

LOS OSOS GROUNDWATER BASIN, BASIN MANAGEMENT COMMITTEE

NOTICE OF MEETING

NOTICE IS HEREBY GIVEN that the Los Osos Groundwater Basin, Basin Management Committee Board of Directors will hold a **Regular Board Meeting at 1:30 P.M. on Wednesday, May 17, 2023** at the **Los Osos Community Services District Boardroom**, located at 2122 9th Street, Suite 106, Los Osos, CA 93402 Members of the public may participate in this meeting in person or via teleconference and/or electronically.

For quick access, go to <https://us04web.zoom.us/j/778762508>

(This link will help connect both your browser and telephone to the call)

If not using a computer, dial 1 (669) 900-6833 or 1 (346) 248-779 and enter **778 762 508**

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

- Email at danheimel@ConfluenceES.com by 5:00 PM on the day prior to the Committee meeting.
- Teleconference by phone at 1 (669) 900-6833 and enter **778 762 508**
- Teleconference by phone at 1 (346) 248-7799 and enter **778 762 508**
- Teleconference meeting at <https://us04web.zoom.us/j/778762508>
- Mail by 5:00 PM on the day prior to the Committee meeting to:
Attn: Dan HeimeI (Basin Management Committee)
2122 9th St.
Suite 110
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 participate in the meeting. Persons who require accommodation for any audio, visual or other disability in order to participate in the meeting of the BMC are encouraged to request such accommodation 48 hours in advance of the meeting from Dan HeimeI at danheimel@ConfluenceES.com.

BASIN MANAGEMENT COMMITTEE BOARD OF DIRECTORS AGENDA

1. CALL TO ORDER

2. ROLL CALL

3. PLEDGE OF ALLEGIANCE

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. SPECIAL PRESENTATION

None

6. 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. 2023 Budget Update and Invoice Register**
- b. Approval of Minutes from March 15, 2023 BMC Meeting**

7. PUBLIC COMMENTS ON ITEMS NOT APPEARING ON THE AGENDA

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

8. EXECUTIVE DIRECTOR'S REPORT

9. ACTION ITEMS

- a. Presentation of Draft 2022 BMC Annual Monitoring Report**

Recommendation: Receive a presentation from Basin Management Committee (BMC) staff on the Public Draft 2022 Annual Monitoring Report (AMR) and confirm schedule for BMC to consider approval of the Final Draft 2022 AMR and submission to the Court.

- b. Recommendation for selection of Cleath-Harris Geologists to complete the WRF Study for the BMC**

Recommendation: Receive recommendation and approve the selection of Cleath-Harris Geologists to complete the WRF Study for the BMC or provide alternate direction to staff.

10. ADJOURNMENT

TO: Los Osos Basin Management Committee

FROM: Daniel Heimel, Executive Director

DATE: May 17, 2023

SUBJECT: Item 6 – Approval of Budget Update/Invoice Register and Meeting Minutes

Recommendations

Staff recommends that the BMC review and consider approval of Budget/Invoice Register and Meeting Minutes or provide alternate direction to Staff.

Discussion

BMC Staff has prepared a summary of costs incurred as compared to the adopted budget and a running invoice register and Meeting Minutes from previous BMC Meetings (see Attachments).

BASIN MANAGEMENT COMMITTEE BOARD OF DIRECTORS

Agenda Item 6b: Minutes of the Meeting of March 15, 2023

The following is a summary of the actions taken at the Basin Management Committee Board of Directors Meeting.
The official record for the meeting is the recording that can be found at:

<https://slo-span.org/static/meetings-LOBMC.php>

Agenda Item	Discussion or Action
1. Call to Order	Director Zimmer called the meeting to order at approximately 1:30 PM.
2. Roll Call	Daniel Heimel, Executive Director, called roll to begin the meeting. Director Reineke, Director Gibson, Chair Zimmer
3. Pledge of Allegiance	
9. Action Items	Recommendation: Receive letter from Los Osos CSD regarding change in BMC Director and Alternate Director positions.
a. Los Osos CSD BMC Director Change	Public Comment None
b. Appointment of Remaining BMC Officers for Calendar Year 2023	Recommendation: For the BMC to review the existing remaining officer positions and appoint officers for CY 2023 or provide alternative direction to staff. Public Comment None Board Action (07:44) Appointment Director Cesena as Vice-Chair, Director Gibson as Treasurer, Director Reineke as Secretary of the BMC for 2023. Motion: Director Gibson Second: Director Cesena Ayes: All Nays: None Abstain: None Absent: None
4. Board Member Comments	None
5. Special Presentation	Lower Aquifer Nitrate Contamination Investigation Update - Regional Water Quality Control Board Representative (09:10) Public Comment (45:25) Larry Raio Jeff Edwards Deborah Howe Lynette Tornatzky
6. Consent Agenda	Public Comment None
6a. 2023 Budget Update and Invoice Register	Board Action 6a and 6b (1:14:50) Approve Consent Agenda.

<p>6b. Approval of Minutes from February 15th, 2023 BMC Meeting</p>	<p>Motion: Director Gibson Second: Director Cesena Ayes: All Nays: None Abstain: None Absent: None</p>
<p>7. Public Comments on Items Not Appearing on the Agenda</p>	<p>Public Comment (1:15:00) Jeff Edwards Howard Weinstein Linde Owen Becky McFarland</p>
<p>8. Executive Director's Report</p>	<p>Public Comment (1:34:38) Jeff Edwards Linde Owen Becky McFarland</p>
<p>9c. Draft Los Osos Basin Sustainable Yield Update for Program C Wells with Adaptive Method Technical Memorandum</p>	<p>Recommendation: Receive an update on the Draft Los Osos Basin Sustainable Yield Update for Program C Wells with Adaptive Method Technical Memorandum.</p> <p>Board Direction Bring an Adaptive Management item for potential re-inclusion of a third well in Program C at a future BMC Meeting.</p> <p>Public Comment (2:10:38) Lynette Tornatzky Lindy Owen Becky McFarland</p>
<p>10. Adjournment</p>	<p>Meeting adjourned at approximately 3:52 PM. The next regularly scheduled meeting is Wednesday, April 19th, 2023, at 1:30 PM.</p>

TO: Los Osos Basin Management Committee

FROM: Dan Heimel, Executive Director

DATE: May 17, 2023

SUBJECT: Item 8 – Executive Director’s Report

Recommendations

Staff recommends that the Basin Management Committee (BMC) receive and file the report and provide staff with any direction for future discussions. Sections of the Executive Director’s Report that have been updated or significantly changed from the previous meeting’s version are underlined and sections of the report that have not had any recent or anticipated updates have been removed.

Discussion

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

Presentations

No recent or planned presentations

Funding and Financing Programs to Support Basin Plan Implementation

WRFP Grant: On 2/11/2022 the Los Osos Community Services District (Los Osos CSD) submitted an application for a WRFP grant to develop a transient model and analyze recycled water and supplemental water projects to improve the sustainability of the Los Osos Basin (WRFP Study). Los Osos CSD was notified of the award of the grant in January 2023 and all the required documents were signed and fully executed. The Los Osos CSD released the RFP for the WRFP Study on February 27th, 2023 and proposals were due March 31st, 2023. The WRFP Study Consultant Selection Committee reviewed the proposals and interviewed the two top ranked consulting firms and provided the BMC with a recommendation in Agenda Item 9b.

BMC Staff will continue to monitor potential additional grant funding opportunities and bring information on these opportunities to the BMC for consideration as they become available.

Status of BMC Initiatives

DWR AEM Survey: In December 2022, BMC Staff were notified that the Los Osos Basin would be included in the Department of Water Resources (DWR) upcoming Statewide Airborne Electromagnetic (AEM) Survey in Spring 2023. To assist DWR in preparing flight lines for the AEM Survey, BMC Staff provided DWR with lithologic information for the Los Osos Basin and prepared an Area of Interest Map.

The data collected during the AEM survey will improve DWR and the BMC's understanding of Los Osos Basin hydrogeology and seawater intrusion. The AEM Survey for the San Luis Obispo and Santa Barbara County basins was initiated on April 26th, 2023, however, due to weather conditions and the need to support emergency flood response efforts elsewhere in the State, DWR was not able to complete the survey of the Los Osos Basin. DWR has indicated that they will return in Fall 2023 to complete the survey. Additional information on DWR's Statewide AEM Survey Project can be found here: <https://water.ca.gov/Programs/Groundwater-Management/Data-and-Tools/AEM>

Sustainable Yield: At its October 27th, 2021 Meeting, the BMC unanimously approved an updated Sustainable Yield estimate of 2,380 Acre-Feet per Year (AFY) for Calendar Year 2022 and at its October 19th, 2023 Meeting, the BMC unanimously approved retaining the current Sustainable Yield estimate of 2,380 AFY for CY 2023 for the following reasons: 1) No new infrastructure, not already considered in the 2022 Sustainable Yield Estimate, has been constructed; 2) estimates for the development of the Broderson Mound and long-term average rainfall were updated and incorporated into the CY 2022 Sustainable Yield Estimate and are not anticipated to change significantly on a year-over-year basis; 3) no significant hydrogeologic investigations have been conducted that would warrant an update to the steady-state groundwater model utilized to develop the Sustainable Yield Estimate.

Los Osos Basin Well Database: Cleath-Harris Geologists (CHG) completed the development of the Los Osos Basin Well Database and after review by BMC and BMC Party Staff an overview of the database will be presented to the BMC at a future meeting.

Basin Monitoring Program Improvement: BMC Staff are working on permitting and construction of a new monitoring well at the eastern end of Skyline Drive in 2023.

Basin Metric Evaluation: Analysis of potential modifications to the Basin Metric's is currently on hold. Proposed modifications to the metrics were provided to BMC Party Staff for review. However, BMC Party Staff requested that potential improvements to the existing BMC Monitoring Program (i.e. modifications to an existing wells or a new monitoring well) be evaluated prior to modifying the Basin Metrics. BMC Staff are currently working on construction of a new monitoring well at the eastern end of Skyline Drive. This new well could be incorporated into the updated Basin Metrics. Once the new monitoring well is completed, recommendations on potential modifications to the Basin Metrics will be brought to the BMC for their consideration.

Transient Groundwater Model: See update under WRFPP Grant above.

Lower Aquifer Nitrate Investigation: On October 19th, 2022 the BMC authorized Calendar Year (CY) 2022 funding to perform additional Nitrate Source Investigation to better understand the source of nitrate impacting the S&T Mutual Water Company's LA8 Well. However, due to the inability to obtain well owner permission to sample the desired wells, much of that work was not completed in 2022. Subsequently, the Regional Water Quality Control Board (RWQCB) staff reviewed the investigation information and findings available to date and provided a presentation to the BMC at its March 15th,

2023 Meeting. BMC Party Staff is working with RWQCB Staff to identify potential additional investigations to help better inform the sources of the nitrate in the LA8 Well and additional information will be provided to the BMC, once available.

Program C Adaptive Management: At its April 20th, 2022 Meeting, the BMC approved CHG to evaluate the re-inclusion of the 3rd Well into Program C. CHG completed the evaluation of the anticipated increase to the Sustainable Yield that the 2nd and 3rd Program C Wells would provide utilizing the new criteria for calculating the Sustainable Yield approved by the BMC at their October 27th, 2021 Meeting. The results of this evaluation were presented to the BMC at its March 15th, 2023 Meeting and the BMC directed staff to bring an Adaptive Management item for potential re-inclusion of a third well in Program C at a future BMC Meeting.

Status of Basin Plan Implementation and Funding Plans

The BMC has requested an integrated funding plan for project implementation and BMC monitoring and administration. At its October 27th, 2021 Meeting, the BMC approved a proposal from SCI Consulting Group to provide an updated funding options analysis and assessment evaluation. SCI prepared a draft Technical Memorandum (TM), that includes evaluation of funding alternatives and findings from the funding model. The draft TM was shared with the BMC at the July 27th, 2022 Meeting and the BMC requested that Staff return with additional information on the BMC's options for moving forward. BMC Staff worked with SCI to develop a Work Plan and Budget to assist the BMC in understanding the key decision points, timelines and costs for establishing a more formal organization and funding structure. A roadmap for how the BMC could implement a special tax was provided at the October 19th, 2022 BMC Meeting and the BMC provided direction for the Executive Director to work with BMC Party Staff to further discuss different options for a JPA with or without a special tax, strategies to educate the community about the proposed tax and its benefits and bring additional information back the BMC at a future meeting. BMC Staff are evaluating different organization and funding strategies to achieve the desired objectives and will bring back additional information/recommendations to the BMC when complete.

Land Use Planning Process Update

Guide to Planning Information for Development in Los Osos:

This website is intended to provide relevant planning information and an outline of what type of development is currently allowed within Los Osos:

<https://www.slocounty.ca.gov/Departments/Planning-Building/Grid-Items/Community-Engagement/Communities-Villages/Los-Osos.aspx>.

Topics covered include but are not limited to:

- Types of permit applications currently being accepted for processing
- Status of the building moratorium and waitlist for undeveloped parcels in the sewer service area (still in place)
- Status of the Communitywide Habitat Conservation Plan

Los Osos Retrofit-to-Build Program (Title 19 Water Offset Requirement) Update:

Maddaus Water Management Inc. is preparing a study to update water usage estimates for urban and rural residences sourcing water from the Los Osos Groundwater Basin, propose new water conservation measures for the retrofit-to-build program, and estimate remaining water savings potential for the community. Maddaus and County Planning staff are preparing a technical memorandum describing the analysis carried out in the study. The projected completion date is June 30th, 2023.

Los Osos Community Plan:

The Los Osos Community Plan (LOCP) is being reviewed by the California Coastal Commission (Commission) and a hearing date has not yet been scheduled by the Commission. In the meantime, the County is meeting with BMC and BMC Party Staff to discuss potential policy changes considering ongoing basin monitoring and Basin Plan program implementation efforts. The Los Osos Community Plan ("LOCP") update and Final Environmental Impact Report ("FEIR") considered by the Board on December 15, 2020 are available at: <https://www.slocounty.ca.gov/LosOsosPlan-1.aspx>.

LOCP Background

The Board authorized preparation of this update on December 11, 2012. A series of community outreach meetings to unveil the Community Plan were conducted in the Spring of 2015. The plan was prepared to be consistent and coordinated with the draft groundwater basin management plan and the draft Habitat Conservation Plan ("HCP"). The draft Environmental Impact Report was released on September 12, 2019; comments were due December 11, 2019. A Community Meeting on the Draft Environmental Impact Report for the LOCP, HCP, and associated Environmental Documents was held on October 28, 2019. The Final Environmental Impact Report and Public Hearing Draft were released on June 8, 2020. The Planning Commission held hearings on July 9, 2020, August 13, 2020, and October 8, 2020. At the October 8, 2020 hearing, the Planning Commission recommended approval of the Plan to the Board of Supervisors (BOS).

