MEETING NOTICE AND AGENDA

TECHNICAL ADVISORY COMMITTEE
OF THE
SEASIDE BASIN WATER MASTER

DATE: Wednesday, January 12, 2022
MEETING TIME: 1:30 p.m.

IN KEEPING WITH GOVERNOR NEWSOMS EXECUTIVE ORDERS N-29-20 AND N-35-20, 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/87606010835?pwd=VzBURUxXalFOelBrRjhsL0ppM29ldz09
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: 876 0601 0835
Passcode: 472586

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

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The next regular meeting is tentatively planned for Wednesday February 9, 2022 at 1:30 p.m. That meeting will likely also be held via teleconference.	

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SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	January 12, 2022
AGENDA ITEM:	2.A
AGENDA TITLE:	Approve Minutes from the November 17 and December 15, 2021 Meetings
PREPARED BY:	Robert Jaques, Technical Program Manager

SUMMARY:

Draft Minutes from these meetings were emailed to all TAC members. Any changes requested by TAC members have been included in the attached versions.

ATTACHMENTS:	Minutes from these meetings
RECOMMENDED ACTION:	Approve the minutes

D-R-A-F-T
MINUTES

Seaside Groundwater Basin Watermaster
Technical Advisory Committee Meeting
November 17, 2021
(Meeting Held Using Zoom Conferencing)

Attendees: TAC Members

City of Seaside – Scott Ottmar
California American Water – Tim O'Halloran
City of Monterey – Cody Hennings
Laguna Seca Property Owners – Wes Leith
MPWMD – Jon Lear
MCWRA – Tamara Voss
City of Del Rey Oaks – No Representative
City of Sand City – Taylor Fagan
Coastal Subarea Landowners – No Representative

Watermaster

Technical Program Manager - Robert Jaques

Consultants

Montgomery & Associates – Georgina King, Patrick Wickham

Others

MCWD – Patrick Breen
City of Seaside – Nisha Patel
Kevin Hanrighausen

The meeting was convened at 1:33 p.m.

1. Public Comments

There were no public comments.

A. Approve Minutes from the August 11, 2021 and October 20, 2021 Meetings

On a motion by Ms. Voss, seconded by Mr. O'Halloran, the minutes from both meetings were unanimously approved as presented.

B. Results from Martin Feeney's September 2021 Induction Logging of the Sentinel Wells

Mr. Jaques summarized the agenda packet materials for this item, and there was no other discussion.

C. Sustainable Groundwater Management Act (SGMA) Update

Mr. Jaques summarized the agenda packet materials for this item. Mr. O'Halloran reported that he will attend the Monterey Subbasin Corral de Tierra Community information meeting to be held via Zoom later today . Ms. Voss will also be attending, Mr. Jaques said he was not sure whether his schedule would allow him to attend.

D. Update on Security National Guarantee (SNG) Well

Mr. Jaques summarized the agenda packet materials for this item and there was no other discussion.

E. Make Findings Required Under AB 361 Regarding Holding Meetings Via Teleconference

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

Mr. Lear asked whether the Board of Directors could do this for itself as well as all of its committees. Mr. Jaques responded that according to Mr. Girard, County Counsel, AB 361 requires that each of those bodies adopt findings on its own, and that the Board of Directors could not adopt the findings for its committees.

Mr. Leith asked what the result would be if the findings were not adopted. Mr. Jaques responded that the body would then have to meet in-person.

A motion was made by Mr. O'Halloran, seconded by Mr. Lear, to adopt the three findings stated in the agenda packet on pages 20 and 21. The motion passed with Mr. Leith voting no, and all other members of the committee voting yes.

3. Discuss and Provide Input on the Draft 2021 Seawater Intrusion Analysis Report (SIAR)

Mr. Jaques introduced this agenda item, and Ms. King of Montgomery and Associates made a PowerPoint presentation summarizing the report and its findings and recommendations. Copies of the PowerPoint slides are attached.

Mr. Lear reported that MPWMD is in the process of getting permits and approvals, so that destruction of Monitoring Well FO-9 shallow can proceed.

In response to a question from Mr. Jaques, Mr. Lear reported that a new data logger has been installed in Sentinel Monitoring Well SBWM-1. B failed datalogger has been sent in to the manufacture to try to retrieve data from it for water year 2021. He felt the failure of the data logger was likely caused by a battery wearing out.

Mr. Lear also reported that the K Mart monitoring well is very close to the CDM well, and that perhaps data from the CDM well could be used as representative of that area. He said that in spite of requests made to law enforcement about clearing away the homeless encampment there, no action by them has thus far been taken. Therefore it remains an unsafe location for MPWMD staff to visit. He went on to say that if the homeless camp was cleared away, MPWMD could resume sampling there.

In her PowerPoint presentation, Ms. King noted that injection of water under the Pure Water Monterey Project seems to the reducing the easterly expansion of the pumping depression located in the Northern coastal subarea. She also pointed out the following:

- Water levels in all of the deep aquifer protective elevation wells are below sea level.
- Monitoring Well FO-10 Shallow continues to show increasing chloride levels and decreasing sodium:chloride molar ratios.

Because data is often late in arriving, it is not possible to complete preparation of the full draft SIAR in time for presentation to the TAC at its November meetings. Mr. Jaques said he would look into delaying the presentation on the SIAR to a December TAC meeting in future years. Mr. Lear noted that longer than usual lead times to get lab data back from Monterey Bay Analytical Services has occurred this year. Ms. Voss suggested looking into a change of laboratories to the Monterey County Health Department's laboratory, if that might help resolve the problem. Mr. Lear pointed out that this would increase costs due to having to transport samples to Salinas if that laboratory change were to be made. There was consensus that if the date for submittal of the draft SIAR was postponed until December in future years, this would likely resolve these problems.

Ms. Voss asked if any progress is being made in determining what is causing the increasing chloride levels in Monitoring Well FO-10 Shallow. Mr. Jaques responded that MCWD has indicated it will investigate this as it implements the GSP for the Monterey Subbasin in the Marina-Ord area.

Mr. Leith asked if the depth to groundwater in the Pure Water Monterey injection areas has decreased. Ms. King said yes, near the injection wells themselves, but groundwater levels have not shown an increase near the coast.

Mr. Lear reported that there is a 1000 acre foot operational reserve now in place in the pure water Monterey project. The goal is to raise this to 1500 acre-feet sometime in the near future. A drought reserve would be created if the growers quote buy-in" to the pure water Monterey project. No agreement on this has thus far been achieved.

A motion was made by Ms. Voss, seconded by Mr. Leith, to approve the draft SIAR and forward it to the Board with the TAC's recommendation for approval. The motion passed unanimously.

4. Discuss and Provide Input on the Preliminary Draft Watermaster 2021 Annual Report

Mr. Jaques briefly summarized the agenda packet materials for this item and invited questions or comments on the document from the TAC .

Following brief discussion, a motion was made by Mr. Lear, seconded by Ms. Voss, to accept the document as-is and submit it to the Board for its consideration. The motion passed unanimously.

Ms. Voss asked if the Pure Water Monterey Project was currently able to inject the full 3,500 acre-feet per year with the existing deep and shallow injection wells. Mr. Lear responded that all four original wells are currently injecting. The two additional deep injection wells are expected to become operational in January or February 2022, and are expected to increase injection capacity to the full 3,500 acre foot per year level. He went on to say that MPWMD is pursuing a Waste Discharge Requirement revision to enable it to increase to 4,100 water acre-feet per year the amount the Pure Water Monterey Project is authorized to inject. He noted that the existing Advanced Water Treatment facility in the Pure Water Monterey Project can provide this additional 600 acre-feet per year.

5. Schedule

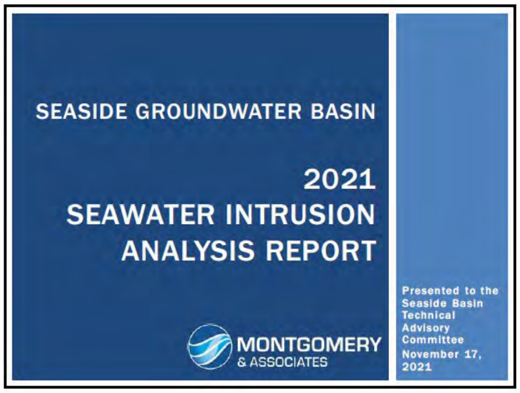
Mr. Jaques briefly summarized this item and highlighted the potential need for a December TAC meeting in order to comply with AB 361 meeting requirements.

6. Other Business

Mr. Leith asked what the pipeline construction work was on General Jim Moore Boulevard. Mr. O'Halloran responded that it consists of installing a parallel pipeline to increase the capability of the ASR project to simultaneously inject and extract water.

Ms. Voss asked when the appendices to the SIAR would be available. Ms. King said she would complete those next week, and Mr. Jaques said he would then post them to the Watermaster's website.

The meeting adjourned at 2:49 PM.

