contribute as much as possible to the process. The community needs to be part of the committee to contribute a productive dialogue.

Ms. Tornatzky: I would like a clarification. If the committee chose to do option 1, can community members email the *ad hoc* committee with their suggestions?

Mr. Edwards: So, this committee will be formed to promote the rebate program? This rebate program is going to have limited participation whether it's promoted or not. I would object to the use of BMC resources on any of these options. The BMC and staff should be focused on its core mission, and that is implementation of programs under the Basin Management Plan.

BMC Comments

Director Ochylski: The purpose of this is for outreach on water conservation, not just the rebate program.

Mr. Miller: Regarding option 1 vs option 2, if there was an *ad hoc* committee it would not be subject to the Brown Act, but could not have a standing member from the public. There can be open communication with the public, just not an official member from the public. If you want people from the public, you need to be subject to the Brown Act. You would then be able to invite the public to apply. We don't know what this would cost in terms of staff resource, but if the meetings were short and not too often, this could be done in a low budget way.

Director Garfinkel: If the committee incurs any need for financial funds does it come from the BMC or do the individual members incur that cost?

Mr. Miller: Yes, the BMC would incur the cost. I think it would be to the extent that you need just a meeting facility, it will be low cost.

Director Garfinkel: If there are other things such as a mailer or something along those lines?

Mr. Miller: That's when you get into real dollars. We do have money for that in other

budget items, for example we have a water conservation line item in our budget. However, we do not have a strategy as to what to tell the public and when to inform them and certain things like that.

Director Garfinkel: Would the committee make those decisions?

Director Ochylski: No, it says in here for providing advice to the committee regarding the public outreach plan. So, the committee has to adopt that.

Mr. Miller: Agreed.

Director Zimmer: Just to clarify on the members of this, it would be two board members that don't exceed 50% of voting power. If it's not going to be the public, who else would be on this board?

Mr. Miller: *Ad hoc* would be those two members, and they could invite discussion from the public or organized groups, but it would only be those two members. If you do the Brown Act, you can have as many committee members as you choose.

Director Ochylski: For example, if the *ad hoc* committee did a study session it would allow open discussion.

Director Zimmer: Under this committee (BMC), couldn't two members get together and have an open discussion on a topic without forming a commission?

Mr. Miller: Deferring to our legal folks, I think that is true. We typically restrict our discussion to staff.

Director Ochylski: He's talking about informal discussion.

Director Zimmer: Right, but something that could be brought back at some point and put on the agenda for a more formal discussion. I just feel a key component to this is to have the public input into the process and take some of the time and energy of the board. With a public group, they could create concise topics to bring back to us to talk about. After seeing the legal constraints of these options, it seems like we are just creating another committee of our committee. I don't see the benefit of doing this, by eliminating the public out of it undermines my impression of what we were looking to achieve.

Director Ochylski: I think if we did the *ad hoc* committee and then had workshops that accomplishes the same thing were talking about. Not having the Brown Act regulations in effect saves a lot of time, effort, and money. If we had the *ad hoc* committee of two committee members that had public meetings to take in feedback, that may be the most effective way to do this.

Director Alternative Hutchinson: The idea behind an *ad hoc* committee is to engage directly with members of the public in a group setting, and bring those ideas and feedback back to the BMC. It sounds like you are cutting the public out when you do an *ad hoc* committee with no public members but I agree with Director Ochylski that makes it easier for the public to have those conversations with BMC board members.

Director Garfinkel: You also mentioned in the first paragraph of the discussion item, Title 19, how do you bring Title 19 changes into this discussion?

Mr. Miller: I think having all of the available resources known to the public is important. There are people pursuing Title 19 Credits right now for washing machines. Not just the County Rebate program but all programs that are available.

Director Garfinkel: The Rebate list currently shown, aren't those only for waste water service area residents?

Mr. Miller: They are just for waste water service whereas Title 19 covers the entirety of the Basin.

Director Ochylski: I think the water conservation is also an educational process as we talked about.

Director Zimmer: I have a comment on the structure of this. If we went with option 3, could our alternative member participate in that, or would that have to be the board member?

Director Ochylski: A committee member could participate in that, we just couldn't have two participate in that.

Mr. Miller: We can bring this back again as an item. As staff, I would welcome the community and public to go ahead and submit feedback on ways we can reach out to the community in the meantime.

Director Ochylski: Options 1 and 2 and the preferable options. The reason I would choose 1 is the cost and time-consuming nature of doing the Brown Act Committee.

Director Garfinkel: The ISJ Committee did some school outreach programs. Do we have any idea of how those programs worked out?

Mr. Miller: I heard positive things, but I don't know how much is being done in the schools on water conservation.

Director Ochylski: Back then, we did have receive really good feedback. We need some direction; do we need to bring this back as again as an item?

Director Alternative Hutchinson: Option 1 would add Director Garfinkel to the committee but it seems to be the best way to roll out these ideas to the community would be with a committee member from the community. We would hopefully find someone who is able to reach people outside of the BMC and the BMC audience, someone connected to the community. Adding someone from the community is the best way to do that.

Mr. Miller: If you do have an *ad hoc* committee, we would definitely advertise that to all our CSD standing committees and let them know here's when the *ad hoc* meeting is coming and we might have some that would engage heavily.

Director Zimmer: I would like to see this item come back at the next meeting. I like options 1 & 3.

Mr. Miller: We can bring a resolution to the next meeting for option 1 in case we decide to adopt it.

Director Garfinkel: I'm deciding between 2 & 3 but I don't think we were ready to make

	<p>the decision today.</p> <p>Director Ochylski: What you can do is identify what the cost and timing would be for these options so we would have some criteria while looking at them. It doesn't look like any of us favor Option 4 though.</p> <p>Mr. Miller: I will bring that back.</p> <p>Director Alternative Hutchinson: The beauty of Option 4 is you can accomplish that by doing any of the other options. Do you want to direct staff to bring back the cost and timing of the options as well as a resolution for Option 1?</p> <p>Director Ochylski: I think we need to look at Options 1,2, and 3.</p> <p>Director Zimmer: I think we need to look at the expense and burden of these options. If we had public meetings where would they take place? However, in bringing this back we should keep all Options on the table.</p> <p>Mr. Miller: Staff will put some numbers to it and bring it back. If we can have a resolution to cover anything at the next meeting we'll try to do that.</p> <p>Director Ochylski: Regarding Option 2, you might want to look at the number of people that would comprise that committee. For the CSD, we have a difficult time filling the 5 seats of public members.</p> <p>Director Garfinkel: I don't think there would be a lot of trouble finding people to fill this committee. Will our next meeting be in August? I will not be available for a September meeting, but I do have an alternate.</p> <p>Mr. Miller: We could, usually we skip a month. I think staff has general direction to bring this back.</p>
<p>7c. Cuesta by the Sea Monitoring Well</p>	<p>Mr. Miller: Provided a verbal overview of the written content of the Cuesta by the Sea Monitoring Well Discussion Item.</p> <p>Director Garfinkel: Is there an exact location for the well, or just an approximate location?</p> <p>Mr. Miller: We have two or three options but we want to leave that flexible. The big challenge will be getting the rig positioned within the right-of-way without being on private lots that have endangered species issues. We would like to keep it in the street.</p> <p>Director Garfinkel: If we drill a well in that location and discover it's all salt water, what is the next step?</p> <p>Mr. Miller: I think that's unlikely, but we may detect a portion of the saltwater front. However, in that case the well would be positioned ideally, because we would now have a monitoring point on the front. If we start to see some chlorides in that water we can postulate where we are at in that front.</p> <p>Director Zimmer: Where we drilled back in 2004, is that the optimum place that we would want to drill in this time?</p> <p>Mr. Miller: We filled that hole with concrete so we would not be drilling in that precise</p>

	<p>location.</p> <p>Director Zimmer: How will you go through the procurement process, will this be bid out?</p> <p>Mr. Miller: I think we will have to bid this out. It will need to be pursued as a public works project. So, staff would like to work on the bid docs and collaborate with your staff to see what is the best way to physically do that.</p> <p><u>Public Comment</u></p> <p>Mr. Cesena: I would like to see this funded and proceed, at least through the acquisition of bids to see the actual prices. This is important.</p> <p>Director Alternative Hutchinson: I would support Mr. Miller’s recommendation to move this forward, get some bids, and find out what this would cost.</p> <p>Director Zimmer: Is that a motion?</p> <p>Director Alternative Hutchinson: I move.</p> <p>Director Zimmer: I second.</p> <p>Ayes: Unanimous Nays: None Abstain: None Absent: None</p>
<p>8. PUBLIC COMMENTS ON ITEMS NOT APPEARING ON THE AGENDA</p>	<p>Ms. Owens: Are we any closer to knowing how many years of water supply, based on current usage, remain in the basin? We have 4 conservation efforts currently ongoing; I encourage us to continue bringing in people and ideas that are working elsewhere. As the water flows from Broderson to other locations I wonder, are we still trying to take water to dry land farmers? I oppose supplying them with that water. It’s the same as throwing it away. I am still looking forward to the idea of having recycled water home deliveries. With all of the issues Morro Bay is facing with their sewer system, and our system being overbuilt, it may be cheaper for them to build a pipeline between the two cities.</p> <p>Mr. Best: I had a conversation with the man that gave a presentation at IRWM and he liked the concept that I’ve been talking about with the saltwater pool derived from saltwater intrusion area. Has there been any input or feedback on that? Also, we have to start thinking about what this aquifer will support in this community. Does it support the current occupancy, if so how much more buildout can it handle if any?</p> <p>Mr. Miller: Regarding the years of water remaining in the aquifer, we have some good published volumes of “fresh water available above sea level” in the annual report. I do caution you though the aquifer is not static. There are continual recharge and extractions occurring. Regarding the pool, I have had some discussion with our groundwater modeler, we are discussing if that would be a benefit.</p>
<p>9. ADJOURNMENT</p>	<p>Meeting was adjourned at 3:20 pm. The next meeting will be on September 20th at the South Bay Community Center in Los Osos at 1:30pm.</p>

TO: Los Osos Basin Management Committee

FROM: Rob Miller, Interim Executive Director

DATE: September 20, 2017

SUBJECT: Item 5b – Approval of Budget Update and Invoice Register through September 13, 2017

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 September 13, 2017 (see Attachment 1). A running invoice register is also provided as Attachment 2. Staff recommends that the Committee approve the current invoices, outlined in Attachment 3.

Payment of invoices will continue to be processed through Brownstein Hyatt as noted in previous meetings.

