MEETING NOTICE AND AGENDA

TECHNICAL ADVISORY COMMITTEE OF THE SEASIDE BASIN WATER MASTER

DATE: Wednesday, June 12, 2024

MEETING TIME: 1:30 p.m.

THE TECHNICAL ADVISORY COMMITTEE MEETING WILL BE CONDUCTED BY TELECONFERENCE AND WILL NOT BE HELD IN THE MONTEREY ONE WATER OFFICES. YOU MAY ATTEND AND PARTICIPATE IN THE MEETING AS FOLLOWS: JOIN FROM A PC, MAC, IPAD, IPHONE OR ANDROID DEVICE (NOTE: ZOOM APP MAY NEED TO BE DOWNLOADED FOR SAFARI OR OTHER BROWSERS PRIOR TO LINKING) BY GOING TO THIS WEB ADDRESS:
https://us02web.zoom.us/j/82508914622?pwd=bgMolstNfTRoyM5L22uYnbOCabOE4o.1

If joining the meeting by phone, dial this number:
+1 669 900 9128 US (San Jose)

If you encounter problems joining the meeting using the link above, you may join from your Zoom screen using the following information:
Meeting ID: 825 0891 4622
Passcode: 014784
TAC Member Teleconferencing Information is on the Next Page

OFFICERS
Chairperson: Jon Lear, MPWMD
Vice-Chairperson: Tamara Voss, MCWRA
MEMBERS

California American Water Company | **City of Del Rey Oaks** | **City of Monterey**
City of Sand City | **City of Seaside** | **Coastal Subarea Landowners**
Laguna Seca Property Owners | **Monterey County Water Resources Agency**
Monterey Peninsula Water Management District

The next regular meeting is tentatively planned for Tuesday July 9, 2024 at 1:30 p.m. Note that this is one day earlier than the TAC's normal Wednesday meeting day.

TAC MEMBER TELECONFERENCING INFORMATION

NAME	ENTITY	LOCATION
Amy Woodrow	Monterey County Water Resources Agency	1441 Schilling Place, Salinas, CA
Kim Shirley	City of Del Rey Oaks	4 Baxter Place, Del Rey Oaks, CA
Nisha Patel	City of Seaside	Engineering Trailer, 440 Harcourt Avenue Seaside, CA
Tim O'Halloran	California American Water	511 Forest Lodge Rd. Suite 100 Pacific Grove, CA
Cody Hennings	City of Monterey	City of Monterey Administrative Service Center, Orca Room, 735 Pacific Street, Monterey, CA
Jon Lear	Monterey Peninsula Water Management District	5 Harris Court, Bldg. G, Monterey, CA
Leon Gomez	City of Sand City	City Hall in Sand City, 1 Pendergrass Way, Sand City, CA 93955
Paul Bruno	Coastal Subarea Landowners	192 Healy Ave, Marina, CA

SEASIDE BASIN WATER MASTER TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	June 12, 2024
AGENDA ITEM:	2.A
AGENDA TITLE:	Welcome New TAC Member Representing the Monterey County Water Resources Agency
PREPARED BY:	Robert Jaques, Technical Program Manager

SUMMARY:

Tamara Voss, who has been the MCWRA TAC representative for a number of years, has retired. Her replacement will be Amy Woodrow, starting with today's meeting.

Amy is a Senior Water Resources Hydrologist at the Monterey County Water Resources Agency. She manages multiple long-term groundwater and surface water monitoring programs and contributes technical expertise to water resources management and planning throughout Monterey County. Amy has experience with evaluating seawater intrusion in the Salinas Valley, overseeing well drilling activities, and has led multiple projects utilizing integrated groundwater-surface water modeling tools. She is a licensed Professional Geologist in the States of California and New Hampshire.

ATTACHMENTS:	None
RECOMMENDED ACTION:	None required – information only

SEASIDE BASIN WATER MASTER TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	June 12, 2024
AGENDA ITEM:	2.B
AGENDA TITLE:	Elect New Vice-Chairperson
PREPARED BY:	Robert Jaques, Technical Program Manager

SUMMARY:
With Tamara Voss retiring from her position with the Monterey County Water Resources Agency, the TAC is left with no Vice-Chairperson. It would be appropriate to solicit volunteers for the position and to elect a new Vice-Chairperson from that group of volunteers.

ATTACHMENTS:	None
RECOMMENDED ACTION:	Seek volunteers to fill the vacant position of Vice-Chairperson and hold an election to fill that vacancy

SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	June 12, 2024
AGENDA ITEM:	2.C
AGENDA TITLE:	Approve Minutes from the March 13, 2024 Meeting
PREPARED BY:	Robert Jaques, Technical Program Manager

SUMMARY:

Draft Minutes from this meeting were emailed to all TAC members. Any changes requested by TAC members have been included in the attached version.

ATTACHMENTS:	Minutes from this meeting
RECOMMENDED ACTION:	Approve the minutes

D-R-A-F-T
MINUTES

Seaside Groundwater Basin Watermaster
Technical Advisory Committee Meeting
March 13, 2024

Attendees: TAC Members

City of Seaside – Nisha Patel
California American Water – Scott Ottmar
City of Monterey – Cody Hennings
Laguna Seca Property Owners – No Representative
MPWMD – No Representative
MCWRA – Tamara Voss
City of Del Rey Oaks – Kim Shirley
City of Sand City –Leon Gomez
Coastal Subarea Landowners – No Representative

Watermaster
Technical Program Manager-Bob Jaques

Others
MCWD – Patrick Breen

The meeting was convened at 1:33 p.m. with Tamara Voss Chairing the meeting in Jon Lear's absence.

1. Public Comments

There were no public comments.

2. Administrative Matters:

A. Approve Minutes from the December 13, 2023 Meeting

On a motion by Ms. Shirley, seconded by Mr. Gomez, the minutes were unanimously approved as presented.

B. Sustainable Groundwater Management Act (SGMA) Update

Mr. Jaques introduced this item.

Ms. Shirley commented on the notes from Mr. Jaques' participation in the February 15, 2024 SVBGSA Advisory Committee. At that meeting it was reported that the Seaside Basin was not being included as a potential recipient of desalinated water if the Seawater Extraction Barrier with Desalination project is implemented by the SVBGSA. She recommended that a representative from the SVBGSA be invited to make a presentation to the Watermaster Board regarding their coordination and interaction with the Seaside Basin. Mr. Jaques commented that Mr. Cook had made a similar recommendation at the Board's February 7, 2024 meeting and that he would pursue having representatives from both the SVBGSA and the MCWDGSA make presentations at an upcoming Watermaster Board meeting.

3. Discuss Follow-up Actions Regarding Induction Logging Findings on Sentinel Well No. 4

Mr. Jaques summarized the agenda packet materials for this item.

Ms. Shirley asked about items three and four on page 27 of the agenda packet. Mr. Jaques explained that there was no perforation at the zone of interest in Sentinel well number four so it would not be possible to obtain water quality samples from that zone in that well. Similarly, none of the other wells in the general vicinity are perforated in that zone either, so samples cannot be collected from them either.

Ms. Shirley went on to say that she supported having the Seawater Intrusion Response Plan updated and also to learn more about land-based electromagnetic techniques.

Ms. Voss said she agreed with all six of the recommendations on page 25 of the agenda packet. She went on to say that she would carry out item number three in that list.

Mr. Ottmar commented that Cal Am is getting water quality samples at various levels in some of its wells and questioned whether or not that could be done in Sentinel well number four. Mr. Jaques and Ms. Voss responded that there is equipment that can do this, but since there are no perforations in the zone of interest in Sentinel well number four, water sample collection cannot be done at that zone. Mr. Ottmar also asked if the update of the Seawater Intrusion Response Plan could take into consideration land-based electromagnetic techniques. Mr. Jaques said that could be considered when the consultant prepares a proposal to perform the update.

A motion was made by Ms. Shirley, seconded by Mr. Hennings, to move forward with all six of the recommendations on page 25 of the agenda packet. The motion passed unanimously.

4. Discuss Proposed Change in TAC Presentation of 2024 Seawater Intrusion Analysis Report

Mr. Jaques summarized the agenda packet materials for this item.

Ms. Shirley said that while she appreciated efforts being made to reduce the number of meetings, she felt it was important to have a presentation and discussion of the Seawater Intrusion Analysis Report at actual meetings. She recommended staying with the approach that has been used in the past. Ms. Voss said she agreed that having the presentations was beneficial.

Mr. Jaques will update the schedule to reflect having a December TAC meeting and a January Board meeting so presentations can be made to both of those bodies and still allow time for the Seawater Intrusion Analysis Report to be completed and included in the Annual Report.

5. Schedule

Mr. Jaques briefly summarized the agenda packet materials for this item. Ms. Shirley noted that the updated dates for processing the Seawater Intrusion Analysis Report, as previously discussed, should be reflected in the next schedule update.

6. Other Business

There was no other business.

The meeting adjourned at 2:15 p.m.

SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

**** * * AGENDA TRANSMITTAL FORM * * ****

MEETING DATE:	June 12, 2024
AGENDA ITEM:	2.D
AGENDA TITLE:	Sustainable Groundwater Management Act (SGMA) Update
PREPARED BY:	Robert Jaques, Technical Program Manager

At the State level:
Since the last TAC meeting I have not received anything from the State that impacts the Watermaster.

At the Monterey County level:
Attached are summaries of meetings held in March, April, and May 2024.

ATTACHMENTS:	Meeting Summaries
RECOMMENDED ACTION:	None required – information only

SUMMARY OF
PURE WATER MONTEREY, AND
SALINAS VALLEY AND
MARINA COAST WATER DISTRICT GROUNDWATER SUSTAINABILITY AGENCY ZOOM MEETINGS
IN MARCH 2024

Note: This is a synopsis of information from these meetings that may be of interest to the Seaside Basin Watermaster

SVBGSA 180/400 Foot Aquifer Implementation Committee Meeting, March 7, 2024:

I did not see anything on the agenda for this meeting that had not already been discussed at the Advisory Committee meeting on February 15th, or was of impact to the Watermaster, so I did not attend this meeting.

Groundwater Technical Advisory Committee Meeting, March 11, 2024:

I did not see anything on the agenda for this meeting that impacts the Watermaster, so I did not attend this meeting.

SUMMARY OF PURE WATER MONTEREY, AND SALINAS VALLEY AND MARINA COAST WATER DISTRICT GROUNDWATER SUSTAINABILITY AGENCY ZOOM MEETINGS IN APRIL AND MAY 2024

Note: This is a synopsis of information from these meetings that may be of interest to the Seaside Basin Watermaster

MPWMD Monterey Peninsula Water Operations Meeting, April 24, 2024:

At this meeting the agenda items pertained to the Pure Water Monterey Project and its Expansion, and ASR operations. The following information was included in the presentations:

- Pure Water Monterey Project:
  - 3,005 AF of water had been delivered this Fiscal Year (beginning July 1, 2023) as of March 31, 2024.
  - 1,870 AF is in the operating reserve.
  - Delivery of recycled water to the Bayonet/Black Horse golf courses started in February 2023. As of this date about a total of about 450 AF has been delivered to the golf courses.
  - All underground retention time travel time requirements (four months) are being met.
  - The DIW Extrinsic Tracer Studies travel time results are summarized in the table below:

Source Well	Downgradient Well	t_{10} Travel Time (months)	Calculated Average Travel time (months)
DIW-1	Paralta	4.6	~ 5.2
DIW-2	Paralta	>7.0[1]	~ 6.5
DIW-3	ASR-3	10.2	~ 7.4
DIW-4	Ord Grove 2	7.6	~ 7.0

[1] Dye arrival and peak concentration appeared to have occurred between the first and the second extrinsic tracer studies (7.0 – 14.4 months)

  - With regard to water quality, there have been no violations in Q4, and all log reduction requirements were met. The Annual Report has nearly been completed.
- ASR:
  - Injection is only occurring at Wells ASR-1 and ASR-2. There is no extraction from these wells.
  - As of 4/24/24 1,070 AF has been injected into the Basin during WY 2024.
  - ASR-1 and ASR-2 will be rehabbed (scrubbed) this summer or fall.
  - Some Carmel Valley wells will be rehabbed late this calendar year.
  -
- Pure Water Monterey Expansion Project:
  - New Extraction Wells 1 and 2 will begin construction in Q3.
  - New deep injection wells DIW-5 and DIW-6 (part of the PWMX project) are under construction.
  - Projected start-up of the PWMX project is the summer of 2025.
- The next meeting of this group is scheduled for July 2024.

Monterey Subbasin GSP Implementation Committee Meeting, April 24, 2024:

Items of interest to the Watermaster included:

- Janet Brennan commented that Derrick Williams had told her in an off-line conversation that there is not enough water available via ASR to raise groundwater levels in the 180/400 Foot Aquifer Subbasin to stop seawater intrusion. Thus the pursuit of the seawater intrusion extraction barrier project. Sarah Hardgrave reported that work is in progress to look at the effectiveness of each proposed project and management action to see what is the most cost-effective combination of those projects and management actions.
- One member reported frustration about not getting data from Cal Am regarding the number of connections and volumes of water being pumped in the corral de Tierra subarea. He said it had been months since his request was submitted to them and no data had yet been received from Josh Stratton who is the contact person to whom he made the request.
- One public attendee urged having a "regional playbook" to coordinate activities between all of the subbasins.
- There was discussion of other topics including the 2023 Monterey Subbasin Groundwater Sustainability Plan Annual Report, grant update statuses, demand management workshops other issues not directly contacting the Watermaster.
- A presentation was made about the Seawater Intrusion Extraction Barrier project status and progress which is essentially the same as one I reported on that was presented at an earlier Advisory Committee meeting. During that presentation it was reported that their groundwater level change projections (using the EKI model) include climate change data which indicates groundwater levels in the eastern portion of the Laguna Seca Subarea will actually increase due to projected increasing wet years in the future. This appears to conflict with the Seaside Basin modeling done for the Watermaster for the Laguna Seca Subarea. Sarah Hardgrave contacted me to say they intend to contact us about getting the apparent conflict resolved. I asked Georgina King to coordinate with the GSA consultants to discuss that and then to have a subsequent meeting in which I would be included to present their findings and recommendations.