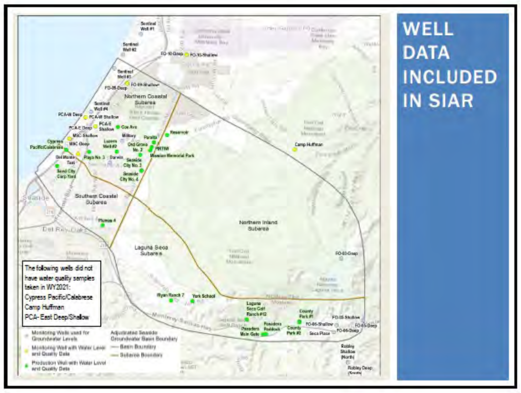


SEASIDE GROUNDWATER BASIN

2021 SEAWATER INTRUSION ANALYSIS REPORT

Presented to the Seaside Basin Technical Advisory Committee
November 17, 2021

MONTGOMERY & ASSOCIATES



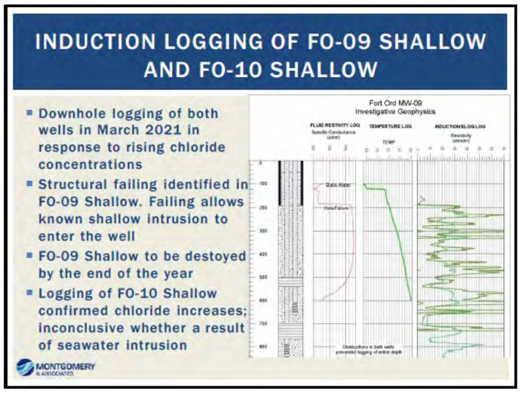
WELL DATA INCLUDED IN SIAR

The following wells did not have water quality samples taken in WY2021:
Cypress Pacific/Calebrese
Camp Huffman
PCA- East Deep/Shallow

SIAR ANALYSIS

- Chloride Distribution and Na/Cl Molar Ratio
- Cation/Anions – Piper and Stiff Diagrams
- Electric Induction Logs
- Groundwater Elevations
- Protective Groundwater Elevations
- Groundwater Production

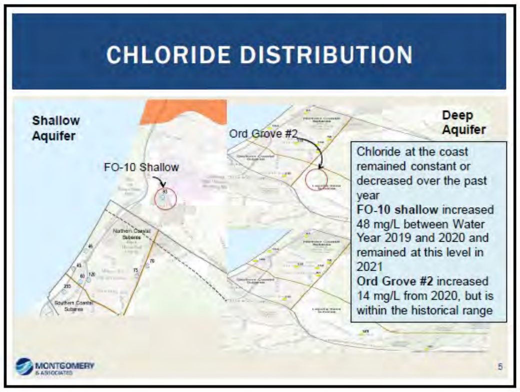
MONTGOMERY & ASSOCIATES 2



INDUCTION LOGGING OF FO-09 SHALLOW AND FO-10 SHALLOW

- Downhole logging of both wells in March 2021 in response to rising chloride concentrations
- Structural failing identified in FO-09 Shallow. Failing allows known shallow intrusion to enter the well
- FO-09 Shallow to be destoyed by the end of the year
- Logging of FO-10 Shallow confirmed chloride increases; inconclusive whether a result of seawater intrusion

MONTGOMERY & ASSOCIATES

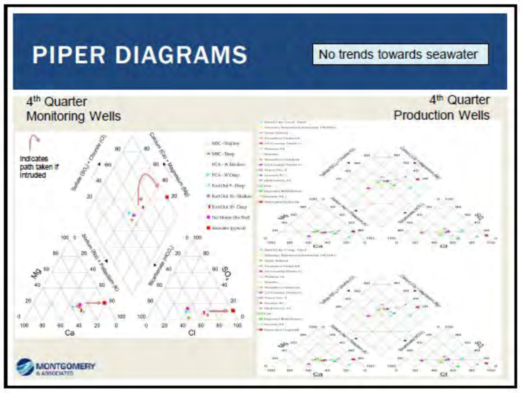


CHLORIDE DISTRIBUTION

Chloride at the coast remained constant or decreased over the past year

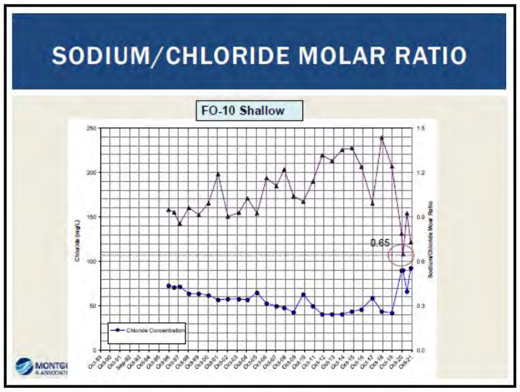
FO-10 shallow increased 48 mg/L between Water Year 2019 and 2020 and remained at this level in 2021

Ord Grove #2 increased 14 mg/L from 2020, but is within the historical range

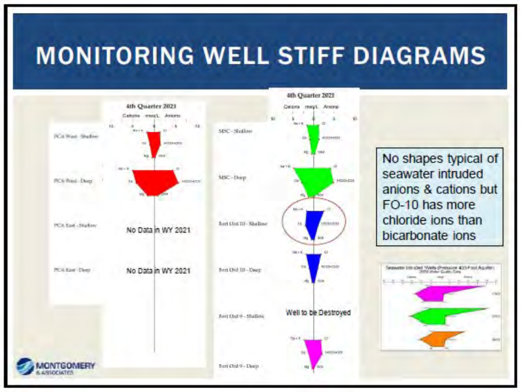


PIPER DIAGRAMS

No trends towards seawater

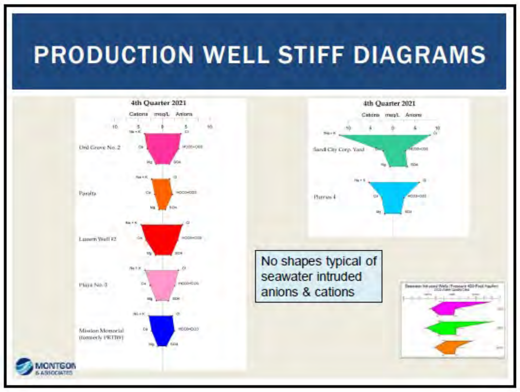


SODIUM/CHLORIDE MOLAR RATIO



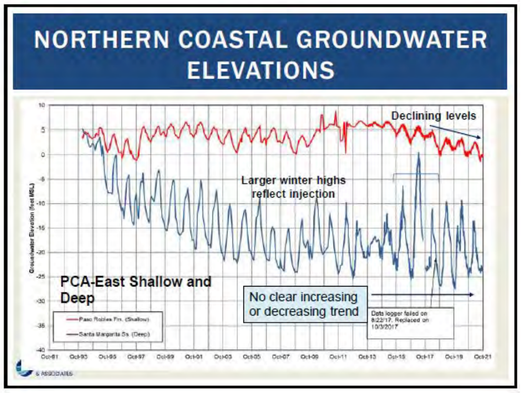
MONITORING WELL STIFF DIAGRAMS

No shapes typical of seawater intruded anions & cations but FO-10 has more chloride ions than bicarbonate ions



PRODUCTION WELL STIFF DIAGRAMS

No shapes typical of seawater intruded anions & cations



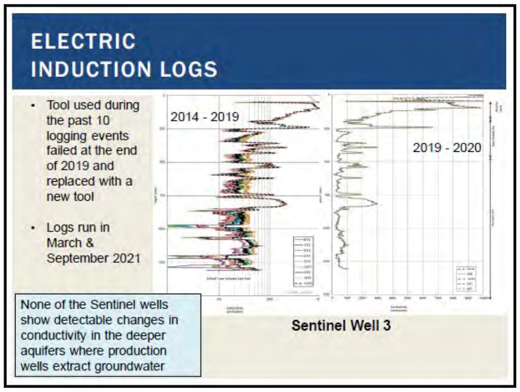
NORTHERN COASTAL GROUNDWATER ELEVATIONS

Declining levels

Larger winter highs reflect injection

PCA-East Shallow and Deep

No clear increasing or decreasing trend

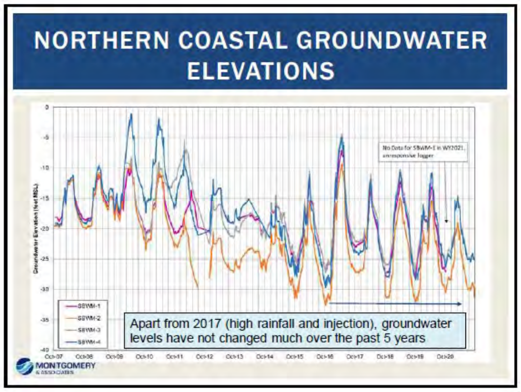


ELECTRIC INDUCTION LOGS

- Tool used during the past 10 logging events failed at the end of 2019 and replaced with a new tool
- Logs run in March & September 2021

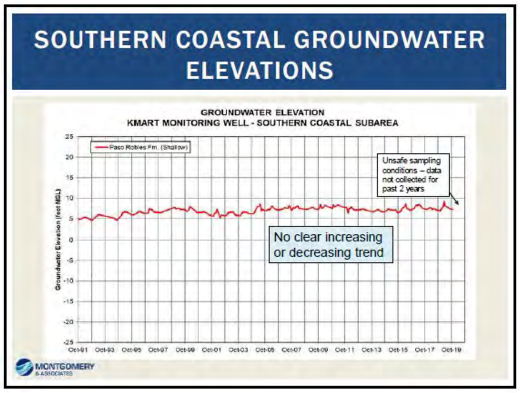
Sentinel Well 3

None of the Sentinel wells show detectable changes in conductivity in the deeper aquifers where production wells extract groundwater



NORTHERN COASTAL GROUNDWATER ELEVATIONS

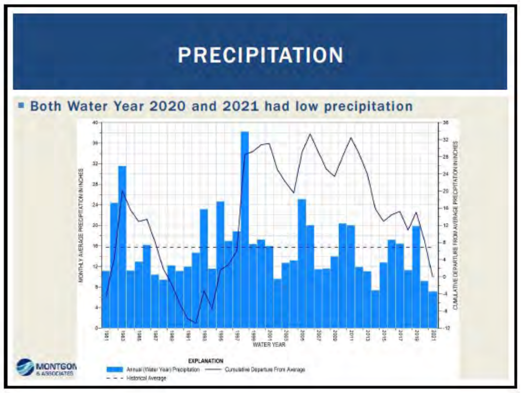
Apart from 2017 (high rainfall and injection), groundwater levels have not changed much over the past 5 years