Attachment 1: Cost Summary (Year to Date) for Calendar Year 2017 (updated through September 13, 2017)

Item	Description	Budget Amount	Costs Incurred Through December 31	Percent Incurred	Remaining Budget
1	Monthly meeting administration, including preparation, staff notes, and attendance	\$50,000	\$20,514.25	41.0%	\$29,486
2	Meeting expenses - facility rent (if SBCC needed for larger venue)	\$1,000	\$480.00	48.0%	\$520
3	Meeting expenses - audio and video services	\$6,000	\$3,750.00	62.5%	\$2,250
4	Legal counsel (special counsel for funding measure)	\$10,000	\$0.00	0.0%	\$10,000
5	Semi annual seawater intrusion monitoring	\$15,000	\$10,879.26	72.5%	\$4,121
6	Annual report - not including Year 1 start up costs	\$35,000	\$13,600.00	38.9%	\$21,400
8	Grant writing (outside consultant)	\$12,000	\$1,102.50	9.2%	\$10,898
9	Creek Recharge and Replenishment Studies	\$25,000	\$12,521.70	50.1%	\$12,478
10	Funding measure including Proposition 218 process	\$100,000	\$0.00	0.0%	\$100,000
11	Conservation programs (not including member programs)	\$10,000	\$0.00	0.0%	\$10,000
	Subtotal	\$264,000			\$201,152
	10% Contingency	\$26,400			
	Total	\$290,400	\$62,847.71	21.6%	\$227,552
	LOCSO (38%)	\$110,352			
	GSWC (38%)	\$110,352			
	County of SLO (20%)	\$58,080			
	S&T Mutual (4%)	\$11,616			
Notes					

Attachment 2: Invoice Register for Los Osos BMC for Calendar Year 2017 (through September 13, 2017)

Vendor	Invoice No.	Amount	Month of Service	Description	Budget Item	Previously Approved
Wallace Group	43235	\$6,056.77	Jan-17	BMC admin services	1	x
Wallace Group	43389	\$1,418.50	Feb-17	BMC admin services	1	x
Wallace Group	43548	\$5,000.41	Mar-17	BMC admin services	1	x
Wallace Group	43783	\$1,500.54	Apr-17	BMC admin services	1	x
Wallace Group	43926	\$5,372.38	May-17	BMC admin services	1	x
Wallace Group	44538	\$1,165.65	August-17	BMC admin services	1	
South Bay Comm. Center	105	\$120.00	Mar-17	Meeting Expenses-Facility Rent	2	x
South Bay Comm. Center	106	\$120.00	May-17	Meeting Expenses-Facility Rent	2	x
South Bay Comm. Center	108	\$120.00	Jul-17	Meeting Expenses-Facility Rent	2	
South Bay Comm. Center	109	\$120.00	Jun-17	Meeting Expenses-Facility Rent	2	
AGP	6849	\$675.00	Jan-17	Audio services	3	x
AGP	6912	\$775.00	Mar-17	Video/Audio	3	x
AGP	6981	\$775.00	May-17	Video/Audio	3	x
AGP	7022	\$800.00	Jun-17	Video/Audio	3	x
AGP	7046	\$725.00	Jul-17	Video/Audio	3	
State Water Resources	RW-1008149	\$837.20	Jan-17	Creek Discharge	9	x
Cleath Harris Geologists	20170302	\$3,196.25	Mar-17	Semi-Annual Seawater Intrusion Monitoring	5	x
Cleath Harris Geologists	20170400	\$7,683.01	Apr-17	Semi-Annual Seawater Intrusion Monitoring	5	x
Cleath Harris Geologists	20170401	\$8,387.50	Apr-17	Annual Report Preparations	6	x
MKN	3548	\$10,197.00	Jul-17	Boundary-Creek Discharge Study	9	
MKN	3652	\$1,487.50	Aug-17	Boundary-Creek Discharge Study	9	
Cleath Harris Geologists	20170303	\$5,212.50	Mar-17	Annual Report Preparations	6	x
WSC	2205	\$1,102.50	Apr-17	Grant Writing	8	x
Total		\$62,847.71				

ATTACHMENT 3

Current Invoices Subject to Approval for Payment (Warrant List as of September 13, 2017):

Vendor	Invoice #	Date of Services	Amount of Invoice
Wallace Group	44538	June, July 2017	\$1,165.65
SBCC	108	July 2017	\$120.00
SBCC	109	June 2017	\$120.00
AGP	7046	July 2017	\$725.00
MKN	3548	July 2017	\$10,197.00
MKN	3652	August 2017	\$1,487.50

TO: Los Osos Basin Management Committee

FROM: Rob Miller, Interim Executive Director

DATE: September 20, 2017

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

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. 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. Staff has also engaged in the IRWM process with SLO County.

Status of Zone of Benefit Analysis

Similar to previous updates, no special tax measure is being pursued by staff to fund BMC administrative or capital costs, though some funding has been set aside in the 2017 BMC budget to advance a funding measure if needed. This funding has been allocated to the construction of a Cuesta by the Sea monitoring well for calendar year 2017 as approved in the July 2017 BMC meeting. Staff’s current approach to capital projects under the Basin Plan Infrastructure Program is to advance the needed projects through the property acquisition, environmental review, and Coastal Development Permit phases.

Sustainable Groundwater Management Act (SGMA) Compliance and Pending Deadlines

As indicated in the July 2017 update, the Plan Area defined in the Basin Plan and adopted by the Court is not subject to the requirements of SGMA. On April 4, 2017, the County of San Luis Obispo (County) Board of Supervisors became the GSA for the Los Osos Basin Fringe Areas Groundwater Sustainability Agency (GSA). On June 6, 2017, the County Board of Supervisors approved the contract with Cleath-Harris Geologist (Consultant) to conduct a basin characterization study for the basin fringe areas, in preparation for submitting a basin boundary modification request to the California Department of Water Resources in early 2018. The County is anticipating that the basin characterization study will be completed in early January 2018. On July 26, 2017, the County of San Luis Obispo hosted a community meeting to

update the residents in the basin fringe areas on SGMA and the 2018 Basin Boundary Modification process.

Los Osos Wastewater Project Flow and Connection Update

Staff plans to provide periodic updates on the status of connections and flows from the LOWWP. The following is an update on the status:

- As of 9/1/17, 93% of the lateral connections have been completed, or approximately 3,918 out of 4,200 laterals. The breakdown by area for the remaining laterals is as follows:
 - Phase 1: 64
 - Phase 2: 148
 - Phase 3: 70
 - Total: 282
- Flows are averaging approximately 430,000 gallons per day, with weekend peaks of 470,000 gallons per day
- Effluent has been discharged to the Broderson percolation site since August 10th. It is filtered and disinfected, which meets the WDR requirements of 7 mg/L total nitrogen. The County has completed the process verification procedure with SWB Division of Drinking Water, and the effluent has been deemed Title 22 disinfected tertiary recycled water.
- No recycled water has been delivered to irrigation customers to date, but final negotiations are ongoing.

TO: Los Osos Basin Management Committee

FROM: Rob Miller, Interim Executive Director

DATE: September 20, 2017

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 four parts, designated Programs A through D. Programs A and B shift groundwater production from the Lower Aquifer to the Upper Aquifer, and Programs C and D shift production within the Lower Aquifer from the Western Area to the Central and Eastern Areas, respectively. 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. The following Table provides an overview of status of the Projects that are currently moving forward or have been completed.

As indicated in the July 2017 BMC meeting, the LOCSO has implemented new water rates intended to provide net revenue for capital funding over the next three fiscal years as follows:

- FY 17/18: \$500,000
- FY 18/19: \$700,000

- FY 19/20: \$900,000

These rates will be sufficient to fully fund the District's portion of all Program A and C projects, either using debt service or pay-as-you-go. Additional cooperative funding approaches with other BMC members could also be considered for Expansion Well No. 3 or other program elements.

Project Name	Parties Involved	Funding Status	Capital Cost	Status
Program A				
Water Systems Interconnection	LOCSD/ GSWC	Fully Funded	Construction Value: \$103,550	Project completed February 2017, with final approval in March 2017
Upper Aquifer Well (8 th Street)	LOCSD	Fully Funded	\$250,000	Well was drilled and cased in December 2016. Budget remaining \$250,000 to equip the well. Design RFP was issued in April, and a consultant was retained in June 2017. A design technical memorandum is due in September 2017. Project to be completed by June 2018 or earlier if possible.
South Bay Well Nitrate Removal	LOCSD	Completed		
Palisades Well Modifications	LOCSD	Completed		
Blending Project (Skyline Well)	GSWC	Fully Funded	Previously funded through rate case	Blending of Skyline Well and Rosina Well Project was completed. Project required modifications to include a new nitrate removal unit. Permits and equipment secured. Delivery of the treatment unit has occurred, and start-up is anticipated in the first two weeks of October 2017.
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	First phase combined with GSWC Program A	GSWC's Program A Blending Project allows for incremental expansion of the nitrate facility and can be considered a first phase in Program B.
Program C				
Expansion Well No. 1 (Los Olivos)	GSWC	Fully Funded	Previously funded through rate case	Well is now fully operational as of the end of June 2017.

Project Name	Parties Involved	Funding Status	Capital Cost	Status
Expansion Well No. 2	GSWC/LOCSD	Cooperative Funding	BMP: \$2.0 mil	Property acquisition phase is on-going through efforts of LOCSD. Three sites are currently being reviewed, and all appear to be viable for new east side lower aquifer wells, Environmental studies were initiated in December 2016 for expansion well #2.
Expansion Well 3 and LOVR Water Main Upgrade	GSWC/LOCSD	Cooperative Funding	BMP: \$1.6 mil	Property acquisition phase is on-going through efforts of LOCSD.
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	Conceptual design
Program M				
New Zone D/E lower aquifer monitoring well in Cuesta by the Sea	All Parties	Funded through BMC Budget	\$100,000	See agenda item 7c

TO: Los Osos Basin Management Committee

FROM: Rob Miller, Interim Executive Director

DATE: September 20, 2017

SUBJECT: Item 7b – Water Conservation Program Update

Recommendations

Received update and provide input to staff for future action.

Discussion

In November 2016, the BMC reviewed and endorsed an Addendum to the Water Conservation Implementation Plan for the Los Osos Wastewater Project. The document can be found at the following web address:

http://slocountywater.org/site/Water%20Resources/LosOsos/pdf/WCIP_Addendum%201_rev.pdf

In June 2017, the County approved a subset of the BMC rebate programs intended for properties connect to the Los Osos Wastewater Project as shown on the attached summary (Exhibit A). Two of the BMC's recommended measures are not included in the staff recommendation. These are the septic tank repurposing program (BMC Outdoor 1) and the Low Impact Development Landscape measure (BMC Outdoor 4). While both measures are reasonable elements of a community water conservation program, they are not recommended for inclusion in the County's efforts because there is no clear nexus between the wastewater project and the reduction of outdoor irrigation using potable water supplies. On June 20, 2017, the County submitted the measures in Exhibit A to the Executive Director of the California Coastal Commission. In August 2017, the Coastal Commission requested clarification, and the County is in the process of responding. County staff anticipates that it will receive notification that the Coastal Commission agrees that the rebate changes are consistent with the requirements of the Coastal Development Permit soon. The County will begin implementing the rebate changes upon receipt of said notification.