SVBGSA 180/400 Foot Aquifer Implementation Committee Meeting, May 3, 2024:

I did not see anything on the agenda for this meeting that had not already been discussed at the other recent Committee meetings, or was of impact to the Watermaster, so I did not attend this meeting.

SEASIDE BASIN WATER MASTER TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	June 12, 2024
AGENDA ITEM:	3
AGENDA TITLE:	Informational Presentation on Stationary Transient Magnetic (sTEM) Imaging
PREPARED BY:	Robert Jaques, Technical Program Manager

SUMMARY:

At the TAC's March 2024 meeting interest was expressed by some TAC members in learning more about land-based electromagnetic imaging techniques that could potentially be used to further examine the possible indication of the start of seawater intrusion in the vicinity of Sentinel Well No. 4. I have invited Geophysical Imaging Partners, who are consultants that perform land-based subsurface imaging, to give us a presentation on that technology at today's meeting.

The technology they will describe is similar to that used by DWR in the Salinas Valley Groundwater Basin a few years ago, except that the DWR imaging was done aerially using a helicopter and the imaging that will be described in today's presentation is done from the ground surface.

ATTACHMENTS:	None
RECOMMENDED ACTION:	None required – information only

SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	June 12, 2024
AGENDA ITEM:	4
AGENDA TITLE:	Continued Discussion of Follow-up Actions Regarding Induction Logging Findings on Sentinel Well No. 4 (SBWM-4)
PREPARED BY:	Robert Jaques, Technical Program Manager

BACKGROUND

At the TAC's December 13, 2023 and March 13, 2024 meetings there was discussion regarding the apparent trend at certain of the Sentinel Wells showing a gradual increase in conductivity at certain depths in the Paso Robles formation. This could be an early sign that seawater is beginning to creep into that formation. A list of six recommended follow-up items was approved by the TAC at its March13 meeting. These were:

1. More closely examine the Sentinel Well induction logging data prior to 2019 to see if the trends date back further in time.
2. See if access for the induction logging vehicle to reach monitoring well PCA-W can be made available, and if so, include that well in the Fall of 2024 induction logging event. This would enable data to start being compiled from that location to supplement the data from the Sentinel Wells.
3. Examine the Piper and Stiff diagrams for the Coe Avenue well from the SIARs for those years in which such diagrams were prepared to see if they show any indications of water quality changes that might indicate increasing chloride or conductivity levels.
4. Continue the effort that was recently initiated through the Watermaster's legal counsel to have the SNG well either repaired or destroyed so it will not provide a conduit for cross-aquifer contamination.
5. Investigate the feasibility, cost, and potential benefit of doing land-based geophysical surveys capable of penetrating to the required depths. Transects could be done, one from the coastline to and beyond SBWM-4 to see if the expected seawater pattern is present. A second transect could be done between SBWM-4 and the SNG well to see if the data indicates that the SNG well is contributing to the increasing conductivity in SBWM-4. Such transects might provide useful information.
6. Obtain a proposal from Montgomery & Associates to prepare an updated SIRP. The update would be intended to address the issues discussed at the February 22 meeting with our consultants, and any other recommendations that either the TAC or our consultants feel warrant should be addressed. Seek Board approval to provide funding in the 2025 Watermaster budget to have the SIRP update prepared.

DISCUSSION

Below is an update on each of these items to allow further TAC discussion of them.

Item 1: Attachment 1 is a plot of annual average induction logging results in the upper portion of Sentinel Well No. 4 from the beginning of induction logging (2008) through 2019. The first six years are plotted with solid lines and the more recent six years are plotted with dashed lines with symbols. There does not appear to be a steady trend toward increasing conductivities in the first six years, since the values sometimes increase and sometimes decrease from year-to-year. There is a noticeable drop in conductivities in the data from the more recent six years compared to the data from the first six years.

AGENDA ITEM:	4 (Continued)

However, again there does appear to be a steady trend toward increasing conductivities, since the values sometimes increase and sometimes decrease from year-to-year.

Item 2: I reached out to Ed Ghandour to see if he would be able to grant us access to have the sand cleared off of the access road to the PCA-West well site, so it could be induction logged in the Fall of 2024 when we do the other induction logging. He provided us permission to do this. Monterey Peninsula Engineers said they have cleared out sand on this site in the past, and could do this for us if permission from the property owner was granted.

Item 3: Tamara Voss reviewed the piper diagram that was included in the 2022 SIAR, a copy of which is in Attachment 2. She notes that all the datapoints, except from 2009 and 2018, cluster relatively closely on the piper (see the blue circle that she added to the piper). This indicates to her that there isn't much shifting occurring among the analytes. The two outliers, 2009 and 2018, she would disregard.

She also looked at all the stiff diagrams that she could find in the various SIARs, and attached the earliest (2010) and latest (2022) ones she could find in Attachment 2. She finds that the shape has not shifted significantly between 2010 and 2022, and that the only stiff diagram that looked different was from 2018. She said she would disregard that dataset.

She also looked at the chloride, sodium, and calcium concentrations to see if there was any significant changes. The table in Attachment 2 contains the data she could find from the SIARs and from the website. There was not much concentration data in the SIARs or on the website for the Coe Avenue well, but what she did find would only indicate a small increase in chloride concentration from 79 mg/L in 2016 to 125 mg/L in 2022. This chloride concentration is still well below the secondary MCL for drinking water.

Her conclusion is that the water quality data from the Coe Avenue well doesn't seem to indicate significant changes or that a significant influx of seawater intrusion is occurring at the Coe Avenue well location.

Item 4: As of late May the Watermaster's legal counsel reports that thus far they have not been able to make any progress with the SNG attorneys on this matter.

Item 5: Attachment 3 is an article that discusses electromagnetic imaging, and describes both air-based and land-based methods. Attachment 4 are notes from my Zoom meeting with electromagnetic imaging consultants. In Item 3 of today's agenda, consultants who perform electromagnetic imaging made an informational PowerPoint presentation on land-based methods and how they could potentially be used in the vicinity of Sentinel Well No. 4. They have also provided me with a cost proposal to do a pilot test of the technology in the vicinity of Sentinel Well No. 4 to minimize costs while determining how effective this work would be. The body of their proposal is contained in Attachment 7.

SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

AGENDA ITEM:	4 (Continued)

Item 6: At the February 22, 2024 meeting with our consultants, there was some discussion regarding the Watermaster's February 2009 *Seawater Intrusion Response Plan* (SIRP). The SIRP describes actions to be taken if certain indicators of possible sweater intrusion are detected. There are four indicators used in the SIRP used to determine if action should be taken:

1. Increasing chloride concentrations.
2. Decreasing sodium/chloride molar ratios
3. Visual inspection of cation/anion ratios
4. Chloride concentration maps

The SIRP has contingency actions to be taken to reduce the magnitude and extent of SWI until supplemental water supplies are made available. It includes a list of "trigger" wells for which chloride levels have been statistically developed to trigger implementation the contingency actions in the SIRP. There are 7 trigger wells for the Paso Robles aquifer, and 5 for the Santa Margarita aquifer. These trigger wells do not include any of the Sentinel Wells. The Sentinel Wells are no longer used for groundwater quality monitoring due to their long screened intervals that do not provide consistent data. Monitoring Well FO-9 Shallow is one of the wells in the Paso Robles aquifer list, and it had to be abandoned and replaced with a new monitoring well at the Seaside Golf Course. Two of the other wells in the Paso Robles list, Monitoring Wells FO-10 Shallow and FO-10 Deep, have been recommended for destruction due to apparent casing leakage, so they would no longer be available for use as trigger wells. Those wells may be replaced at some future date by MCWD as part of the Groundwater Sustainability Plan for the Monterey Subbasin.

The contingency actions are triggered by:

- Chloride concentrations higher than the chloride threshold values established for each "trigger" well (listed in Table 1 in the SIRP).
- Sodium/chloride molar ratios showing a rapid drop and being below 0.86.
- At least one of four indicators of trends:
    - Statistical analysis showing increasing chloride concentrations.
    - Evolution of seawater mixing shown in Piper diagrams.
    - Change in Stiff diagrams showing high chloride spikes.
    - Chloride concentration maps indicating increasing chloride concentrations near the coast.

The contingency actions are, in this order of implementation:

1. Verification of data by re-sampling.
2. Issue a formal Declaration of Seawater Intrusion.
3. Notify all Seaside Basin groundwater producers and other interested entities that the SIRP contingency actions have been triggered.
4. Pumping Redistribution Plan, consisting of these eight activities:
    - Discontinue or reduce pumping at the impacted production well(s) (Impacted Wells). This is not applicable to monitoring wells.

- Identify wells where SWI might occur (these are referred to as "At Risk" wells).
- Identify and/or install additional monitoring wells if evaluation indicates this would be beneficial.
- Estimate an acceptable groundwater gradient between Impacted Wells and At Risk production wells that will protect the At Risk wells against SWI until a supplemental water supply is obtained (estimated to occur in 2015 in the SIRP).
- Identify and evaluate influence of production wells on the groundwater gradients that are causing SWI to occur and migrate within the Basin. Then estimate pumping scenarios that will achieve the acceptable groundwater gradient developed in the preceding action.
- Increase monitoring frequency at the Impacted, At Risk, and monitoring wells to evaluate the migration of SWI.
- Re-evaluate the Basin's Operating Yield to prevent further Material Injury.
- After the preceding actions have been taken, modify pumping to achieve the desired groundwater gradients.

5. When a supplemental water supply becomes available, use the supply to both offset pumping and to raise groundwater levels to reverse the SWI.

Performing all the tasks under Action No. 4 will be costly and time-consuming, and the reduced pumping scenarios may be inadequate to supply customer demands. Redistributing pumping may be economically or practically infeasible in the near-term.

At the February 22, 2024 meeting it was felt that that it might be desirable to update the SIRP to reassess the methodology of determining when to implement it. For example:

- Using specific chloride threshold levels for just the trigger wells might not be adequate. It might be better to use a rate-of-increase in chloride levels, rather than discrete chloride values, as triggers.
- Trigger levels for induction-logged conductivity measurements could be considered for possible inclusion in the SIRP. However, it was reported that most people are more comfortable using chloride measurements, rather than induction-logged conductivity measurements, to trigger any basin management actions. Data obtained from induction logging shows the conductivity of the strata adjacent to the well where the logging is performed, but does not directly indicate the conductivity of the water itself. This is because the minerals and other constituents present in the strata affect the conductivity measurements. While induction logging can be a useful tool in identifying changes in water quality, i.e. conductivity, it does not provide a conductivity measurement of the water itself. That can only be measured by collecting and analyzing a water sample from the well.

  In Title 22 of the State of California Code of Regulations (CCR) there are drinking water standards for chloride, total dissolved solids (TDS), and conductivity, as follows:

Constituent	Recommended Maximum	Upper Maximum	Short Term Maximum
TDS, mg/L	500	1,000	1,500
Conductivity, µS/cm	900	1,600	2,200
Chloride, mg/L	250	500	600

However, these are called "Secondary Standards" and pertain to the esthetic properties of the water. The "Primary Standards," which pertain to the health aspects of the water, do not include these constituents. Based on this information, using induction logging conductivity measurements may not be suitable.

Both Georgina King and I reviewed the SIRP and discussed possible updating that could be done to it. Some of the actions that could be taken, and topics that could be updated or revised, include:

- Update Figure 1 in the SIRP (the one showing the locations of wells) to reflect the new location of Monitoring Well FO-9 Shallow which replaced the previous one that had to be destroyed.
- Update Table 1 in the SIRP (the table that provides data on chloride threshold values and a trend analysis for each of the trigger wells) using data collected since the 2009 SIRP was prepared. Also, if there are additional wells for which there is now sufficient data, add them to Table 1.
- In addition to the regular annual induction logging of the four Sentinel Wells, begin annual induction logging of certain of those trigger wells where this is feasible (casing must be PVC, not steel for induction logging) and try to develop a correlation between conductivity levels and chloride levels in those wells. These would be monitoring wells MSC Deep, PCA-West Deep, and PCA-East Deep. This could be helpful in better identifying the depth and location of potential SWI in the general vicinity of SBWM-4. Table 1 and Figure 1 from the SIRP showing the locations of these wells are included in Attachment 5.
- Although the SIRP currently uses a combination of indicators to define the occurrence of SWI, it might be desirable to consider creating some flexibility in what triggers implementation of the Seawater Intrusion Contingency Actions. For example it might be desirable to modify the language to say that the trigger points would need to be observed for more than one year (perhaps several) as a way of confirming the existence of SWI before implementing the Contingency Actions. Another example could be to require that the percentage increase in chloride concentration exceeds some percentage amount from the prior year.

  Certain of the Sustainable Management Criteria in the Groundwater Sustainability Plans (GSPs) that have been developed for the subbasins within the Salinas Valley Groundwater Basin include some flexibility before certain actions are triggered. Some examples in the Monterey Subbasin GSP are:

- For the chronic lowering of groundwater levels, the undesirable result is defined to mean that over the course of any one year, more than 20% of the established groundwater level minimum thresholds are exceeded.
- For depletion of interconnected surface water, the undesirable result is defined to mean that for more than two consecutive years any minimum threshold is exceeded in a shallow groundwater well near any location of interconnected surface water.
- However, for seawater intrusion, the undesirable result is defined as any inland expansion of the seawater intruded area boundary as measured in 2015, with the boundary of that area being the 500 mg/L chloride level. There is no flexibility in this definition of undesirable result for this sustainable management criteria.