Los Osos Habitat Conservation Plan (HCP):

The Los Osos HCP is an effort of the County of San Luis Obispo (County) to receive a programmatic incidental take permit with a term of 25 years from the US Fish and Wildlife Service. The permit(s) authorize take of covered species associated with covered activities in the HCP area, which is approximately 3,560 acres bounded by the Los Osos Urban Reserve Line. As the permittee, the County will have the ability to issue certificates of inclusion to confer incidental take coverage to landowners and other entities if their activities are included on the incidental take permit(s). Once approved, the LOHCP will be incorporated into the LOCP. The County is currently addressing the latest round of comments on the plan from the US Fish and Wildlife Service and anticipates submitting the HCP in Summer 2023.

Coastal Zone Accessory Dwelling Unit (ADU) Ordinance:

On April 4th, 2023, the County BOS approved the Coastal Commission's suggested modifications. The suggested modifications included an action to remove ADUs as an allowable use in Los Osos. The Coastal

Commission's final certification of the BOS-approved modifications for implementation is anticipated to occur by the end of May 2023.

Please use the following link to access the recorded April 4th, 2023 BOS Meeting:

<https://www.slocounty.ca.gov/Home/Meetings-Calendar.aspx> Meetings-Calendar - County of San Luis Obispo.

The Coastal Commission’s suggested modifications approved at their February 11, 2022 Meeting are available at: <https://www.coastal.ca.gov/meetings/agenda/#/2022/2> (Agenda Item # 16a). Significant suggested modifications include not allowing ADUs within the Los Osos Groundwater Basin boundary and/or within the Los Osos Groundwater Basin Plan Area.

Los Osos Water Recycling Facility Project Update

The following table summarizes flows from the LOWRF based on the available data.

LOWRF Wastewater and Recycled Water Flows (Acre Feet)

Year	Month	Influent	Broderson	Bayridge	Sea Pines	Ag Users	Effluent
2023	Jan	46.78	50.82	1.45	0.03	0.00	55.24
2023	Feb	41.07	41.90	1.10	1.26	0.00	42.92
2023	Mar	62.28	52.37	1.19	0.02	0.00	53.58
2023	Apr	55.94	42.44	1.16	2.35	0.14	46.09
2023	May						
2023	Jun						
2023	Jul						
2023	Aug						
2023	Sept						
2023	Oct						
2023	Nov						
2023	Dec						
Total		87.85	92.72	2.55	1.29	0	98.16

LOWRF Project Updates:

- The County has contracted West Yost to prepare plans and specifications for connecting the four school sites in Los Osos to the existing recycled water system. The estimated completion date is mid-2023. The plans and specifications will be approved by the State and used for going out to bid for construction, as funding is available. The priority site for San Luis Coastal Unified School District (SLCUSD) is Los Osos Middle School, and it is anticipated that this will be the first school site connected. The design project is funded by ARPA grant money.

- The County is working with West Yost to connect the Los Osos Community Park to recycled water. The consultant will prepare plans and specifications to be reviewed by the State for approval and for construction.
- The County is preparing to go out to bid for the Flow Meter Project at the Broderson Leach Field. The project includes a flow meter and two isolation gate valves for maintenance. The current method for calculating the volume of water at Broderson Leach Field is a calculation based on other meters in the recycled water distribution system. The flow meter will improve the accuracy of water discharged here and will be connected to the LOWRF's SCADA system through the existing local control panel. The project is funded by ARPA grant money.
- The County has completed the Recycled Water Distribution Model that evaluates existing and future uses within the recycled water system. The model identified setpoints for the future effluent pump station VFDs at the LOWRF that will result in energy savings.
- The County is working with a consultant for preparing design plans for installing VFDs on the LOWRF's effluent pumps. This will allow the pumps to ramp up and down based on need in the recycled water distribution system and the plant return water supply. Currently the pumps only have the capability to run at one speed and that leads to increased wear and tear on the motor and impellers. The VFDs will be set to specific pressure setpoints that will be determined using the recycled water distribution model. The expected outcome from installing the VFDs is decreased energy consumption and recirculated water within the system.

Enforcement: A list of properties that were not connected were transferred to County Code Enforcement and Notice of Violations were issued last year in Feb. 2019. That list was about 70 properties. As of 5/12/2021, the sewer service area has a 99.4% connection status with a total of 36 properties not yet connected. Of those, one is not required to connect because there is no structure (demolished), 18 have expired building permits, and the rest have an open Code Enforcement case.

The County has assigned staff in code enforcement to Los Osos. Expired permits did not receive a Code Enforcement case because those properties have their own noticing process through the Building Department which, if not corrected, could result in a Notice of Violation.

Water Conservation Update

Average indoor water usage for 2021 was estimated to be 38 gpd per person and remains at that number currently.

Sustainable Groundwater Management Act (SGMA)

SGMA Overview: SGMA took effect on January 1, 2015.¹ SGMA provides new authorities to local agencies with water supply, water management or land use responsibilities and requires various actions be taken in order to achieve sustainable groundwater management in high and medium priority groundwater basins. Los Osos Valley Groundwater Basin (Los Osos Basin) was subject to SGMA based on the 2014 Basin

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

Prioritization by the California Department of Water Resources (DWR) that listed the Los Osos Basin as high priority and in critical conditions of overdraft.²

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

- Los Osos Area Subbasin is listed as **very low** priority for SGMA³ and in critical conditions of overdraft⁴
- SGMA does not apply to the portions of Los Osos Basin that are adjudicated provided that certain requirements are met (Water Code §10720.8).
- Warden Creek Subbasin is listed as **very low** priority for SGMA³

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

Additional Attachments:

1. Updated Status of Basin Plan Programs

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

³ As noted by DWR, the priority for the subbasin has been set to very low (0 total priority points) as a result of conditions being met under sub-component C of the Draft SGMA 2019 Basin Prioritizations.

⁴ Critical conditions of overdraft have been identified in 21 groundwater basins as described in Bulletin 118 (Water Code Section 12924). Bulletin 118 (updates 2003) defines a groundwater basin subject to condition of critical overdraft as: “A basin is subject to critical conditions of overdraft when continuation of present water management practices would probably result in significant adverse overdraft-related environmental, social, or economic impacts.”

Update on Status of Basin Plan Infrastructure Projects

Program Name	Project Name	Parties Involved	BMC Budgeted Amount	Funding Status	Anticipated Planning/Pre-Construction Cost	Anticipated Capital Cost	Status/Notes
Program A – Shift groundwater production from Lower Aquifer to Upper Aquifer	Water Systems Interconnection	LOCS D/ GSWC	NA	NA	NA	NA	Completed
	Upper Aquifer Well (8 th Street)	LOCS D	NA	Fully Funded	NA	\$307,000	Completed
	South Bay Well Nitrate Removal	LOCS D	NA	NA	NA	NA	Completed
	Palisades Well Modifications	LOCS D	NA	NA	NA	NA	Completed
	Blending Project (Skyline Well)	GSWC	NA	NA	NA	NA	Completed
	Water Meters	S&T	NA	NA	NA	NA	Completed
Program B - Shift groundwater production from Lower Aquifer to Upper Aquifer	LOCS D Wells (Upper Aquifer)	LOCS D		Not Funded	TBD	BMP: \$2.7 mil	Project not initiated
	GSWC Wells (Upper Aquifer)	GSWC		Not Funded	TBD	BMP: \$3.2 mil	Project not initiated
	Community Nitrate Removal Facility	LOCS D/GSWC/S&T	TBD	Partial, GSWC portion funded	TBD	GSWC: \$1.23 mil	GSWC’s Program A Blending Project might be capable of expanding to be the first phase of the Program B Community Nitrate Removal Facility.
Program C - Shift production within the Lower Aquifer from the Western Area to the Central Area of the Basin	Expansion Well No. 1 (Los Olivos)	GSWC	NA	NA	NA	NA	Completed
	Expansion Well No. 2 (Lower Aquifer)	LOCS D		LOCS D	TBD	BMP: \$2.5 mil	<u>The well construction is complete and the water transmission main and well equipping design and construction activities are currently underway. Completion of all phases of the project is estimated to occur in June 2024.</u>
	Expansion Well 3 (Lower Aquifer) and LOVR Water Main Upgrade	GSWC/LOCS D		Cooperative Funding	TBD	BMP: \$1.6 mil	This project has been deferred under Adaptive Management.
	LOVR Water Main Upgrade	GSWC		May be deferred	TBD	BMP: \$1.53 mil	Project may not be required, depending on the pumping capacity of the drilled Program C wells. It may be deferred to Program D.
	S&T/GSWC Interconnection	S&T/ GSWC		Pending	TBD	BMP: \$30,000	Currently on hold pending further evaluation of the project.
Program D - Shift production within the Lower Aquifer from the Western Area to the Eastern Area of the Basin							Currently being considered for deferment through Adaptive Management. BMC to review on an annual or semi-annual basis.
Program M – Groundwater Monitoring Plan	New Zone D/E lower aquifer monitoring well in Cuesta by the Sea	All Parties	NA	NA	NA	NA	Completed

Program Name	Project Name	Parties Involved	BMC Budgeted Amount	Funding Status	Anticipated Planning/Pre-Construction Cost	Anticipated Capital Cost	Status/Notes
Program U - Urban Water Reinvestment Program	Creek Discharge Program	All Parties				TBD	These activities are currently on hold.
	8 th and El Moro Urban Storm Water Recovery Project	All Parties				TBD	These activities are currently on hold.

TO: Los Osos Basin Management Committee

FROM: Dan Heimel, Executive Director

DATE: May 17, 2023

SUBJECT: Item 9a – Presentation of Public Draft 2022 Annual Monitoring Report

Recommendations

Receive a presentation from Basin Management Committee (BMC) staff on the Public Draft 2022 Annual Monitoring Report (AMR) and confirm schedule for BMC to consider approval of the Final Draft 2022 AMR and submission to the Court.

Discussion

Section 5.8.3 of the Final Judgment requires the preparation of an AMR for the Los Osos Basin by June 30 of each year. The AMR describes activities related to the Los Osos Basin Plan, groundwater monitoring program, and the results and interpretations of these findings. The BMC retained Cleath-Harris Geologists (CHG) to prepare the seventh AMR for Calendar Year 2022. The Public Draft 2022 AMR is available at the following link or at the BMC's website and a staff summary will be provided at the meeting.

[Click here to view the Public Draft 2021 Annual Report](#)

TO: Los Osos Basin Management Committee

FROM: Dan Heibel, Executive Director

DATE: May 17, 2023

SUBJECT: Item 9b – Recommendation for selection of Cleath-Harris Geologists to complete the WRF Study for the BMC

Recommendations

Receive recommendation and approve the selection of Cleath-Harris Geologists to complete the WRF Study for the BMC or provide alternate direction to staff.

Discussion

On February 11th, 2022, on behalf of the Basin Management Committee (BMC), the Los Osos Community Services District (Los Osos CSD) submitted an application for a Water Recycling Funding Program (WRF) grant to develop a transient model and analyze recycled water and supplemental water projects to improve the sustainability of the Los Osos Basin (WRF Study). The Los Osos CSD was notified of the award of the grant in January 2023 and all the required documents have been signed and fully executed. The Los Osos CSD released the Request for Proposals (RFP) for the WRF Study on February 27th, 2023 and proposals were due March 31st, 2023. The WRF Study Consultant Selection Committee, consisting of representatives from each of the BMC Parties, reviewed the proposals and interviewed the two top ranked consulting firms.

Based upon review of the proposals and interviews with select firms, the WRF Study Consultant Selection Committee is recommending the selection of the Cleath-Harris Geologists (CHG) Team to complete the WRF Study for the BMC. The CHG Team is recommended based upon their combination of knowledge of the Los Osos Basin and experience preparing WRF Studies. Additional information regarding the CHG Team's experience and qualifications for the WRF Study can be found in the attached proposal.

If the WRF Study Consultant Selection Committee's recommendation is approved, the Los Osos CSD General Manager will review and consider approving the contract with CHG. Additionally, BMC and Los Osos CSD Staff will solicit informal proposals for the Peer Review consultant and will bring back a recommendation at a future meeting.

Fiscal Impact

The WRF Study will be funded through a combination of WRF Grant, County of San Luis Obispo and BMC funding contributions. A breakdown of the costs and funding sources is provided in the table below.

WRFP Study and Match Funding	Cost
WRFP Study	\$350,000
Model Development Peer Review	\$30,000
Los Osos Creek Stream Gage Rating Curve	\$20,000
Total Cost	\$400,000

Funding Sources	Funding
County Funding Contribution	\$150,000
BMC Funding Contribution	\$50,000
WRFP Grant Funding Contribution	\$200,000
Total Funding	\$400,000

In the CY 2023 Budget, the BMC approved \$15,000 for Year 1 of Model Development Peer Review and intends to include an additional \$15,000 in the CY 2024 Budget and approved \$25,000 in funding for the Los Osos Creek Stream Gage Rating Curve.

Attachments:

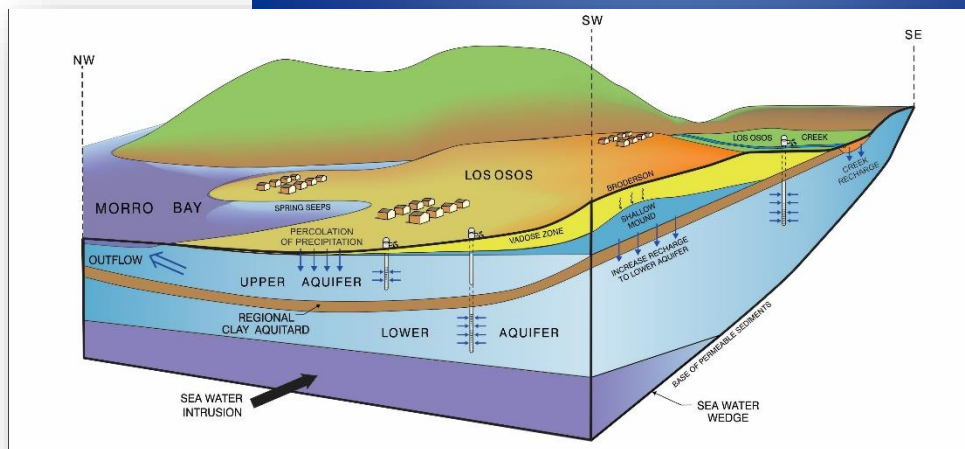
CHG Proposal for WRFP Study

March 2023

Water Recycling Funding Program Facilities Planning Study Proposal



Los Osos Community Services District
County Of San Luis Obispo
Los Osos Basin Management Committee



Cleath-Harris Geologists, Inc.