Conservation Outreach

In July 2017, the BMC discussed a number of alternatives for the formation of a subcommittee to discuss outreach efforts for water conservation. The Committee requested clarification on the cost of administering a subcommittee that would be subject to the Brown Act. Staff estimates the cost to be in the range of \$1,400 to \$1,800 per meeting, assuming that the meeting would not be televised and would be held in the LOCSD Board chambers. This cost would include agenda package preparation and posting, as well as meeting attendance by staff. If quarterly meetings are proposed, the annual cost would be in the range of \$5,600 to \$7,200. The BMC currently has an annual budget of \$10,000 per year for water conservation activities. The staff of the Morro Bay National Estuary Program (MBNEP) have been supporting BMC activities with both funding and staff input since its inception. On the topic of conservation outreach, MBNEP

staff have indicated a willingness to assist with media coordination (newspaper, television, etc) and on-line outreach through their website and social media platforms. County Counsel will not be available to attend the September 20, meeting, and therefore staff suggests deferral of a final decision on any subcommittee to the next meeting. However, given the cost estimates presented above, staff would appreciate any input.

Title 19 Status

As described in the March 2017 BMC meeting, Title 19 retrofits are pursued by private parties in order to facilitate development within the community. In recent years, the County has found that minimal retrofit opportunities are available through pre-approved measures with published values for water savings. This situation primarily impacts new development that is either outside of the prohibition zone, or not subject to Special Condition 6 of the Los Osos Wastewater Project's Coast Development Permit. The County currently considers retrofits on a case by case basis, including the installation of high-efficiency clothes washers. Since such retrofits are expected to continue irrespective of rebate funding, the BMC may wish to recommend to the County inclusion of measures from the Addendum to the Water Conservation Implementation Plan within an updated version of Title 19.

EXHIBIT A

Water Conservation Implementation Plan, Los Osos Wastewater Project Proposed Rebate Program <i>changes in italics</i>			
Measures Required for Connection to the Wastewater System			
<i>Fixture or Appliance</i>	<i>Existing Fixture Flow Rate</i>	<i>New Fixture Flow Rate Eligible for Rebate</i>	<i>Rebates</i>
Toilets Residential & Commercial	Greater than 1.6 gpf	1.28 gpf or less	\$250
Showerheads Residential & Commercial	Greater than 2.0 gpm	1.5 gpm or less	\$40
Faucet Aerators Residential	Greater than 1.5 gpm	1.5 gpm or less	\$5
Faucet Aerators Commercial	Greater than 0.5 gpm	0.5 gpm	\$5
Urinals Commercial	Greater than 1.0 gpf	0.5 gpf or less	\$500
Pre-rinse Spray Valves Commercial	Greater than 1.15 gpm	1.15 gpm or less	N/A
Optional Measures Eligible for Rebates (Requires Connection to the Wastewater System and Compliance with Above Measures)			
Toilets Residential & Commercial	Equal to 1.6 gpf	1.0 1.28 gpf or less	\$250
Washers Residential & Commercial	Less than Tier 3, Water Factor 4	Tier 3, Water Factor 4 or Less	\$150 \$450 (1)
<i>Hot Water Recirc System Residential & Commercial</i>	<i>N/A</i>	<i>N/A</i>	<i>\$350</i>
<i>Showerheads Residential & Commercial</i>	<i>1.5 gpm or more</i>	<i>Less than 1.5 gpm</i>	<i>\$40</i>
<i>Complete Gray Water System</i>	<i>N/A</i>	<i>N/A</i>	<i>\$500</i>
<i>Laundry only Gray Water System</i>	<i>N/A</i>	<i>N/A</i>	<i>\$50</i>
<i>Recycled Water Irrigation Commercial & Institutional</i>	<i>N/A</i>	<i>N/A</i>	<i>negotiated</i>
Alternative Measures	1.28 gpf toilet 1.5 gpm showerhead 1.5 gpm faucet aerators	Needs prior approval	\$300

gpf = gallons per flush
gpm = gallons per minute

NOTES: (1) Rebate not retroactive to prior

TO: Los Osos Basin Management Committee

FROM: Rob Miller, Interim Executive Director

DATE: September 20, 2017

SUBJECT: Item 5c: Award of Contract to Cleath Harris Geologists for the Design of Cuesta by the Sea Lower Aquifer Monitoring Well

Recommendations

Staff recommends that the Committee award the contract for the design of the proposed lower aquifer monitoring well.

Discussion

In the July 2017 meeting, the Committee approved the reallocation of calendar year 2017 funds from the Proposition 218 process to the construction of a critical lower aquifer monitoring well in the Cuesta by the Sea area. The Committee agreed to continue detailed discussions after actual bid prices were obtained for the work. The attached proposal from Cleath Harris Geologists in the amount of \$15,000 provides sufficient consulting services to obtain bids, including design of the well and observation during construction. The precise location of the well will be determined in coordination with the County during design. Staff will endeavor to bring bids back for Committee consideration before the end of 2017.

Financial Considerations

The following budgeted line items provide potential funding for the design and construction of the proposed monitoring well:

2017 Budget Item	Description	Available Funding Amount
4	Legal counsel (special counsel for funding measure):	\$10,000
10	Funding measure including Proposition 218 process	\$100,000
Contingency	10% Contingency	\$26,400
Total		\$136,400



July 26, 2017

Los Osos Basin Management Committee
c/o Mr. Robert S. Miller, P.E.
Wallace group
612 Clarion Court
San Luis Obsipo, CA 93401

SUBJECT: Proposal for Hydrogeologic Services during Design and Construction of Nested Monitoring Well, Los Osos Groundwater Basin.

Dear Mr. Miller:

Cleath-Harris Geologists (CHG) proposes to provide hydrogeologic services to assist the Los Osos Basin Management Committee (BMC) with design and construction of a nested monitoring well in Cuesta-by-the-Sea, Los Osos. This proposal presents a scope of work, schedule, and the estimated costs for these services.

SCOPE OF WORK

CHG will provide technical support and construction monitoring services during the design and construction of the new well. The well would contain up to three nested casings that tap discrete aquifer zones. On-site observations during well drilling and construction would be performed by a licensed professional geologist or staff geologist working under the direct supervision of a licensed geologist. The tasks that CHG will perform prior to and during construction and development of the new well include the following:

1. Prepare written specifications, including a preliminary well design diagram, for the construction and development of a nested monitoring well. The well is proposed to be constructed in the County right-of-way in the Cuesta-by-the-Sea area of Los Osos (exact location to be determined).
2. Prepare a drilling contractor bid sheet.
3. Assist with contractor bidding and selection process (e.g., attend on-site pre-bid meeting, respond to contractor questions, review bids).
4. Attend pre-construction meeting.
5. Review well construction materials for conformity with technical specifications.
6. Monitor pilot hole borehole drilling and prepare borehole lithologic log.
7. Provide final well design.
8. Observe well screen, filter pack, and annular seal installation.
9. Review well development records.



10. Coordinate final inspection.
11. Prepare well construction report.

Groundwater monitoring at the new well would be performed as part of the BMC semi-annual (April and October) monitoring program and is not included in this scope of work.

COST ESTIMATE

Cleath-Harris Geologists proposes to perform the above scope of work an hourly rate plus expenses basis in accordance with the attached terms of fees and conditions and hourly rate schedule. The estimated cost for hydrogeologic services related to the proposed scope of work is **\$15,000**. The schedule for hydrogeologic services would be coordinated with the drilling contractor schedule from rig mobilization to final inspection.

SCHEDULE OF HOURLY RATES

Principal Hydrogeologist	\$ 150
Associate Hydrogeologist	\$ 140
Project Geologist	\$ 120
Staff Geologist II	\$ 110
GIS Specialist/Environmental Scientist	\$ 110
Staff Geologist I	\$ 100

EXPENSES

Mileage \$0.54/mile
Other expenses at cost plus 10 percent handling.

AGREEMENT

If the above described work scope and fees and conditions are acceptable, this proposal will serve as the basis for agreement.

Cleath-Harris Geologists, Inc.

Spencer J. Harris
Vice President



SCHEDULE OF FEES AND CONDITIONS

1. Invoices will be submitted monthly. The invoice is due and payable upon receipt.
2. In order to defray carrying charges resulting from delayed payments, simple interest at the rate of ten percent (10%) per annum (but not to exceed the maximum rate allowed by law) will be added to the unpaid balance of each invoice. The interest period shall commence 30 days after date of original invoice and shall terminate upon date of payment. Payments will be first credited to interest and then to principle. No interest charge would be added during the initial 30 day period following date of invoice.
3. The fee for services will be based on current hourly rates for specific classifications and expenses. Hourly rates and expenses included in the attached schedule are reevaluated on January 1 and July 1 of each year.
4. Documents including tracings, maps, and other original documents as instruments of service are and shall remain properties of the consultant except where by law or precedent these documents become public property.
5. If any portion of the work is terminated by the client, then the provisions of this Schedule of Fees and Conditions in regard to compensation and payment shall apply insofar as possible to that portion of the work not terminated or abandoned. If said termination occurs prior to completion of any phase of the project, the fee for services performed during such phase shall be based on the consultant's reasonable estimate of the portion of such phase completed prior to said termination, plus a reasonable amount to reimburse consultant for termination costs.
6. If either party becomes involved in litigation arising out of this contract or the performance thereof, the court in such litigation shall award reasonable costs and expenses, including attorney's fees, to the party justly entitled thereto. In awarding attorney's fees the court shall not be bound by any court fee schedule, but shall, if it is in the interest of justice to do so, award the full amount of costs, expenses, and attorney's fees paid or incurred in good faith.
7. All of the terms, conditions and provisions hereof shall inure to the benefit of and be binding upon the parties hereto and their respective successors and assigns, provided, however, that no assignment of the contract shall be made without written consent of the parties to the agreement.

TO: Los Osos Basin Management Committee
FROM: Rob Miller, Interim Executive Director
DATE: September 20, 2017
SUBJECT: Item 7d: Creek Discharge Plan Technical Memo

Recommendations

Receive report and provide input to staff for future action.

Discussion

In the January, 2017 meeting, the Committee approved a working budget for calendar year 2017. The budget included the Line Item 9 for Creek Recharge and Replenishment Studies in an amount not to exceed \$25,000. MKN has produced a draft of their work product which is attached for Committee review. Staff will provide a supplemental presentation at the meeting to summarize the results of the study.

Financial Considerations

The approved Committee budget for calendar year 2017 includes a specific line item for the proposed work as described above. The Morro Bay National Estuary Program also partnered with the BMC on the effort by providing funding for the creek water quality monitoring event referenced in the draft report.