- See if MPWMD's *Water Conservation and Standby Rationing Plan* and/or the *Water Shortage Contingency Plan,* which is part of Cal Am's 2020 *Urban Water Management Plan,* could be helpful in updating the SIRP.

  MPWMD'S Regulation XV contains their *Water Conservation and Standby Rationing Plan (MPWMD Plan)* which is formulated to trigger increasingly stringent requirements if (1) the amount of water in storage falls below the desired level, or (2) if the production targets for pumpers are not being met, or (3) if there is the occurrence of a "Water Emergency." The *MPWMD Plan* contains a series of "Stages" with increasingly stringent rationing and other requirements in order to address a problem. In the Regulations a water emergency would be declared by MPWMD if it finds a water shortage emergency condition prevails within one or more Water Distribution Systems. However, the definition does not list SWI as constituting a Water Emergency. The approach in the *MPWMD Plan* is to ramp-up to the next Stage if one Stage does not achieve the desired result. The Watermaster's SIRP already has a similar ramp-up of actions in Action 4.

  Cal Am's *Water Shortage Contingency Plan* (*Cal Am Plan*) consists of imposing increasing levels of monetary fines on customers for violations of requirements contained in the *MPWMD Plan* through the first three Stages of that *Plan*, and only implements rationing in the fourth Stage, relying on the rationing amounts in the *MPWMD Plan*. The *Cal Am Plan* does not mention SWI as being a trigger for any actions – all of the actions are based on a shortage of supply to meet customer demands.

Technical Program Manager's Recommendations:

SIRP Updates:

1. Update Figure 1 and Table 1 in the SIRP as discussed above. If there are additional wells for which there is now sufficient data, add them to Table 1.
2. I don't see that either the *MPWMD Plan* or the *Cal Am Plan* would be helpful to us to update or refine the Watermaster's SIRP. However, one thing we could potentially incorporate into an updated SIRP would be for the Watermaster to be able to direct Cal Am to implement Stage four of the *Cal Am Plan* if the Watermaster declares that SWI is occurring (Action 2 in the SIRP's list of Contingency Actions). We may have the authority to do this under the language in the Adjudication Decision that allows the Watermaster to reduce pumping allocations if it is

AGENDA ITEM:	4 (Continued)

determined that Material Injury (as defined in the Adjudication Decision) is at risk of occurring. A legal review may be necessary to confirm that the Watermaster has that authority.

3. If possible, revise the list of tasks in Contingency Action No. 4 to make the Action more practical, less complicated, and less time-consuming to implement.
4. Develop Protective Water Levels (PWLs) for major production wells, and see if the Pure Water Monterey Expansion Project will be able to achieve these. Attachment 6 includes groundwater elevation maps from the *2023 Seawater Intrusion Analysis Report* (SIAR) and shows (in the blue highlighted areas) where groundwater mounding is currently occurring as a result of ASR and Pure Water Monterey Project injections. That mounding does not appear to impact groundwater levels at any of the production wells. However, when the Expansion Project is implemented the mounding could expand and possibly increase groundwater levels near some of the production wells. Establishing PWLs for the major production wells would provide information about how beneficial the injection is in terms of providing SWI protection to these wells. Having PWLs for these wells would also be useful in carrying out the tasks in Contingency Action No. 4 of the SIRP by providing information about how much pumping reduction would need to be achieved at the major production wells in order for them to reach PWLs. Update the SIRP to include a discussion and tabulation of these PWLs.

Other Actions:

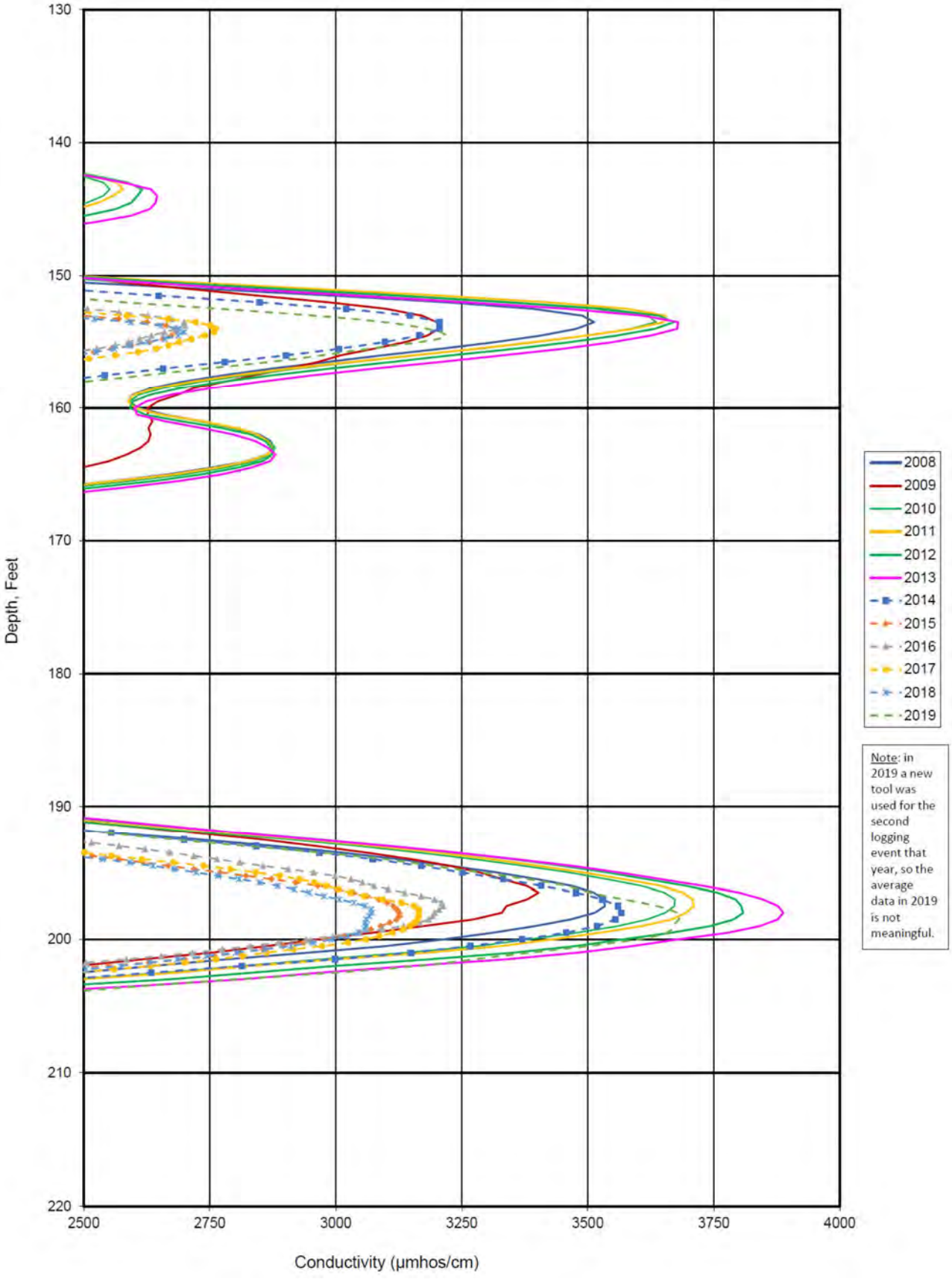
1. Add Monitoring Wells MSC Deep, PCA-West Deep, and PCA-East Deep to the list of wells to be induction logged each year. It will cost about $1,000 for each well we add. Add these to the October 2024 induction logging event if we have sufficient contingency funds available to that. If not, budget to include these in the 2025 induction logging event.
2. Further discuss the proposal provided by Geophysical Imaging Partners and decide if the potential value of the work described in their proposal warrants budgeting to perform that work in the 2025 M&MP Operations budget.

The TAC is asked to provide direction on whether it feels the Technical Program Manager's recommendations are adequate/acceptable or whether they should be modified. Once that is done, the TAC's recommendations will be forwarded to the Board for its consideration.

ATTACHMENTS:	1. Historical (2008 to 2019) Sentinel Well No. 4 annual average induction logging results 2. Piper and Stiff diagrams, and tabulation of selected water quality data for the Coe Avenue Well 3. Article discussing electromagnetic surveys 4. Notes from 4/23/24 Zoom conference with electromagnetic imaging consultants 5. Table 1 and Figure 1 from the SIRP 6. Groundwater Elevation maps from the 2023 SIAR 7. Proposal from Geophysical Imaging Partners (body only)
RECOMMENDED ACTION:	Discuss and provide direction on these issues