75 Zaca Lane, Suite 110
San Luis Obispo, CA 93401
(805) 543-1413

Water Systems Consulting, Inc.

805 Aerovista Place, Suite 201
San Luis Obispo, CA 93401

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



March 31, 2023

Mr. Ron Munds, General Manager
Los Osos Community Services District
2122 9th Street, Ste. 110
Los Osos, CA 93402

RE: Request for Proposal – Water Recycling Funding Program Facilities Planning Study

Dear Mr. Munds:

Cleath-Harris Geologists (CHG), in association with Water Systems Consulting, Inc. (WSC), is pleased to offer professional services for the Water Recycling Funding Program Facilities Planning Study. Our firms are exceptionally qualified to assist the Los Osos CSD, the County of San Luis Obispo, and the Los Osos Basin Management Committee (BMC) with the planning study and associated transient groundwater model. The following key points summarize the advantages our team provides:

- Extensive experience applicable to all work required.
- In-depth knowledge of the local groundwater basin.
- Over 35 years of local service.
- Proven team partnership on complex projects.

CHG staff have been working in the Los Osos groundwater basin for over three decades, and have developed or refined much of the foundational basin hydrogeology, including the existing basin groundwater model. Our team partner WSC brings a wealth of local understanding and specialized expertise in addressing water supply reliability and evaluating alternatives. Together, we have the staff and experience to deliver the high-quality study needed to improve the sustainability of the groundwater basin.

CHG works closely with BMC members on many diverse and challenging projects. We value the trust that we have been given, and the responsibility that we share to provide outstanding service to our community. Thank you for the opportunity to collaborate again.

Sincerely,
CLEATH-HARRIS GEOLOGISTS, INC.

A handwritten signature in black ink, appearing to read 'Spencer J. Harris', written in a cursive style.

Spencer J. Harris, PG, CHG, CEG
President



March 2023

DESCRIPTION OF FIRM



Company Name:

Cleath-Harris Geologists, Inc.

Business Structure:

California S-Corporation (2009)
Formerly Cleath & Associates (1984-2008)

Designated Contract Lead:

Spencer J. Harris, President
Cleath-Harris Geologists
75 Zaca Lane, Suite 110
San Luis Obispo, CA 93401
Telephone: (805) 543-1413
e-mail: spencerh@cleath-harris.com

Business License:

No. 107214
City of San Luis Obispo

Principal Services:

Water Resources Management
Hydrogeology
Engineering Geology
Environmental Services

Website: www.cleath-harris.com

Partial List of Clients:

County of San Luis Obispo
San Luis Obispo Flood Control and Water
Conservation District
County Service Area 16
City of San Luis Obispo
City of El Paso de Robles
City of Morro Bay
City of Arroyo Grande
City of Pismo Beach
City of Santa Maria
City of Lompoc
Golden State Water Company
Los Osos Community Services District
San Miguel Community Services District
San Simeon Community Services District
Cambria Community Services District
S&T Mutual Water Company
Atascadero Mutual Water Company
San Miguelito Mutual Water Company
Heritage Ranch Mutual Water Company

Cleath-Harris Geologists (CHG) has been providing geological consulting services for over 35 years. Our team consists of professional geologists with certifications in hydrogeology and engineering geology. We are uniquely equipped to service the Central Coast and have worked extensively in the Los Osos groundwater basin. CHG brings outstanding expertise in modeling services and designing and implementing groundwater models. We have constructed dozens of groundwater models for a wide variety of applications, including evaluating seawater intrusion using Equivalent Freshwater Head and dual-density approaches in coastal basins. CHG models have been peer reviewed and accepted by local and State agencies.



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About WSC (Subconsultant)

Experts in water supply alternatives analysis and trusted partners to CHG, Water Systems Consulting, Inc., (WSC) is dedicated to improving the water resiliency of the region for everyone who lives and works in San Luis Obispo County. WSC is an employee owned, California S-Corporation, incorporated in San Luis Obispo in 2007. WSC provides water resource, groundwater, wastewater, and recycled water expertise to clients throughout California and San Luis Obispo County.

WSC brings a wealth of local understanding and specialized expertise in addressing water supply reliability and evaluating alternatives. Their team's experience includes long-term water supply studies and planning for the City of Fresno (Metropolitan Water Resource Management Plan), the City of Santa Barbara (Water Vision Santa Barbara), the County of Santa Barbara (Long-Term Supplemental Water Supply Study), and for the Central Coast Blue program. These projects and programs have all identified and evaluated potential local, regional, and/or inter-regional supplemental water supply sources including enhanced use of recycled water.

FIRM QUALIFICATIONS

CHG and WSC are exceptionally qualified to assist the Los Osos CSD, County of San Luis Obispo, and the Los Osos BMC with hydrogeological and engineering planning services, including groundwater modeling. Our team offers:

- **Extensive experience applicable to all work required.** CHG's groundwater modeling staff bring decades of groundwater modeling experience, including over ten years working with the dual-density models needed for seawater intrusion investigations. WSC'S staff of engineers and water resource professionals specialize in integrated planning and recycled water projects.
- **In-depth knowledge of Los Osos groundwater basin.** Building a useful groundwater basin model requires more than modeling expertise, it also requires in-depth knowledge of the local basin hydrogeology. CHG staff have been providing hydrogeological services to the community of Los Osos for 35 years, and have an expert understanding of the basin.
- **Proven team partnership on complex projects.** CHG and WSC have a strong relationship and extensive experience successfully delivering complex projects. Our local experience working collaboratively includes successfully completing several recent projects together, including the San Luis Obispo Valley Groundwater Basin Groundwater Sustainability Plan (GSP), the Arroyo Grande Subbasin GSP, and projects involving transient groundwater models in the San Luis Obispo Valley and Santa Maria Valley Groundwater Basins. CHG and WSC have both managed grant-funded projects.

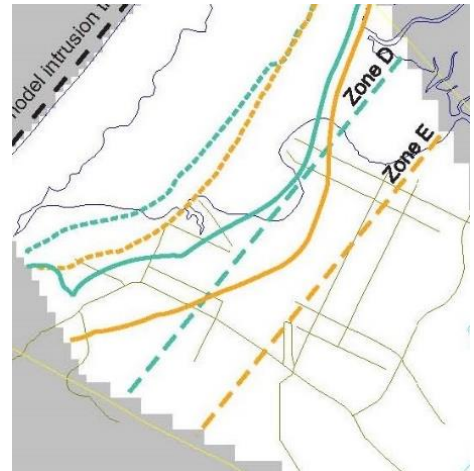
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SIMILAR PROJECT EXPERIENCE AND REFERENCES - CHG

Project: Los Osos Basin EFH and SEAWAT Model (2005-2023)

Client: Los Osos CSD, ISJ and BMC

The original version of the current steady-state basin model for Los Osos was constructed by URS Corporation in 2000, and updated for nitrate mass transport by CHG (formerly Cleath & Associates) and others in 2002, 2003, and 2004. In 2005, CHG updated the basin model to Equivalent Freshwater Head (EFH) in order to evaluate seawater intrusion for the Los Osos wastewater project. CHG updated the model again in 2009 to provide dual-density flow using the SEAWAT package, further improving seawater intrusion evaluation capabilities. The SEAWAT model is peer-reviewed and has proven to be a valuable tool for basin management.



Project Reference:

Ron Munds, LOCSO General Manager (805) 528-9370, e-mail rmunds@lososocsd.org

Los Osos Community Services District, 2122 9th Street, Suite 110, Los Osos, CA 93402

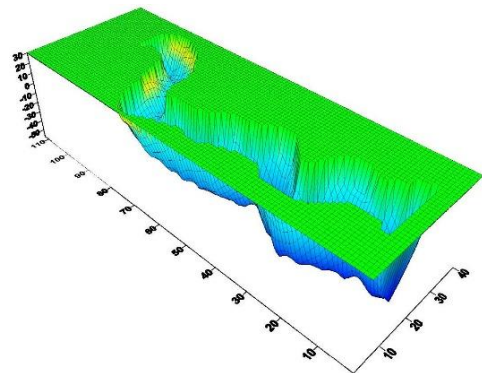
Costs: >\$200,000 (used for multiple scenarios over 20 years)

Key Staff: Spencer Harris (PM/Lead Modeler), Tim Kershaw (GIS Analyst)

Project: Groundwater Availability Study Update with Transient SEAWAT Model, Pico Creek Valley Groundwater Basin (2014, 2022)

Client: San Simeon Community Services District

CHG updated a 1986 Groundwater Availability Study using new information to re-evaluate the sustainable yield of this coastal groundwater basin. The project characterized the groundwater basin aquifers, developed a hydrogeologic conceptual model, analyzed aquifer tests and constructed and calibrated a dual-density SEAWAT model to assess the effects of storm surge and drought on seawater intrusion at the community purveyor well field. CHG simulated both transient stream flow and dual-density groundwater flow by running a Stream Flow Routing (SFR) package model in tandem with the SEAWAT-based model. In 2022, CHG performed groundwater/streamflow interconnectivity testing for the Instream Flow Management Study of Pico Creek. This information may be used to update the Pico Creek SFR-based model in the future.



Project Reference:

Charles Grace, General Manager, (805) 927-4778, e-mail cgrace@graceenviro.com

San Simeon Community Services District, 111 Pico Avenue, San Simeon, CA 93452

Costs: \$70,000

Firm's Role: Hydrogeology, Groundwater Modeling

Key Staff: Spencer Harris (PM/Lead Modeler)

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Project: Groundwater Flow Analysis - Recycled Water Recharge Project *and* Hydraulic Capture Zone Analysis for the City of San Luis Obispo Tetrachloroethylene (PCE) Plume Characterization Project, San Luis Obispo Valley Groundwater Basin (2019, 2022)

Client: City of San Luis Obispo and Water Systems Consulting, Inc.

CHG was subcontracted by current proposal team partner WSC to construct a transient groundwater flow model in 2019 for the City of San Luis Obispo. The 2019 model was used to evaluate recycled water discharge alternatives in San Luis Obispo Creek. Subsequently, in 2022, CHG updated the recycled water recharge model to incorporate the results of a TCE contaminant plume field investigation, and used the updated model to perform a hydraulic capture zone analysis of the plume with particle tracking and simulated treatment wells. This model was prepared with grant funding and reviewed by State regulators. A second phase of investigation is currently planned which will include the addition of PCE solute mass transport to the flow model.



Project Reference:

Nick Teague, Water Resources Program Manager, Public Utilities, City of San Luis Obispo
879 Morro Street, San Luis Obispo, CA 93401-2710
(805) 781-7217, e-mail nteague@slocity.org

Costs: \$115,000

Firm's Role: Hydrogeology, Groundwater Modeling

Key Staff: Spencer Harris (PM), Tim Kershaw (Lead Modeler), Neil Currie (Advisor)

SIMILAR PROJECT EXPERIENCE AND REFERENCES - WSC

Project: Metropolitan Water Resource Management Plan, City of Fresno.

Client: City of Fresno

WSC has partnered with the City of Fresno to update their Metro Plan, providing a road map for the City's water supplies, water infrastructure, and sustainable growth through 2070. WSC is updating and expanding a long-range plan that sets the City's water resources vision for the next 50 years, addressing near- and long-term changes and uncertainties around elements such as conservation, pace of growth, location of growth, surface water availability, climate change impacts, and groundwater management actions. WSC's work includes integrating and leveraging evaluations and data for multi-planning outputs including an Environmental Impact Report, 2020 Urban Water Management Plan, and U.S. Bureau of Reclamation Water Management Plan. WSC is creating and employing proven methodologies and tools for confident water management.



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Similar to the Los Osos CSD's needs, the Metro Plan documents the City's existing water assets, supplies, infrastructure, and rights, evaluates multiple future supply and demand scenarios considering different assumptions on uncertainties such as conservation, pace and location of growth, surface water availability, climate change impacts, and groundwater management actions.

WSC has developed a decision tool for the City that considers multiple solutions to future supply shortfalls and tests the top alternatives under several resiliency and demand scenarios. The adaptive planning tool is designed to be updated by the City as uncertainties—such as demand projections, surface water projections, and sustainable groundwater yield—become better defined. The potential portfolios can be reevaluated with the updated conditions and with consideration to changing City priorities for reliability or resiliency.



WSC is creating a management plan for the City of Fresno that adapts to water supply variables such as surface water reliability, climate change, regulatory constraints, etc.

Project Reference:

Brock Buche, Assistant Director of Public Utilities, City of Fresno
2600 Fresno Street, Fresno, CA 93721

(559) 621-8600, e-mail Brock.Buche@fresno.gov

Costs: \$1.8 million (anticipated)

Firm's Role: Water Resources Engineering, Hydrogeology

Key Staff: Rob Morrow (PM), Heather Freed (Assistant PM), Michael Cruikshank (Groundwater Lead)

Project: San Luis Obispo Valley Groundwater Basin GSP
Client: San Luis Obispo County Flood Control and Water Conservation District

WSC successfully managed the development of the San Luis Obispo Valley Groundwater Basin (SLO Basin) Groundwater Sustainability Plan (GSP). SGMA requires the sustainable groundwater management in all high and medium priority basins. The SLO Basin was designated as a high priority basin. The SLO Basin GSP was developed by two Groundwater Sustainability Agencies (GSAs) formed by the County of San Luis Obispo (County GSA) and the City of San Luis Obispo (City GSA). An advisory board, the Groundwater Sustainability Commission (GSC), made up of representatives from the six participating agencies oversaw the development of the GSP. The GSP describes and assesses the groundwater condition of the SLO Basin, develops quantifiable management objectives



Groundwater is a vital part of our region's water supply. Local agencies are developing a Groundwater Sustainability Plan (GSP) to sustainably manage this important water resource for the San Luis Obispo Valley Groundwater Basin (SLO Basin) while meeting the requirements of the Sustainable Groundwater Management Act (SGMA).

PLANNING HAS JUST STARTED. Visit SLOWaterBasin.com to learn how you can participate.

ESPAÑOL?

Si necesita solicitar alojamiento para asistir a un evento, incluidos los servicios de traducción al español, comuníquese con Dick Tiozu a dtiozu@co.slo.ca.us o al 805.791.4473.