DRAFT Technical Memorandum

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

From: Eileen Shields, PE
Chris Martin, PE

Date: September 8, 2017

Subject: Los Osos Creek Groundwater Replenishment Reuse Project Treatment Evaluation Workplan

1.0 Background

The Los Osos Basin Management Committee (Committee) has completed a feasibility study for using LOWRF tertiary treated recycled water to establish a groundwater replenishment project. The concept includes discharge of treated effluent to Los Osos Creek, which naturally recharges the Los Osos Groundwater Basin. The study concluded that the discharge will likely qualify as a Groundwater Replenishment Reuse Project (GRRP), as defined by the California State Water Resources Control Board Department of Drinking Water (DDW). Designation as a GRRP triggers establishment of a number of water quality and treatment requirements for the discharge. The project may require treatment beyond the tertiary disinfected recycled water levels achieved at the Los Osos Water Recycling Facility (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. The extent of this depends upon the water quality, retention time, as well as the physical and geochemical composition of the aquifer.

DDW regulates GRRPs, establishing treatment requirements, specific water quality criteria, and monitoring and reporting requirements for each GRRP. Determining these criteria requires information on the quality of the recycled water as well as the expected Soil Aquifer Treatment (SAT). SAT processes are likely to occur within the native creek bed and underlying vadose zone sediments and may reduce TOC concentration of the applied recycled water, thereby helping to meet the DDW permit requirements. Accurate information during the planning and design stages is important to avoid implementation of unnecessary, expensive treatment processes, and reduce the risk of constructing facilities unable to meet the GRRP discharge requirements. An early understanding of the project alternatives will allow for refinement of the project design.

This Treatment Evaluation Workplan was prepared by Michael K Nunley & Associates, Inc. (MKN) in conjunction with GSI Water Solutions, Inc. for the Los Osos Basin Management Committee. The Workplan describes the required and recommended processes to develop the foundation for a robust and cost-effective design for the Los Osos Creek GRRP. Specifically, the Workplan lays out the recommended scope, budget, and schedule to conduct a study designed to evaluate SAT, predict advanced treatment requirements, and collect information necessary for permitting and continuing to assess project costs and feasibility. The development of this plan included investigation of existing and anticipated LOWRF effluent characteristics, Los Osos Creek

water quality characteristics, potential treatment methods and their effectiveness, and the specific data needs of the DDW for permitting a GRRP.

Los Osos Creek GRRP Concept

The Los Osos Creek GRRP project concept is depicted in Figure 1.

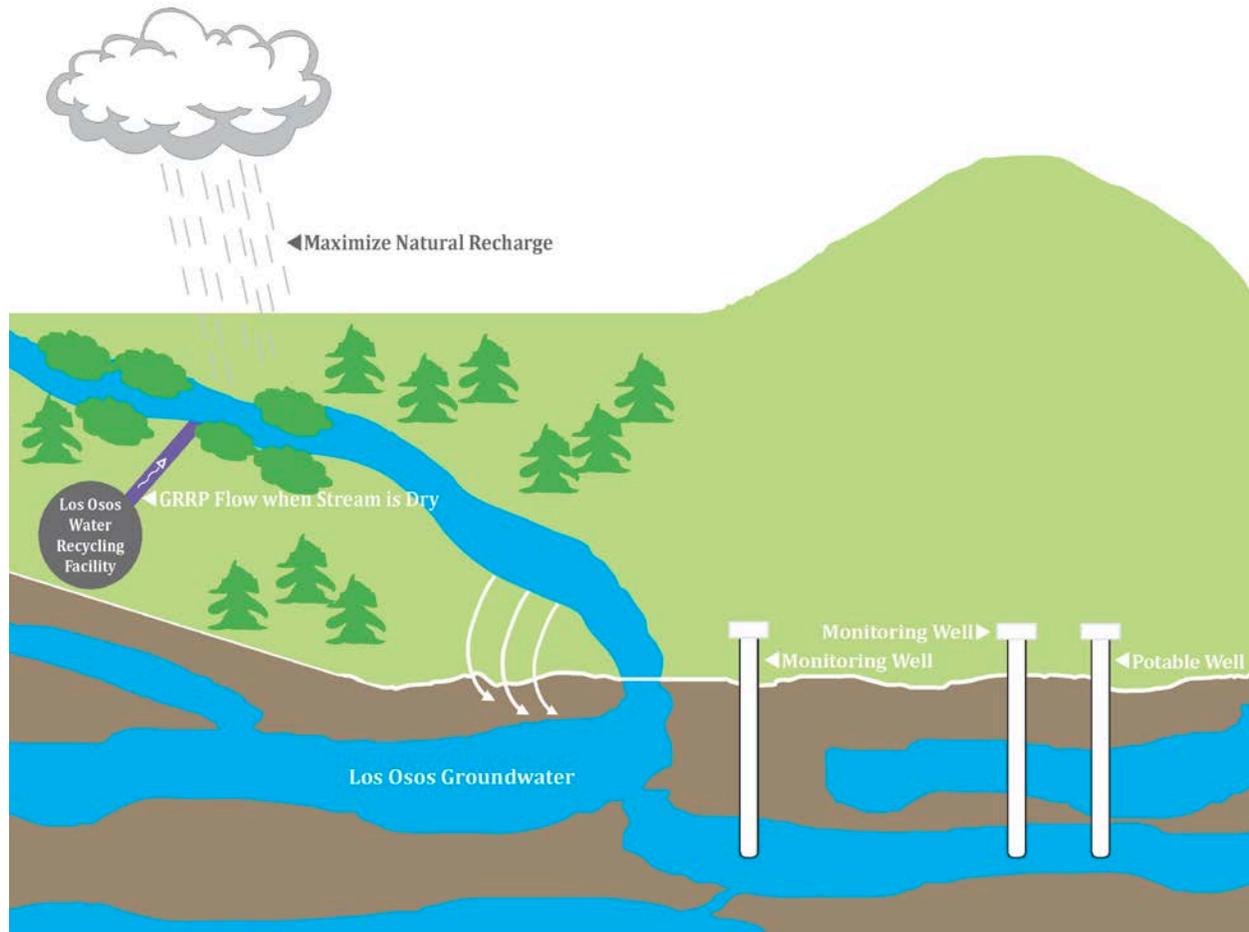


Figure 1. Los Osos Creek GRRP Concept

Highly treated wastewater discharged from the LOWRF will be delivered to Los Osos Creek, generally during periods when there is no or insignificant flow in the Creek. The recycled water will percolate through the creek bed into the groundwater aquifer. In the aquifer, the recycled water will mix with natural flows that percolate during periods when the creek is flowing. The natural flows will dilute the recycled water, hence are referred to in this document as “diluent”. The ratio of recycled water flow to diluent flow must be maintained below a specific value per GRRP Regulations, which will be determined when the qualities of the two flows are known.

The diluted recycled water will travel through the aquifer, ultimately reaching one or more potable water wells where it will be extracted for use. This transit through the aquifer provides an important benefit through SAT for organic destruction and filtration for removal of microbial pathogens.

2.0 Objectives

The Los Osos Basin Management Committee is interested in finding and implementing the highest and best use for the recycled water from the LOWRF. This Workplan is intended to develop a pathway to determining the regulatory, technical, and financial feasibility of implementing a GRRP using water from the LOWRF. Groundwater replenishment could provide a drought-resistant water supply, if found to be feasible and economically viable.

The California Code of Regulations, Titles 17 and 22, provide the framework for regulating GRRPs. These regulations provide specific requirements for obtaining approval to construct and to operate a GRRP, and direct the DDW in their permitting efforts. In general, the DDW must find that the GRRP will not produce a negative impact on groundwater supplies, and that the entity operating the GRRP is capable of reliable, safe operation of the GRRP within permit limitations.

Regulations lay out specific requirements for the water quality of GRRP water. The preliminary study must evaluate the effectiveness of the LOWRF to produce high quality water and the effectiveness of SAT. Any shortfall in contaminant removal by these processes must be made up through additional advanced treatment processes. There are several potential treatment processes available to provide advanced treatment with varying effectiveness and cost.

As with all engineering projects, cost may determine whether the project proceeds. The regulatory requirements placed on GRRPs require significant monitoring costs. The advanced treatment processes required to meet water quality targets may add significantly more cost.

The specific objectives for this Workplan include:

- Determine permitting requirements for a Los Osos Creek GRRP,
- Outline the steps for developing information necessary for the permitting process,
- Outline the major tasks required to further develop the project components and confirm feasibility, including costs, and
- Develop an estimated budget and schedule for the major tasks required for project development.

3.0 GRRP Requirements

3.1 DDW Requirements to Permit GRRP

To provide a permit to operate a GRRP, the DDW must find that the GRRP will not degrade groundwater quality or negatively impact downgradient users of the groundwater. Specific criteria have been developed to allow DDW to make this finding:

- If the GRRP provides “full treatment”, consisting of membrane filtration, reverse osmosis treatment, and advanced oxidation treatment, DDW assumes that criteria are met.
- Treatment must provide 12 logs enteric virus inactivation, 10 logs *Giardia Lamblia* cyst inactivation, and 10 logs *Cryptosporidium Parvum* oocyst inactivation.

- TOC concentration of the treated effluent (either the 20-week running average of TOC, or the average of the four most recent weekly TOC results) must be less than 0.5 mg/L divided by the recycled water contribution (RWC).
- The treated effluent must meet all maximum contaminant levels (MCLs) and notification levels (NLs) established for public water systems, and have total nitrogen concentration less than 10 mg/L.
- Diluent water quality must be reviewed and accepted by DDW.
- The project includes a plan to monitor the recycled water, diluent water, and groundwater to verify adequate treatment.
- A plan must be developed to provide an alternative source of water to downgradient groundwater users in case of failure of any component of the GRRP or negative impact due to GRRP operation.
- The wastewater management agency must demonstrate (a) adequate managerial and technical capability and (b) that all treatment processes have been installed and can be operated to meet their intended function.

The water quality criteria must be met either by treatment prior to percolation or by SAT. For SAT, credit is given for each month the water is retained underground. The amount of virus removal credit depends upon the method of determining the response retention time, with numerical modeling providing 0.5 log credit while an “added tracer” study provides 1.0 log credit per month.

A “Title 22 Engineering Report” is required by DDW for permitting, prior to operation of a GRRP. The Report must describe how the project will meet DDW requirements and provide the following minimum elements:

- A map showing GRRP facilities and boundaries in relation to drinking water wells and monitoring wells
- An hydrogeological assessment of the GRRP’s setting
- An evaluation of SAT, including anticipated RRT and the method of evaluating retention time
- Proposed advanced treatment process train with anticipated log inactivation demonstrating that water quality and log inactivation targets will be met
- An evaluation of the project sponsor’s management and technical ability to meet the requirements established by DDW

Table 1 details specific activities that must be performed to implement the GRRP. The Table presents monitoring, evaluation, and testing requirements for each of the water streams impacting the GRRP and the project phase during which they should be implemented.