ATTACHMENT 1

Sentinel Well No. 4 Annual Average Induction Logs



ATTACHMENT 2

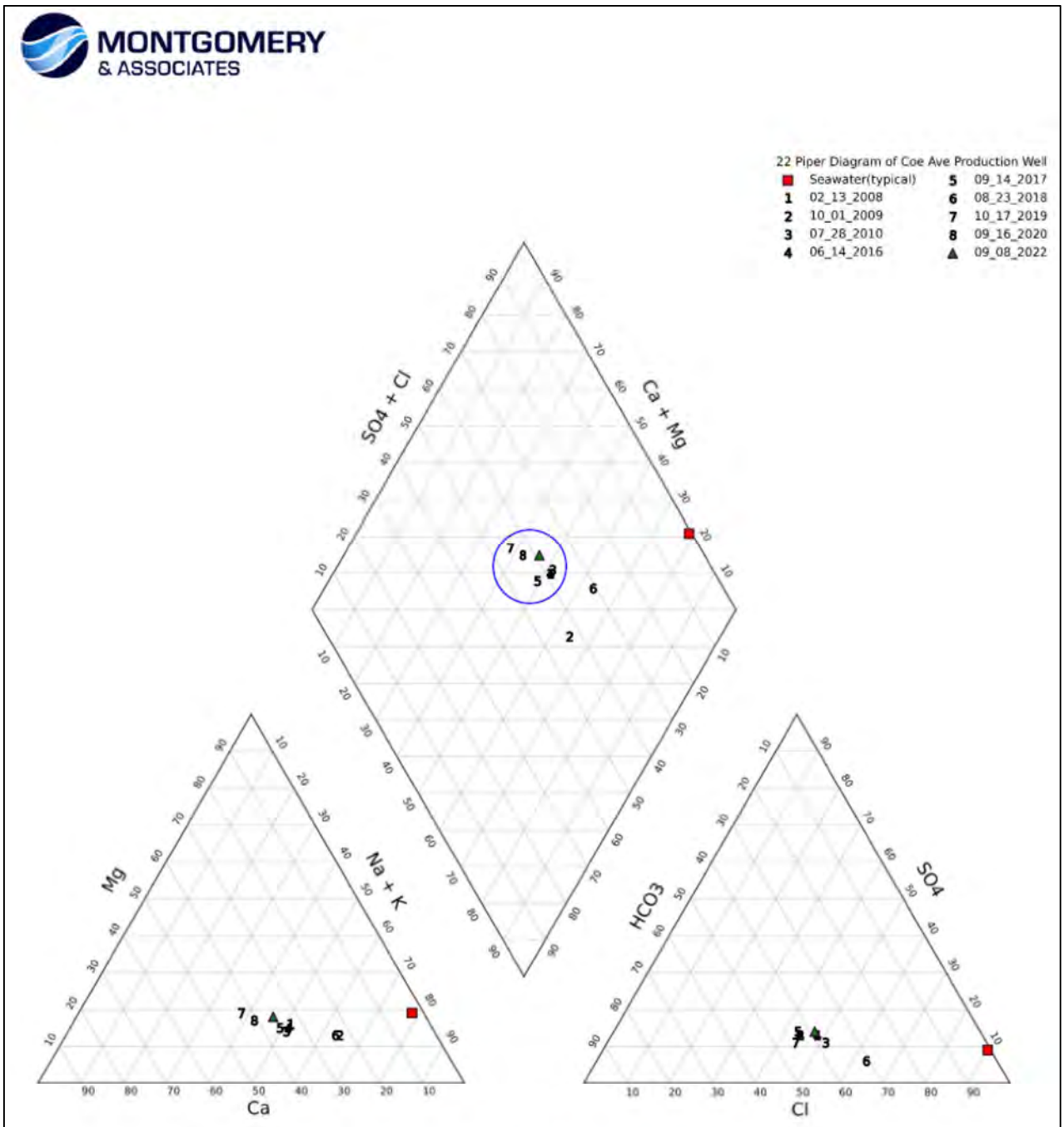


Figure C-22. Piper Diagram of Coe Ave. Production Well

Page C-22

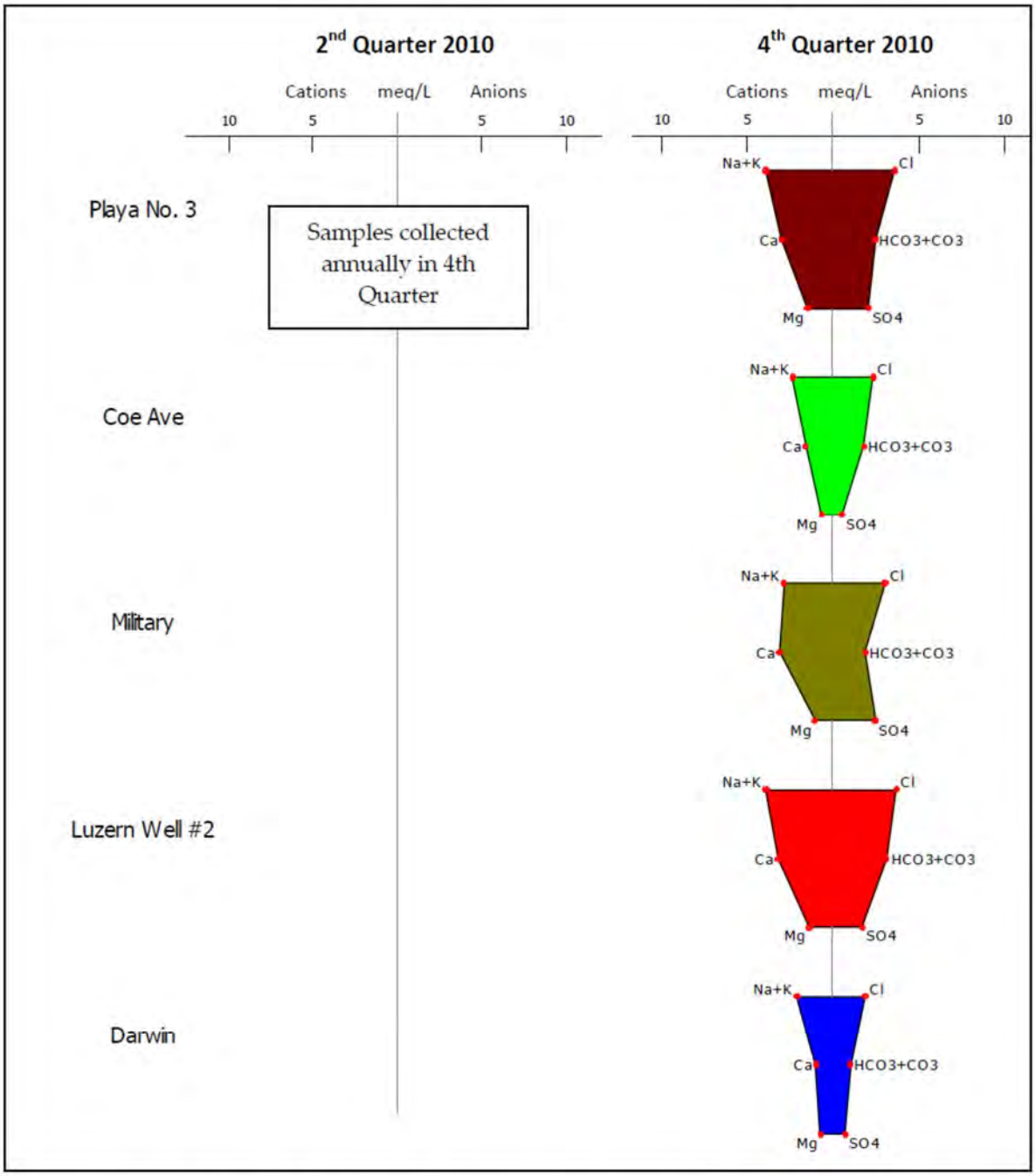
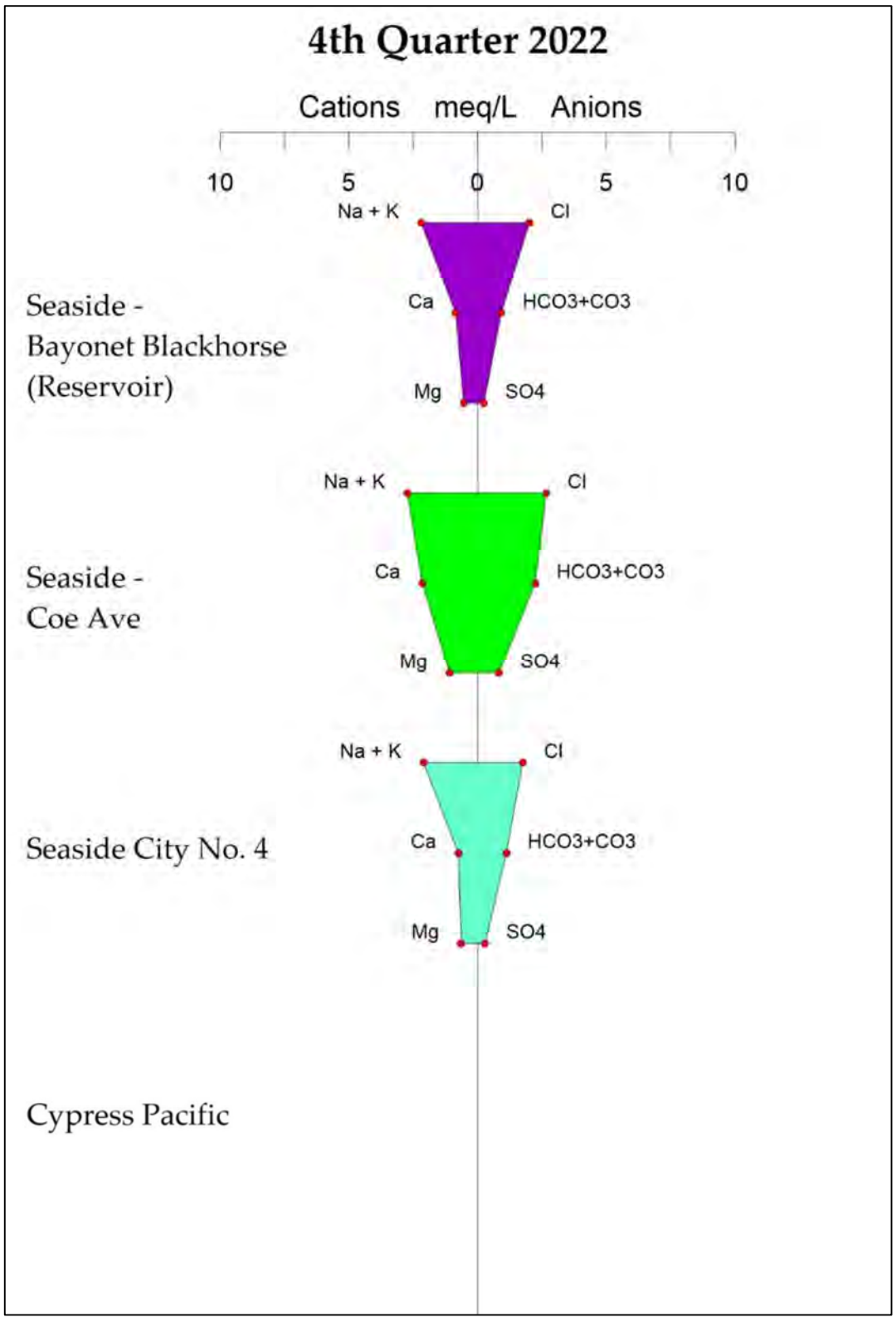


Figure 19: Stiff Diagrams for Northern Subbasin Production Wells (Data source: Watermaster)

2010 Coe Avenue Well Stiff Diagram


4th Quarter 2022
Cations meq/L Anions
10
5
0
5
10
Na + K
Cl
Ca
HCO3+CO3
Mg
SO4
Seaside - Bayonet Blackhorse (Reservoir)
Na + K
Cl
Ca
HCO3+CO3
Mg
SO4
Seaside - Coe Ave
Na + K
Cl
Ca
HCO3+CO3
Mg
SO4
Seaside City No. 4
Cypress Pacific

2022 Coe Avenue Well Stiff Diagram

Coe Avenue Well Chloride, Sodium, and Calcium Concentrations

Coe Ave Well			
Date	Chloride (mg/L)	Sodium (mg/L)	Calcium (mg/L)
2008	NA		
2009	NA		
2010	NA		
2011	NS		
2012	NS		
2013	NS		
2014	NS		
2015	NS		
2016	79	56	34
2017	NA		
2018	NA		
2019	128	80	81
2020	NA		
2021	NS		
2022	125	81	76
2023	NS		

ATTACHMENT 3

Electromagnetic Surveys in the Sky and on Land Give a View of What's Below Earth's Surface

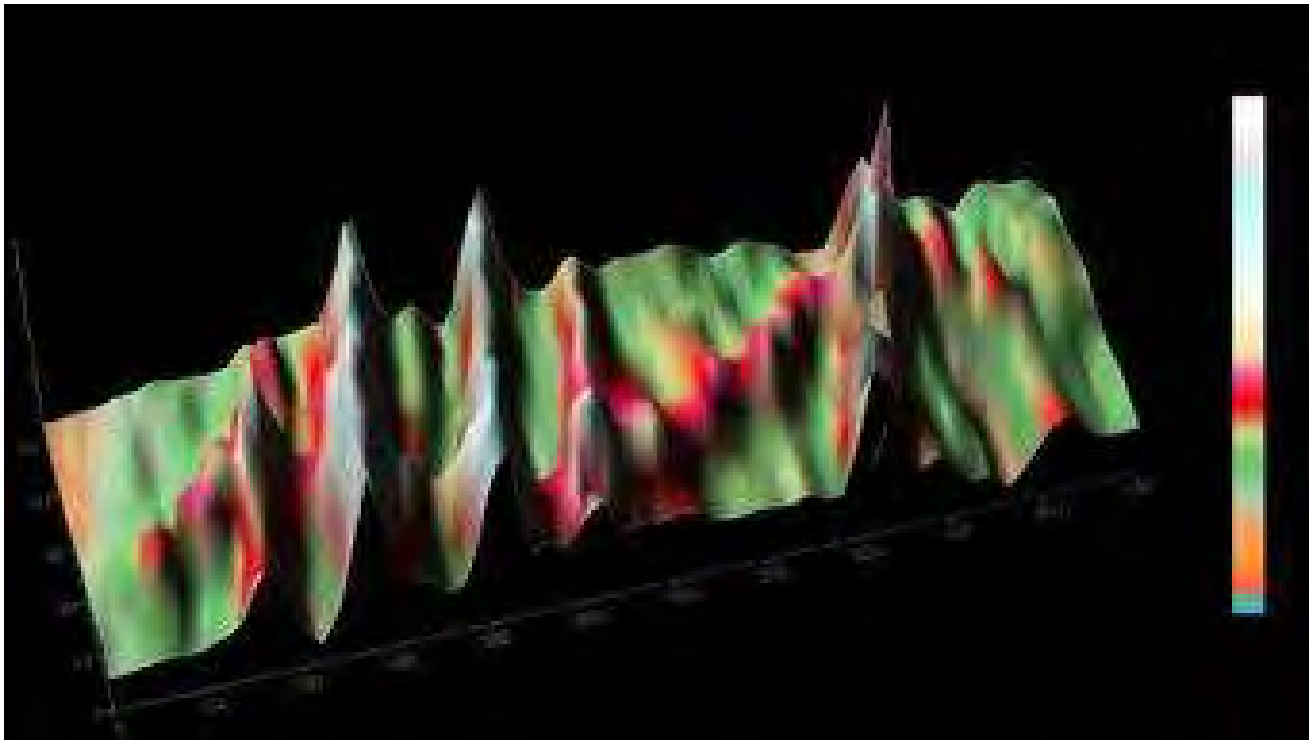
By **California Water Science Center** July 20, 2017

Electromagnetic surveying is helping the California Water Science Center to study geology and groundwater throughout California. It's like something out of a science-fiction movie: in an empty field in the middle of nowhere, hundreds of feet of wire hum with barely audible electricity.

A group of scientists take a peek under the Earth's surface, all without disturbing a speck of soil; what is revealed to them will forever change their understanding of this part of the planet. On a 1950s silver screen, mad-scientists in impeccable lab coats would have discovered an underground colony or remnants of a long-lost civilization. In the 21st century, actual real-life scientists in dusty clothes uncover the geological secrets stored underground, secrets that shape their knowledge of an area's geological history and groundwater resources.

The technique is called electromagnetic surveying, and scientists at the California Water Science Center are using it to study geology and groundwater throughout California.

Example of a resistivity map



Sources/Usage: Public Domain. View Media Details

Geophysical electromagnetic (EM) surveys are something like an x-ray machine – able to create a visual of what's beneath the skin without puncturing it. Using specialized equipment, scientists transmit an electromagnetic field (radio waves) into the ground, then measure the response that returns from the ground to a receiver. The strength of the response indicates how easily the electric current travels through the ground. This measurement is called "resistivity," and changes as the geology changes because certain minerals, rock formations, and water conduct electricity more readily than others. The data collected are processed into mapped images that give geophysicists a composition model of the earth's subsurface.

Dr. Lyndsay Ball knows the benefits of EM surveying well. Ball is a research geophysicist at the U.S. Geological Survey Crustal Geophysics and Geochemistry Science Center in Denver, Colorado, and has been conducting EM surveys for the USGS since 2004. In September 2016, Ball was in California, heading up a geophysical study in Kern County in the Central Valley.

"EM methods are non-invasive," Ball said. "They don't disturb the ground or have minimal disturbance. They can typically be used quickly. Changes in resistivity can often be used to interpret changes in subsurface hydrogeologic conditions – so that we can map aquifer geometry, variations in groundwater salinity, and potential changes in aquifer properties like how easily water can move though the ground."

Sources/Usage: Public Domain. View Media Details

A USGS field geologist uses ground-based electromagnetic surveying techniques to collect geophysical data in the Mojave Desert, California. Wires set up on the ground send electromagnetic fields below the earth's surface, and receive returned responses with a receiver. USGS photo.(Public domain.)