Your voice is important. Here's how to get involved:



MEETINGS. Join Groundwater Sustainability Commission (GSC) meetings to receive project news and to share your input. MEETINGS ARE HELD QUARTERLY.



WORKSHOPS. Join interactive workshops to learn about and inform the development of the GSP. WORKSHOPS ARE ALIGNED WITH PLAN MILESTONES.



REVIEW AND COMMENT. Review and comment on sections/chapters of the GSP. FIND DOCUMENTS OPEN FOR COMMENT ON THE WEBSITE.

SLOWaterBasin.com — GET INVOLVED NOW



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that account for the interests of the SLO Basin’s beneficial groundwater uses and users, and identifies a group of projects and management actions that will allow the SLO Basin to achieve and maintain sustainability in the future.

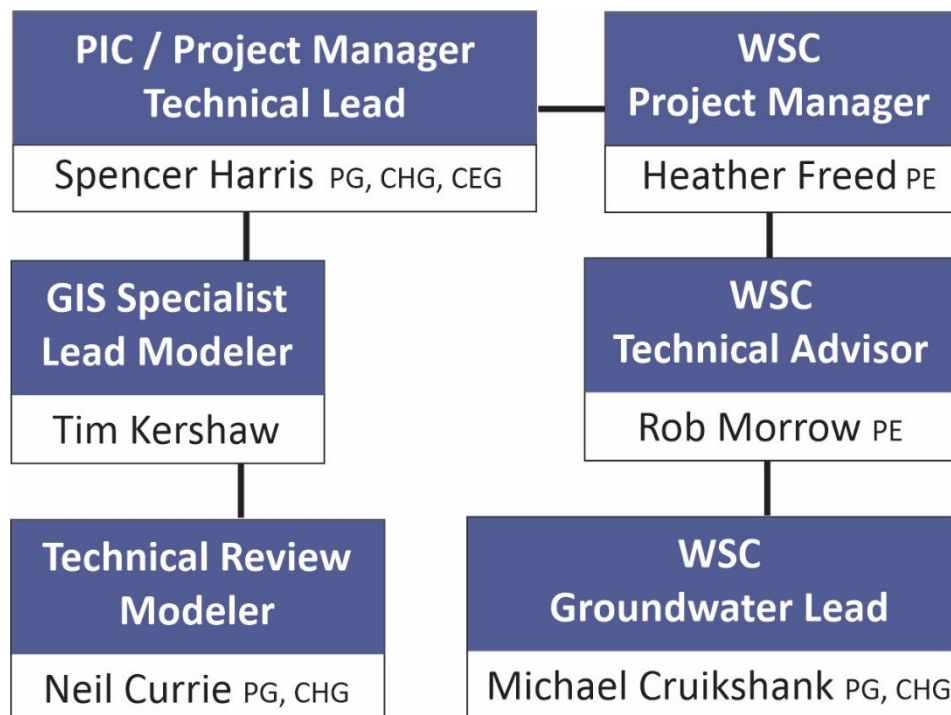
WSC was responsible for the program management, execution of the communications and engagement plan, development of an integrated model, identification of the projects and management actions, and the implementation plan. CHG partnered with WSC on this GSP. CHG was responsible for development of water budget and the monitoring well network.

Project Reference:

Courtney Howard, Water Resources Division Manager, Public Works Department, County of San Luis Obispo
976 Osos Street, San Luis Obispo, CA 93408
(805) 781-1016, e-mail choward@co.slo.ca.us
Costs: \$1.4 million
Firm’s Role: Water Resources Engineering, Hydrogeology
Key Staff: Michael Cruikshank (PM), Rob Morrow (Projects), Spencer Harris (CHG)

TEAM ORGANIZATION AND PROJECT STAFFING

The team is highly experienced in the services required for completing the scope of work. A California Certified Hydrogeologist will be managing the project. Key personnel would be organized to handle these services as outlined in the chart below. A brief summary of their qualifications and roles follows, with resumes attached in Appendix A.





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Key Project Staff (CHG)



Spencer J. Harris, PG, CHG, CEG – Principal Hydrogeologist

Project Role: Principal-in-Charge/Project Manager/Technical Lead

Spencer Harris brings over 35 years of professional experience, and has managed local public agency and water company projects for over 25 years. He has been using USGS MODFLOW since it was first released in the late 1980's, and has constructed groundwater models for a variety of applications and settings. Spencer has also performed foundational work for characterizing the water resources of the Los Osos groundwater basin, including recycled water studies and salt/nutrient management studies. This combination of extensive modeling experience and local hydrogeological knowledge will greatly benefit

the project. Spencer will manage the project team and as technical lead will provide modeling and hydrogeological support.



Timothy D. Kershaw – Environmental Scientist

Project Role: GIS Specialist/Lead Modeler

Tim Kershaw has over seven years of professional experience with expertise in GIS, groundwater flow and transport modeling, field monitoring services, and database management. Tim provides GIS software and hardware support and database management to clients. Tim was the lead modeler for the SLO Recycled Water Recharge Project and the Phase 1a Central Coast Blue model, and has extensive cross-platform experience with GIS and modeling software. He has excellent model organization, documentation, and spatial analysis skills that are needed for complex flow model construction. Tim will be the lead

modeler for this project.



Neil Currie, PG, CHG – Senior Hydrogeologist

Project Role: Technical Review/Modeler

Neil Currie has more than seven years of professional geological experience on the Central Coast, including project management for public agencies. His expertise includes conceptual model development, geophysical surveying, geostatistical analysis, fluid flow modeling, and local hydrogeologic investigations. Neil performed the geostatistical modeling of a fan-fluvial aquifer system for aquifer parameter distribution in a 14 square mile contaminant transport model completed by CHG in Fresno, California. Neil will provide technical review and modeling support.



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Key Project Staff (WSC)



Rob Morrow, PE – Principal Engineer

Project Role: WSC Technical Advisor

Rob has 19 years of engineering experience centered on water resources projects. He has led large and small recycled water master plans, facilities plans, and preliminary designs across California and has led integrated water resources planning projects that analyzed water supply and demand portfolios. Rob’s experience with the County includes the Paso Basin Supplemental Water Supply Options Study, where he led the Nacimiento and recycled water alternatives evaluation. Rob additionally led development of the Regional Recycled Water Strategic Plan for the County, which created a comprehensive list of existing and potential reuse across the County. He was also a technical advisor for the Regional Water Infrastructure Resiliency Plan. Rob has the depth of experience, specialized technical expertise, and strong local knowledge and relationships to help guide this project to success.



Heather Freed, PE – Associate Engineer

Project Role: WSC Project Manager

Heather Freed is a Professional Engineer with over 6 years’ experience in integrated planning, modeling, and master planning for water supply, treatment, and distribution systems. She has supported integrated water resources planning projects that evaluate demand projections and water supplies, including surface water, imported water, groundwater, recycled water, stormwater, and desalinated water supply availability, constraints, future risks, and costs, to develop and recommend a future supply portfolio. She is currently serving as Deputy Project Manager for the 2020 Urban Water Management Plan and Metropolitan Water Resources Management Plan (Metro Plan), for the City of Fresno, which includes recharging local groundwater with surface water, storm water, and recycled water; regional groundwater banking with surface water and storm water; groundwater plume management; non-potable reuse expansion; and direct potable reuse via raw water augmentation (purified wastewater to surface water treatment plant) as potential alternatives.



Michael Cruikshank, PG, CHG – Principal Hydrogeologist

Project Role: WSC Project Hydrogeologist

Michael is a certified hydrogeologist, and water resource planner with more than 15 years of professional experience. He has managed projects in large diverse stakeholder environments for a variety of water resource projects including the development of groundwater sustainability plans (GSPs), salt and nutrient management plans (SNMPs), and indirect potable reuse (IPR) projects. He has technical expertise in water resource planning, hydrogeologic basin analysis, and the development of integrated groundwater and surface water models that are used to make important water resource management decisions on a watershed scale.



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UNDERSTANDING/APPROACH

Groundwater is the Los Osos community's sole source of water. The water supply aquifers in the groundwater basin extend to the coast and are currently threatened by seawater intrusion. Prior to construction of the Los Osos Wastewater Project, decades of septic system discharges from high-density residential parcels also resulted in elevated nitrate concentrations in many areas of the basin. Recycled water is a key resource for achieving long-term basin sustainability, and the Water Recycling Funding Program Facilities Planning Study will help ensure that recycled water is utilized in the most effective way feasible to mitigate the threat of seawater intrusion. Development of the Upper Aquifer in areas with elevated nitrate concentrations will also be evaluated as a supply alternative in the study.

Given the wide range of recycled water/water supply alternatives being evaluated, a transient groundwater model is the best tool for comparing these alternatives. The dynamic capabilities of a transient numerical model can provide impacts analyses and sustainable yield estimates for the basin for various alternatives, while also considering climate change and drought cycles. In order to meet the analytical requirements of the planning study, the transient model will need to evaluate both seawater intrusion and potential impacts to wetlands and riparian habitats of the estuary.

CHG will take the lead in project management, transient model development, scenario analysis, and interaction with the model peer reviewer. WSC will take the lead in the supplemental supply alternatives evaluations and facilities planning study report development.

Our preferred approach to transient model development will be to build a new model, rather than upgrading the existing steady-state model. Although the existing model has proven to be a robust and valuable tool, there are enough modifications planned to warrant new model construction.

WSC will work with the Los Osos CSD, County and BMC to develop a framework to evaluate the alternatives to support prioritization of the most beneficial options to be carried forward for further evaluation. The transient groundwater model task occurs first to gain a better understanding of the basin and develop basin management goals that will help define and score alternatives. This analysis will identify target pumping and locations for reduced pumping or recharge. Other key factors that will influence the cost effectiveness and feasibility of alternatives includes the recycled water uses, regulations and resulting treatment requirements, total volume of use, which can be constrained by seasonal use patterns, and proximity to other sources. We will take a broad look at the recycled water and supply projects and envision it on a map overlaid with the groundwater basin to narrow the focus of the recommendation.

The analysis will be documented in the Water Recycling Facilities Plan summarizing regional recycled water resources, recycled water alternatives development and analysis, and recommendations. The writing style will be clear, concise, and easy to read, accompanied by explanatory graphics and tables to reinforce understanding and provide useful reference for subsequent use. Our team will also prepare and deliver presentations to the Technical Advisory Committee throughout the project to share the results of the Water Recycling Feasibility Study. It will cover the alternatives development process, an overview of each alternative evaluated and recommendations for next steps. This process will provide clarity on the



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highest value options for its recycled water program and set you up to take the next step along the path to optimizing the value of your water resource portfolio.

For the set of alternatives selected for preliminary evaluation, WSC will prepare maps and tables summarizing key information about each alternative, including:

- Description and location of potential use
- Preliminary estimate of volume that can be beneficially used
- Required treatment upgrades to support the planned use (if any)
- Storage, pumping and distribution infrastructure requirements
- Summary of anticipated regulatory requirements
- Risk, uncertainties and additional evaluation needs
- AACE Class 5 (concept level) cost estimates

SCOPE OF WORK

Task 1 Project Management (CHG/WSC)

1.1 Project Administration and Management

- Participate in internal Consultant Team and external coordination calls with the Los Osos CSD.
- Prepare monthly progress reports to be submitted with each invoice. It is assumed that the project duration is 19 months.

1.2 Kickoff Meeting

- Plan, attend and participate in a project Kickoff Meeting. Budget is based on a 2-hour meeting at the Los Osos CSD's office.

Deliverables: Monthly progress reports and invoices.

Assumptions: Project duration is 19 months.

Task 2 Transient Groundwater Model (CHG)

2.1 Conceptual Groundwater Model

- Use existing information and references to define the conceptual groundwater model of basin, including topography, boundaries, geologic structures/formations, principal aquifers and aquitards, groundwater extractions, groundwater quality, groundwater recharge and discharge areas, wetland/riparian areas, and data gaps.
- Compile available historical groundwater production data, water quality data, climate data, streamflow data, and aquifer tests.



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2.2 Model Selection Alternatives Analysis

- Prepare a summary table of options for model selection alternatives, with pros and cons. Identify the preferred alternative in a brief memorandum.

Deliverables: Model Selection Alternative Analysis TM

2.3 Modeling Approach

- Establish the model domain and boundaries.
- Determine correct grid orientation for numerical stability.
- Establish appropriate model horizontal and vertical discretization.
- Review historical data sets compiled in Task 2.1 and establish the model stress periods, calibration period, and calibration targets.
- Establish protocol for using Stream Flow Routing package with SEAWAT.
- Evaluate the feasibility of including portions of the perched aquifer in the basin model, which is currently excluded. Explicit modeling of the perched aquifer can improve the analysis of certain wetland and riparian areas.
- Establish recharge methodology.
- Estimate model run times as configured relative to feasible planning horizons.

2.4 Model Construction and Calibration

- Construct model grid, contour the basin geometry, and assign model layers to aquifers and aquitards, along with intermediate layers for vertical discretization.
- Add wells, streams, the estuary, and other features with the help of GIS.
- Input hydrologic budget data sets into model.
- Source initial model aquifer parameters from available pumping tests and lithologic correlation, to be refined during calibration.
- Load calibration targets.
- Calibrate model to acceptable industry standards and provide calibration statistics.
- Perform model parameter sensitivity analysis.
- Prepare draft and final technical memorandum.

2.5 TAC Meetings #1 and #2

- Review the conceptual model, model selection alternatives analysis, and approach.
- Review model construction and calibration.
- Coordinate all TAC meetings.

Deliverables: Draft technical memorandum on transient model construction and calibration, as Chapter 6 or as an Appendix to the study.



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Task 3 Scenario Analysis (CHG/WSC)

3.1 Groundwater Modeling Scenario Analysis (CHG)

- Utilization of the transient model to evaluate up to five (5) different infrastructure and pumping scenarios to determine if, and to what extent, adverse impacts to wetlands and riparian habitats or the estuary may occur and to characterize both Upper Aquifer and Lower Aquifer conditions to inform appropriate development limits and aquifer-specific infrastructure improvements. Consideration will be made to:
 - (a) The conceptual feasibility of recharging groundwater through Indirect Potable Reuse supply alternatives;
 - (b) Localized groundwater impacts for each supply alternative (groundwater levels, water quality impacts, etc.);
 - (c) The supply alternatives impact on meeting the sustainable basin goals.

3.2 Conceptual Alternatives Analysis (WSC)

- Evaluate the provided supply alternatives identified in Table 1 of the RFP against criteria, impacts to the basins, planning level conceptual costs based on previous work, and other impacts.
- Summarize the outcome including screening/evaluation criteria, results from the screening/evaluation, and preferred conceptual alternatives for treatment, distribution and storage.