Regulatory requirements for subsurface application (injection wells) of recycled water are similar to the requirements for a surface application project. However, for subsurface application it would be necessary to fully treat the recycled water using reverse osmosis and advanced oxidation (Full Advanced Treatment [FAT]). Depending upon DDW review of the Title 22 Engineering Report and the expected TOC concentration, which must be below 0.5 mg/L, blending with diluent water could be required. It is possible that the diluent water would also require treatment by RO. More stringent monitoring requirements would apply.

Requirements for injection wells to provide a seawater intrusion barrier is anticipated to be the same as for injection for indirect reuse because the groundwater basin is designated as a drinking water aquifer.

**Table 1
GRRP Regulatory Requirements**

Phase	Diluent Water	Recycled Water	Groundwater	Potable Water
Feasibility/ Planning	<p>Verify (analyze) water meets primary drinking water standards, and does not exceed any MCL's or NL's</p> <p>Calculate average annual volume of diluent water (acre-feet or average mgd).</p>	<p>Analyze recycled water TOC, and other water quality parameters that impact soil aquifer treatment or advanced treatment.</p> <p>Calculate average annual volume of recycled water (acre-feet or average mgd) discharged from the LOWRF.</p> <p>Determine SAT factor (if applicable).</p>	<p>Analyze groundwater TOC and ambient water quality; Collect 4 quarterly samples from each potentially affected aquifer.</p>	
Permitting/ Design	<p>Analyze water for primary drinking water standards and notification levels.</p> <p>Develop a water quality monitoring plan</p> <p>Develop method to verify diluent water volume and 120-month average RWC.</p> <p>Perform Watershed Sanitary Survey.</p>	<p>Prepare Title 22 Engineering Report to describe the GRRP plan, including elements shown in this row.</p> <p>Provide report demonstrating log removals for each treatment process, including challenge tests.</p> <p>Notification of all downgradient well owners within 10 years' distance.</p> <p>Public hearing on GRRP, with minimum 30 days' notice.</p>	<p>Hydrogeological report showing (among other things) quarterly groundwater elevations and gradients.</p> <p>Model travel time between application and first extraction.</p> <p>Determine Response Retention Time.</p>	<p>Provide a map showing GRRP boundary, monitoring and potable well locations, and control area restricting potable wells.</p>
Design/ Construction		<p>Demonstrate all treatment processes operate per design and permit conditions.</p> <p>Provide 12/10/10 log microorganism reduction.</p> <p>Provide at least 3 treatment processes.</p> <p>Limit TOC in recharge water to 0.5 mg/L / RWC.</p> <p>Evaluate indicator compounds and develop monitoring program.</p> <p>Prepare Operation Optimization Plan.</p>	<p>Construct at least two monitoring wells accessing each affected aquifer.</p> <p>Analyze each monitoring well twice (quarterly) for multiple contaminants.</p>	

**Table 1
GRRP Regulatory Requirements**

Phase	Diluent Water	Recycled Water	Groundwater	Potable Water
<p>Operation (Any exceedance triggers repeat sampling and analysis, and potentially GRRP shutdown.)</p>		<p>WRF must meet its effluent limits</p> <p>Implement WRF source control and industrial pretreatment program.</p> <p>Limit TOC in recharge water to 0.5 mg/L / RWC.</p> <p>Monitor treatment process performance.</p> <p>Analyze total nitrogen twice weekly.</p> <p>Weekly TOC analyses.</p> <p>Monthly calculation / verification of RWC for preceding 120 months.</p> <p>Analyze regulated chemicals quarterly.</p> <p>Analyze removal of indicator compounds and evaluate using monitoring wells quarterly.</p> <p>Analyze recycled water for priority pollutants quarterly.</p> <p>Analyze recycled water for chemicals with notification levels quarterly.</p> <p>Analyze secondary contaminants annually.</p> <p>Analyze recycled water for indicators of PPCPs annually.</p> <p>Update Operation Optimization Plan with best practices, and operate according to these best practices.</p> <p>Annual report of GRRP operation, with public notification of availability.</p>	<p>Conduct tracer study (intrinsic or added) demonstrating travel time. Repeat in case of significant changes.</p> <p>Analyze quarterly for nitrate/nitrite.</p> <p>Analyze groundwater (monitoring wells) for priority pollutants quarterly.</p>	

3.2 Response Retention Time

Per CCR, Title 22, Section 60320.124 (surface application), recycled water recharged through the Los Osos Creek bed must be retained underground for a period of time necessary to allow a Project Sponsor sufficient response time to identify treatment failures and implement actions, including the plan to provide an alternative water supply or well-head treatment. The minimum allowable response retention time (RRT) is two months. The initial RRT for the Los Osos Creek GRRP will be based on the amount of advanced treatment and through further analysis associated with the design and implementation of a tracer study. To demonstrate that the actual retention time underground is no less than the required RRT, a tracer study must be conducted using an added tracer, or a DDW-approved intrinsic tracer may be used. For each month of retention time estimated utilizing the approved intrinsic tracer, a project sponsor can receive no more than 0.67 months credit. The actual retention time is the time representing the difference between when the water containing the tracer is applied at the GRRP and when either 2% of the initially introduced tracer concentration has reached the downgradient monitoring point, or 10% of the peak tracer unit value arrives at the downgradient monitoring point.

4.0 Studies Required to Develop Information Necessary for Permit

4.1 Hydrogeological Assessment

GRRP permitting requirements include a through description of the hydrogeological characteristics of the Los Osos groundwater basin. Through the work that the Los Osos Basin Management Committee and others have performed over the years, it is estimated that some of the information is available through existing technical reports. The Title 22 Engineering Report should include the following technical elements of the groundwater basin for the Hydrogeological Assessment:

1. A general description of the geologic and hydrogeological setting of the groundwater basin, including an overview and history of groundwater use in basin.
2. A detailed description of the hydro-stratigraphy beneath the GRRP including the composition, extent and physical properties of the affected aquifers;
3. Historical groundwater levels, flow directions and groundwater migration rates.
4. A groundwater budget (last updated in 2012)
5. Map and data on both water supply production wells and domestic water supply wells in the GRRP vicinity
6. Documentation of existing water quality at water supply production wells and domestic water supply wells
7. Based on at least four rounds of consecutive quarterly monitoring to capture seasonal impacts:
 - a. Assess the existing hydrogeology and the hydrogeology anticipated as a result of the operation of the GRRP, and
 - b. Prepare maps showing quarterly groundwater elevation contours, along with vector flow directions and calculated hydraulic gradients.

8. Design for a tracer study to validate modelled underground retention time. This test shall be conducted prior to the end of the third month of GRRP operation. The retention time represents the difference from when the water with the tracer is applied at the GRRP to when either 2% of the initially introduced tracer concentration has reached the downgradient monitoring point, or 10% of the peak tracer unit value is observed at the downgradient monitoring point. With DDW approval, an *intrinsic* tracer may be used in lieu of an added tracer with a credit of no more than 0.67-log per month provided. (It is assumed that the tracer study design will be part of the future preliminary engineering and permitting phase).

4.2 SAT Evaluation

An evaluation will be conducted of the water quality improvements that occur as the recycled water migrates down through the unsaturated zone to the underlying saturated zone (known as Soil Aquifer Treatment or SAT). DDW regulations acknowledge the benefits of SAT and allow for water quality credit through the use of a 'SAT factor' that establishes the removal efficiency (often on the order of 90%) that occurs. Based upon demonstration studies, an 'SAT factor' will be developed that can be used to calculate the TOC of the recycled water after it has passed through the vadose zone. More specifically, for surface application projects such as the Los Osos Creek GRRP, the GRRP's Project Sponsor must assess the SAT process through the monitoring of TOC, indicator compounds, and surrogate parameters, as approved by DDW. Prior to initial operations and at five-year intervals, the Project Sponsor must conduct a study approved by DDW to determine the occurrence of various indicator compounds in the recycled water and propose at least three indicator compounds to evaluate the SAT process. Recommendations for the SAT evaluation and developing the SAT factor are included in sections below.

After operation of the GRRP has begun, SAT performance must be evaluated quarterly by monitoring the recycled water or recharge water prior to and after SAT (at a point no farther than 30 days downgradient of the spreading area). If the results do not indicate a reduction of at least 90% in the concentration of the indicator compounds, excluding the effluents of dilution, the Project Sponsor must investigate the reason for the low reduction and report the results within 90 days. If the investigation shows that the 90% reduction could not be demonstrated because the concentration of the indicator compounds was not sufficient, the Project Sponsor must consult with DDW and comply with an alternative monitoring plan approved by DDW. If the Project Sponsor demonstrates that there are not three compounds suitable for indicating a 90% reduction, the Project Sponsor may use an indicator that achieves less than 90% SAT reduction per DDW approval.

Monitoring of water quality at the surface and at multiple downgradient monitoring wells that will be designed to sample discrete depth intervals and thereby characterize the water quality present in the effected portions of the subsurface.

4.3 Advanced Treatment Evaluation

Following determination of the expected treatment levels provided by SAT, it will be possible to estimate the level of additional treatment needed meet the water quality targets established by DDW. At the

current time, it is anticipated that these targets will be reached by a combination of ozonation and biological activated carbon (BAC) or advanced oxidation processes (AOP).

The Environmental Protection Agency and DDW have established tables of concentration-time (CT) for ozone inactivation of *Cryptosporidium*. These tables will be referenced to determine ozonation requirements and ozone contact basin dimensions.

BAC is an attractive process for TOC reduction. However, there is limited experience with BAC for GRRP use, so making a reliable predication of TOC performance will require pilot testing. Since BAC is a biological process, pilot testing will require setting up an ozone contactor and BAC filter at the LOWRF and operating it for an extended period – at least three months and preferably six months - to allow the biological component to become active.

General experience has shown that ozone/BAC typically has lower lifecycle cost than AOP. Therefore it may be appropriate to focus work initially on ozone/BAC and look at AOP only if ozone/BAC is not able to provide the necessary level of treatment.

Specific steps necessary to evaluate advanced treatment include:

1. Evaluate the ozone / BAC process to determine TOC reduction that can be anticipated from this process. Develop conceptual design and capital and O&M costs for this process.
2. Evaluate the Advanced Oxidation Process (AOP) to determine existing evidence on TOC reduction that can be anticipated from this process. Develop conceptual design and capital and O&M costs for this process.
3. Based on steps 1 and 2, select one or both processes for pilot testing at the LOWRF.
4. Develop recommendations for pilot testing, including design for installation and anticipated costs.
5. During preliminary design and permitting phase (future effort), conduct pilot tests of the selected process(es).
 - a. Pilot testing of ozone / BAC will require an extended period of up to six months. This is because BAC, being a biological process, requires exhaustion of the granular activated carbon (GAC) substrate and growth and acclimation of the bacteria provided biological treatment. It may be possible to begin the test with pre-exhausted GAC, which would accelerate the test by two to three months.
 - b. Pilot testing of AOP can be significantly shorter, as it is a physical-chemical process that does not rely on biology. AOP pilot testing can be expected to require two to four weeks of operation. Longer operation (up to six months) is advisable to allow for variations in effluent quality.
6. Using data produced by pilot testing, develop preliminary designs of ozone/BAC and AOP systems, including capital and O&M costs. The Technical Memorandum entitled, Los Osos Creek Discharge Study (by MKN, draft final dated June 16, 2016) provided a preliminary cost opinion for ozone/BAC system for the purposes of comparing costs to microfiltration/reverse osmosis treatment system. The ozone/BAC system, including the other components required for a GRRP (recycled water

pump station, pipeline, and appurtenances), a contingency and engineering and design, was estimated at \$4.3 million, assuming a 2% per escalation and construction in 10 years.