Resistivity maps can be used to understand a number of different things about geology, ranging from the 3D location of different kinds of rocks, to how much clay is present underground, to the relative salinity of the groundwater in a surveyed area. The geological structure of an area can affect groundwater in countless ways, including impeding groundwater flow into or out of aquifers, or influencing the water-quality of a basin through exposure to different rocks, minerals, or constituents below the earth's surface. This data is useful for local water managers to better understand their groundwater resources and aquifer systems. Comprehensive understanding of groundwater resources and aquifer systems contributes to managers being better able to address current and potential future issues that may affect their water supply system, and gives them tools and data they need to create plans to ensure the long-term sustainability of groundwater resources in their basin.

The geophysical technology was originally developed for use in the mining industry to locate and map ore bodies. The technique is safely used worldwide for mineral exploration, and in the evaluation of land features and natural resources. The electromagnetic signals generated by EM

systems are considerably weaker than the signals generated by natural and man-made sources (i.e. lightening, broadcast radio stations) that surround us every day.

In the past two decades, the USGS has used EM surveys to map groundwater resources throughout the world. EM surveys can be conducted either on land or from the sky! Each method shares the same technique of using a transmitter and receiver, but the process by which data is collected has its unique modus operandi and scientific benefits.

In the video below you can watch scientists from the USGS California Water Science Center set up ground-based electromagnetic surveying equipment in two different areas of Bakersfield, California. These time-lapsed images show CAWSC field crews establishing the site and collecting data during a March 2016 survey. Images by Joshua Larsen, USGS. (Public domain.)

Sources/Usage: Public Domain. View Media Details

The first – and easiest – way to take geophysical measurements is to make them with two feet (and lots of equipment) solidly on the ground. To make ground-based EM measurements, scientists lay a transmitter wire on the ground in a large square, measuring up to 300 feet across. They then place the receiver system and a data logger in the center of the square. An

electric current generated by a small generator (batter) is pulsed through the transmitter wire. The receiver measures the returning EM fields, and the data logger records resulting data.

This method allows USGS scientists to measure electrical properties of the underground materials below the transmitter square to depths up to 1,000 feet, all without drilling a well or disturbing the ground.

"With ground-based geophysics, we can use different types of surveys to measure resistivity in different ways," Ball said. "Comparing results from different methods can help us develop better interpretations about the hydrogeologic conditions we're really interested in knowing more about, and also helps us learn about how different hydrogeologic conditions affect the resistivity."

There are limiting factors to this technology, however. "Most electrical and EM methods are sensitive to electrical noise from infrastructure, so working in urban areas or places with lots of powerlines and pipelines, like oil fields, can be challenging," Ball said.

Sources/Usage: Public Domain. View Media Details

The video above show the setting up of ground-based electromagnetic survey equipment (Public domain.)

Electromagnetic surveys can also be conducted from the air, using low-flying aircraft and the same transmitter/receiver set up as a ground-based EM survey. The system creates a striking silhouette against the sky, with an aircraft like a plane or helicopter towing a large wire frame

(imagine a gigantic hula hoop). The hoop is suspended about 100-feet below the helicopter, gliding only 100-feet above the ground. This hoop acts as the transmitter and receiver. The helicopter travels at an average of 70 miles per hour in closely-spaced parallel lines across the study area.

Using this method, scientists can cover up to 100 miles per day, collecting nearly continuous data over large areas. Signals can potentially penetrate depths up to 1,500 feet.

Because the survey is taking place in the air, AEM can cover larger areas than ground-based EM surveys, allowing scientists to see the continuity between features. This data gives scientists a more complete picture of the subsurface, allowing them to connect the dots across large areas. This large-scale dataset helps support watershed- or regional-scale studies, where single-site ground-based surveys only provide information about one site.

Sources/Usage: Public Domain. View Media Details

Airborne electromagnetic (AEM) surveys use the same transmitter/receiver set up as a ground-based EM survey, but the technologies are towed below a low-flying aircraft. In September 2016, USGS ran a AEM survey in Kern County, California. USGS Photo by Laurel Rogers. (Public domain.)

"Airborne platforms can also cover large areas that are difficult to access on the ground, such as wetlands, sand dunes, or other ecologically sensitive or logistically difficult areas where ground surveys aren't feasible," Ball said. "AEM surveys do, however, require quite a bit of planning and coordination, and they take much longer to get 'off the ground' than a ground survey. We

typically pair ground geophysics with AEM, both as part of survey planning and data analysis, so ground and airborne geophysics are a good team, not necessarily an either-or choice."

Whether in the air or on land, it’s clear that electromagnetic surveys are technologies that benefit scientific understanding of subsurface geology and aquifer systems. "Geophysical systems are evolving all the time," Ball said. "We can do a lot of things with AEM data today that we couldn’t do 10 years ago because of improved sensors – which are essentially for groundwater types of application. The limitations that we have today could be different next year, or in 10 years."

ATTACHMENT 4

NOTES FROM

APRIL 23, 2024 ZOOM CONFERENCE CALL

WITH

ELECTROMAGNETIC IMAGING CONSULTANTS

Participants:
Robert Jaques, Seaside Basin Watermaster
Ahmad Ali Behroozmand, Geophysical Imaging Partners
Jesse Cruz, Hallie & Aldrick

Notes:
The Zoom conference was for the purpose of discussing the feasibility and potential benefits of doing some sub surface electromagnetic imaging in the vicinity Sentinel Well No. 4 where increasing conductivity levels have been noted.

It was reported that you cannot get electromagnetic imaging data near any electrical interference sources such as power lines. This is true for both airborne and surface conducted electromagnetic imaging. The work needs to be done as far away from any electrical interference sources as the depth that you are expecting to survey down into.

The towed Time-domain Electro Magnetic (TEM) methodology uses a quad-bike for moving the equipment around. The stationary TEM is man-carried so it can go into other areas that are not accessible using a quad-bike. There is also a small loop STEM profiler that is lightweight and easily carried. These methods can go up to 800 to 900 feet deep with their imaging.

It was suggested that we might want to do a pilot run to see the feasibility of subsurface imaging in the location of Sentinel Well No. 4. They would like to have water quality data and conductivity data from the area near Sentinel Well No. 4 in order to calibrate the electromagnetic imaging data with actual chloride and TDS values.

It is also possible, if desired, to put in a permanent underground TEM monitoring network.

The work is generally done on a daily-cost basis. The initial pilot work could probably be done in one day.

Mr. Ali Behroozmand was involved with and very familiar with the DWR AEM imaging work that was recently done in this area. Mr. Crews offered to help with the geophysics and hydrogeology associated with the results from the electromagnetic imaging.

If the Watermaster decides to pursue this, the Watermaster could either contact directly with Geophysical Imaging Partners (and potentially also Hallie & Aldrick) or have them subcontract to either Montgomery and Associates or Todd Groundwater with the Watermaster already has Professional Services Agreements.

ATTACHMENT 5

TABLE 1. TRIGGER WELL LIST FROM THE SIRP

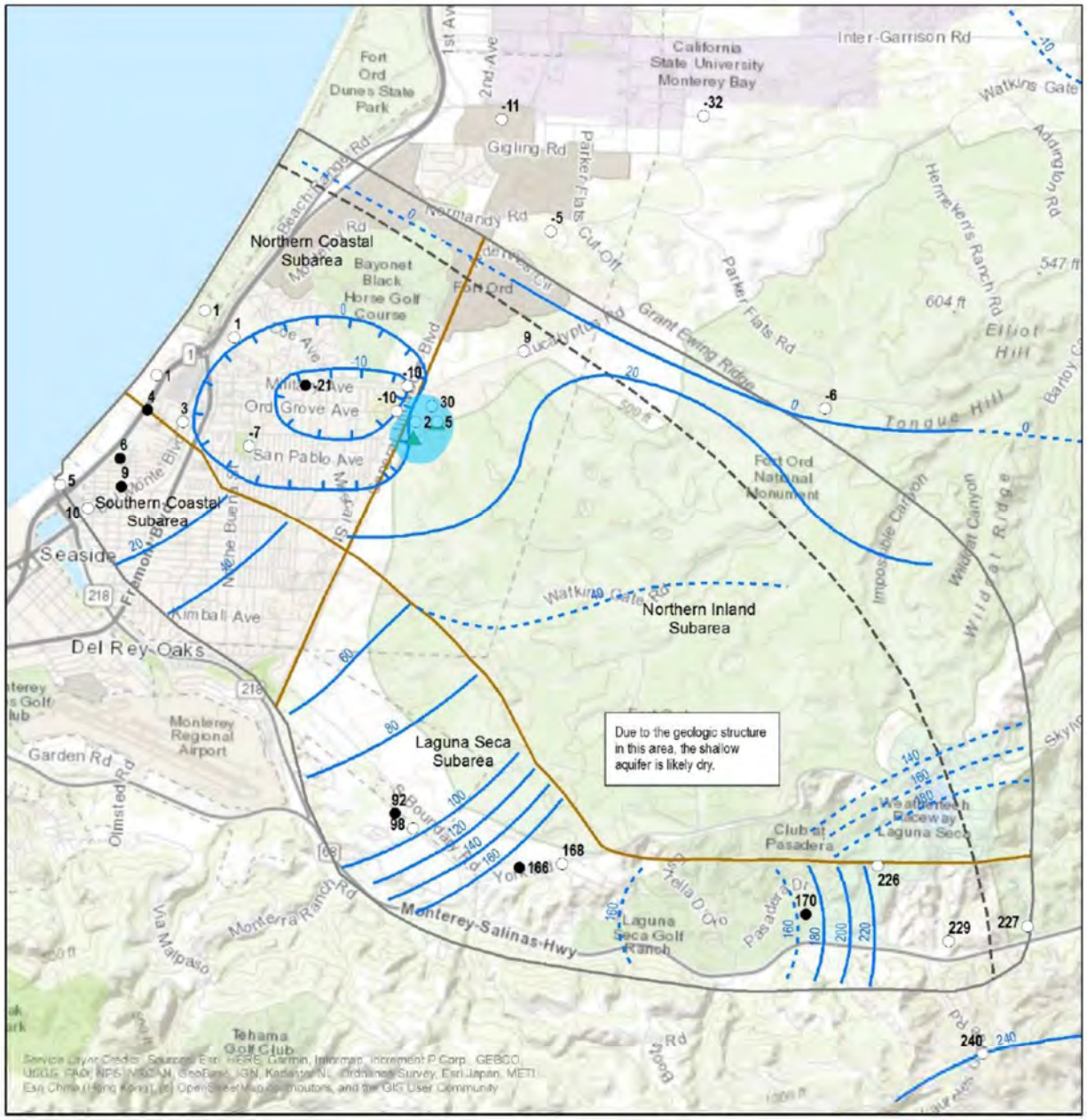
Table 1: Chloride Threshold Values and Trend Analysis

Primary Aquifer	Well Location	Chloride Threshold Value[a] (mg/L)	Statistical Trend
Paso Robles (shallow)	MSC-Shallow	62	No Trend
	PCA-W Shallow	70	No Trend
	PCA-E (Multiple) Shallow	73	NP
	MPWMD #FO-09-Shallow	67	Decreasing
	MPWMD #FO-09-Deep	85	No Trend
	MPWMD #FO-10-Shallow	94	NP
	MPWMD #FO-10-Deep	93	NP
	Basin Wide[b]	94	
Santa Margarita (deep)	MSC-Deep	182	Decreasing
	PCA-W Deep	186	No Trend
	PCA-E (Multiple) Deep	181	NP
	Ord Terrace-Shallow	185	NP
	Ord Terrace-Deep	260	NP
	Basin Wide[b]	260	

FIGURE 1. WELL LOCATION MAP FROM THE SIRP

Figure 1: Wells with Adequate Historical Water Quality Data

ATTACHMENT 6



EXPLANATION

Wells with Water-Level Data (2nd Quarter WY 2023, Shallow Zone)

- Monitoring Well
- Production Well
- Pure Water Monterey Shallow Injection Well

WY 2023 Shallow Zone Groundwater Elevation (feet MSL)

- Groundwater Elevation
- Pumping Depression
- Dashed where uncertain (no well data)
- Influence of Injection (2nd Quarter, WY 2023, Shallow Zone)