Deliverables: Draft Chapter 7. Project Alternative Analysis

Task 4 Model Peer Review (Work by Others)

- A 3rd party peer reviewer will be procured by the Los Osos CSD to review development of the model, calibration, and scenario analysis.

Task 5 Preliminary Engineering Analysis (WSC)

5.1 Data Review and Summary

- Prepare a preliminary data request log for review and discussion at the kickoff meeting. Update the data request log as data is received.
- Review relevant data and planning documents.
- Prepare a summary of the Study Area based on previous documents that meets the requirements of the State Water Resources Control Board Water Recycling Funding Program (WRFP).
- Prepare a summary of water supply characteristics and facilities based on previous documents that meets the requirements of the WRFP.
- Prepare a summary of wastewater characteristics and facilities based on previous documents that meets the requirements of the WRFP.



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Deliverables: Draft Chapter 1. Project Area, Draft Chapter 2. Water Supply Characteristics and Facilities, and Draft Chapter 3. Wastewater Characteristics and Facilities.

5.2 Evaluate Treatment Objective for Reuse

- Evaluate recycled water quality and described required water qualities and regulatory requirements relative to the potential types of use for the reuse supply alternatives.
- Describe Basin Plan requirements for recycled water use.
- Describe water quality related requirements of the RWQCB to protect surface or ground water from problems resulting from recycled water.
- Evaluate what treatment upgrades, if any, are needed for the different reuse supply alternatives.
- Describe operational and on-site requirements for recycled water (such as backflow prevention, buffer zones, etc.).

5.3 Recycled Water Market Assessment

- Update the recycled water market assessment completed for the 2011 San Luis Obispo County Los Osos Wastewater Project Development Water Recycling Facility Plan.
- Identify potential recycled water users for non-potable reuse and agricultural irrigation.
- Determine the recycled water demand (annual use and peak use) for each potential user.
- Evaluate the recycled water supply availability compared to timing of demands.
- It is anticipated that WSC would approach the top 4 potential recycled water users and attempt to obtain a preliminary assurance in the form of a letter, email or other form of correspondence.

5.4 Preliminary Hydrogeological Assessment

- Research and summarize relevant data for considering a conceptual alternative to develop a groundwater recharge project to utilize recycled water.
- Evaluate the conceptual feasibility of disposing of water through the use of injection wells.
- Summarize the facilities required to accomplish the disposal/recharge through injection concept. The discussion of conceptual facilities will include injection/recharge rates potential, potential well construction design and materials, well depths, spacing and estimated construction costs.

Deliverables: Draft Chapter 4. Treatment Objective for Discharge and Reuse and Draft Chapter 5. Recycled Water Market of the Recycled Water Facility Plan.

5.5 Planning and Design Criteria

- Develop relevant planning and design assumptions and criteria that will be used when evaluating project alternatives identified in Table 3 of Attachment 1 to the RFP. These assumptions should include:
 - Delivery and system pressure criteria
 - Peak delivery criteria



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- Storage criteria
- Cost basis: key assumptions; cost index; cost escalation and contingency factors; discount rate; evaluation term for present worth analysis; etc.
- Planning period

5.6 Alternatives Development

(1) Treatment Alternatives

- Develop up to three (3) conceptual facility upgrade alternatives capturing the following levels of treatment: (a) Indirect Potable Reuse Advanced Treatment; (b) Direct Potable Reuse Advanced Treatment; (c) Upper Aquifer Capture and Treatment: Improvements for high nitrate treatment at the LOWRF
- Each conceptual treatment alternative will include: (a) Narrative description including summary of required unit processes and summary of pros, cons and/or key considerations; (b) Simplified process flow diagram; (c) Conceptual location and layout for the necessary improvements; (d) Preliminary estimates of capital and O&M cost, net present value, equivalent annual cost, and cost per acre-foot of supply

(2) Distribution System Alternatives

- Develop up to two (2) conceptual distribution system alternatives capturing each of the following levels of treatment: (a) No treatment improvements: Expanded non-potable reuse, agricultural irrigation; (b) Advanced Treatment for Indirect Potable Reuse: Creek discharge, groundwater recharge; (c) Advanced Treatment for Direct Potable Reuse
- Develop each conceptual distribution system piping and pumping alternative to the same level of detail as the treatment alternatives.

(3) Recycled Water Storage Alternatives

- Develop up two (2) conceptual alternatives for recycled water system storage building from the Treatment and Distribution Alternatives described above.
- Each conceptual storage alternative will be developed to the same level of detail as the treatment and distribution system alternatives.

(4) Non-Recycled Water Alternatives

- Develop up to two (2) conceptual alternatives for non-recycled water alternatives, building from the Treatment and Distribution Alternatives described above, expected to include: (a) Surface Water Intertie; (b) Nitrate Treatment
- Each non-recycled water conceptual alternative will be developed to the same level of detail as the alternatives described above.

(5) Water Conservation/Reduction Analysis



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- Summarize the Los Osos CSD's, GSWC, and S&T's current and future plans for water conservation and impact on water recycling.

(6) No Project Alternative

- Evaluate the no project alternative and include in alternatives analysis.

5.7 Conceptual Design of the Preferred Alternative

- Develop preliminary design criteria and conceptual maps, figures, and process flow diagram(s).
- Update cost estimates (capital, O&M, and lifecycle) based on final configuration and considering expected time of construction.
- Prepare list of all potential users, quantity of recycled water use, peak demand and commitments obtained to-date.
- Compare reliability of the recycled water facilities to the user requirements.
- Develop an operational plan of the preferred alternative, including key parties, necessary equipment, monitoring, and irrigation scheduling.

5.8 Implementation Plan

- Prepare a schedule for the implementation of the recycled water project.
- Determine needed agreements and ordinances for implementation.
- Describe the tentative water recycling requirements of the RWQCB.
- Evaluate water rights impacts.
- Evaluate permits required for project implementation.
- Highlight any key assumptions of issues that need to be resolved before implementation.

5.9 Construction Financing Plan and Revenue Program

- Prepare funding plan that outlines sources and timing of funds for design and construction.
- Summarize pricing policy recommendations for recycled water.
- Evaluate costs that can be allocated to water pollution control and/or water supply reliability.
- Develop criteria and annual projections for (a) Water prices for each user or category of users; (b) Recycled water used by each user; (c) Annual costs (required revenue) of recycling project; (d) Allocation of costs to users; (g) Sunk costs and indebtedness

Deliverables: Draft Chapter 8. Recommended Project of the Recycled Water Facility Plan.

Assumptions: All cost estimates will be AACE Class 5 for conceptual level planning.

5.10 TAC Meetings #3 and #4

- Review the preliminary engineering analysis and alternatives development.
- Review scenario analysis and recommendations.



March 2023

Task 6 Water Recycling Facility Planning (WRFP) Study (WSC)

6.1 Draft WRFP Study

- Prepare draft executive summary and prepare or update the draft chapters prepared in Tasks 1 to 5 to develop the draft report.
- WSC will provide comprehensive quality control of the work items being prepared for delivery.

Deliverables: Draft Water Recycling Facilities Planning Study

6.2 Final Draft WRFP Study

- Prepare Final Draft Water Recycling Facilities Planning Study based on comments received from the Los Osos CSD and other stakeholders on the Draft Report.
- WSC will provide comprehensive quality control of the work items being prepared for delivery.

Deliverables: Final Draft Water Recycling Facilities Planning Study

6.3 Final WRFP Study

- Prepare Final Water Recycling Facilities Planning Study based on comments received from the Los Osos CSD on the Final Draft Report.
- WSC will provide comprehensive quality control of the work items being prepared for delivery.

Deliverables: Final Water Recycling Facilities Planning Study

Schedule

The overall project schedule is shown in the attached timeline and effectively runs from the kickoff meeting in June 2023 through final report delivery in December 2024, a total of 19 months. The sequence of key tasks begins with conceptual model and compilation of data sets. TAC meetings are strategically scheduled to coincide with milestones where key tasks are beginning or ending. The final report is scheduled for completion by the end of 2024.

Fees

Project fees are estimated at **\$349,987**. A detailed breakdown of the scope of work into key tasks with level of effort and hourly billing rates are provided in the attached Fee Proposal sheet and the Subcontractor Level of Effort Breakdown sheet, which contain any and all anticipated costs for completion of the project. Hourly rate schedules for all CHG and WSC staff classifications are available upon request.

Exceptions to Agreement and Addendums

A list of requested exceptions to the language of the Agreement for Services is included in Appendix B. Signed Addendums to the RFP are in Appendix C.

WRFP FACILITIES PLANNING STUDY - LOS OSOS
PROJECT SCHEDULE
CLEATH-HARRIS GEOLOGISTS / WATER SYSTEMS CONSULTING

Year	2023									2024												
Quarter	Q2			Q3			Q4			Q1			Q2			Q3			Q4			
Project Month			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
Milestones	Bid award		Begin model development						Begin engineering analysis				Calibrated model tech memo			End engineering analysis		Draft report			Final report	
Task 1: Project Management and Meetings		Kickoff meeting		TAC Meeting #1	Quarterly status report		TAC Meeting #2	Quarterly status report		Quarterly status report	TAC meeting #3		Quarterly status report		TAC meeting #4	Quarterly status report						
Task 2: Transient Model Development		Conceptual model, data gaps, approach		Model construction, calibration						Tech memo												
Task 3: Scenario Analysis													Scenario analysis									
Task 4: Model Peer Review (Work by Others)			TAC meeting				TAC meeting					TAC meeting				TAC meeting						
Task 5: Supplemental Supply Alternatives Evaluation							Preliminary engineering analysis, market assessment, and updated cost estimates															
Task 6: Report development																		Prepare draft report	Agency review	Prepare draft final and final report		

WRFP FACILITIES PLANNING STUDY - LOS OSOS
FEE PROPOSAL
CLEATH-HARRIS GEOLOGISTS / WATER SYSTEMS CONSULTING

Task	Description	Principal Hydrogeologist Project Manager/ Modeler	Environmental Scientist GIS Specialist / Lead Modeler	Senior Hydrogeologist Technical Review/ Modeler	Staff Geologist	CHG Labor Hours	CHG Labor Fee	Subcontractor Cost and CHG carrying cost*		TOTAL PROJECT FEE
		Spencer Harris	Tim Kershaw	Neil Currie				WSC	CHG (10%)	
		Hours								
	Billing Rates \$/hour	\$184	\$157	\$173	\$140					
Task 1	Project Management and Meetings									
1.1	Project administration and management	50				50	\$9,200	\$7,300	\$730	
1.2	Kickoff Meeting	4	2	2		8	\$1,396	\$1,030	\$103	
	SUBTOTAL	54	2	2	0	58	\$10,596	\$8,330	\$833	\$19,759
Task 2	Transient Groundwater Model									
2.1	Conceptual Groundwater Model	40	16	8	16	80	\$13,496			
2.2	Model Selection Alternatives Analysis	12	2			14	\$2,522			
2.3	Modeling Approach	48	36	8		92	\$15,868			
2.4	Model Construction and Calibration	260	420	60	80	820	\$135,360			
2.5	TAC Meetings	16	8			24	\$4,200			
	SUBTOTAL	376	482	76	96	934	\$171,446	\$0	\$0	\$171,446
Task 3	Scenario Analysis									
3.1	Groundwater Modeling Scenario Analysis	60	180			240	\$39,300			
3.2	Conceptual Alternatives Analysis	0	0	0	0	0	\$0	\$19,190	\$1,919	
	SUBTOTAL	60	180	0	0	240	\$39,300	\$19,190	\$1,919	\$60,409
Task 4	Model Peer Review									
	SUBTOTAL	0	0	0	0	0	\$0	\$0	\$0	\$0
Task 5	Preliminary Engineering Analysis									
	SUBTOTAL	0	0	0	0	0	\$0	\$68,730	\$6,873	\$75,603
Task 6	Water Recycling Facility Planning Study									
	SUBTOTAL	0	0	0	0	0	\$0	\$20,700	\$2,070	\$22,770
PROJECT TOTALS		490	664	78	96	1232	\$221,342	\$116,950	\$11,695	\$349,987

*NOTE Subcontractor (WSC) level of effort breakdown on separate sheet
CHG expenses to carry WSC subcontract billed at cost plus 10 percent

WRFP FACILITIES PLANNING STUDY - LOS OSOS

SUBCONTRACTOR LEVEL OF EFFORT BREAKDOWN



Task No. Task Description	WSC									Total Fee
	PIC/ Technical Advisor	Hydrogeology Lead	Project Manager	Project Administration	Staff Engineer	WSC Labor Hours	WSC Labor Fee	Expenses	WSC Fee	
	Robert Morrow	Michael Cruikshank	Heather Freed	Kay Merrill						
<i>Billing rates, \$/hr</i>	\$335	\$295	\$220	\$170	\$165					
1 Project Management and Meetings										
1.1 Project Administration and Management	2	2	12	20		36	\$ 7,300	\$ -	\$ 7,300	\$ 7,300
1.2 Kickoff Meeting		2	2			4	\$ 1,030	\$ -	\$ 1,030	\$ 1,030
SUBTOTAL	2	4	14	20	0	40	\$ 8,330	\$ -	\$ 8,330	\$ 8,330
2 Transient Groundwater Model										
SUBTOTAL	0	0	0	0	0	0	\$ -	\$ -	\$ -	\$ -
3 Scenario Analysis										
3.1 Groundwater Modeling Scenario Analysis						0	\$ -	\$ -	\$ -	\$ -
3.2 Conceptual Alternatives Analysis	6	12	32		40	90	\$ 19,190	\$ -	\$ 19,190	\$ 19,190
SUBTOTAL	6	12	32	0	40	90	\$ 19,190	\$ -	\$ 19,190	\$ 19,190
4 Model Peer Review										
SUBTOTAL	0	0	0	0	0	0	\$ -	\$ -	\$ -	\$ -
5 Preliminary Engineering Analysis										
5.1 Data Review and Summary			8		40	48	\$ 8,360	\$ -	\$ 8,360	\$ 8,360
5.2 Evaluate Treatment Objectives for Reuse	2		2		8	12	\$ 2,430	\$ -	\$ 2,430	\$ 2,430
5.3 Recycled Water Market Assessment	4		8		24	36	\$ 7,060	\$ -	\$ 7,060	\$ 7,060
5.4 Preliminary Hydrogeological Assessment		4	2		12	18	\$ 3,600	\$ -	\$ 3,600	\$ 3,600
5.5 Planning and Design Criteria			4		8	12	\$ 2,200	\$ -	\$ 2,200	\$ 2,200
5.6 Alternatives Development	8	8	40		60	116	\$ 23,740	\$ -	\$ 23,740	\$ 23,740
5.7 Conceptual Design of Preferred Alternative	4	2	8		24	38	\$ 7,650	\$ -	\$ 7,650	\$ 7,650
5.8 Implementation Plan	2	2	4		12	20	\$ 4,120	\$ -	\$ 4,120	\$ 4,120
5.9 Construction and Financing Plan	2		4		12	18	\$ 3,530	\$ -	\$ 3,530	\$ 3,530
5.10 TAC Meetings	4	4	16			24	\$ 6,040	\$ -	\$ 6,040	\$ 6,040
SUBTOTAL	26	20	96	0	200	342	\$ 68,730	\$ -	\$ 68,730	\$ 68,730
6 Water Recycling Facility Planning Study										
6.1 Draft WRFP Study	6	4	16		36	62	\$ 12,650	\$ -	\$ 12,650	\$ 12,650
6.2 Final Draft WRFP Study	2	2	6		16	26	\$ 5,220	\$ -	\$ 5,220	\$ 5,220
6.3 Final WRFP Study	1	1	4		8	14	\$ 2,830	\$ -	\$ 2,830	\$ 2,830
SUBTOTAL	9	7	26	0	60	102	\$ 20,700	\$ -	\$ 20,700	\$ 20,700
COLUMN TOTALS	43	43	168	20	300	574	\$ 116,950	\$ -	\$ 116,950	\$ 116,950