SOUTHERN COASTAL GROUNDWATER ELEVATIONS

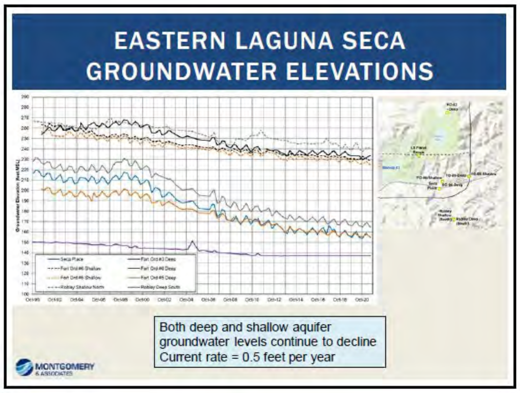
Unsafe sampling conditions – data not collected for past 2 years

No clear increasing or decreasing trend



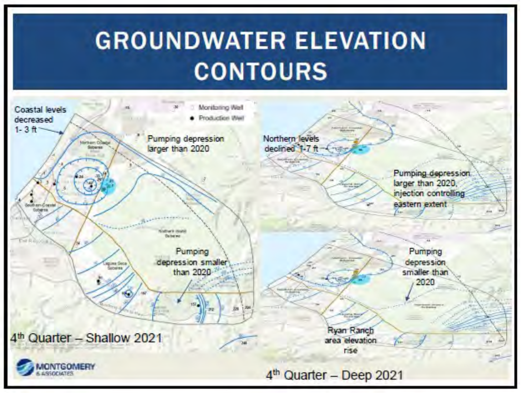
PRECIPITATION

- Both Water Year 2020 and 2021 had low precipitation



EASTERN LAGUNA SECA GROUNDWATER ELEVATIONS

Both deep and shallow aquifer groundwater levels continue to decline
Current rate = 0.5 feet per year



GROUNDWATER ELEVATION CONTOURS

Coastal levels decreased 1- 3 ft

Pumping depression larger than 2020

Pumping depression smaller than 2020

4th Quarter – Shallow 2021

Northern levels declined 1-7 ft

Pumping depression larger than 2020, injection controlling eastern extent

Pumping depression smaller than 2020

Ryan Ranch area elevation rise

4th Quarter – Deep 2021

PROTECTIVE GROUNDWATER ELEVATIONS

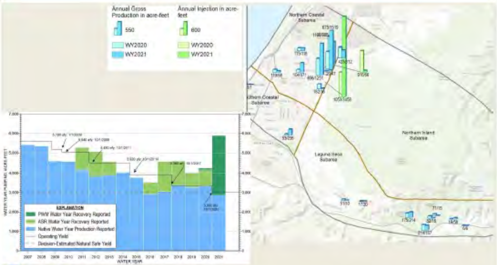
Subarea	Well	Depth	Protective Elevation, feet amsl	Above or Below
Northern Coastal	MSC	Deep	17	Below
		Shallow	11	Below
	PCA-W	Deep	17	Below
		Shallow	2	Below
	Sentinel 3	Deep	4	Below
Southern Coastal	CDM-MW4	Shallow	2	Above

CONCLUSIONS

Conditions in the basin that continue to provide a potential for seawater intrusion:

- All deep groundwater in the Northern Coastal subarea is below sea level
  - 2nd quarter (winter/spring) > 40 feet below sea level
  - 4th quarter (summer/fall) > 60 feet below sea level
- Groundwater levels remain below protective elevations in all deep target monitoring wells
- Two of the three shallow wells' groundwater levels are below protective elevations

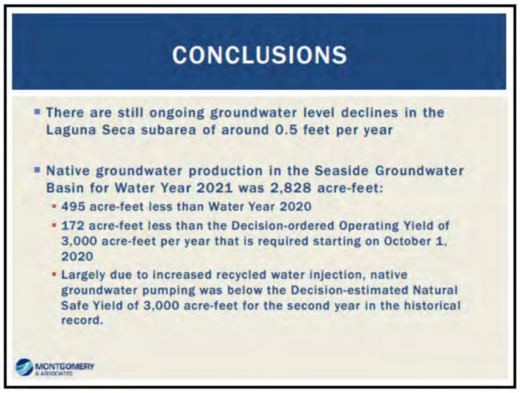
GROUNDWATER PRODUCTION WY 2020 VS 2021



CONCLUSIONS

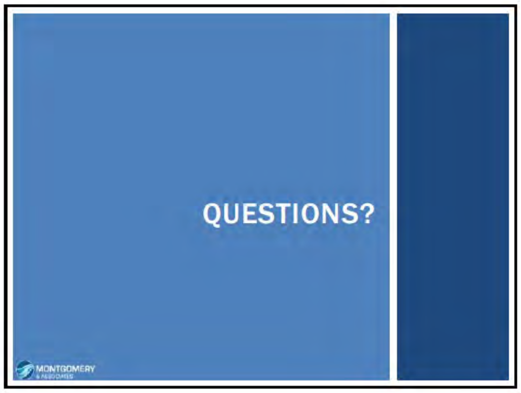
Analyses indicating seawater intrusion is currently NOT occurring:

- No groundwater chemistry changes towards seawater in either shallow or deep groundwater
- Overall, chloride concentration trends were stable for most monitoring wells. Two wells had an increase greater than 10 mg/L
  - FO-10 shallow has sustained increased chloride concentrations up to 93 mg/L chloride since 2020
- Sodium/chloride molar ratios at most monitoring wells remained constant or increased over the past year. One well had a molar ratio below 0.86:
  - FO-10 shallow now has a molar ratio 0.65
- Induction logging data at the coastal Sentinel Wells do not show large changes over time that are indicative of seawater intrusion

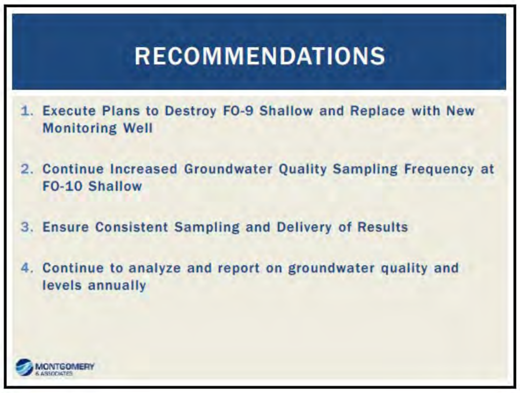


CONCLUSIONS

- There are still ongoing groundwater level declines in the Laguna Seca subarea of around 0.5 feet per year
- Native groundwater production in the Seaside Groundwater Basin for Water Year 2021 was 2,828 acre-feet:
  - 495 acre-feet less than Water Year 2020
  - 172 acre-feet less than the Decision-ordered Operating Yield of 3,000 acre-feet per year that is required starting on October 1, 2020
  - Largely due to increased recycled water injection, native groundwater pumping was below the Decision-estimated Natural Safe Yield of 3,000 acre-feet for the second year in the historical record.



QUESTIONS?



RECOMMENDATIONS

1. Execute Plans to Destroy FO-9 Shallow and Replace with New Monitoring Well
2. Continue Increased Groundwater Quality Sampling Frequency at FO-10 Shallow
3. Ensure Consistent Sampling and Delivery of Results
4. Continue to analyze and report on groundwater quality and levels annually

D-R-A-F-T
MINUTES

Seaside Groundwater Basin Watermaster
Technical Advisory Committee Meeting
December 15, 2021
(Meeting Held Using Zoom Conferencing)

Attendees: TAC Members

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

Watermaster
None

Consultants
None

Others
None

The meeting was convened at 1:33 p.m.

1. Public Comments

There were no public comments.

2. Make Findings Required Under AB 361 Regarding Holding Meetings Via Teleconference

After a brief discussion a motion was made by Mr. Ottmar to find that AB361 criteria were met and recommended continuing to meet via teleconference. The motion passed with Mr. Ottmar, Mr. Hennings, Ms. Voss, and Mr. Gomez voting yes. Mr. Leith voted no.

Mr. Leith commented that he did not believe that two years into the COVID-19 pandemic it was still an emergency.

3. Other Business

There was no other business.

The meeting adjourned at 1:42 PM.

SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	January 12, 2022
AGENDA ITEM:	2.B
AGENDA TITLE:	Sustainable Groundwater Management Act (SGMA) Update
PREPARED BY:	Robert Jaques, Technical Program Manager

At the State level:
Since my last update, I have not received any new materials from the State that would impact the Watermaster.

At the Monterey County level:
Attached are summaries of meetings held in November and December, 2021.

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

SUMMARY OF PURE WATER MONTEREY, SALINAS VALLEY GROUNDWATER SUSTAINABILITY, AND MARINA COAST WATER DISTRICT GROUNDWATER SUSTAINABILITY ZOOM MEETINGS IN NOVEMBER 2021

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

SVBGSA Monterey Subbasin GSP Committee Meeting November 15, 2021:
The primary purpose of this meeting was to adopt necessary findings to allow Zoom meetings to continue to be held in compliance with the requirements of AB361. There was no other information discussed or reported at this meeting of particular interest to the Watermaster.

Pure Water Monterey Water Quality and Operations Committee Meeting November 17, 2021:
Topics discussed at this meeting which are of interest to the watermaster included:

- Due to equipment delivery delays, startup of deep injection wells 3 and 4 will be delayed by two months to approximately February 2022.
- An addendum to the Supplemental Environmental Impact Report for the Pure Water Monterey Expansion Project to add an additional injection well is currently being circulated.
- The extrinsic tracer injection started on October 26th in deep injection wells 1 and 2. Sampling is planned to be performed starting on November 16 and to continue through Q1 of 2022. MPWMD is coordinating sampling of the California American wells. Preliminary results are expected to be available in early February.
- Injected water from the Pure Water Monterey Project has now reached extraction wells and met all of the underground storage time requirements.
- For Fiscal Year 20-21 the total amount injected by the Pure Water Monterey Project through September 30, 2021 is 3,381 acre-feet.
- ASR injection this fall has not yet started-need about 5 to 7 inches of rainfall minimum before flow requirements in the Carmel River will be met.
- The next meeting of this group is scheduled for February 16, 2022.