- Shallow Aquifer Northern Boundary

Adjudicated Seaside Groundwater Basin Boundary

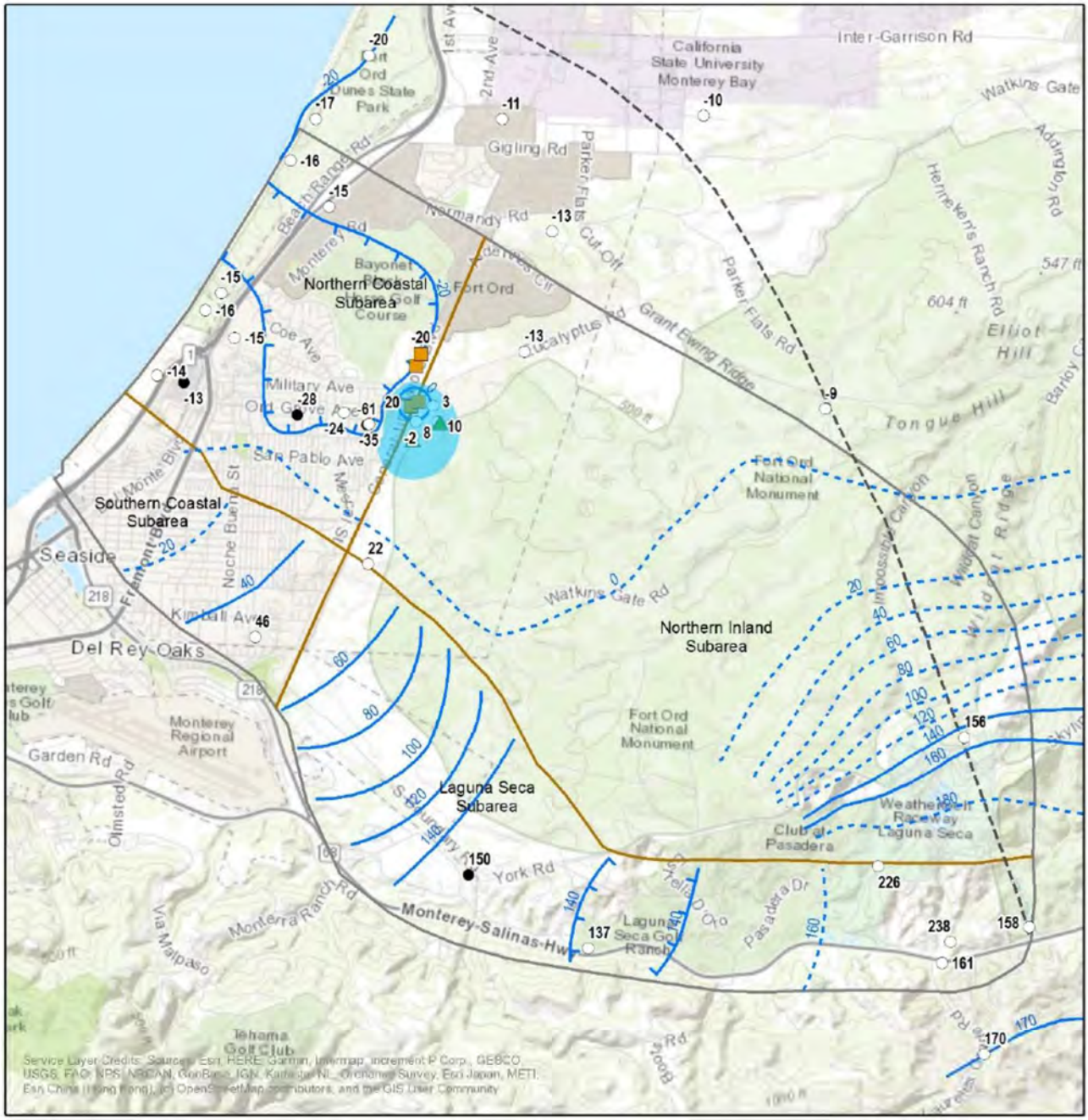
- Basin Boundary
- Subarea Boundary

N

0 0.5 1 1.5 2

Miles

Figure 40. Paso Robles Aquifer (Shallow Zone) Water Elevation Map – Second Quarter Water Year 2023 (January-March 2023)



EXPLANATION

Wells with Water-Level Data (2nd Quarter WY 2023, Deep Zone)

- Monitoring Well
- Production Well
- ASR Wells
- Pure Water Monterey Deep Injection Well

WY 2023 Deep Zone Groundwater Elevation (feet MSL)

- Groundwater Elevation
- Pumping Depression
- Dashed where uncertain (no well data)
- Influence of Injection (2nd Quarter, WY 2023, Deep Zone)

- Deep Aquifer Northern Boundary

Adjudicated Seaside Groundwater Basin Boundary

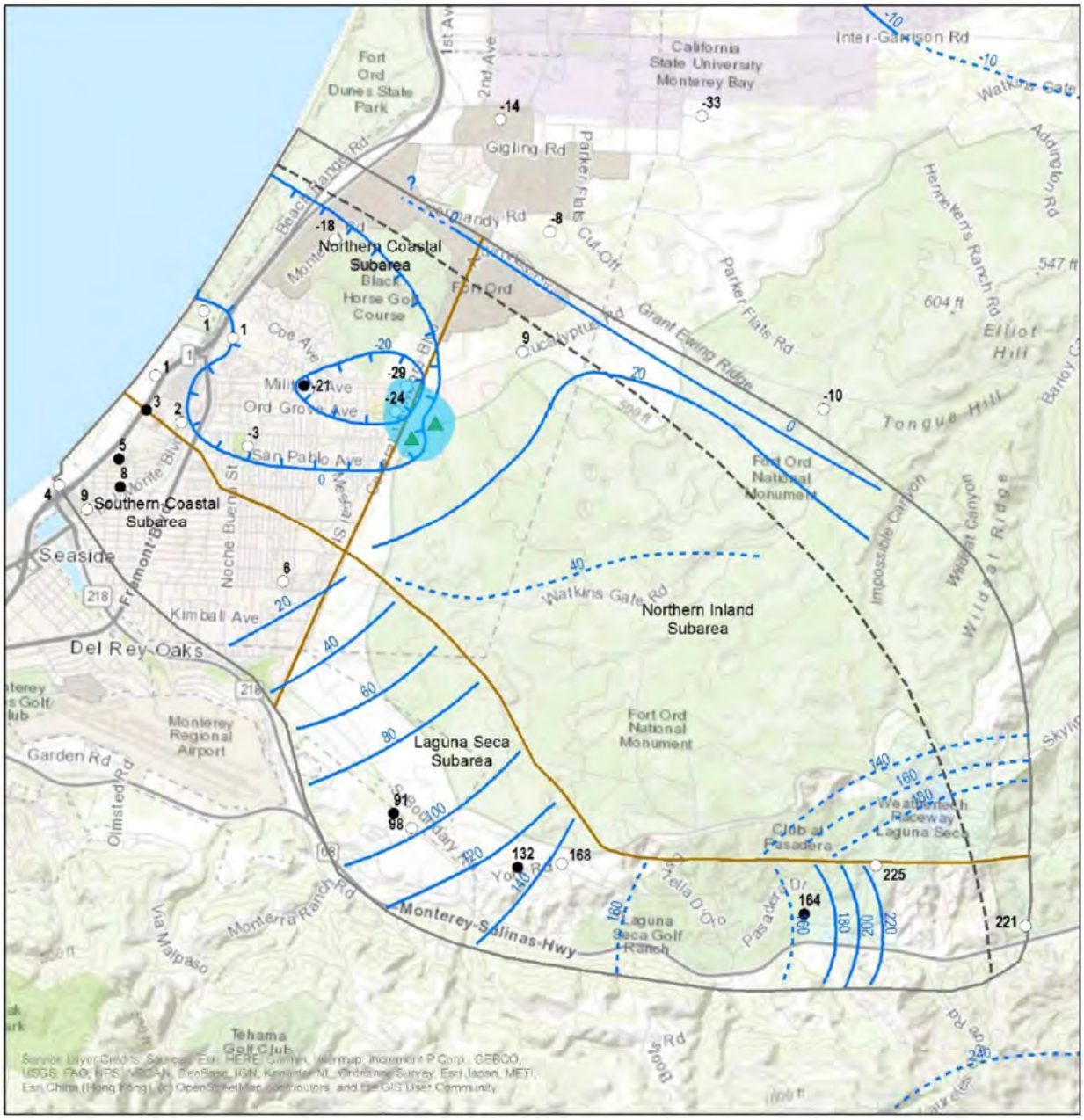
- Basin Boundary
- Subarea Boundary

N

0 0.5 1 1.5 2

Miles

Figure 41. Santa Margarita Aquifer (Deep Zone) Water Elevation Map – Second Quarter Water Year 2023 (January-March 2023)



EXPLANATION

Wells with Water-Level Data (4th Quarter WY 2023, Shallow Zone)

- Monitoring Well
- Production Well
- Pure Water Monterey Shallow Injection Well

WY 2023 Shallow Zone Groundwater Elevation (feet MSL)

- Groundwater Elevation
- Pumping Depression
- Dashed where uncertain (no well data)
- Influence of Injection (4th Quarter,WY2023, Shallow Zone)

- Shallow Aquifer Northern Boundary

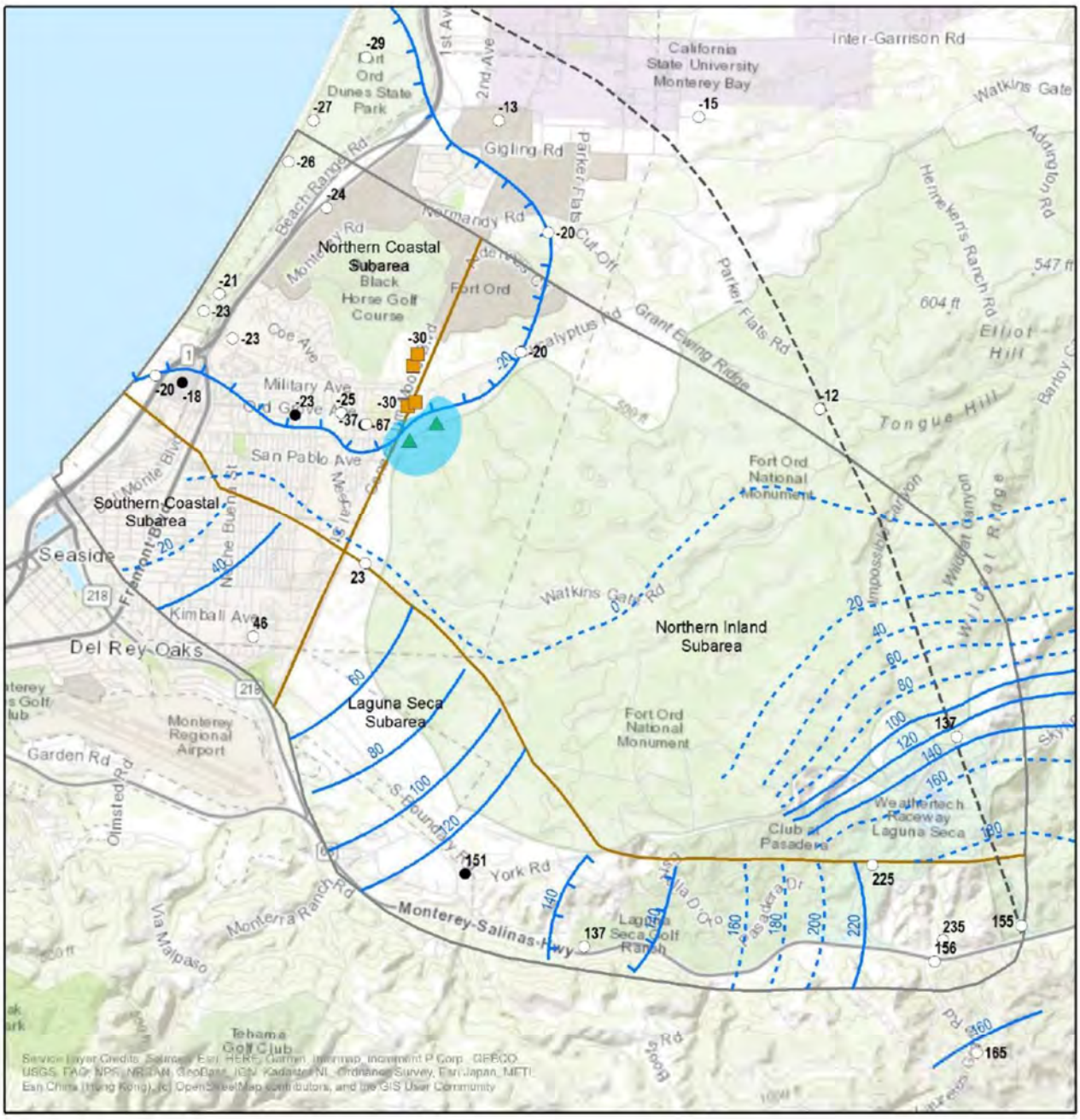
Adjudicated Seaside Groundwater Basin Boundary

- Basin Boundary
- Subarea Boundary

N

0 0.5 1 1.5 2

Figure 42. Paso Robles Aquifer (Shallow Zone) Water Elevation Map – Fourth Quarter Water Year 2023 (August/September 2023)



EXPLANATION

Wells with Water-Level Data (4th Quarter WY 2023, Deep Zone)

- Monitoring Well
- Production Well
- Pure Water Monterey Deep Injection Well
- ASR Wells

WY 2023 Deep Zone Groundwater Elevation (feet MSL)

- Groundwater Elevation
- Pumping Depression
- Dashed where uncertain (no to limited well data)
- Influence of Injection (4th Quarter WY 2023, Deep Zone)

- Deep Aquifer Northern Boundary

Adjudicated Seaside Groundwater Basin Boundary

- Basin Boundary
- Subarea Boundary

N

0 0.5 1 1.5 2

Miles

Figure 43. Santa Margarita Aquifer (Deep Zone) Water Elevation Map – Fourth Quarter Water Year 2023 (July/September 2023)

ATTACHMENT 7

PROPOSAL: sTEM GEOPHYSICAL SURVEY TO MAP SALTWATER INTRUSION

June 2024

Seaside Basin Watermaster
83 Via Encanto
Monterey, CA 93940

GEOPHYSICAL IMAGING PARTNERS

Opportunity #	Q24017
Project name	sTEM geophysical survey to map potential saltwater intrusion near a sentinel monitoring well
Date	1 June 2024
Client	Seaside Basin Watermaster 83 Via Encanto Monterey, CA 93940
Prepared by	Ahmad-Ali Behroozmand, Max Halkjaer, Jesse Crews
Project description	TEM geophysical survey to investigate near potential saltwater intrusion near a sentinel monitoring well.
Cover photo	The sTEM system in operation during a recent groundwater mapping survey in Livermore, California.

Geophysical Imaging Partners Inc.
Pleasant Hill, California
Email: ahmad@geophysicalimaging.com, max@geophysicalimaging.com
Phone: +1 415-430-7173

Dear Mr. Robert S. Jaques,

Following a recent meeting held between Seaside Basin Watermaster (the Client), and Geophysical Imaging Partners (GIP) and Haley & Aldrich (H&A), this proposal is prepared for the Client in response to a request for a pilot geophysical survey near a sentinel well in Seaside, California. Recent data from the sentinel well suggests increasing salinity, however the extent of potential seawater intrusion in the monitored aquifer(s) around this well is currently unknown. The purpose of the geophysical surveys is to confirm the applicability of time-domain electromagnetic (TEM) imaging as a tool to investigate the presence and map the extent of seawater intrusion in the vicinity of the affected sentinel well.