5.0 GRRP Testing and Monitoring Requirements

DDW has established monitoring requirements for the recycled water, diluent water, and receiving water that will be a part of a GRRP. Monitoring is required before construction of the GRRP to establish the baseline quality and during GRRP operation to evaluate treatment.

5.1 Recycled Water Monitoring Requirements

WRF effluent must be sampled and analyzed for

- Inorganic chemicals (Table 64431-A, Title 22)
- Radionuclide chemicals (Tables 64442 and 64443)
- Organic chemicals (Table 64444-A)
- Disinfection byproducts (Table 64533-A)
- Lead and copper
- Total Organic Carbon (TOC)

Results of these analyses will be used to determine the requirements of the Advanced Treatment system. If any of the analyses show exceedance of an MCL or Notification Level, treatment will be required to bring the effluent into compliance. TOC is a primary regulatory requirement for the GRRP, and is used as a surrogate to indicate the effectiveness of treatment for other, harder to analyze constituents. This is the rationale for the requirement for weekly TOC analyses. These analyses will also be required quarterly during operation of the GRRP.

5.2 Diluent Water Monitoring Requirements

Diluent water that is from an approved drinking water source is exempt from sampling requirements. However, in this case the proposed diluent water source Los Osos Creek, which is not an approved drinking water source. Approval for use of this water source will require:

- A source water evaluation per the California-Nevada Section of AWWA Watershed Sanitary Survey Guidance Manual (1993).
- Analyses as described above under “Recycled Water Monitoring Requirements”.

Samples of the Los Osos Creek were taken on May 30, 2017 and analyzed for primary drinking water MCLs, Notification Levels, and total organic carbon to review the potential to use the seasonal creek as a diluent water. The results are included as Appendix A. No exceedances were measured and the total organic carbon was 2.3 mg/L. Continued monitoring of the Creek water for these parameters will be required during operation. Since there is no identified substitute diluent at this time, quarterly sampling of the Creek is recommended to establish a trend in water quality and continue assessing the viability to utilize it as a diluent source.

5.3 Groundwater Evaluation Requirements

Prior to initiation of the GRRP, monitoring wells must be constructed to allow analysis of the groundwater to establish baseline water quality. These monitoring wells should access all potentially impacted aquifers. Construction of these monitoring wells is included in the recommended Advanced Treatment Evaluation scope, schedule and budget included in Section 8. This information will be used to evaluate future impact of the GRRP on groundwater quality. Analyses of each potentially impacted aquifer should include analyses as described above under “Recycled Water Monitoring Requirements”.

Per CCR Title 22, Sections 60320.126 and 60320.226, the Project Sponsor must site and construct at least two monitoring wells downgradient of the GRRP. One monitoring well must be located between two weeks to six months travel time through the saturated zone and at least 30 days upgradient of the nearest drinking water well; the second monitoring well must be located between the GRRP and the nearest downgradient drinking water well. The monitoring wells must allow for samples to be obtained independently from each aquifer that will receive the GRIP water and validated as receiving recharge water from the GRRP. For new projects, the Project Sponsor must collect two samples prior to GRRP operation¹ and at least one sample each quarter after operations begin. Each sample must be analyzed for nitrogen, nitrate, nitrite, SMCLs, Priority Pollutants, contaminants specified by DDW or RWQCB taking into consideration the groundwater basin quality, the source control inventory, and the results of the recycled water monitoring.

As stipulated in the regulations, one of the monitoring wells shall be located to monitor recharged water that has migrated within the aquifer for not less than two weeks but not more than six months. The second monitoring well shall be located between the GRRP and the nearest downgradient drinking water well. As part of the project design, specification of the number and depths of discrete monitoring levels will be established to track any differences in water quality migrating through the main aquifers. GRRP regulations require that the monitoring wells access all potentially affected aquifers, which would indicate that they must extend about 300 feet below ground surface to the base of Zone E.

5.4 GRRP Monitoring Requirements and Costs

There are two phases of monitoring required: prior to construction and during GRRP operation.

Pre-construction period

Prior to operation of the GRRP it will be necessary to establish a baseline of water quality both for the WRF effluent and for dilution water. This information will be used to evaluate the effectiveness of SAT and the capabilities required of the advanced treatment process. The analytical work that will be required is

¹ Note: CCR Title 22 Section 60320.200(c) requires the Project Sponsor to conduct background monitoring consisting of least four samples (one sample each quarter) from each potentially affected aquifer before operations begin for nitrogen compounds, regulated constituents and physical characteristics, TOC, Priority Pollutants, and any contaminants specified by DDW or RWQCB taking into consideration the groundwater basin quality and the source control inventory.

described above under Recycled Water Monitoring Requirements. Table 2 presents a preliminary analysis of the cost of monitoring during this period.

Table 2					
Pre-construction Analytical Cost					
Test	Frequency (number per year)			Cost per Analysis	Annual Cost
	WRF Effluent	Diluent	Total per Year		
Inorganic Chemicals	4	4	8	\$650	\$5,200
Radionuclides	4	4	8	\$650	\$5,200
Organic Chemicals	4	4	8	\$1975	\$15,800
DBPs	4	4	8	\$400	\$3,200
Lead and Copper	4	4	8	\$42	\$336
TOC	48		48	\$65	\$3,120
Total Nitrogen	52		52	\$70	\$3,640
Total Annual (rounded)					\$40,000
Notes: Costs reflect lab analyses only, based on 2017 rates, and do not include sampling costs.					
These costs, with the exception of Total Nitrogen, are in addition to analyses currently being conducted at the WRF.					

Operation period

Additional monitoring will be required during operation of the GRRP. Two monitoring wells will be added to the analytical regime, with the same analytical requirements as the WRF effluent and diluent water. Table 3 presents the anticipated annual analytical cost during operation of the GRRP. Quarterly groundwater monitoring should start at least one year before operation.

Test	Frequency (number per year)				Cost per Analysis	Annual Cost
	WRF Effluent	Diluent	Monitoring Wells (2)	Total per Year		
Inorganic Chemicals	4	4	8	16	\$650	\$10,400
Radionuclides	4	4	8	16	\$650	\$10,400
Organic Chemicals	4	4	8	16	\$1975	\$31,600
DBPs	4	4	8	16	\$400	\$6,400
Lead and Copper	4	4	8	16	\$42	\$672
TOC	48			48	\$65	\$3,120
Total Nitrogen	104			104	\$70	\$7,280
Total Annual (rounded)						\$70,000
Notes: Costs reflect lab analyses only, based on 2017 rates, and do not include sampling costs. These costs are in addition to analyses currently being conducted at the WRF, with the exception of half of the Total Nitrogen tests.						

6.0 Soil Aquifer Treatment (SAT) Evaluation

SAT has been shown to be effective at removing many problematic constituents including TOC, nitrate, constituents of emerging concern (CECs), pharmaceuticals and personal care products² (PPCPs), NDMA, THMs, and HAAs. SAT is a sustainable and natural biodegradation process which reduces organic carbon through natural processes; it needs organic carbon to be effective, and consumes the organic carbon as part of the process, thereby reducing the TOC concentration in the recharged water. Testing at other locations indicates that a substantial amount of TOC reduction occurs in the first two meters of soil, where the water remains well aerated. The GRRP project sponsor is required to assess the SAT process through monitoring of TOC, indicator compounds³ and any surrogate parameters as approved by DDW. The sponsor will conduct demonstration studies to establish a SAT factor which will be used to predict the removal efficiency that occurs as the recharged water passes through the vadose zone. The key demonstration study is an 'occurrence study' which will determine the occurrence of indicator compounds in the recycled water. Based on this study, at least three indicator compounds will be identified for future evaluation of monitoring samples collected from a downgradient monitoring well.

We recommend completing an SAT Evaluation early in the Treatment Evaluation to allow for an evaluation of the additional treatment that will be required, and to refine the costs and feasibility of the GRRP. To

² PPCPs include chemicals such as soaps, detergents, shampoo, cosmetics, sunscreen products, fragrances, insect repellants and antibacterial compounds.

³ Indicator compounds used at other GRRP sites have included the following: caffeine, DEET, sucralose, NDMA, gemfibrozil, and others.

predict the SAT factor that can be applied to determine the post-SAT water quality of the recharged water, a series of technical evaluations will be conducted, to include the following elements:

1. Review of existing studies and analytical results of SAT evaluations prepared for similar GRRPs.
2. Based upon detailed coordination with the DDW, the design and execution of a soil column bench-top analytical study will be prepared. This soil column study will include collection of soil cores from the Los Osos Creek bed sediments, 2-3 months of soil column percolation using the LOWRF recycled water, water quality tracking, and preparation of a summary report.
3. Results from the soil column study will be used to support geochemical modeling of the anticipated water quality of the recharge water following SAT.

The main work items for the SAT Evaluation and schedule is anticipated as follows:

Develop SAT workplan	1 month
Provide workplan to DDW for review	2 weeks
Collect soil cores and recycled water samples	2 weeks
Conduct soil column testing	3 months
Evaluate results, prepare summary report	1 month
Review results with DDW	2 weeks

Results of the SAT Evaluation should be incorporated into the future Title 22 Engineering Report, should the project move to the preliminary design and permitting phase.

7.0 Advanced Treatment Evaluation

7.1 Effluent Treatment Requirements

Regulations lay out specific requirements for water quality for a GRRP. These include:

- Meet all MCLs and Notification Levels for regulated contaminants.
- Provide 12-log enteric virus reduction
- Provide 10-log Giardia cyst reduction
- Provide 10-log Cryptosporidium oocyst reduction.
- Provide total nitrogen no more than 10 mg/L.

These requirements must be met by a combination of tertiary treatment at the LOWRF, SAT, and any advanced treatment processes that are required to make up a shortfall.