Monterey Subbasin GSP Corral de Tierra Community Meeting November 17, 2021:
At this Zoom meeting members of the public received a presentation from multiple consultants working on the GSP for the Monterey Subbasin to educate them on groundwater issues in the Corral de Tierra subarea and adjacent subareas and subbasins. A number of questions were raised by a members of the public and were responded to by various consultants and or SVBGSA staff members.

SVBGSA Advisory Committee Meeting November 18, 2021:
The primary purpose of this meeting was to adopt necessary findings to allow Zoom meetings to continue to be held in compliance with the requirements of AB361. There was no other information discussed or reported at this meeting of particular interest to the Watermaster.

Seawater Intrusion Work Group (SWIG) Meeting November 22, 2021:
The topics discussed were an update on progress of the Deep Aquifer Study and an ongoing discussion of Projects to control and/or manage Seawater Intrusion. In addition, a presentation was made by a

representative of the United Water Conservation District about designing a coastal brackish water extraction and treatment project.

SVBGSA Advisory Committee Meeting November 29, 2021:
At this meeting there was an overall presentation on the Draft GSPs for the Upper Valley, Langley, Eastside, and Forebay subbasins. Later this month or in December meetings will be held of the Monterey Subbasin GSP Committee, and then the Advisory Committee, for presentations on the Draft Monterey Subbasin GSP.

SUMMARY OF
PURE WATER MONTEREY,
SALINAS VALLEY GROUNDWATER SUSTAINABILITY, AND
MARINA COAST WATER DISTRICT GROUNDWATER SUSTAINABILITY
ZOOM MEETINGS
IN DECEMBER 2021

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

SVBGSA Monterey Subbasin GSP Committee Meeting December 13, 2021:

Because of a scheduling conflict I was not able to attend this meeting. The primary purpose of this meeting was to receive a presentation on the Final Draft of the Monterey Subbasin GSP. Included in an appendix to that document is a listing of comments that were received on the draft chapters when they were released for review, and how the authors of the GSP responded to those comments. I went through the comments I had made and reviewed the responses. I then submitted my findings on those responses to Emily Gardner who is the SVBGSA staff member associated with the development of the GSP. I found that some of my comments and/or questions had not been adequately responded to or addressed in the Final Draft GSP and asked that adequate responses and edits to the GSP be made. There was no other information discussed or reported at this meeting of particular interest to the Watermaster.

SVBGSA Advisory Committee Meeting December 16, 2021:

This meeting was attended by Laura Paxton to represent the Watermaster. Issues of interest to the Watermaster included:

Nancy Isackson asked for clarification of how the implementation committees will work with the planning committees and other SVBGSA committees. Implementation committees will help to implement the actions described in the GSPs. She felt there was quite a bit of confusion, and asked if the January 14th deadline could be extended.

Chris Bunn also sought clarity on committee and board interworking, such as the SWIG with planning and implementation, etc. The integrated committee is for general GSP implementation to address hydrology questions in the basin as a whole. The MCWDGSA is the lead for purposes of developing the Marina-Ord portion of the Monterey Subbasin GSP, and the SVBGSA is the lead for the Corral de Tierra portion of the GSP. MCWDGSA and SVBGSA will coordinate with each other when implementing the GSP.

The DWR Round 1 Implementation grant being sought for the critically over drafted 180/400 foot Aquifer Subbasin would be $7.6 million fully funded if awarded with no match necessary. Application deadline is February 18. SVBGSA staff is the lead and has been working for a couple months already on the application. They will present the grant application to the 180/400’ Implementation Committee. The GSP for that basin did not have projects prioritized, however projects would be prioritized with input from partners (i.e. CSIP) to list in the grant application. It was stated that monitoring well installation could be funded by the grant under “enhancing metering” that allows projects that improve operations. Chris Bunn requested Subbasin interaction modeling and analysis of river percolation locations be added to projects requested to be funded. Tom Ward noted the extraction barrier project is not decided upon, and the desal plant is too far down the road, so a more immediate project is needed. Beverly Bean suggested grant funding be used for a legal analysis of a moratorium on deep aquifer pumping. The committee concurred recommendation to pursue the grant and bring back a list of prioritized projects.

A $200 million state grant for high priority basins (such as the Monterey Subbasin) was announced yesterday. It is expected that the federal government will fund regional solutions.

It was noted that arsenic is found in Corral de Tierra groundwater.

Abby Ostovar stated that Watermaster's request for LSSA data and conditions to be included in management and modeling was presented "late in the game" but perhaps can be incorporated into annual reports. [Note: The Watermaster has raised this issue for months, not "late in the game." The SVBGSA has encountered a lot of difficulty in putting together the GSP for the Corral de Tierra area and is facing a tight deadline to complete its work by the DWR deadline for GSP submittal in January 2022. Hence, it has been saying that some of the issues raised by commentors will be addressed in the early phases of GSP implementation, and not in the GSP itself.]

SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	December 15, 2021
AGENDA ITEM:	2.C
AGENDA TITLE:	Make Findings Required Under AB 361 Regarding Holding Meetings Via Teleconference
PREPARED BY:	Robert Jaques, Technical Program Manager

SUMMARY:
As discussed at the November 17, 2021 TAC meeting, in order to remain in compliance with AB 361 the TAC needs to adopt certain findings every 30 days in order to keep meeting remotely.

One action required at today's meeting is to readopt the same findings the TAC adopted at its November 17 meeting, namely that:

(1) The Governor's proclaimed state of emergency is still in effect,
(2) The TAC has reconsidered the circumstances of the state of emergency, and
(3) The Monterey County Health Officer continues to recommend social distancing measures for meetings of legislative bodies.

I recommend that the TAC again adopt these three findings.

ATTACHMENTS:	None
RECOMMENDED ACTION:	Approve Making the Findings Described Above

SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	January 12, 2022
AGENDA ITEM:	3
AGENDA TITLE:	Status Report on Flow Direction and Flow Velocity Modeling
PREPARED BY:	Robert Jaques, Technical Program Manager

SUMMARY:

At its March 10, 2021 meeting the TAC approved a contract with Montgomery & Associates to perform flow direction and flow velocity modeling to help determine where seawater intrusion, if it were to be detected, would move within the Seaside Basin. This contract was approved by the Board at its September 1, 2021 meeting.

It was anticipated that this work would be completed in late December 2021, so it could be presented to the TAC at its January 2022 meeting. However, because of the workload of performing the replenishment water modeling, the completion of the flow direction/flow velocity modeling has been delayed. It is expected to be completed in time to present the Technical Memorandum on that work, and to have Montgomery & Associates make a presentation on it, at the TAC's February 2022 meeting.

ATTACHMENTS:	None
RECOMMENDED ACTION:	None required – information only

SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	January 12, 2022
AGENDA ITEM:	4
AGENDA TITLE:	Presentation and Discussion of Replenishment Water Modeling
PREPARED BY:	Robert Jaques, Technical Program Manager

SUMMARY:

At its August 11, 2021 meeting the TAC approved a contract with Montgomery & Associates to update the replenishment water modeling that had been performed in 2013. The work consisted of these Tasks:

- Extending the historical hydrology Baseline scenario (from that used in the 2013 modeling)
- Incorporating all existing and approved/planned projects into the Baseline Model
- Incorporating sea level rise at ocean boundaries
- Developing iterative scenarios to achieve protective elevations in 20 years
- Preparing a Technical Memorandum
- Making presentations to both the TAC and the Board

Attached is the Draft Replenishment Modeling Technical Memorandum.

At today's meeting Montgomery & Associates will make a PowerPoint presentation describing this work and will respond to questions and comments from the TAC.

ATTACHMENTS:	Replenishment Water Modeling Technical Memorandum
RECOMMENDED ACTION:	Discuss and provide comments, questions, and suggested revisions to the Technical Memorandum and then forward the document to the Board with the TAC's recommendation for approval

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DRAFT TECHNICAL MEMORANDUM

DATE: January 5, 2022 **PROJECT #:** 9150.0504

TO: Bob Jaques, Technical Program Manager, Seaside Basin Watermaster

FROM: Pascual Benito and Georgina King

PROJECT: Seaside Basin Watermaster

SUBJECT: Updated Modeling of Seaside Basin Replenishment Options

INTRODUCTION

BACKGROUND

In April 2013, HydroMetrics Water Resources Inc. (now acquired by Montgomery & Associates) completed a groundwater modeling study that evaluated 3 potential future scenarios:

- **Scenario 1**: A 25-year groundwater overpumping replenishment program proposed by California American Water (Cal-Am) which replenishes their overpumping by in-lieu recharge through reducing pumping from their Seaside Basin wells production wells.
- **Scenario 2**: A set of pumping reductions by Standard and Alternative Producers to achieve protective groundwater levels over a 25-year period
- **Scenario 3**: Cal-Am's replenishment plan coupled with additional injection into the Santa Margarita aquifer to achieve protective elevations in 25 years.

Scenario 1 did not achieve protective elevations as 700 acre-feet per year (AFY) is too little replenishment to raise groundwater levels to protective elevations at coastal wells. Because of this, the scenario was not updated as part of this updated modeling of replenishment options.

Under Scenario 2, a pumping reduction by Standard and Alternative Producers of just over 2,000 AFY (including Cal Am's 700 AFY reduction) was needed to achieve protective groundwater levels at the coast. Since Scenario 2 is not a practical solution because Standard and Alternative producers do not have access to supplemental sources of water, it was not included as part of this updated modeling of replenishment options.

The results of Scenario 3 showed that when combined with Cal-Am's 25-year repayment schedule of 700 AFY, protective groundwater elevations can be achieved by injecting an additional 1,000 acre-feet per year of water into existing ASR wells. Recharged water is left in the basin to replenish the overdrafted aquifers, and is not pumped by Standard or Alternative producers. This approach requires less supplemental water to implement than the pumping reduction approach for Scenario 2.