Taking the scope of work and the expected geological settings into consideration, we propose a one-day preliminary geophysical survey the area near the well using the stationary time-domain electromagnetic (sTEM) method, sTEM (see Figure 1).

This pilot survey will be conducted using a sTEM system from TEMCompany, which provides point measurements down to maximum depths of 200-300 meters.

This pilot geophysical survey will provide an electrical resistivity model of the subsurface at each measuring point, which can then be transformed and interpreted to estimate lithology and relative pore fluid salinity. The primary objective of this initial pilot is to determine if the resulting geophysical profiles and interpretations provide meaningful insight to the Client toward understanding seawater intrusion in the study area, and warrant additional geophysical investigations.

Figure 1 The sTEM system, STEM, in operation during a recent project in Livermore, California.

It is not feasible to collect useful TEM data in the vicinity of powerlines and other installations due to interference from these sources. As a general rule, we will need to maintain a distance from powerlines that is similar to the depth of investigation.

Proposed sTEM sounding locations are shown in Figure 2. We understand that vegetation can be dense in the study area, and actual survey locations may be adjusted based on local obstructions and/or access issues. Overall, we will make efforts to conduct measurements wherever possible near the well within the pilot study timeframe.

Our team has worked on geophysical saltwater intrusion projects in northern Monterey Bay, both by applying ground-based TEM like the proposed sTEM system and by flying offshore airborne EM (AEM) survey in 2017, as well as the statewide AEM survey on behalf of DWR until late 2022. Furthermore, the team has recently worked on the deep aquifer study in Salinas Valley using AEM.

Existing geophysical data near the survey area will be revisited to optimize field setup and help with the interpretation of the sTEM results. Existing data include:

- ERT vertical section performed along the beach by Stanford University (2015)
- Airborne Electromagnetic (AEM) SkyTEM 2017 performed by Stanford University
- AEM SkyTEM 2019 performed by Stanford University
- AEM SkyTEM 2022 performed by DWR

A preliminary hydrogeologic interpretation of the pilot study results will be included in our final report, correlating our measured electrical resistivity profiles to known stratigraphy in the study area. We ask that the Client provide well logs, along with monitoring data and all other existing information about the affected sentinel well (and any other pertinent wells within or directly adjacent to the pilot study area). These data, along with publicly available data from the previous geophysical surveys noted above, will be used to generate a preliminary interpretation of lithology, including depth intervals corresponding to key regional aquifers. If data are able to substantiate an estimation of relative areas of higher vs lower pore fluid resistivity (correlating with salinity) within these key aquifers, a preliminary interpretation of seawater intrusion indications will also be included.

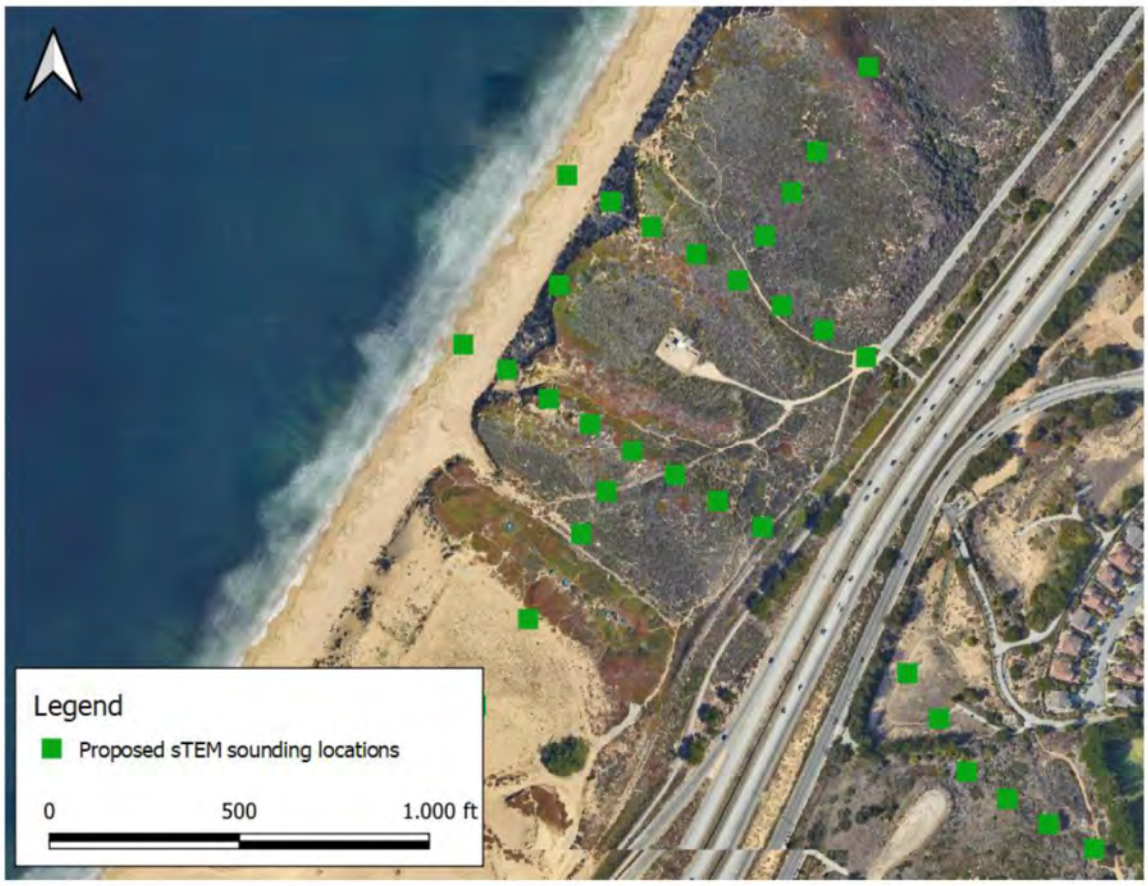


Figure 2 Proposed sTEM sounding locations.

The Stationary Time-Domain Electromagnetics (sTEM)

The sTEM is a hand carried system that involves laying out a 40 x 40 m (130x130 ft) square-shaped transmitter loop, along with a receiver placed at the center of the transmitter loop for each measurement (see Figure 3). These measurements are referred to as 'soundings' and provide subsurface information beneath the transmitter loop to depths of approximately 200-300 meters. The depth of investigation depends on the geological conditions, the water quality (salinity) and signal-to-noise ratio. In the presence of seawater in the formation, the resistivity will be in the range of 1 ohm-m. The electrically conductive saltwater will prevent the EM signal from penetrating a thick conductive layer (e.g., 100+ft) of seawater.

Depending on the distance between the soundings and the terrain, about 10-20 soundings can be conducted in a day. The instrument is lightweight and can also be hand carried in the field by a crew of two people, as illustrated in Figure 4. By hand carrying the instrument and placing only thin cables on the ground for a short period (up to 20 minutes), no damage to the environment is expected.

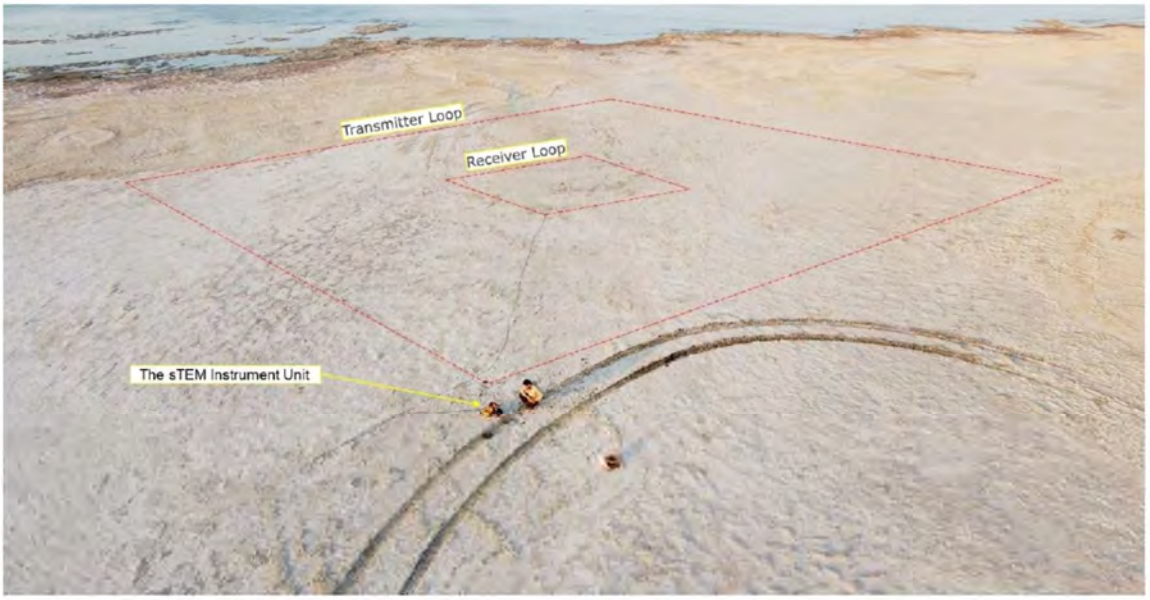


Figure 3 Configuration of the sTEM system.

sTEM data processing steps

The collected STEM data undergo the following processing steps:

1. Manually inspect each dataset for both low-moment (LM) and high-moment (HM) sounding curves.
2. Remove noisy data. The noise can be due to overhead powerlines, buried power cables, metal fences, and other man-made sources.
3. Assign a standard uniform 3% noise to all data.
4. Assign transmitter loop center coordinates (acquired in the field) and Digital Elevation Model (DEM) elevation to the sounding positions.

Figure 4 A sTEM system, STEM, being carried with a two-person team during a recent well siting project in Livermore, California.

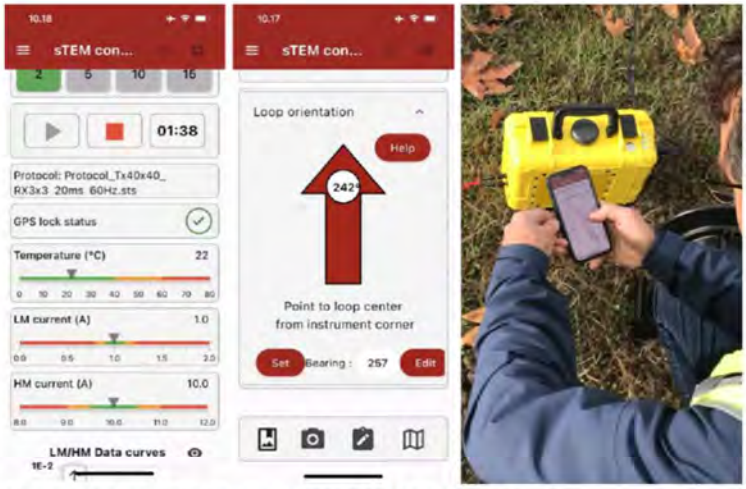


Figure 5 The user interface when operating the sTEM instrument.

sTEM data inversion steps

The processed STEM data will then be used in the following inversion scheme:

1. Define vertical constraints on the resistivities as well as the number of model layers and layer thicknesses.
2. Invert the processed data for smooth (multi-layer) resistivity models.
3. Present the results as line models. If the results are not satisfactory (e.g., due to high data residual), the inversion setup is revisited, and the data are re-inverted.
4. Calculate the data residual (data fit), which represents the difference between the observed data and the mapping of the estimated model to the data space.
5. Calculate the depth of investigation (DOI), based on a sensitivity analysis of the model.

sTEM Results

The processing and inversion of the STEM data will be performed using the software packages Aarhus SPIA (https://www.aarhusgeosoftware.dk/aarhus-spia-tem) and Aarhus Workbench (https://www.aarhusgeosoftware.dk/aarhus-workbench). The SPIA and Workbench are well-documented and technically sound software packages used for processing and inversion of ground-based and airborne electromagnetic and geoelectrical data. We utilized an application that is specifically designed for the processing and inversion of STEM data.

As described in the previous sections, the measured data are modeled to represent electrical resistivities at various depths, which can then be interpreted as lithology to get an understanding of the site geology. The inversion of STEM data results in one-dimensional (1D) resistivity models at each sounding location.

The STEM results will be presented as vertical resistivity sections, mean resistivity plan-view maps, and resistivity model reports.