7.2 Effluent Treatment Options

If SAT and existing tertiary treatment components of the LOWRF do not meet effluent treatment requirements, additional advanced treatment will be needed. The type of treatment process required will be determined by whatever treatment requirement is not met. Potential treatment processes include:

- Membrane treatment using membrane filtration and reverse osmosis. This is the “gold standard” of treatment, providing very effective microbial treatment as well as removal of TOC and trace organics. However, the process produces a significant concentrate stream that requires disposal. There is currently no identified feasible disposal method, making this treatment option generally infeasible.
- Granular activated carbon (GAC) adsorption. GAC treatment is effective at removing TOC and trace organics, but is not effective at removing microbiological pathogens. While GAC will remove organics to very low concentrations, it has a limited capacity. Frequent replacement would be expected, leading to relatively high operating cost. Therefore, even though it has relatively low capital cost, GAC treatment is typically not as cost effective as other treatment options. Capital cost for a GAC treatment system of this size is anticipated to cost \$750,000 to \$1,250,000⁴. Assuming GAC life of 1000 bed volumes, cost of replacing the GAC can be expected to be about \$2,200 per acre-foot of treated water.
- Ozone followed by biologically active carbon (BAC). In this process, ozone is used to partially break down refractive organics and TOC, making them more accessible to destruction by bacterial action. Granular activated carbon provides a substrate for bacteria to grow. Since the organic removal is performed by bacteria rather than GAC adsorption, GAC replacement is very infrequent, reducing operating cost. The primary cost is for ozone generation. The process has been shown to remove around 30 percent of TOC, and can be effective for destruction of trace organics. This is a potentially attractive treatment process. Capital cost of an ozone/BAC system can be expected to range from \$2.5-\$3.5 million. Operating cost of an ozone/BAC system will be around \$200 per acre-foot.
- Advanced oxidation processes (AOP). While there are several AOP processes that could be used, in the most typical process ultraviolet light (UV) is used to activate an oxidizing chemical such as hydrogen peroxide. This significantly increases the oxidizing power of the peroxide, and can result in complete destruction of organic substances. Chemical cost of AOP processes is relatively small, but the energy input for the UV system can be significant. This is a potentially attractive treatment process. Capital cost of an AOP system can be expected to range from \$3 to \$4 million. Operating cost of the AOP system is expected to range from \$400 - \$700 per acre-foot.

7.3 Pilot Testing

After the SAT treatment evaluation has been performed and advanced treatment requirements have been estimated, it is anticipated that DDW will require actual tests on the LOWRF effluent to determine the effectiveness of the proposed treatment processes. These tests will help to determine the viability of treatment as well as the expected cost of the GRRP. It is assumed the pilot testing would occur during Phase 2, as described in Section 8. Alternatively, the testing could be deferred to coincide with preliminary design and permitting.

⁴ Costs in this section are constructed cost of the treatment system. This includes the treatment equipment installed on a foundation with all associated piping, electrical, and control systems included.

Ozone / BAC Pilot Test

This is a biological process, and as a result requires a significant run time to establish the microbiological colonies. In addition, since GAC is used a substrate, it is necessary to run the pilot past the expected exhaustion of the GAC to be able to see the biological activity. Otherwise the bacterial action may be masked by the adsorption capability of the GAC. Therefore, an ozone/BAC pilot test could be expected to last over six months.

Components of the ozone/BAC pilot would include:

- A small ozone generator
- A small GAC contactor vessel
- Associated tanks and pumps

Capacity of the system should be kept to less than 5 gpm. Source water would be tertiary effluent. Treated water would be returned to the WRF for retreatment. Preconfigured ozone/BAC pilot systems are available for rent from equipment suppliers. Typical rental fee is \$10,000 per month, not including installation and demobilization. It may be possible to obtain the pilot system with GAC that was used in a previous test. This would eliminate the run time associated with exhausting the GAC, which would reduce the testing period by several months. However, sufficient run time to allow establishment of locally acclimated bacteria cultures would still be needed. A minimum run time of three months should be assumed, with the potential for up to eight months if virgin GAC is used.

Advanced Oxidation Process Pilot

Since AOP is a physical/chemical process, the required run time would be substantially less than for ozone/BAC. However, it would still be necessary to run several different doses of both UV and peroxide, and obtain results of these various doses, in order to predict performance. A minimum run time of at least a month should be assumed.

Components of the AOP pilot would include:

- Chemical storage and metering system
- UV contactor
- Associated tanks and pumps

Capacity should be limited to less than 10 gpm. Source water would be tertiary effluent. Treated water would be returned to the WRF for retreatment. It might be necessary to add filtration to the effluent if turbidity is excessive (say above 2 NTU consistently). Preconfigured AOP pilot systems are available for rent. Typical rental fee is \$10,000 per month, not including installation and demobilization.

Conceptual Costs of Treatment

Results of pilot testing will be used to develop preliminary designs of the advanced treatment processes, which will in turn be used to develop feasibility-level cost of treatment. Capital and operating and

maintenance cost estimates will then be used as a basis for evaluating the feasibility of implementing the GRRP.

8.0 Treatment Evaluation Workplan

8.1 Treatment Evaluation Scope

The Los Osos Creek GRRP Treatment Evaluation is intended to develop the background information and evaluations necessary for preliminary design and permitting of the project. Simultaneously, the work will further refine the estimated costs of the GRRP and allow for continued evaluation of the project feasibility.

The recommended Treatment Evaluation scope consists of the following tasks:

1. **Develop Water Quality Baseline**
This task will consist of obtaining and analyzing samples of LOWRF effluent and Los Osos Creek baseline flows according to the analytical schedule presented in “GRRP Testing and Monitoring Requirements”. Samples will be taken and analyzed quarterly throughout the feasibility and preliminary design phases. Groundwater water quality baseline will require installation of two new monitoring wells (described under Task 3, Hydrogeological Analysis). A minimum of four quarterly sampling events is required, with additional sampling required if any constituents exceed MCLs or NLs.
2. **SAT Evaluation**
This task requires that a SAT testing plan be developed and approved by the DDW. It is anticipated that soil column testing will be required to develop a site-specific SAT factor. Following approval of the testing plan, soil samples will be obtained and the treatment analysis performed. Results of the SAT study will be compiled in a report and reviewed with the DDW.
3. **Hydrogeological Analysis**
This task will use existing technical reports to develop a description of the hydro-stratigraphy beneath the GRRP. Groundwater flows and directions will be reviewed and existing water quality based upon existing wells will be documented. Next, two monitoring wells will be constructed per the GRRP requirements and four quarterly rounds of monitoring will be performed to establish groundwater elevation contours and water quality.
4. **Source Water Evaluation**
This task includes a source water evaluation per the California-Nevada Section of AWWA Watershed Sanitary Survey Guidance Manual (1993), required for approval of the diluent water and part of the Title 22 Engineering Report.
5. **Treatment Evaluation**
Using the results of the SAT analysis, develop a preliminary specification for requirements of the Advanced Treatment system. This analysis will compare expected chemical and microbiological treatment capabilities of the current LOWRF and SAT with requirements specified in the regulations. One or more treatment trains capable of meeting water quality targets will be developed. The results of this task will be compiled in the GRRP Feasibility Report (Task 7).

6. Pilot studies

At this time, it is recommended that two technologies for advanced treatment of WRF effluent be tested – ozone/BAC and UV/peroxide oxidation. Pilot testing for ozone/BAC requires a minimum of six months to allow the carbon to become exhausted and convert to biological mode. Monthly analysis of TOC and trace organics will be required during the pilot test.

7. GRRP Feasibility Report

Results of the preceding work will be compiled into a comprehensive GRRP Feasibility Report. The Report will present recommendations and predictions for SAT and advanced treatment, proposed process train(s), and include recommendations and estimated costs for pilot testing. Maps showing major GRRP facilities, including monitoring wells, will be provided. A detailed cost analysis will be included, based on the SAT Evaluation and preliminary estimates for advanced treatment. If the results of the feasibility report are favorable, and the GRRP is pursued, the Feasibility Report will provide the basis for a Title 22 Engineering Report.

8.2 Recommended Treatment Evaluation Schedule and Budget

The Los Osos Creek GRRP Treatment Evaluation will require about 18 months to implement. The anticipated schedule is provided in Table 4 and the recommended budget is summarized in Table 5. We recommend dividing the Treatment Evaluation work into two phases, prioritizing the SAT Evaluation. The SAT factor (amount of treatment anticipated through the soil aquifer underneath Los Osos Creek) will influence the amount of additional treatment required at the LOWRF and determination.

Table 4 Preliminary Los Osos Creek GRRP Treatment Evaluation Schedule		
Task	Start	Finish
Phase 1		
1. Develop water quality baseline	Kickoff	Sample quarterly for 12 months
2. SAT Evaluation	Kickoff	6 months
Phase 2		
3. Hydrogeological Analysis	SAT Completion (6 months)	18 months (Sample quarterly for 12 months)
4. Source Water Evaluation	SAT Completion (6 months)	9 months
5. Treatment Evaluation	SAT completion (6 months)	8 months
6. Pilot Studies	SAT Completion	8 months
7. Feasibility Report	Treatment Evaluation (8 months)	Hydrogeological Analysis (18 months)
Note: All times are from months from kickoff. It is assumed that design and permitting would occur simultaneously, and after completion of the Feasibility Report.		

Table 5 Recommended Los Osos Creek GRRP Treatment Evaluation Budget			
Task	Recommended Budget		
	Planning/ Engineering	Sampling/Lab Costs	Total
Phase 1			
1. Develop water quality baseline	\$ 14,000	\$ 41,000	\$ 55,000
2. SAT Evaluation	\$ 47,000	\$ 25,000	\$ 72,000
Allowance for DDW Review	\$ 5,000	-	-
Subtotal Phase 1	\$ 66,000	\$ 66,000	\$ 132,000
Phase 2			
3. Hydrogeological Analysis	\$ 55,000	\$ 32,000	\$ 87,000
4. Design/Construct 2 nested monitoring wells	\$ 20,000	\$ 100,000	\$ 120,000
5. Source Water Evaluation	\$ 10,000	-	\$ 10,000
6. Treatment Evaluation	\$ 27,000	-	\$ 27,000
7. Pilot Studies	\$ 15,000	\$ 150,000	\$ 165,000
8. Feasibility Report	\$ 26,000	-	\$ 26,000
9. Allowance for DDW Review	\$ 15,000	-	\$ 15,000
Subtotal Phase 2	\$ 168,000	\$ 282,000	\$ 450,000
Total Phase 1 + Phase 2	\$ 234,000	\$ 348,000	\$ 582,000
Note: Task 3, Hydrogeological Analysis, includes 1 year of quarterly groundwater sampling/analyses of the two new monitoring wells.			