The predictive simulation for the 2013 scenarios only took into account historical Carmel River ASR by MPWMD and not Pure Water Monterey (PWM), since in early 2013 PWM was only in the very early planning stages.

UPDATED BASELINE MODEL

Extend and Update Baseline Period and Hydrology

Previous predictive model simulations have been based on repeating the historical hydrology from the original 22-year model calibration period of 1987 – 2008. Previous predictive simulations run from 2009 through 2042. While maintaining this approach allows for direct comparison between new and previous simulations, it does not take advantage of the additional 9 years of hydrologic and climatic data that have been incorporated into the historical model. The historical model was updated in 2014 and 2018, and now includes a continuous 31-year hydrologic record from January 1987 through December 2017. Significantly, this 31-year hydrologic record includes both the 1987-1991 drought and the recent 2012-2015 drought. This historical hydrology and climate dataset is now the basis for all predictive modeling, as it incorporates a broader range of potential climate variability that is predicted by climate change analysis. While previous predictive groundwater models used a calendar year basis, the updated predictive model is now based on water year (WY).

The updated baseline model simulates a 33-year period from October, 2017 through the end of September, 2050 (WY 2018 – 2050). The hydrology (rainfall, recharge, and streamflow) for WY 2018 – 2021 is based on measured values, while the hydrology for WY 2022 – 2050 is simulated by repeating the hydrology record from WY 1988 – 2016, as illustrated on Figure 1 and detailed in Table 3.

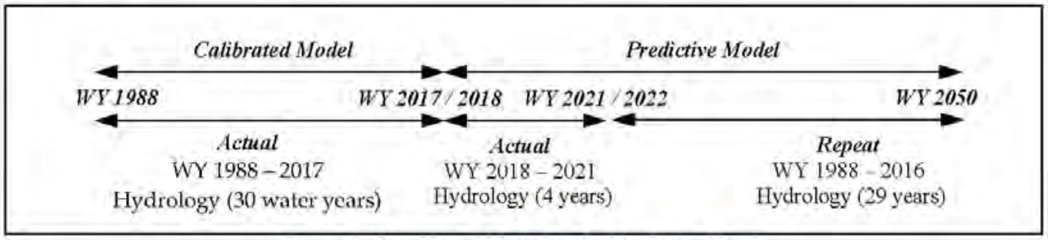

Figure 1: Repetition of Hydrology for Predictive Model

The 2013 replenishment modeling effort assumed protective groundwater elevations must be reached within 25 years from the time supplemental water is available to offset pumping (assumed at that time to be in 2016) thereby resulting in protective elevations being reached in 2041. Per the TACs direction for this model update of replenishment options, the model is used to determine how much replenishment water is needed to achieve protective coastal groundwater elevations in 20 years. Extending the hydrology to WY 2050 covers the 20-year target to be used for evaluating replenishment volumes that achieve protective elevations and also covers the entire 25-year Cal-Am repayment period.

Actual hydrology and measured pumping and injection rates are used for WY 2018 – 2021, with the following WY 2022-2050 period using projected production and injection rates as described in sections below.

The update of hydrology also included an update of the estimated shallow groundwater recharge from percolation of precipitation based on the new updated hydrology cycle, while the irrigation return flow, ponds, system losses, and septic systems are based on the previously modeled estimates.

Incorporating of Sea Level Rise at Ocean Boundaries

Estimates of projected sea level rise through WY 2050 are incorporated into the predictive model simulation by adjusting the freshwater equivalent head boundary conditions specified along the ocean boundary. The mean sea level rise (MSLR) estimate is based on scenarios of the projected MSLR for Monterey Bay from the 2018 update of the State of California Sea-Level Rise Guidance document recently released by the California Ocean Protection Council (OPC, 2018), shown on Figure 2. In consultation with the TAC, the High Emissions, Medium-High Risk Aversion scenario (green dots on Figure 2) was selected, which projects a mean sea level rise of 1.3 feet by 2050. As the protective head elevations are tied to mean sea level, a simple equivalent adjustment to the protective head elevations is made by increasing the protective elevations by the projected sea level rise over time. For WY 2018 – 2021 measured values of actual MSLR for the Monterey Bay (NOAA, 2021) are used, while projected MSLR is used for WY 2022-2050.

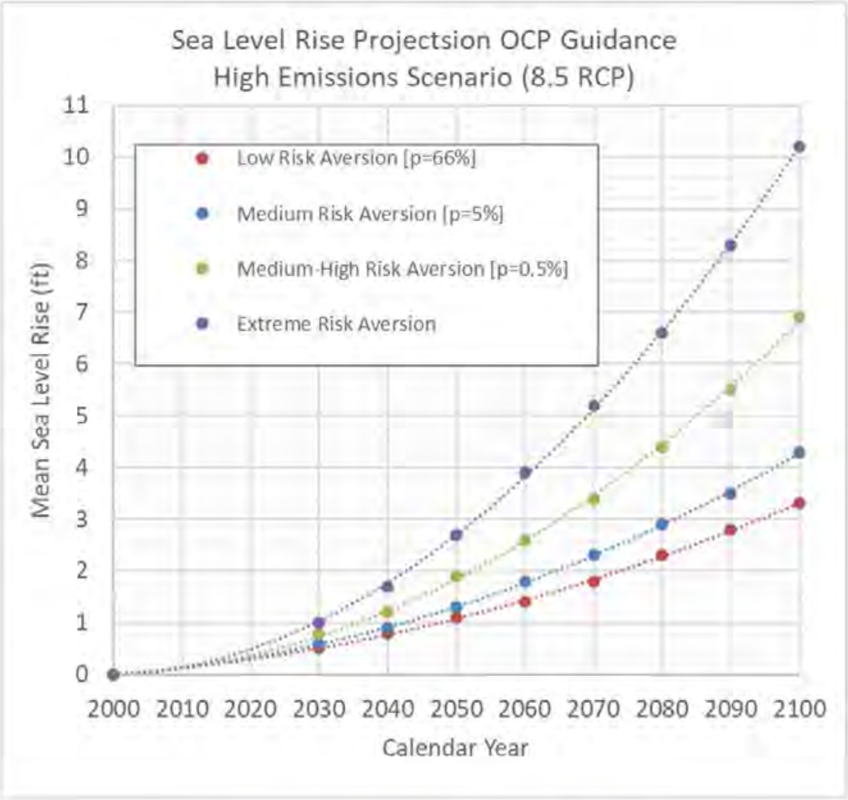

Figure 2. Projections of Rise in Mean Sea Level

Projected Groundwater Pumping

The assumptions used for projected groundwater pumping are:

1. Actual reported pumping within the Seaside basin is used for WY 2017–2021. Projected Standard and Alternative Producer pumping are set at the 5-year average of measured WY 2017-2021 pumping shown in Table 1 from WY 2022 and onwards, with a few specific exceptions described in the next section. Projected pumping for all Standard Producer and Alternative Producers meets their safe yield allocations of native Seaside basin groundwater from WY 2022 forward, except for City of Seaside, whose 5-year WY 2017-2021 average of 182 AFY exceeds their current allocation of 123 AFY.

Table 1. Five-Year Average (WY 2017-2021) Standard and Alternative Producer Pumping

Sub-Area and Producer	WY 2017-2021 Average (acre-feet/year)
Coastal and Northern Inland Subareas	**2,741**
Calabrese	0
Cal-Am*	2,048
Mission Memorial	22
City of Seaside (golf course use)	487
City of Seaside (municipal use)	182
SNG	1
Sand City	1
Laguna Seca Subarea	**575**
Cal-Am	153
Laguna Seca County Park	19
Laguna Seca Golf Resort	206
The Club at Pasadera	181
York School	16

*Includes non-native PWM & ASR recovery

2. Cal-Am's ceases pumping from the Ryan Ranch and Bishop Units in the Laguna Seca subarea starting in WY 2021. Pumping continues from the Hidden Hills Unit which is located just outside the Laguna Seca subarea.

3. Cal-Am's projected demand and pumping schedule for WY 2022-2050 is based on an updated version of the spreadsheet supply-demand forecast model originally developed by MPWMD for use in the 2019 PWM Expansion SEIR modeling (MPWMD, 2019). This is described in more detail below.

4. Private pumping within the Seaside Basin was based on repeating the most recent estimates.

5. Pumping rates for adjacent subbasins remain as they currently are, and do not assume any projects included in their respective GSPs are implemented.

6. Pumping outside the Seaside basin in the Corral de Tierra and Torro Creek areas of the Monterey Subbasin is based on repeating the most recently estimated pumping rates from the historical model, with the exception of Cal-Am Hidden Hills pumping which is based on the 5-year average of reported pumping for WY 2017-2021 of 128 AFY.

7. Pumping by Marina Coast Water District (MCWD) is not explicitly simulated in the model but is represented by proxy via the prescribed constant head boundary along the model boundary in the Marina/Ord area. These are assumed to remain the same as in the historical model.

8. Golf course irrigation pumping both within and outside the Seaside basin matches the historical pumping aligned with the cycled historical hydrology. In a few cases where the historical pumping record was not consistent or complete, an average rate is used. Another exception is the change in the City of Seaside golf course water supply described in the next section.

Existing and Planned Projects

Assumptions regarding existing and planned projects are:

1. Carmel River ASR injection quantities are assumed to be the same as current planned operations based on cycled historical Carmel River hydrology. Projected Carmel River diversion and ASR injection schedule is described in more detail in a subsequent section.

2. The Pure Water Monterey (PWM) base injection of average 3,500 AFY begins in WY 2020 with the PWM Expansion project increasing to an annual average of 5,750 AFY assumed to start in WY 2024. Actual measured monthly injection rates for WY 2020-2021 are used followed by a projected injection schedule for the remainder of the simulation, using the injection delivery spreadsheet previously developed for the PWM project modeling and updated for the simulated future hydrology. The PWM recharge assumptions are described in more detail in a subsequent section of this technical memorandum.