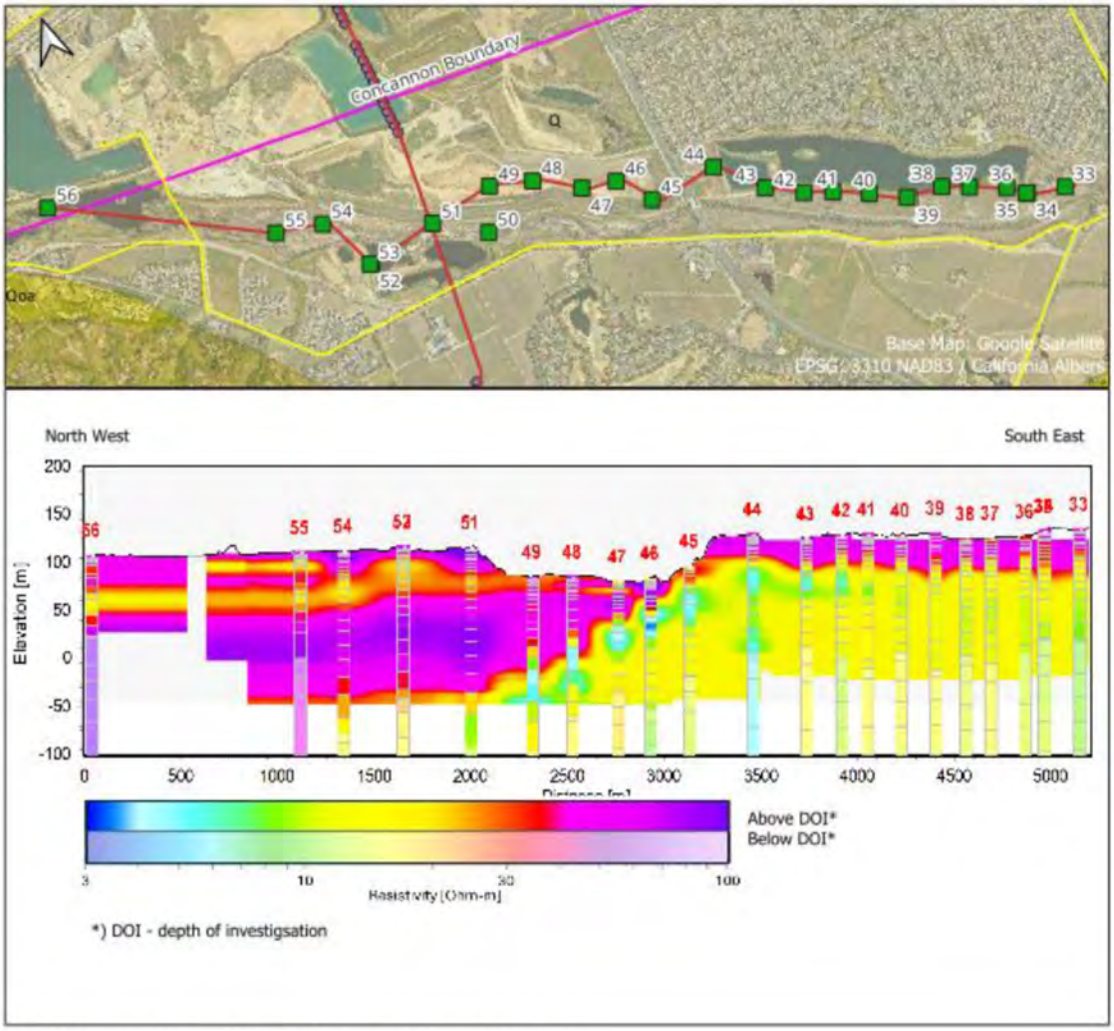


Figure 6 Example showing the sTEM models as a vertical section.

Data Deliverables

The following files will be provided as project deliverables.

1. Raw data, including files extracted from the instruments and supporting configuration files.
2. A GERDA Firebird database containing the acquired data, processed data, and the inverted model results.
3. ArcGIS layers, which include:
    a. Layout: ArcGIS shape files ("*.shp") containing general information about the surveyed area (AOI, well locations etc.) and location of the collected data.
    b. Georeferenced TIFF files for mean resistivity slices
    c. Model Sections: ArcGIS shape files ("*.shp") providing location information for the vertical sections presented in this report.

4. Google Earth KMZ files.
5. The project report, delivered as a PDF file.

The project report contains basic interpretations of the data based on our general understanding of the geological and hydrogeological settings in the study area, with specific correlations to data provided by the Client on the affected sentinel well and any other pertinent wells within the pilot study area. We will participate in one or two meetings to discuss the interpretations further.

Time schedule

We are prepared to discuss the project timeline and schedule the fieldwork according to the needs. Initial inversion results will be shared within two-three weeks after demobilization. A virtual meeting will be held with the Client to present the results. The final project deliverables will be provided within 4-8 weeks after demobilization. Please do not hesitate to reach out if you would like to discuss the project plan further.

Team

Ahmad-Ali Behroozmand, Max Halkjaer and Jesse Crews will be in charge of the field operations and managing data processing, inversion, and reporting of results. The team members bring years of experience in TEM investigations covering any aspect from the theoretical geophysical background, hardware and software utilized for data processing and inversion, and interpretation of the results.

Budget

The table below provides cost estimates for the project, which will be invoiced as a lump sum. The cost estimates are provided according to the above-mentioned plan. Should the proposed plan require adjustments, we are happy to discuss it with the Client and modify the budget accordingly.

Tasks	Price (USD)
Mob/demob[1]	1,500
1 day of STEM survey ($9,000/day)[2]	9,000
Integration with AEM results and report[3]	5,000
Total (USD)	**15,500**

[1]Includes instrument preparation, hotels, car rental, gasoline for the car, insurance, time while traveling, software license (SPIA, Workbench), and per diem.

[2]Includes fieldwork, data processing and inversion.

[3]Includes presentation of the results to the Client, preparing standard data report and other project deliverables.

SEASIDE BASIN WATER MASTER TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	June 12, 2024
AGENDA ITEM:	5
AGENDA TITLE:	Schedule
PREPARED BY:	Robert Jaques, Technical Program Manager

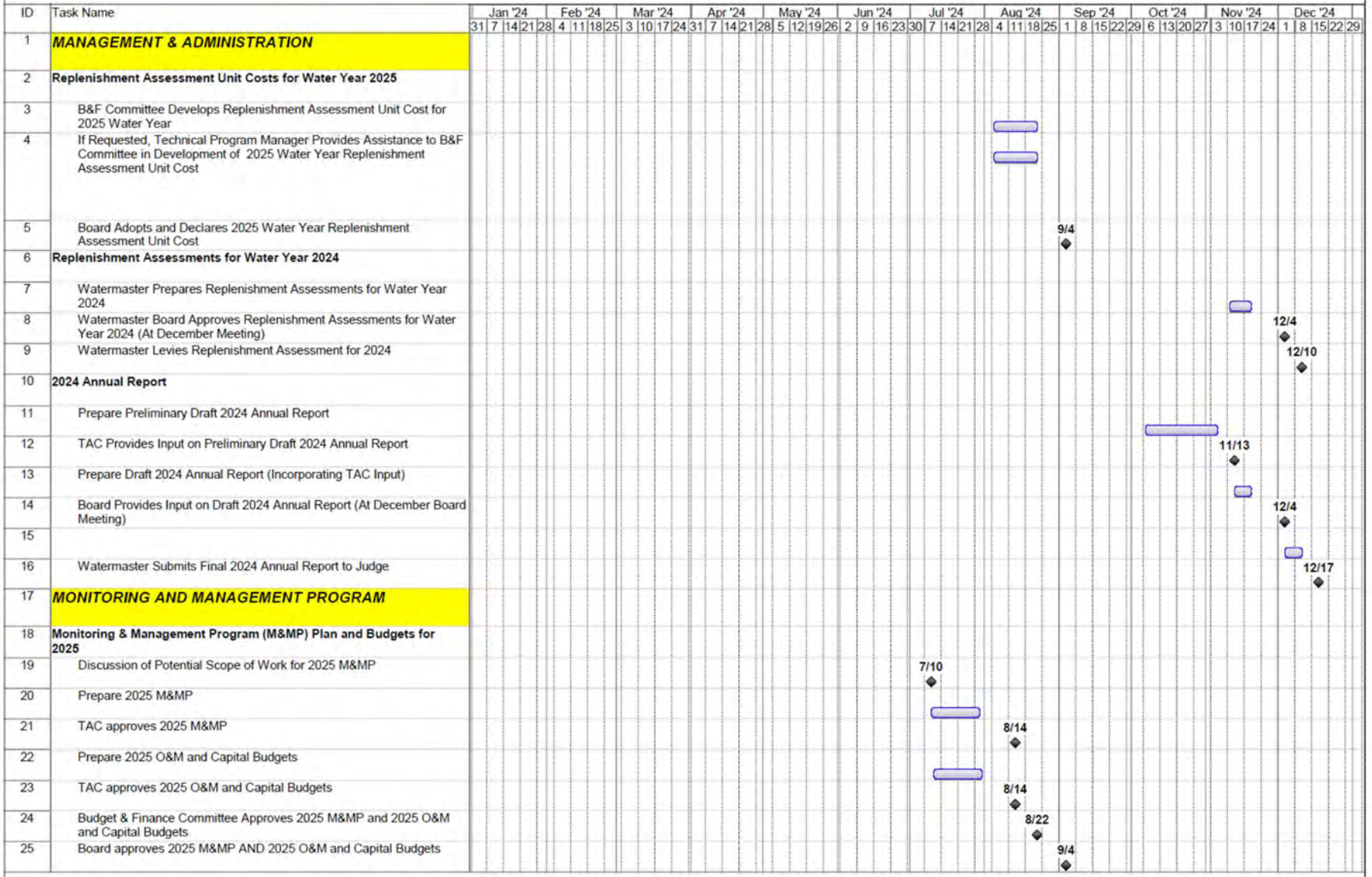
SUMMARY:

As a regular part of each monthly TAC meeting, I will provide the TAC with an updated Schedule of the activities being performed by the Watermaster, its consultants, and the public entity (MPWMD) which are performing certain portions of the work.

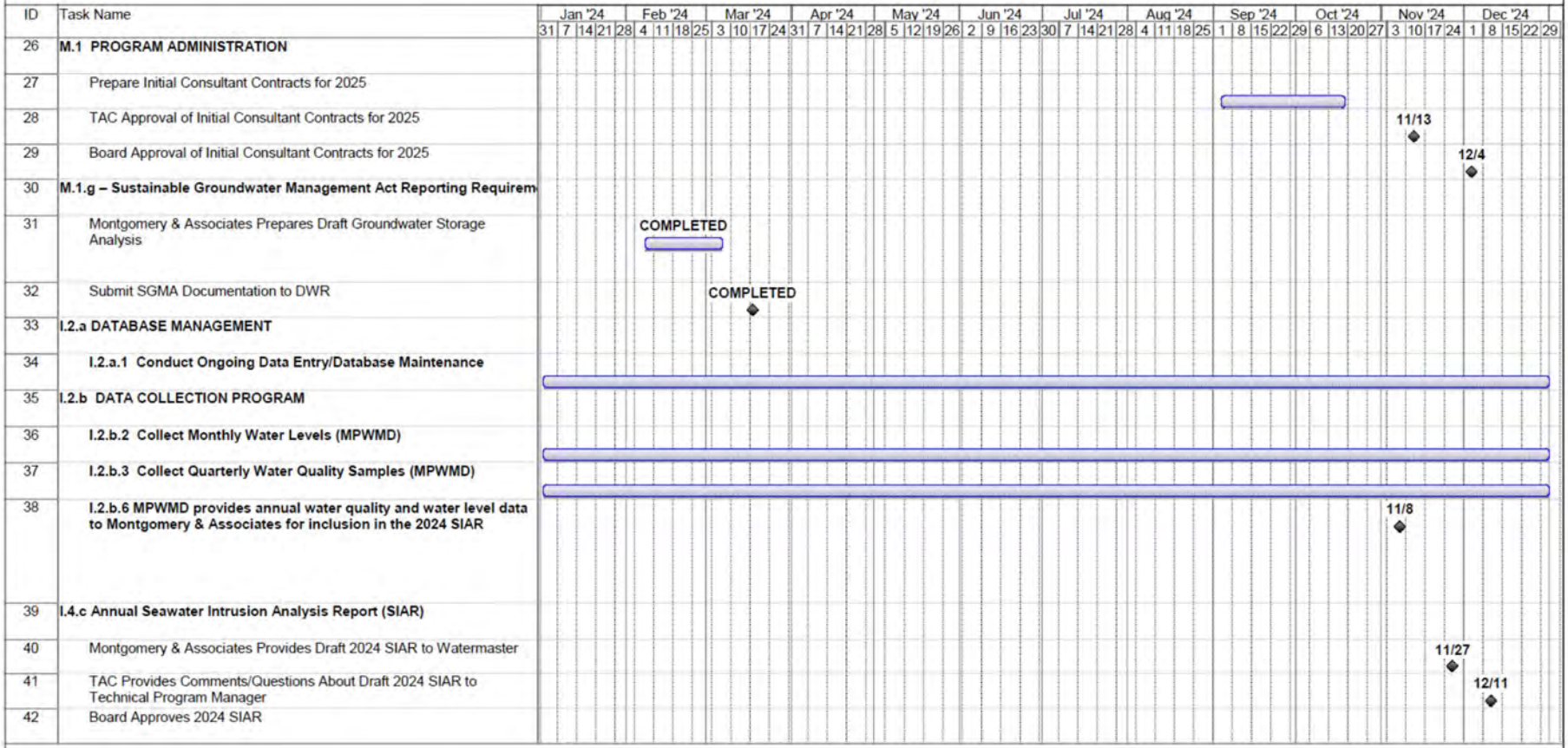
Attached is the updated schedule for 2024 activities. It reflects the TAC's March 13th decision to have a meeting in December 2024 to receive a presentation on the 2024 SIAR

ATTACHMENTS:	Updated Schedule of Work Activities for FY 2024
RECOMMENDED ACTION:	Provide Input to Technical Program Manager Regarding Any Corrections or Additions to the Schedules

Seaside Basin Watermaster
2024 Monitoring and Management Program
Work Schedule



Seaside Basin Watermaster
2024 Monitoring and Management Program
Work Schedule



SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	June 12, 2024
AGENDA ITEM:	6
AGENDA TITLE:	Other Business
PREPARED BY:	Robert Jaques, Technical Program Manager

SUMMARY:
The "Other Business" agenda item is intended to provide an opportunity for TAC members or others present at the meeting to discuss items not on the agenda that may be of interest to the TAC.

ATTACHMENTS:	None
RECOMMENDED ACTION:	None required – information only