March 2023

APPENDIX A: RESUMES



SPENCER J. HARRIS, PG, CHG, CEG

Principal Hydrogeologist

Spencer Harris, a certified hydrogeologist (CHG) and certified engineering geologist (CEG) in California, has over 35 years of work experience in geology and hydrogeology, including over 25 years managing projects on the Central Coast and 10 years prior experience in geophysical exploration and environmental consulting. Spencer's varied background includes groundwater exploration and development, water resource management, groundwater flow and transport modeling, groundwater/surface water interaction and stream flow depletion studies, geophysical surveying, environmental assessments, and experience in numerous techniques related to subsurface investigation.

SELECTED PROJECT WORK EXPERIENCE

Los Osos Basin Plan, BMC Groundwater Monitoring and Annual Reports, (2015-2023)

Primary technical contributor on hydrogeology for the Los Osos Basin Plan used for groundwater basin adjudication and providing solutions for sustainable management. Developed and implemented basin monitoring program and prepared Annual Reports for the Los Osos Basin Management Committee since 2015.

Los Osos Basin Groundwater Models, (2000-2023)

Developed groundwater mounding models for planned Broderson disposal site and several other potential disposal sites during the Los Osos Wastewater Project. Updated the URS MODFLOW model in 2002 with MT3D (mass transport). Developed an Equivalent Freshwater Head version of basin model for evaluating seawater intrusion along the coast, and to compare the mitigating effects of recycled water project alternatives for the Los Osos Wastewater Project. Upgraded basin model in 2009 to the current dual-density SEAWAT version, simulating seawater intrusion within the basin and improving sustainable yield estimates. Operated the basin model on behalf of community purveyors and basin managers for the last 20 years.



EDUCATION

B.A. Geology, 1982
Pomona College, Claremont, CA

PROFESSIONAL REGISTRATION

Certified Hydrogeologist, HG 633
Certified Engineering Geologist, EG 2735
Professional Geologist, PG 6310
(all California)

PROFESSIONAL ASSOCIATIONS

Geological Society of America
National Ground Water Association

CAPABILITIES

Water Resource Management

- Hydrologic inventories and budgets
- Basin characterization
- Sustainable yield evaluation
- Flow and transport modeling
- Groundwater development
- Seawater intrusion assessment
- Anti-degradation and assimilative capacity studies
- Wastewater disposal projects
- Climate readiness evaluation
- Water quality investigations
- Well design and construction monitoring
- Groundwater monitoring programs

Environmental Impacts Studies

- Well and streamflow interference
- Drainage, erosion, and sedimentation
- Salt loading

Field Investigations

- Well site evaluation
- Geologic mapping
- Aquifer testing
- Surface water influence
- Geophysical methods
- Borehole logging
- Groundwater/surface water interaction
- Streamflow measurement



San Luis Obispo PCE Investigation and Groundwater Model (2022)

CHG Project manager for field investigation and groundwater model capture zone evaluation of a tetrachloroethylene (PCE) contaminant plume in the San Luis Obispo Valley Groundwater Basin. Field investigation involved cone penetrometer testing, direct push lithologic core sampling and groundwater sampling, and sonic drilling direct core sampling. Field investigation results were incorporated into a MODFLOW groundwater flow model. The model was used to evaluate hydraulic capture at potential treatment well sites using MODPATH particle tracking analyses.

Fresno Hydraulic Capture Zone and TCE Solute Transport Groundwater Model (2015-2021)

Project Manager and technical lead for the development of fate and transport model of a major Trichlorethylene (TCE) contaminant plume underlying the City of Fresno. Model development included geostatistical analyses and paleo-channel correlations within three hydrostratigraphic zones over an area of 14.3 square miles. The results of the model were reviewed and accepted by the Department of Toxic Substances Control. There has been one update to the model and it is currently used for projecting plume remediation times and for evaluating City well operations.

Los Osos CSD – Program C (Bay Oaks) Well (2022)

Project manager for the construction and testing of a new municipal supply well for the Los Osos Community Services District. The 700-foot stainless-steel well was constructed as part of planned Program C infrastructure improvements to help with seawater intrusion mitigation and water supply resiliency.

Groundwater Availability Study and SEAWAT Groundwater Model, Pico Creek Valley Groundwater Basin (2014, 2022)

Project manager and technical lead for Groundwater Availability Study in coastal basin for community reliant on groundwater. Updated groundwater basin characterization, developed hydrogeologic conceptual model, analyzed aquifer tests, and constructed transient dual-density SEAWAT model to assess the effects of storm surge and drought on seawater intrusion at the well field. In 2022, CHG performed groundwater/streamflow interconnectivity testing for the Instream Flow Management Study of Pico Creek. This information may be used to update the groundwater model in the future.

San Luis Obispo Valley Groundwater Basin GSP and Annual Reports (2019-2023)

Technical lead for water budget and monitoring program in support of the Groundwater Sustainability Plan for the San Luis Obispo Valley groundwater basin, a high-priority basin under SGMA. The water budget addressed changes in storage, groundwater/surface water interaction, sustainable yield, and overdraft. The monitoring program addressed groundwater and surface water monitoring. Also providing technical support for Annual Reports.

Los Osos Groundwater Basin Boundary Modification Request (2017-2018)

Project manager for successful Los Osos BBMR to realign the DWR basin boundaries for both scientific and jurisdictional purposes. Performed fringe area investigation to characterize the eastern alluvial valley, which became a subbasin, and to characterize the hydrogeology of Montana de Oro State Park, which was removed from the basin.



TIMOTHY D. KERSHAW

Environmental Scientist / GIS Specialist

Tim Kershaw brings leading edge expertise in database management and geographic information systems (GIS) analysis. Tim also performs groundwater and surface water modeling, GPS surveying, and hydrologic and hydrogeologic monitoring. He is proficient in industry standard and open-source GIS software and has a wide range of knowledge in data processing software and techniques.

SELECTED PROJECT WORK EXPERIENCE

PCE Investigation and Groundwater Model (2022)

Compiled existing hydrologic and lithologic data in the SLO Basin and incorporated new lithologic boring information into a conceptual model for analyzing existing PCE contamination around SLO Creek. Constructed and calibrated a groundwater flow model within the San Luis Valley Subarea to evaluate PCE migration within the plume area.

Hydrogeologic Recharge Analysis, San Luis Valley Subbasin (2018)

Compiled historical pumping, water level and recharge data and performed a streamflow survey to characterize the hydrogeology around San Luis Obispo Creek. Constructed and calibrated a groundwater flow model within the San Luis Valley Subarea to evaluate recharge of recycled water from the SLO Water Resource Recovery Facility.

Regional Groundwater Sustainability Project, Arroyo Grande/Tri-Cities Mesa Area (2016-2017)

Collected and processed hydrogeologic data including: pumping, water level, and streamflow records; soil and land-cover data; and well logs and geologic cross-sections. Developed and calibrated a numerical flow model for the Arroyo Grande Tri-Cities Mesa Area. Met with stakeholders and reviewers to present model results and develop appropriate recycled water injection scenarios. Produced maps, charts and figures and prepared the technical report.



EDUCATION

M.A. Geography, 2013
University of California, Santa Barbara

B.S. Environmental Engineering, 2010
Cal Poly, San Luis Obispo

CAPABILITIES

Water Resource Management

- Groundwater characterization
- Groundwater flow modeling
- Hydrologic budget analysis
- Water level contouring and database development

Environmental Science

- Surface and groundwater quality sampling
- Streamflow Measurement
- Groundwater level monitoring
- Water quality monitoring

Geographic Information Systems

- Database management
- Spatial data processing
- Geostatistical methods
- GPS data collection and correction
- Map production
- Interactive webmap creation

COMPUTER SKILLS

Geographic Information Systems

- ArcGIS, ArcPad
- QGIS
- Golden Surfer

Hydrologic Modeling

- FEFLOW, MODFLOW
- HEC-HMS, HEC-RAS

Design

- AutoCAD, SolidWorks
- Adobe Photoshop, Adobe Illustrator
- CorelDraw

Programming/Scripting

- Python, Matlab, R



Water Resource Reliability Program - Recycled Water Injection Well Study, Oceano (2018)

Developed a groundwater flow model to evaluate suitability of potential recharge sites in the Santa Maria Valley Groundwater Basin. Designed and maintained GIS database of hydrogeologic data in the area. Analyzed groundwater model results to develop ranking for recharge sites.

Fresno Hydraulic Capture Zone and TCE Solute Transport Groundwater Model (2015-2021)

Assisted in construction and calibration of a numerical hydrologic flow and contaminant mass transport model for a cleanup-site. Investigated remediation options for the site using the calibrated model. Developed and maintained GIS database for project and produced maps, charts and figures for the technical report. Developed updated model in 2019 to include recent monitoring data and evaluated model performance.

Groundwater Dewatering Analysis, San Luis Obispo (2018)

Compiled hydrogeologic data including well logs and water levels and developed a flow model in the SLO City Tank Farm area. Used the model to simulated dewatering scenarios for project site to develop recommendations for future development.

Groundwater Dewater Analysis, San Luis Obispo (2016)

Compiled hydrogeologic data including well logs and water levels and developed a flow model in the downtown SLO area. Used the model to simulated dewatering scenarios for project site to develop recommendations for future development.

Los Osos Valley Groundwater Basin Monitoring Program (2016-2022)

Currently process groundwater level and groundwater quality data to develop groundwater storage and seawater intrusion estimates for the basin. Maintain and process agricultural GIS datasets for use in a soil moisture model to develop groundwater extraction estimates. Prepare maps and figures and contribute to annual report.

Basin Characterization and Boundary Modifications for the Fringe Areas of the Los Osos Groundwater Basin (2017-2018)

Prepared GIS data for use in technical reports and for official use. Correlated DWR Bulletin 118 boundaries with the adjudicated basin and plan area boundaries, parcel maps, and the proposed boundary modifications. Performed crop survey to determine agricultural water use estimates. Prepared maps, cross sections and figures for report. Met with stakeholders and community members to present technical analysis and future options.

Los Osos Valley Groundwater Basin, Basin Boundary Modification Request (2016)

Prepared GIS shapefiles for use in technical memorandum. Reconciled boundary locations on the qualified geologic map with digital, geo-referenced locations. Correlated DWR Bulletin 118 boundaries with the adjudicated basin and plan area boundaries, parcel maps, and the proposed boundary modifications.

Los Osos Valley Groundwater Basin, Anti-Degradation and Assimilative Capacity Analysis (2016)

Gathered land-use and administrative boundary data and performed GIS analysis to determine salt loading sources for the anti-degradation and assimilative capacity analysis in the basin.



NEIL D. CURRIE, PG, CHG

Senior Hydrogeologist

Neil Currie has more than 10 years experience working as a geologist on the Central Coast. His background includes groundwater exploration and development, water resource management, groundwater flow and transport modeling, geostatistical modeling, geophysical surveying, well and pump system design, GIS, and experience in numerous field techniques related to subsurface investigations.

Additionally, Neil has background in oilfield operations (both conventional and Enhanced Oil Recovery), petroleum exploration, geothermal exploration, mine reentry and evaluation, and mineral assessments.

SELECTED PROJECT WORK EXPERIENCE

Nipomo Mesa Management Area (NMMA) Technical Committee (2021-2023)

Assessed and advised on groundwater conditions within the Nipomo Mesa Area of the Santa Maria Groundwater Basin as part of ongoing management of the adjudicated basin. Ongoing assistance in improving the understanding of subsurface geology and hydrogeology within the work area.

Fresno Hydraulic Capture Zone and TCE Solute Transport Groundwater Model (2015-2021)

Technical lead for geostatistical modeling that was incorporated into the solute transport model. Developed sequence stratigraphic framework and geostatistical parameters for 14 square-mile Pinedale site in Fresno, California. Used this data to construct facies and upscale to flow and transport model of the site. Also identified paleochannels and assessed flow data for model, including pumping, river bed losses, basin infiltration and rainfall.



EDUCATION

B.S. Earth Science- Hydrology Option
(High Honors), January 2014
New Mexico Tech, Socorro, NM

M.S. Petroleum Engineering, May 2017
New Mexico Tech, Socorro, NM

PROFESSIONAL REGISTRATION

Professional Geologist, California, #9616
Certified Hydrogeologist, California, #1113

PROFESSIONAL ASSOCIATIONS

Geological Society of America (GSA)
Society of Petroleum Engineers (SPE)
Society of Exploration Geophysicists (SEG)
AAPG
National Groundwater Association (NGWA)

CAPABILITIES

Water Resource Management

- Hydrologic inventories and budgets
- Flow and transport modeling
- Geostatistical modeling
- Groundwater exploration & development
- Anti-degradation and assimilative capacity studies
- Water quality investigation
- Well design and construction monitoring
- Groundwater monitoring programs
- Fault barrier assessments

Environmental Impacts Studies

- Well and stream flow interference
- Salt and nutrient loading
- Subsidence studies

Field Investigations:

- Well site evaluation
- Geologic mapping
- Aquifer testing
- Geophysical methods
- Borehole logging
- Transducer and stream flume installations

Drilling and Well Design:

- Well design and construction monitoring
- Complex drilling operations (deep wells, oil and gas hazards, geothermal)
- Drilling mud design
- Managed pressure drilling



SGMA Compliance, North Fork Ranch, New Cuyama, California (2017-2023)

Provided technical advice to North Fork Ranch management as they participated in the development of the Cuyama Valley Groundwater Sustainability Plan (GSP). Participated in the Cuyama Valley Technical Advisory Committee. Conducted technical studies of groundwater flow across the Russell fault zone. Assisted in defining structure and hydrogeology of the Western Cuyama Valley. Conducted assessments of subsidence impacts on the North Fork Ranch.