3. Cal-Am's 700 AFY reduction in pumping of native groundwater as part of its 25-year groundwater over-pumping replenishment program is assumed to start in WY 2024, following completion of the PWM Expansion Project. The repayment period stops at the end of WY 2048.

4. The SNG development is supplied water from Cal-Am wells under an agreement with Cal-Am. As part of the agreement, Cal-Am uses SNG's native groundwater water right of 149.7 AFY to meet the project demand. The SNG development is assumed to be completed in 2025 with usage starting at 25 AFY in 2025 and ramping up to 30 AFY in 2026, 50 AFY in 2027, and 70 AFY from 2028 onwards. Annual usage is allocated monthly based on the historical monthly demand percentages the Cal-Am Monterey District used in the MPWMD Cal-Am Demand-Supply model developed for the PWM Expansion Supplemental Environmental Impact Report (SEIR).

5. The City of Seaside replaces its golf course irrigation with PWM recycled water starting in WY 2023 and uses its 540 AFY golf course irrigation allocation for their municipal water

system to meet demand of the Campus Town development project. The groundwater model assumes that this pumping will be produced by their municipal Well #4. This results in a decrease in pumping of approximately 480 AFY from the 2 irrigation wells screened in the shallow Paso Robles aquifer but will result in an increase in pumping in the deeper Santa Margarita aquifer[1]. Based on information provided by the City of Seaside on projected total water use and construction timeline, the Campus Town project is assumed to begin in WY 2023 with usage starting at 100 AFY in 2023, 130 AFY in 2024, 215 AFY in 2025, and reaching maximum of 301.1 AFY in 2026. The annual usage was allocated monthly based on the historical monthly demand percentages for the Cal-Am Monterey District used in the MPWMD Cal-Am Demand-Supply model developed for the PWM Expansion SEIR and was added to the projected existing City of Seaside municipal pumping demand projections.

Predicted Carmel River Flow Diversions and ASR Injection Assumptions

The amount of Carmel River water available for ASR injection and for Cal-Am Table 13 diversions used to meet Cal-Am system demand for the predictive simulation period is based on historical streamflow records. Because the future simulated hydrology is based on the historical hydrology of WY 1988 – 2016, the projected streamflow is taken as being the same as the historical streamflow and used as the basis for determining when and if diversions can occur. As part of the PWM Expansion SEIR modeling (MPWMD, 2019a), MPWMD staff compared historical daily streamflow between WY 1987 and WY 2008 with daily minimum streamflow requirements. This allowed MPWMD to identify how many days in each month ASR water could be diverted from the Carmel River. Using a daily diversion rate of 20 AF per day, MPWMD estimated the volume of Carmel River water that could be injected into the ASR system each month. The analysis has been updated as part of this study and extended to include Carmel River streamflow data through WY 2021 and used to develop a revised projected monthly Carmel River diversion schedule for the baseline model. The Carmel River water available for injection was divided between the ASR 1&2 Well Site and the ASR 3&4 Well Site according to the historic division of injection. The projected annual ASR injection and Cal Am Table 13 diversions are shown below on Figure 3. The projected period starts off in the midst of multi-year drought[2], such that there are almost no diversions in the first four projected water years, followed by a period that includes multiple years of Above Normal and Extremely Wet conditions which allow for very high amounts of diversion. Table 1 lists the average number of

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[1] In the Seaside model, the Muni #4 is represented as being screened in both the Paso Robles and the Santa Margarita formations, although there is some uncertainty as to whether Seaside Muni #4 is in fact screened in both aquifers or only one of them (J. Lear, personal communication., Sept, 2021).

[2] Corresponding to the historical 1987-1991 drought

projected annual diversion days, total ASR diversions, and Table 13 diversions for each Carmel River water year type, based on the analysis of historical daily stream flows from WY 1987 – 2021. The allowable diversion for ASR injection can easily drop by half even in just going from a Normal water year to a Below Normal water year.

Note that the approach of tying the ASR injection volumes directly to the cycled hydrology period differs from the previous 2013 replenishment modeling where a constant average annual ASR injection volume of 1,445 AFY, characteristic of Normal water year conditions was assumed.

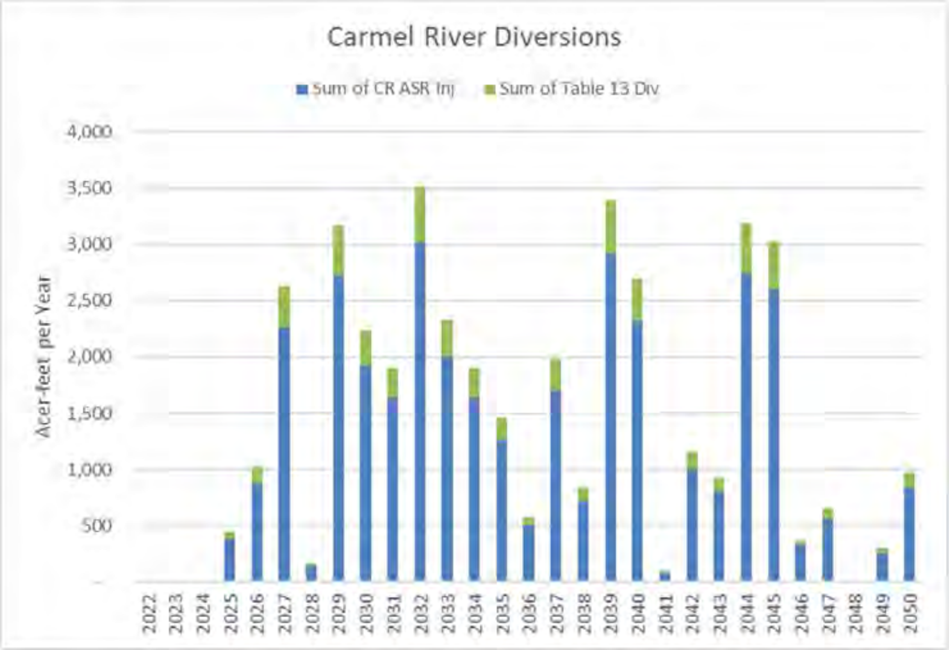

Figure 3. Projected annual Carmel River diversion for ASR injection and Cal-Am Table 13 Diversions (CR = Carmel River)

Table 2. Average Annual Carmel River Diversions by Water Year Type

Carmel River Water Year Type	Average Number Diversion Days	Average ASR Diversions (AFY)	Average Table 13 Diversions (AFY)	Average Total Diversions (AFY)
Extremely Wet	142	2,847	463	3,309
Wet	125	2,500	406	2,906
Above Normal	105	2,108	343	2,451
Normal	64	1,274	207	1,481
Below Normal	33	655	106	761
Dry	19	380	62	442
Critically Dry	3	51	8	60

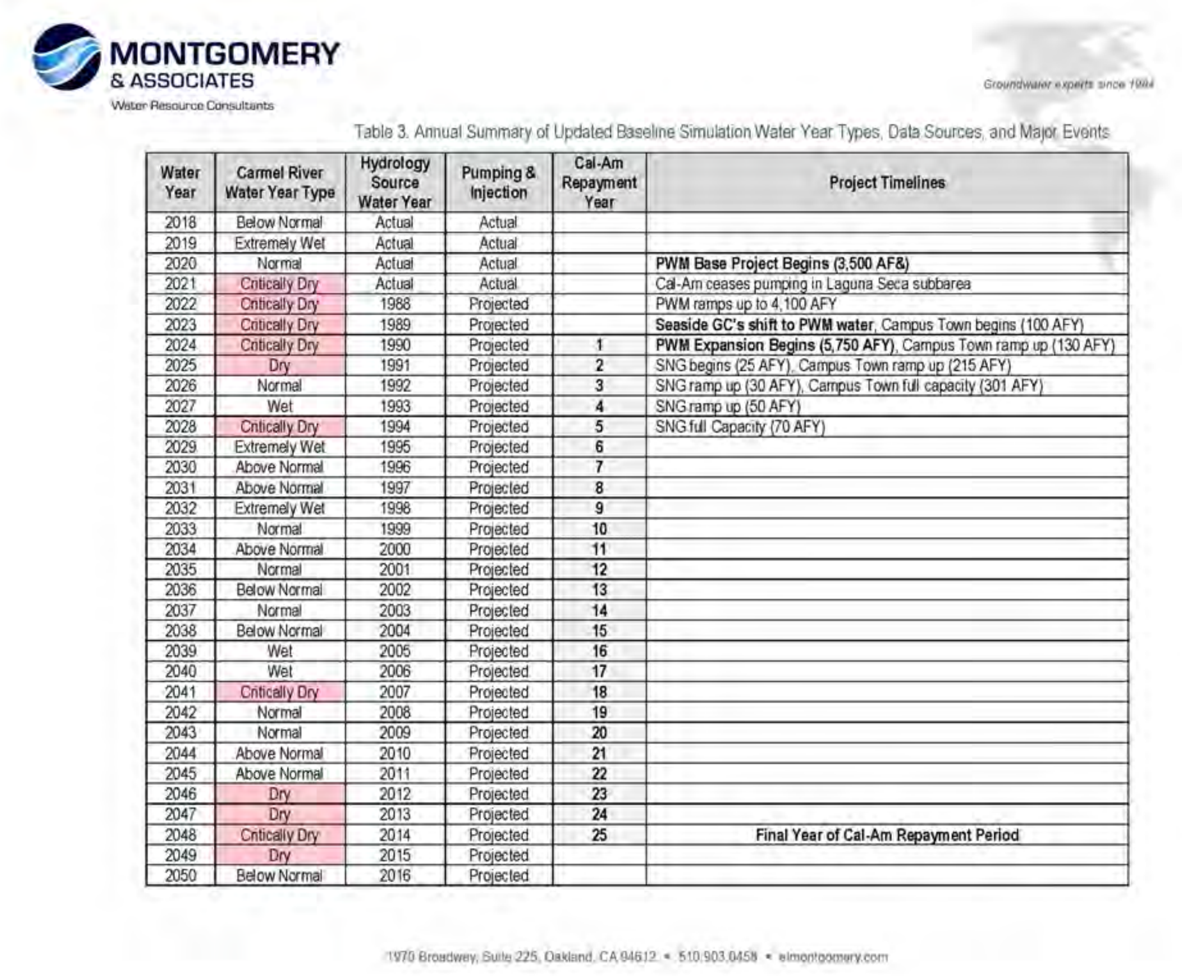

Table 3. Annual Summary of Updated Baseline Simulation Water Year Types, Data Sources, and Major Events