Los Osos Creek Water Quality Sampling Results

Sample taken May 30, 2017 1400 GPS: lat. 35°17'56.31"; long. 120°49'26.07" pH =7.97, EC = 896 µS/cm, T = 16.1 °C, estimated flow = 2.4 cfs

Constituent	Result	PQL	MCL , SMCL, or NL	Units	Exceedance? Y/N
Total Hardness as CaCO3	402	2.5	N/A	--	N/A
Calcium	64	1	N/A	mg/L	N/A
Magnesium	59	1	N/A	mg/L	N/A
Potassium	1	1	N/A	mg/L	N/A
Sodium	36	1	N/A	mg/L	N/A
Total Cations	9.6	0.1	N/A	mg/L	N/A
Boron	0.1	0.1	1	mg/L	N
Copper	ND	10	1.3	mg/L	N
Iron	30	30	300	ug/L	N
Manganese	10	10	50	ug/L	N
Zinc	ND	20	N/A	ug/L	N/A
SAR	0.8	0.1	N/A	--	N/A
Total Alkalinity (as CaCO3)	300	10	N/A	mg/L	N/A
Hydroxide as OH	ND	10	N/A	mg/L	N/A
Carbonate as CO3	ND	10	N/A	mg/L	N/A
Bicarbonate as HCO3	370	10	N/A	mg/L	N/A
Sulfate	103	0.5	N/A	mg/L	N/A
Chloride	57	1	N/A	mg/L	N/A
Nitrate as NO3	ND	0.5	45	mg/L	N
Nitrite as N	ND	0.2	1.0	mg/L	N
Nitrate + Nitrite as N	ND	0.1	10	mg/L	N
Fluoride	0.2	0.1	2	mg/L	N
Total Anions	9.8	0.1	N/A	meq/L	N/A
pH	7.8	--	N/A	units	N/A
Specific Conductance	886	1	N/A	umhos/cm	N/A
Total Dissolved Solids	550	20	N/A	mg/L	N/A
MBAS (foaming agents)	Negative	0.1	N/A	mg/L	N/A
Aggressiveness Index	12.5	1	N/A	--	N/A
Langelier Index (20°C)	0.6	1	N/A	--	N/A
Nitrate Nitrogen	ND	0.1	10	mg/L	N
Aluminum	ND	10	200	ug/L	N
Antimony	ND	1	10	ug/L	N
Arsenic	ND	2	10	ug/L	N
Barium	127	0.2	1000	ug/L	N
Beryllium	ND	1	0	ug/L	N
Cadmium	ND	0.2	5	ug/L	N
Chromium	7	1	50	ug/L	N
Lead	ND	0.5	15	ug/L	N
Mercury	ND	0.02	2	ug/L	N
Nickel	4	1	100	ug/L	N
Selenium	ND	1	50	ug/L	N
Silver	ND	1	N/A	ug/L	N/A
Thallium	ND	0.2	2	ug/L	N
Vanadium	5	2	15	ug/L	N
Chromium VI	0.2	0.1	10	ug/L	N
Cyanide, Total	ND	0.004	0.15	mg/L	N

Perchlorate	ND	2	6	ug/L	N
DBCP	ND	0.01	0	ug/L	N
EDB	ND	0.02	0.05	ug/L	N
Alachlor	ND	0.2	2	ug/L	N
Aldrin	ND	0.075	N/A	ug/L	N/A
Chlordane	ND	0.1	0.1	ug/L	N
Dieldrin	ND	0.01	N/A	ug/L	N/A
Endrin	ND	0.01	2	ug/L	N
Heptachlor	ND	0.01	0.01	ug/L	N
Heptachlor Epoxide	ND	0.01	0.01	ug/L	N
Hexachlorobenzene	ND	0.01	1	ug/L	N
Hexachlorocyclopentadiene	ND	0.1	50	ug/L	N
Lindane (Gamma BHC)	ND	0.05	0.2	ug/L	N
Methoxychlor	ND	0.1	30	ug/L	N
Toxaphene	ND	0.5	3	ug/L	N
PCB 1016	ND	0.5	N/A	ug/L	N/A
PCB 1221	ND	0.5	N/A	ug/L	N/A
PCB 1232	ND	0.5	N/A	ug/L	N/A
PCB 1242	ND	0.5	N/A	ug/L	N/A
PCB 1248	ND	0.5	N/A	ug/L	N/A
PCB 1254	ND	0.5	N/A	ug/L	N/A
PCB 1260	ND	0.5	N/A	ug/L	N/A
Alachlor	ND	1	2	ug/L	N
Atrazine	ND	0.5	1	ug/L	N
Bromacil	ND	2	N/A	ug/L	N/A
Butachlor	ND	0.38	N/A	ug/L	N/A
Diazinon	ND	2	N/A	ug/L	N/A
Dimethoate	ND	2	N/A	ug/L	N/A
Metolachlor	ND	1	N/A	ug/L	N/A
Metribuzin	ND	0.5	N/A	ug/L	N/A
Molinate	ND	2	20	ug/L	N
Prometryne	ND	2	N/A	ug/L	N/A
Propachlor	ND	0.5	N/A	ug/L	N/A
Simazine	ND	0.5	4	ug/L	N
Thiobencarb	ND	1	70	ug/L	N
Cyanazine	ND	0.5	N/A	ug/L	N/A
Bentazon	ND	2	18	ug/L	N
2,4-D	ND	2	70	ug/L	N
Dalapon	ND	10	200	ug/L	N
Dicamba	ND	1	N/A	ug/L	N/A
Dinoseb	ND	1	7	ug/L	N
Pentachlorophenol	ND	0.2	1	ug/L	N
Picloram	ND	1	500	ug/L	N
2,4,5-TP (Silvex)	ND	1	50	ug/L	N
2,4,5-T	ND	1	N/A	ug/L	N/A
Benzene	ND	0.5	1.0	ug/L	N
Bromobenzene	ND	0.5	N/A	ug/L	N/A
Bromochloromethane	ND	0.5	N/A	ug/L	N/A
Bromodichloromethane	ND	0.5	80	ug/L	N
Bromoform	ND	0.5	80	ug/L	N
Bromomethane	ND	0.5	N/A	ug/L	N/A
n-Butylbenzene	ND	0.5	260	ug/L	N

sec-Butylbenzene	ND	0.5	260	ug/L	N
tert-Butylbenzene	ND	0.5	260	ug/L	N
Carbon Tetrachloride	ND	0.5	0.5	ug/L	N
Chlorobenzene	ND	0.5	70	ug/L	N
Chloroethane	ND	0.5	N/A	ug/L	N/A
Chloroform	ND	0.5	80	ug/L	N
Chloromethane	ND	0.5	N/A	ug/L	N/A
2-Chlorotoluene	ND	0.5	140	ug/L	N
4-Chlorotoluene	ND	0.5	140	ug/L	N
Dibromochloromethane	ND	0.5	80	ug/L	N
Dibromomethane	ND	0.5	N/A	ug/L	N/A
1,2-Dichlorobenzene	ND	0.5	600	ug/L	N
1,3-Dichlorobenzene	ND	0.5	N/A	ug/L	N/A
1,4-Dichlorobenzene	ND	0.5	5	ug/L	N
Dichlorodifluoromethane	ND	0.5	1000	ug/L	N
1,1-Dichloroethane	ND	0.5	5	ug/L	N
1,2-Dichloroethane	ND	0.5	0.5	ug/L	N
1,1-Dichloroethylene	ND	0.5	6.0	ug/L	N
cis-1,2-Dichloroethylene	ND	0.5	6.0	ug/L	N
trans-1,2-Dichloroethylene	ND	0.5	6.0	ug/L	N
1,2-Dichloropropane	ND	0.5	0.5	ug/L	N
1,3-Dichloropropane	ND	0.5	0.5	ug/L	N
Dichloromethane	ND	0.5	5.0	ug/L	N
2,2-Dichloropropane	ND	0.5	N/A	ug/L	N/A
1,1-Dichloropropene	ND	0.5	N/A	ug/L	N/A
cis-1,3-Dichloropropene	ND	0.5	N/A	ug/L	N/A
trans-1,3-Dichloropropene	ND	0.5	N/A	ug/L	N/A
1,3-Dichloropropene (Total)	ND	---	N/A	ug/L	N/A
Di-isopropyl ether (DIPE)	ND	3	N/A	ug/L	N/A
Ethyl Benzene	ND	0.5	300	ug/L	N
Ethyl tert-Butyl Ether (ETBE)	ND	3	N/A	ug/L	N/A
Hexachlorobutadiene	ND	0.5	N/A	ug/L	N/A
Isopropylbenzene	ND	0.5	770	ug/L	N
p-Isopropyltoluene	ND	0.5	N/A	ug/L	N/A
Methyl tert-Butyl Ether (MTBE)	ND	1	13	ug/L	N
Naphthalene	ND	0.5	N/A	ug/L	N/A
n-Propylbenzene	ND	0.5	260	ug/L	N
Styrene	ND	0.5	100	ug/L	N
Tert-amyl-methyl Ether (TAME)	ND	3	N/A	ug/L	N/A
1,1,1,2-Tetrachloroethane	ND	0.5	N/A	ug/L	N/A
1,1,2,2-Tetrachloroethane	ND	0.5	1	ug/L	N
Tetrachloroethylene	ND	0.5	5	ug/L	N
Toluene	ND	0.5	150	ug/L	N
1,2,3-Trichlorobenzene	ND	0.5	N/A	ug/L	N/A
1,2,4-Trichlorobenzene	ND	0.5	5	ug/L	N
1,1,1-Trichloroethane	ND	0.5	200	ug/L	N
1,1,2-Trichloroethane	ND	0.5	5	ug/L	N
Trichloroethylene	ND	0.5	5	ug/L	N
Trichlorofluoromethane	ND	0.5	150	ug/L	N
1,1,2-Trichlorotrifluoroethane	ND	0.5	N/A	ug/L	N/A
1,2,4-Trimethylbenzene	ND	0.5	330	ug/L	N
1,3,5-Trimethylbenzene	ND	0.5	330	ug/L	N

Vinyl Chloride	ND	0.5	0.5	ug/L	N
Xylenes m,p	ND	0.5	N/A	ug/L	N/A
Xylenes o	ND	0.5	N/A	ug/L	N/A
Xylenes (Total)	ND	---	1750	ug/L	N
Total Trihalomethanes	ND	---	80	ug/L	N
Aldicarb	ND	3	N/A	ug/L	N/A
Aldicarb Sulfone	ND	2	N/A	ug/L	N/A
Aldicarb Sulfoxide	ND	3	N/A	ug/L	N/A
Carbaryl	ND	5	N/A	ug/L	N/A
Carbofuran	ND	5	18	ug/L	N
3-Hydroxycarbofuran	ND	3	N/A	ug/L	N/A
Methomyl	ND	2	N/A	ug/L	N/A
Oxamyl	ND	5	50	ug/L	N
Glyphosate	ND	20	70	ug/L	N
Endothall	ND	40	100	ug/L	N
Diquat	ND	2	20	ug/L	N
TOC	2.3	0.3	N/A	mg/L	N/A
Gross Alpha	4.06		15	pCi/L	N
Gross Beta	0.457		50	pCi/L	N
Uranium	1.68		20	pCi/L	N
1,2,3-Trichloropropane	ND	0.005	0.005	ug/L	N