Exploration and Development Program, North Fork Ranch, New Cuyama California (2019-2023)

Conducted an assessment of sustainable yield on the North Fork Ranch. Developed a groundwater exploration program to identify infill well sites and a new groundwater exploration to identify infill well sites and new groundwater development options on the North Forks Ranch including extensive geophysical (passive seismic) exploration. Developed well designs and a drilling program to facilitate groundwater development on the North Fork Ranch.

Cuyama Valley Groundwater Basin GSP Technical Committee (2017-2019)

Provided technical advice and input in the development of the Groundwater Sustainability Plan for the Cuyama Valley Groundwater Basin. Assisted in the siting of potential groundwater monitoring wells as part of the ongoing basin wide management program. Assisted in peer reviewing technical documentation and groundwater model development and results.

Exploration and Development (Community Supply Well), Nipomo (2020-2021)

Evaluated the Nipomo Mesa area for geology, groundwater levels, groundwater quality and other system considerations to identify a series of potential sites to develop groundwater for community supply needs. Selected a site for exploration and developed a drilling, plan, preliminary well design, water quality testing program, and pumping test program for the selected site. Managed the bidding, drilling, and testing for well construction and testing following the previously developed plan.

Passive Seismic Geophysical Survey-San Luis Obispo Groundwater Sustainability Plan (2019)

Conducted a geophysical investigation using passive seismic methods (TROMINO™) to evaluate the depth and structure underlying the Southern Edna Valley portion of the San Luis Obispo Groundwater Basin in support of the development of a GSP.

Regional Groundwater Sustainability Project, Arroyo Grande/Tri-Cities Mesa Area (2016- 2017)

Assessed sequence stratigraphy in the model area. Evaluated geostatistical parameters and developed preliminary facies model and up-scaled facies model for groundwater model development.

Los Osos Valley Groundwater Basin, Anti-Degradation and Assimilative Capacity Analysis, San Luis Obispo County (2016)

Analyzed water quality for principal aquifers and basin areas to develop assimilative capacity and conducted an anti-degradation analysis. Supported basin Salt and Nutrient Plan development and Waste Discharge Order permitting for Los Osos Water Recycling Facility.

Heather Freed PE, MS

PROFESSIONAL EXPERIENCE

Heather Freed is a Professional Engineer with over 6 years' experience in integrated planning, modeling, and master planning for water supply, treatment, and distribution systems. She has supported integrated water resources planning projects that evaluate demand projections and water supplies, including surface water, imported water, groundwater, recycled water, stormwater, and desalinated water supply availability, constraints, future risks, and costs, to develop and recommend a future supply portfolio.

REPRESENTATIVE PROJECTS

2020 Urban Water Management Plan and Metropolitan Water Resources Management Plan (Metro Plan), City of Fresno, CA. Project Engineer. Working with the City to develop an updated Metro Plan that will provide a road map for the City's water supplies, water infrastructure, and sustainable growth for the next 50 years. The 2020 Metro Plan will include preparation and certification of a Programmatic/Project Environmental Impact Report, as well as a 2020 UWMP. The 2020 Metro Plan is intended to update the 2014 Metro Plan to incorporate physical and institutional changes and new available data. Land use based demand projections analysis will include estimating a "demand envelope" of possible scenarios impacting water demands, such as conservation programs and sensitivity. Alternatives included local groundwater recharge with surface water, storm water, and recycled water; regional groundwater banking with surface water and storm water; groundwater plume management; surface water treatment plant expansion; non-potable reuse expansion; groundwater recharge with recycled water; direct potable reuse via raw water augmentation (purified wastewater to surface water treatment plant).

2020 Urban Water Management Plan, West Basin Municipal Water District. Project Engineer. Developed a Wholesale UWMP in coordination with Metropolitan Water District and West Basin's retail agencies to meet California DWR's requirement and demonstrate West Basin's water supplies and demands through 2045. As a wholesale provider, West Basin supplies imported water and recycled water to its retail agencies for potable and non-potable use, and to the Water Replenishment District for groundwater recharge

within the West Coast Basin. Developed a supply and demand tool to evaluate supply portfolios under different demand and supply projections to understand the future role of desalination and the impact of local groundwater pumping by retail agencies on West Basin's supply projections.

Chino Basin Program Preliminary Design Report, Inland Empire Utilities Agency, Ontario, CA. Staff Engineer. Evaluated recycled water system seasonal demand fluctuations and performed hydraulic model runs to evaluate system capacity and storage needs for multiple future system alternatives and seasonal operations. Evaluated system upgrades including new pipeline and pump sizing. Prepared preliminary design report for recycled water alternatives and new facilities.

PCE Plume Characterization Prop 1 Grant Work, City of San Luis Obispo, CA. Engineering Support. Prepared a Feasibility Study evaluating potential future groundwater wells, alternative locations, and multiple well head treatment technologies. Coordinated with Cleath-Harris Geologist to model well pumping and treatment alternatives to understand alternative impacts to the PCE plume.

San Juan Retail System Master Plan, San Juan Water District, Granite Bay, CA. Staff Engineer. Assisted in updating the Retail System hydraulic model and using the model to analyze the system to determine recommended improvements. Updated the Retail System demands and future projections and incorporated the updates into the model, analyzed the water system to identify deficiencies and future projects, conducted workshops with District staff to review model results, analyzed fire flows and created mapping, conducted water age analysis, and developed options for future projects to be incorporated into the District's Capital



EDUCATION

MS, Civil and Environmental Engineering, Cal Poly, San Luis Obispo

BS, Environmental Engineering, Cal Poly, San Luis Obispo

PROFESSIONAL REGISTRATIONS

PE – Civil, CA, No. 89406

“Water is life, and I’m motivated to help our clients find creative solutions for their water resources to continue to provide clean, reliable, and affordable water to our communities.”

Heather Freed

Heather Freed ^{PE, MS} continued...

Improvement Program. Prepared sections in the master plan report to document the model update and analysis.

North Pleasant Valley Desalter, Project Management Support, City of Camarillo, CA. Staff Engineer. Performed hydraulic modeling analysis to evaluate seasonal demand fluctuations and operations in the water distribution system. Evaluated system operation and system hydraulic balance with a new desalter supply source serving the distribution system. Performed a seasonal analysis to determine recommend a desalter capacity to meet peak demands and utilize full desalter capacity in the minimum demand months.

Water Vision Santa Barbara/Enhanced Urban Water Management Plan, City of Santa Barbara, CA. Project Engineer. Evaluated the adequacy and reliability of the City's water supply portfolio, incorporating future supply and demand risks, and under unprecedented drought conditions to provide a long-term view of how the City's water supplies will be managed in the future. Developed a clear road map for the City's current and future supply portfolio and flexible implementation plan so the City can make informed water supply decisions as conditions change.

Water Master Plan, San Luis Obispo County Operations Center, San Luis Obispo, CA. Project Engineer. Prepared a detailed database of the Company's infrastructure and evaluated facility condition and age that will result in a Master Plan which includes a comprehensive Asset Management Program. Updated the distribution system hydraulic model based on recent as-builts and calibrated the model using hydrant flow testing data. Evaluated the water system capacity including system pressure, fire flow, and velocity. Assessed the water system resilience, and recommended alternatives to improve operational flexibility and maintain system service with pipeline shutdowns or repairs.

South Bay Well Site Water Transmission Main, Los Osos Community Services District, CA. Staff Engineer. Prepared the design documents for the installation of approximately 2400 linear feet of new 8-inch PVC pipeline in the County Right of Way. The project included the preparation of design plans, technical specifications, engineer's opinion of construction cost, and permitting support.

Program C Well Water Transmission Main, Los Osos Community Services District, CA. Staff Engineer. Prepared design documents for a new 8-inch transmission main along South Bay Boulevard and Mountain View Drive between the new well site located on Nipomo Avenue. The transmission main included a tie-in into the WSC designed South Bay Well transmission main. The tie in included appropriate valving to allow the District to manually control the new well discharge to either the boosted zone or directly into the main zone.

Cayucos Sustainable Water Project Facilities Plan and Beneficial Use Analysis, Cayucos Sanitary District, CA. Engineering Support. Provided engineering services to identify candidate sites Cayucos Sanitary District's new Water Resource Recovery Facility, characterize the District's domestic wastewater flows, perform preliminary engineering investigations, evaluate beneficial use alternatives and prepare a Facilities Plan for implementation of the Sustainable Water Project. Project included assisting in the pursuit of state and federal funding, environmental

document preparation, permit acquisition, stakeholder outreach and coordination and public outreach.

2020 UWMP, California American Water Monterey District, Monterey, CA. Project Engineer. Developed of a Retail UWMP in coordination with California American Water to meet California DWR's requirement and demonstrate the Monterey Peninsula's water supplies and demands through 2045. Developed supply and demand projections and evaluated two future water supply reliability conditions with existing and planned reuse supplies and a with new desalination facility.

Atascadero State Hospital Waste Water Treatment and Collection System Analysis, GHD, Inc., Atascadero, CA. Staff Engineer. Developed a sewer capacity spreadsheet model of the Atascadero State Hospital collection system to evaluated existing and future sewer system capacity. Developed future system flows from a proposed 250-bed expansion and recommended collection system peaking factors to evaluate the system under a range of scenarios. Comprehensive System Master Plan and Asset Management Program, San Antonio Water Company, Upland, CA. Staff Engineer. Prepared a detailed database of the Company's infrastructure and evaluated facility condition and age that will result in a Master Plan which includes a comprehensive Asset Management Program. Supported the development and calibration of a new hydraulic model of the system in conjunction with GIS datasets to improve system operations and CIP development. Evaluating the capacity of the existing water system and identified improvements to meet demands, including fire flow, of the current and future population. Assessing current supply portfolio under multiple risk and resilience scenarios to understand system risks and develop recommendations to reinforce current supplies or develop alternative emergency supply sources.

Replenish Big Bear, Big Bear Area Regional Wastewater Agency, Big Bear City, CA. Staff Engineer. Prepared a facility site plan for the future upgrades of the wastewater treatment plant facility. Incorporated planned facility upgrades, operator preference for facilities, and a utility site plan.

Water System Hydraulic Model, Camrosa Water District, Ventura, CA. Hydraulic Modeling Lead. Developed and calibrated a hydraulic model of the Camrosa Potable Water System. Evaluated customer consumption and production data to determine a spatial demand for loading in the model. Performed steady state and extended period model runs to evaluate the distribution system capacity and water age. Used the calibrated model to evaluate tank fluctuations and determine operational storage needs and overall storage requirements.

Consolidated CIP, Scotts Valley Water District, CA. Project Engineer. Updated and recalibrated the Scotts Valley Water District water model and perform a system capacity analysis. Assisted District staff in hydrant testing to collect calibration data. Identified capacity deficiencies in the water system and recommended capital improvement projects to improve deficiencies. Performed site-visits of booster pump stations, wells, and tanks and updated projects from the water system's previous condition assessment. Reviewed other water system reports with recommendations. Compiled capacity, condition-assessment, and other capital improvement projects into a comprehensive, prioritized, and updatable capital improvement program for budgetary planning.

Michael Cruikshank PG, CHG, MS



PROFESSIONAL EXPERIENCE

Mr. Cruikshank is a proven manager, certified hydrogeologist, and water resource planner with more than 15 years of professional experience. He has managed projects in large diverse stakeholder environments for a variety of water resource projects including the development of groundwater sustainability plans (GSPs), salt and nutrient management plans (SNMPs), and indirect potable reuse (IPR) projects. He has technical expertise in water resource planning, hydrogeologic basin analysis, and the development of integrated groundwater and surface water models that are used to make important water resource management decisions on a watershed scale.

REPRESENTATIVE PROJECTS

San Luis Obispo Valley Groundwater Sustainability Plan, County and City of San Luis Obispo, San Luis Obispo, CA. Project Manager.

Managed the development of the Groundwater Sustainability Plan (GSP) for the high priority San Luis Obispo Valley Groundwater Basin (SLO Basin). The GSP was developed by the County of San Luis Obispo and the City of San Luis Obispo, the two Groundwater Sustainability Agencies in the Basin. Mr. Cruikshank managed a team of four subconsultants, two Groundwater Sustainability Agencies, and a Groundwater Sustainability Commission (GSC). The GSC consisted of elected officials from two Groundwater Sustainability Agencies (City Council Member and County Board of Supervisor), and representatives from the other participating partners (agricultural, private water company, and mutual water companies). The GSP describes and assesses the groundwater condition of the SLO Basin, develops quantifiable management objectives that account for the interests of the SLO Basin's beneficial groundwater uses and users, and identifies a group of projects and management actions that will allow the SLO Basin to achieve and maintain sustainability in the future. Mr. Cruikshank led the development of an integrated groundwater surface water model, GSFLOW model which was used to evaluate the potential impacts of the proposed projects and management actions associated with the Implementation of the GSP.

The SLO Basin GSP was unanimously adopted and is currently being reviewed by the California Department of Water Resources (DWR).

Arroyo Grande Subbasin Groundwater Sustainability Plan, County of San Luis Obispo and City of Arroyo Grande, Arroyo Grande, CA. Project Manager.

Manager for Groundwater Sustainability Plan (GSP) development for the Arroyo Grande Subbasin, a very low priority basin. The subbasin's very low prioritization does a GSP, however the development of a GSP safeguards continued sustainable conjunctive management of groundwater and surface water supplies. Work efforts included in the GSP development are important for advancing water resource management of the AG Subbasin and interconnected surface waters of the Arroyo Grande Creek watershed that overlie the subbasin. As part of the development the GSP, an integrated groundwater/surface water model, GSFLOW model was created to support the future development of a Habitat Conservation Plan (HCP) and to evaluate impacts of the proposed projects and management actions associated with the Implementation of the GSP.