Water Year	Carmel River Water Year Type	Hydrology Source Water Year	Pumping & Injection	Cal-Am Repayment Year	Project Timelines
2018	Below Normal	Actual	Actual		
2019	Extremely Wet	Actual	Actual		
2020	Normal	Actual	Actual		**PWM Base Project Begins (3,500 AF&)**
2021	Critically Dry	Actual	Actual		Cal-Am ceases pumping in Laguna Seca subbarea
2022	Critically Dry	1988	Projected		PWM ramps up to 4,100 AFY
2023	Critically Dry	1989	Projected		**Seaside GC's shift to PWM water**, Campus Town begins (100 AFY)
2024	Critically Dry	1990	Projected	**1**	**PWM Expansion Begins (5,750 AFY)**, Campus Town ramp up (130 AFY)
2025	Dry	1991	Projected	**2**	SNG begins (25 AFY), Campus Town ramp up (215 AFY)
2026	Normal	1992	Projected	**3**	SNG ramp up (30 AFY), Campus Town full capacity (301 AFY)
2027	Wet	1993	Projected	**4**	SNG ramp up (50 AFY)
2028	Critically Dry	1994	Projected	**5**	SNG full Capacity (70 AFY)
2029	Extremely Wet	1995	Projected	**6**	
2030	Above Normal	1996	Projected	**7**	
2031	Above Normal	1997	Projected	**8**	
2032	Extremely Wet	1998	Projected	**9**	
2033	Normal	1999	Projected	**10**	
2034	Above Normal	2000	Projected	**11**	
2035	Normal	2001	Projected	**12**	
2036	Below Normal	2002	Projected	**13**	
2037	Normal	2003	Projected	**14**	
2038	Below Normal	2004	Projected	**15**	
2039	Wet	2005	Projected	**16**	
2040	Wet	2006	Projected	**17**	
2041	Critically Dry	2007	Projected	**18**	
2042	Normal	2008	Projected	**19**	
2043	Normal	2009	Projected	**20**	
2044	Above Normal	2010	Projected	**21**	
2045	Above Normal	2011	Projected	**22**	
2046	Dry	2012	Projected	**23**	
2047	Dry	2013	Projected	**24**	
2048	Critically Dry	2014	Projected	**25**	**Final Year of Cal-Am Repayment Period**
2049	Dry	2015	Projected		
2050	Below Normal	2016	Projected		

Pure Water Monterey Project Recharge Assumptions

Pure Water Monterey Base Project WY 2020-2023

The Pure Water Monterey (PWM) project is a groundwater replenishment reuse water supply project (GRRP) that became operational in March 2020. It injects and stores purified recycled water in the Seaside basin temporarily for use as source of municipal water supply. Once injected into the Seaside Groundwater Basin, the purified water mixes with native groundwater in the aquifers and is stored for future extraction and use. PWM currently provides 3,500 AFY of supply for Cal-Am to deliver to its customers in the Monterey Service district, allowing Cal-Am to reduce its diversions from the Carmel River system by that same amount.

The PWM Project also includes a drought reserve component to support the use of recycled water supply for agricultural irrigation during dry years. The project provides an additional 200 AFY of purified water that will be injected in the Seaside Basin in wet and normal years for up to 5 consecutive years. This will result in a "banked" drought reserve totaling up to 1,000 AF. During dry years, the project will inject less than 3,500 AF of water in the Basin; however, Cal-Am will be able to extract the banked water to make up the difference to its supplies. Recycled water that would have otherwise been purified and injected during these dry years when the drought reserve is in use is sent to augment the Castroville Seawater Intrusion Project's (CSIP) agricultural irrigation supply in the Salinas Valley. The drought reserve component is not currently active but is assumed in the model to start in WY 2024 when the Expansion Project is projected to come online.

PWM purified water is recharged through 4 deep injection wells (DIW) screened in the Santa Margarita Formation (deep aquifer), and 2 vadose zone wells (VZW) screened in the Aromas Sands that recharge the Paso Robles Formation (shallow aquifer). PWM water from back-flushing of the DIW wells as part of weekly maintenance operations is discharged to percolation ponds also recharging the shallow aquifer. In the model, recharge to the shallow aquifer from the VZW wells and the percolation pond is simulated by applying it as additional deep percolation at the water table beneath the recharge locations.

The PWM base project is simulated from WY 2020 through WY 2023. For WY 2020-2021 the simulation uses the actual monthly recharge volumes to the 2 currently operational recharge wells, DIW-1 and DIW-2 and VZW-1 and VZW-2, and to the percolation pond used for discharging backflush water. It should be noted that as originally planned, 70 percent of the recharged water (~2,450 AFY) would recharge the Santa Margarita formation and 30 percent (~1,050 AFY) would recharge the Paso Robles formation, however, once injection operations began in spring of 2020, it was found that the VZW wells had a much lower capacity than originally planned for, and so the recharge distribution is currently closer to 95% to the Santa

Margarita aquifer and only 5% to the Paso Robles aquifer. The updated model takes this new distribution into account.

For WY 2022 – 2023, the model uses projected recharge rates developed for recent modeling of the PWM project included in the recently submitted Addendum to the PWM Title 22 Engineering Report (M&A, 2021). This period includes a planned ramp up from an annual recharge rate of 3,500 AFY to include an additional 600 AFY of recharge for total of 4,100 acre-feet per year. The period also includes bringing online the 2 additional non-expansion injection wells, DIW-3 and DIW-4. The actual and projected injection rates to the DIW wells and to the VZW wells backflush percolation ponds are shown below on Figure 4. Recharge at the VZW wells is assumed to remain at the same monthly rates as in WY 2021. Additional backflush water for each additional DIW well is also added to percolation pond recharge volumes in the simulation.

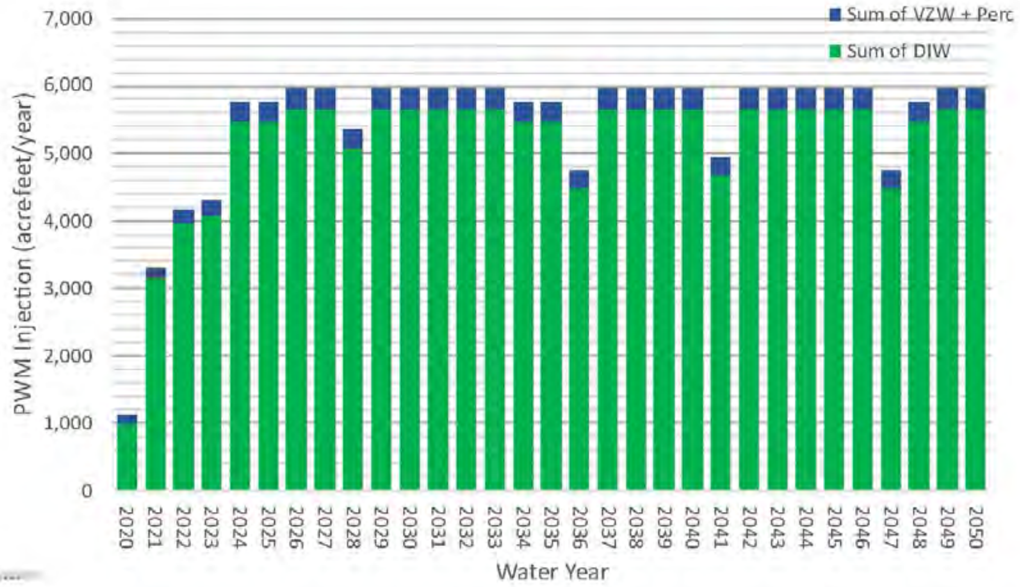

Figure 4. Actual and Projected Annual PWM Recharge to the Deep Aquifer (DIW wells) and the Shallow Aquifer (VZW & Percolation Ponds)

Pure Water Monterey Expansion Project (WY 2024-2050)

The proposed PWM Expansion project is assumed to come online in WY 2024 and includes an expanded capacity of the advanced water purification facility and an increase of recharge to the Seaside Basin by an additional 2,250 AFY for a total average yield of 5,750 AFY. Up to 3 additional deep injection wells and an additional backflush basin are proposed.

For Cal-Am to extract additional groundwater injected, deliver it to meet its system demands at all times, and also provide system redundancy, 4 new extraction wells and associated infrastructure would be constructed; including 2 new extraction wells located at Seaside Middle School (EW-1 and EW-2), and 2 new extraction wells located off General Jim Moore Boulevard (EW-3 and EW-4). The location of these additional wells and pond are shown on Figure 5.