Central Coast Blue, Northern Cities Management Area, Pismo Beach, CA. Senior Hydrogeologist. Managed the development of a groundwater flow model focused in the Northern Cities Management Area (NCMA) of the Santa Maria Groundwater Basin (SMGB) as part of program management of Central Coast



EDUCATION

MS, Civil and Environmental Engineering, California State University, Fullerton, CA.

BS, Geology, California State University, Fullerton, CA.

PROFESSIONAL REGISTRATIONS

Professional Geologist, California, No. 8854

Certified Hydrogeologist, No. 994

Engineer-in-Training No. 142007

"I take a multidisciplinary approach to every project to deliver forward-looking solutions for sustained community value."

Michael Cruikshank

Blue. Oversaw the preparation of preliminary design associated with five injection wells and 3 nested monitoring wells. Reviewed the technical specification for a test injection well and associated nested monitoring well. SMGB is a coastal aquifer that has observed increased chloride concentrations in previous prolonged droughts and been drastically impacted by the current drought. Central Coast Blue is a One Water regional recycled water project that will develop a sustainable water supply and protect the SMGB from seawater intrusion by creating a seawater barrier through a series of wells that will inject advanced treated recycled water that is currently treated and discharged to the ocean.

Recharge Master Plan Update and Implementation, Chino Basin Watermaster, Chino Basin, CA. Staff Engineer. Determined the existing recharge capacity for imported and recycled waters and the future recharge capacity requirements. The report included conclusions and recommendations for future recharge projects and future supplemental water supply sources.

Central Coast Blue Prop 1 GWGP Test Injection Well, Pismo Beach, CA. Senior Hydrogeologist. Oversaw the preparation of preliminary design associated with five injection wells and three nested monitoring wells. Reviewed the technical specification for a test injection well and associated nested monitoring well. The construction of the test injection well and monitoring well is anticipated to begin the first quarter of 2020. The Santa Maria Groundwater Basin (SMGB) is a coastal aquifer that has observed increased chloride concentrations in previous prolonged droughts and been drastically impacted by the current drought. Central Coast Blue is a One Water regional recycled water project that will develop a sustainable water supply and protect the SMGB from seawater intrusion by creating a seawater barrier through a series of wells that will inject advanced treated recycled water that is currently treated and discharged to the ocean.

Metropolitan Water Resources Management Plan (Metro Plan) and 2020 Urban Water Management Plan, City of Fresno, CA. Senior Hydrogeologist. The 2020 Metro Plan will facilitate future water resources decisions and improvement planning through 2070. The plan will be developed in phases with Phase 1 focused on the existing system and evaluating the potential impacts of continuing to operate with existing water resources. Phase 1 entailed development of planning goals and objectives; baseline demands, supplies and groundwater water budget; and identifying physical, regulatory, and legal challenges and opportunities. Phase 2 will develop and evaluate alternatives and develop strategies to optimize the use of available supplies and infrastructure to meet the City's existing and future demands. Phase 3 will define an Implementation Plan that includes an institutional plan, funding plan, and implementation schedule. Alternatives included local groundwater recharge with surface water, storm water, and recycled water; regional groundwater banking with surface water and storm water; groundwater plume management; surface water treatment plant expansion; non-potable reuse expansion; groundwater recharge with recycled water; direct potable reuse via raw water augmentation (purified wastewater to surface water treatment plant).

Central Coast Blue, Northern Cities Management Area, Pismo Beach, CA. Senior Hydrogeologist. Managed the development of a groundwater flow model focused in the Northern Cities Management Area (NCMA) of the Santa Maria Groundwater Basin (SMGB) as part of program management of Central Coast Blue. Oversaw the preparation of preliminary design associated with five injection wells and 3 nested monitoring wells. Reviewed the technical specification for a test injection well and associated nested monitoring well. SMGB is a coastal aquifer that has observed increased chloride concentrations in previous prolonged droughts and been drastically impacted by the current drought. Central Coast Blue is a One Water regional recycled water project that will develop a sustainable water supply and protect the SMGB from seawater intrusion by creating a seawater barrier through a series of wells that will inject advanced treated recycled water that is currently treated and discharged to the ocean.

Recharge Master Plan Update and Implementation, Chino Basin Watermaster, Chino Basin, CA. Staff Engineer. Determined the existing recharge capacity for imported and recycled waters and the future recharge capacity requirements. The report included conclusions and recommendations for future recharge projects and future supplemental water supply sources.

Central Coast Blue Prop 1 GWGP Test Injection Well, Pismo Beach, CA. Senior Hydrogeologist. Oversaw the preparation of preliminary design associated with five injection wells and three nested monitoring wells. Reviewed the technical specification for a test injection well and associated nested monitoring well. The construction of the test injection well and monitoring well is anticipated to begin the first quarter of 2020. The Santa Maria Groundwater Basin (SMGB) is a coastal aquifer that has observed increased chloride concentrations in previous prolonged droughts and been drastically impacted by the current drought. Central Coast Blue is a One Water regional recycled water project that will develop a sustainable water supply and protect the SMGB from seawater intrusion by creating a seawater barrier through a series of wells that will inject advanced treated recycled water that is currently treated and discharged to the ocean.

Indirect Potable Reuse Evaluation, City of San Luis Obispo, CA. Senior Hydrogeologist. Oversaw the evaluation of an indirect potable reuse project associated with the upgrade of Water Resource Recovery Facility (WRRF) in the City through the development of a groundwater flow model completed by Cleath Harris Geologists. The groundwater model evaluated multiple scenarios including moving the discharge point further upstream in San Luis Obispo Creek and an off-channel recharge facility.

Recycled Water Planning Investigation, San Bernardino Municipal Water District, City of San Bernardino, CA. Staff Engineer. Developed cost-effective alternatives for the reuse of recycled water. The proposed Clean Water Factory (CWF) will treat secondary effluent from the existing San Bernardino Water Reclamation Plant to a quality approved for recharge and direct use. Assisted in the development of treatment and project alternatives, preliminary design calculations for conveyance facilities, and created maps and figures for the report.

Rob Morrow PE, MS

PROFESSIONAL EXPERIENCE

Rob Morrow's 23 years of engineering experience centers on integrated water resources planning with a focus on long-term supply planning and implementation of recycled water projects from concept to operation for applications ranging from agricultural irrigation to potable reuse. He has led large and small recycled water master plans and preliminary designs across California and has led integrated water resources planning projects that analyzed water supply and demand portfolios that include imported water supplies, surface water, groundwater, stormwater, rainwater, graywater, groundwater recharge, and in-lieu recharge. Rob is experienced with financial revenue and funding strategy planning as well as preparation of multiple successful state and federal grant and loans.

REPRESENTATIVE PROJECTS

Test Injection Well and Data Collection Phase, Central Coast Blue, City of Pismo Beach, CA.

Project Manager. Managed the pre-design data collection efforts funded by a \$2.0 million grant from the State Water Resources Control Board under Proposition 1 Groundwater Sustainability Grant Program. The primary effort entailed permitting, design, construction, and testing of one injection well and two monitoring wells to inform modeling and design of the Central Coast Blue project. The effort also included a groundwater antidegradation analysis, aerial geophysics investigation, soil leaching study, and well siting analysis. Aquifer testing data from the test injection well and aerial geophysics data were used to update the groundwater model to determine injection well capacity and locations. Soil and water quality data were used to conduct the groundwater anti-degradation analysis and soil leaching study, which informed treatment design for water conditioning. Holds weekly coordination meetings with City Staff and technical teams and provides updated schedules and progress reports. Researches permits, reviews technical drawings and designs, assesses CEQA scoping, analyzes myriad data, and reviews work plans, among other various tasks.

Paso Basin Supplemental Water Supply Options Study, San Luis Obispo County Department of Public Works, CA. *Project Engineer.*

Subconsultant for the Nacimiento Water Project and recycled water alternatives development and

evaluation. The study aims to identify potential new water supplies for users within the Paso Robles Groundwater Basin, which was designated as critically overdrafted by the state. The recycled water options considered primarily landscape irrigation, agricultural irrigation, and groundwater recharge options, such as surface spreading and injection. The Nacimiento project options considered direct use of treated and untreated water as well as groundwater recharge via surface spreading and injection.

Carpinteria Advanced Purification Project, Carpinteria Valley Water District, CA.

Program Manager. Managed the project since its conception through preliminary design and am now leading project implementation. The project entails purification of up to 1.0 MGD of secondary wastewater effluent via advanced treatment (MF/RO/AOP), conveyance to injection wells, and injection for groundwater replenishment in compliance with California DDW and RWQCB regulations. Rob was Project Manager the Recycled Water Facilities Plan that evaluated potential uses of available wastewater, including landscape irrigation, agricultural irrigation, and groundwater recharge. Ultimately, mid-basin injection of advanced treated water was recommended. Then Rob led preliminary design of the advanced treatment plant, pump station, conveyance pipelines, injection wells, and monitoring wells. In addition, he led programmatic efforts, including coordination



EDUCATION

MS, Civil / Environmental Engineering, U.C. Berkeley

BS, Civil / Environmental Engineering, Vanderbilt University

PROFESSIONAL REGISTRATIONS

Professional Engineer - Civil, California, No. C68916

“I have dedicated my career to helping agencies cost-effectively navigate today’s complex water challenges with integrated, system wide approaches to water resources management.”

Rob Morrow

Rob Morrow ^{PE, MS} continued...

of interagency agreements, RWQCB and DDW permitting, development of a funding and financing plan, Title 16 Feasibility Study approved by USBR, successful SRF application, and stakeholder outreach. The program management is ongoing.

Metropolitan Water Resources Management Plan (Metro Plan) and 2020 Urban Water Management Plan, City of Fresno, CA. Project Manager. Responsible for City's foundational water plan that sets the vision, priorities, strategies and initiatives for the City's long-term water security. The 2020 Metro Plan will facilitate future water resources decisions and improvement planning through 2070. The plan will be developed in phases with Phase 1 focused on the existing system and evaluating the potential impacts of continuing to operate with existing water resources. Phase 1 entailed development of planning goals and objectives; baseline demands, supplies and groundwater water budget; and identifying physical, regulatory, and legal challenges and opportunities. Phase 2 will develop and evaluate alternatives and develop strategies to optimize the use of available supplies and infrastructure to meet the City's existing and future demands. Phase 3 will define an Implementation Plan that includes an institutional plan, funding plan, and implementation schedule. The project considers use of USBR water from San Joaquin River / Friant-Kern Canal, surface water from Kings River, groundwater, recycled water, and conservation within a conjunctive use framework that maximizes surface water use and recharge in wet conditions and maximizes groundwater production in dry conditions. Alternatives included local groundwater recharge with surface water, storm water, and recycled water; regional groundwater banking with surface water and storm water; groundwater plume management; surface water treatment plant expansion; non-potable reuse expansion; groundwater recharge with recycled water; direct potable reuse via raw water augmentation (purified wastewater to surface water treatment plant).

Regional Recycled Water Strategic Plan, San Luis Obispo County Department of Public Works, CA. Developed a recycled water strategic plan for San Luis Obispo County. The plan included evaluating potential projects for five areas across of the County. Projects considered included landscape irrigation, commercial irrigation, agricultural irrigation, industrial cooling towers, groundwater recharge via surface spreading and injection wells, streamflow augmentation, and reservoir augmentation. Project development required consideration of local opportunities and constraints that resulted in recommendation for next steps for the highest potential projects in each area. Recommendations included technical, regulatory, institutional, and policy elements. In particular, agricultural reuse has high potential so a long-term plan to implement large-scale reuse by the agricultural community was defined. The project was prepared in coordination with the IRWM Plan Update.

Potable Reuse Facilities Plan, Goleta Water District, CA. Project Manager. Prepared a potable reuse feasibility study examining the potential for groundwater augmentation, raw water augmentation (to surface water treatment plant), and treated water augmentation (directly to potable system) alternatives for GWD in comparison to expanding their existing non-potable system and other identified potential supplies. A preferred alternative of injection of advanced treated water was selected based on cost considering existing and potential regulations and the associated treatment, storage, monitoring, and blending requirements;

implementation schedule; implementation phasing potential; potable system operations; and public acceptance.

Recycled Water Program Title 22 Engineering Report, City of San Luis Obispo, CA. Project Manager. Led report and application for coverage under the SWRCB Order WQ 2016-0068-DDW for Water Reclamation Requirements for Recycled Water Use. The application covered recycled water production from the upgraded Water Resource Recovery Facility (WRRF) (including a new membrane bioreactor and ultraviolet disinfection), distribution of recycled water, and applicable non-potable uses approved in Title 22.

Proposition 1 Integrated Regional Water Management Grant Application, San Luis Obispo County Flood Control and Water Conservation District, CA. Principal-in-Charge. Authored successful grant application to DWR for projects in San Luis Obispo County. The application had no comments from DWR and minimized efforts of each project advocate through the use of templates and close coordination.

Water Vision Santa Barbara/Enhanced Urban Water Management Plan, City of Santa Barbara, CA. Project Manager. Led the development of a long-term water supply plan and UWMP update through a collaborative, adaptive management process. The combined document - an Enhanced UWMP - is the City's consolidated water supply planning reference document for the next 30 years. The project included evaluating the City's existing water supply system and alternatives for supplemental supplies, including desalination, recycled water, increased reservoir storage, and imported water. Each option was evaluated to sustainably reduce risk and improve resiliency to the water supply. The effort also included an open and transparent process for stakeholder and public engagement. The project culminated in a preferred long-term water supply portfolio for the City, along with a recommended implementation plan.

Groundwater Basins Master Plan, Water Replenishment District of Southern California, Lakewood, CA. Project Engineer. Provide technical and strategic support for the development of a long-term plan for the Central and West Coast Groundwater Basins of southern Los Angeles County. Working closely with the basin pumpers and other stakeholders, the plan identified and evaluated alternatives for meeting anticipated future groundwater demands. Issues addressed included identification of additional potential sources of recycled water for providing groundwater replenishment via surface spreading and well injection and replacing non-potable groundwater demands by industrial users with recycled water. A set of projects, concepts and a roadmap for implementing them that meets the plan's goals and objectives was developed.

2020 Urban Water Management Plan, Antelope Valley East Kern Water Agency, CA. Project Manager. Led the development of a 2020 UWMP that meets DWR's requirements, integrates with the Agency's related planning efforts, and provides a clear and well-communicated view of the Agency's 25-year water resources plan. AVEK is a leader in groundwater banking which has allowed them to adapt to reduced State Water Project reliability. As part of the UWMP, Rob led the development of a Water Shortage Contingency Plan, and a Seismic Risk Assessment and Mitigation Plan.