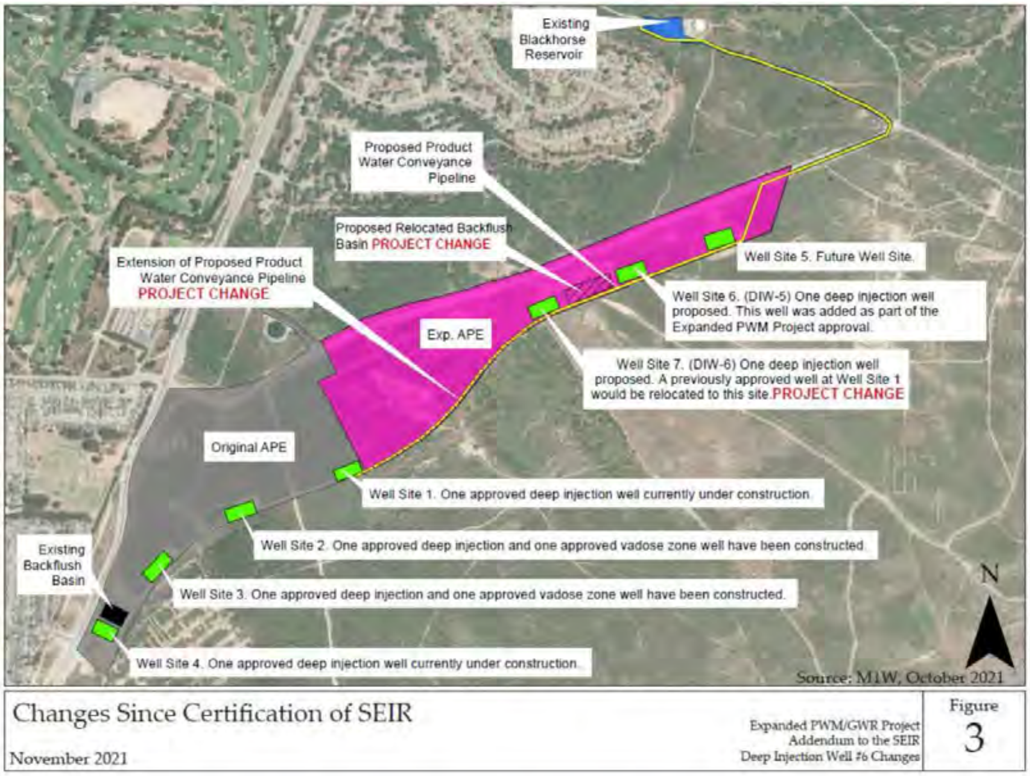

Figure 5. Pure Water Monterey Expansion Injection Facilities (source: M1W, 2021)

PWM recharges variable volumes of water each year, with an average of 5,750 AF recharged per year. The amount of water recharged annually depends on whether the projected hydrology is in a drought or non-drought year, and on the rules for banking and delivering water to the Castroville Seawater Intrusion Project (CSIP) for irrigation use in the Salinas Valley. The drought year classification is based on percent deviation from long term average total annual precipitation data in the CSIP area. A monthly recharge schedule that includes an accounting and description of the CSIP banking and delivery program is shown in Table 7at the end of this technical memorandum. The recharge schedule and the water year classification are updated and extended to align with the new baseline model hydrology period, and so for this reason, it differs from the delivery schedule used for the PWM Expansion SEIR modeling. Locations of the planned wells have also been changed since the 2019 SEIR modeling (see latest Addendum to PWMM Expansion SEIR), so the expansion DIW well locations in the baseline model were updated to align with the latest planned locations. Injection well DIW-7 is assumed to not be constructed. Additionally, it was found during the 2019 PWM Expansion SEIR modeling, that injected water was being lost out to the neighboring Monterey subbasin, and M1W is planning on allocating less injection volumes to the northernmost DIW wells to try to minimize how much injected water is lost out of the basin. Because this could impact the evaluation of the protective elevations, this revised plan is incorporated in the updated baseline model by adjusting the percentage of recharge water that each well receives according to a preliminary estimate. The recharge at the VZW wells was kept at WY 2021 rates. Of the total recharge water injected, 98.5% is injected into the Santa Margarita aquifer through the deep injection wells, and the remaining 1.5% is injected into the Paso Robles aquifer through the vadose zone wells[3]. Monthly recharge via backflush basin was also simulated based on estimated backflush rates reported in the recent addendum to the PWM Expansion Project SEIR (M1W, 2021).

The assumed PWM Expansion Project Scenario allocation of recharge between different well sites is shown below in Table 4, and the annual injection volumes for the WY 2024-2050 period are shown on Figure 4. Significant reductions in recharge of up to 1,000 AFY occur during drought years when recycled water is delivered to CSIP (e.g., WY 2027, 2036, 2042 and 2047).

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[3] Note that this differs substantially from the assumptions used in the PWM Expansion SEIR modeling, where the split was 90% (~5,1750 AFY) Santa Margarita and 10% Paso Robles (~575 AFY).

Table 4. Allocation of Recharge to Deep Injection Wells and Vadose Zone Wells for expanded PWM Expansion Project Period

Percent of Total Recharge	Deep Injection Wells						Vadose Zone Wells	
	98.5%						1.5%	
Well Site	DIW-1	DIW-2	DIW-3	DIW-4	DIW-5	DIW-6	VZW-1	VZW-2
Percent of Deep Recharge	30%	20%	20%	5%	10%	15%	-	-
Percent of Vadose Zone Recharge	-	-	-	-	-	-	63%	37%
Percent of Total Recharge	29.6%	19.7%	19.7%	4.9%	9.9%	14.8%	0.9%	0.6%

Cal-Am Supply and Demand Projections

Projected Cal-Am pumping in the Seaside basin for WY 2022 – 2050 is estimated using an updated version of the supply-demand forecast spreadsheet model developed by MPWMD for the 2019 PWM Expansion SEIR modeling (MPWMD, 2019a). The demand model was updated for the revised and expanded hydrologic period, and to incorporate the Cal-Am wells supplying the water demand of the SNG project when it is completed. The demand forecast has a uniform increase in demand over time, is tied to the hydrology cycle and takes into account all of Cal-Am's water rights and allocations and demand/supply sources (Carmel River Table 13 diversion, Sand City Desal, native groundwater, ASR, and PWM) to determine the projected monthly Seaside pumping demand which is then distributed to Cal-Am extraction wells. The demand model also accounts for the reduction of Cal-Am's wellfield pumping capacity that occurs during and in the 2 months following ASR injection operations when ASR wells cannot be used for extraction, and during which extraction shifts to other wells. The demand model incorporates Cal-Am's 700 acre-feet replenishment payment and the Cease-and-Desist Order (CDO) restricting Cal-Am's diversion of Carmel River water. It is assumed that the 25-year 700 AFY replenishment begins in WY 2024 and finishes at the end of WY 2048.

Cal-Am's projected total annual water demand is assumed to start off in WY 2022 at 9,300 AF and increased linearly to 11,700 AF through the end of WY 2050. The assumed starting volume is based on the 5-year average of Cal-Am's historical demand for WY 2016 – 2020 as reported in Cal-Am's 2020 Urban Water Management Plan (WSC, 2021). The 2050 demand is based on the upper demand projection from Figure 4 of the 2019 MPWMD supply and demand memo (MPMWD, 2019b). The monthly distribution of Cal-Am's annual deliveries, provided by

MPWMD, is used to estimate future monthly demand, and are based on monthly averages of Cal-Am deliveries from 2007 to 2017. The demand model estimates that roughly two-thirds of the total Cal-Am demand can be satisfied by extraction of native groundwater, injected Carmel River water, and injected PWM water from the Seaside Basin. Extraction from the Carmel Valley, Cal-Am's Carmel River Table 13 diversion, and the Sand City Desalination plant would satisfy the remainder of the total Cal-Am demand. Monthly Seaside Basin pumping rates were set to meet monthly Cal-Am demand. The demand model prioritizes Cal-Am's native groundwater right (which drops from 1,474 AFY to 774 AFY during the repayment period), followed by PWM recovery, and then ASR recovery.

Total projected Cal-Am annual demand is shown on Figure 6, broken out by water source. It includes the very small additional 70 AFY to supply SNG. Projected total annual Cal-Am Seaside groundwater extracted is by water right on Figure 7. Most of the pumping demand is supplied by recovery of PWM water (red), while ASR recovery (green) is primarily used during drought years. Cal-Am's 25-year 700 AFY replenishment period is visible in the drop in Native groundwater right (blue) from WY 2024 to 2048.

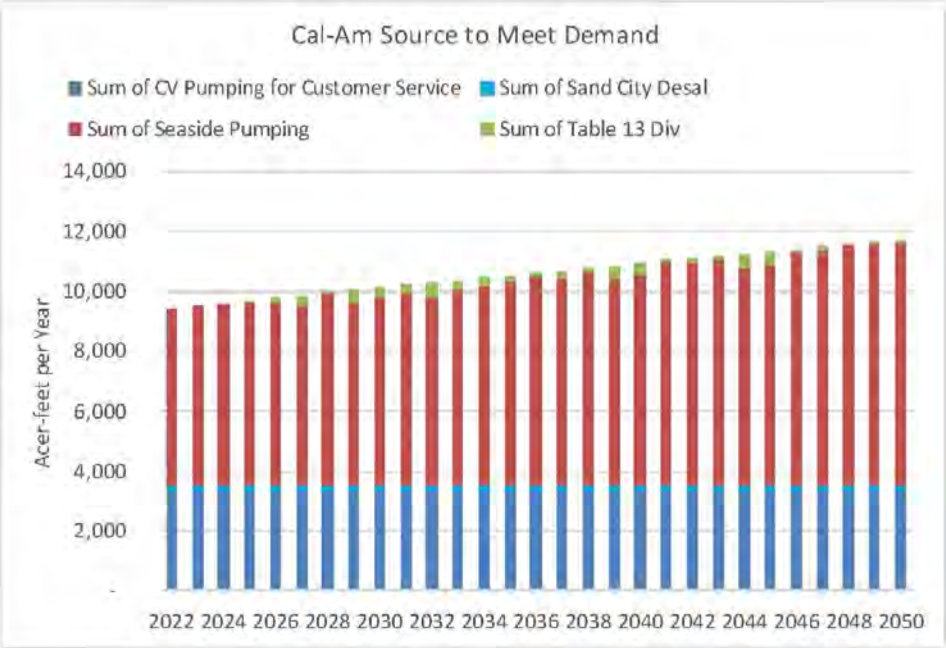

Figure 6. Total Cal-Am Annual Demand and Source to Meet Demand (CV = Carmel Valley)

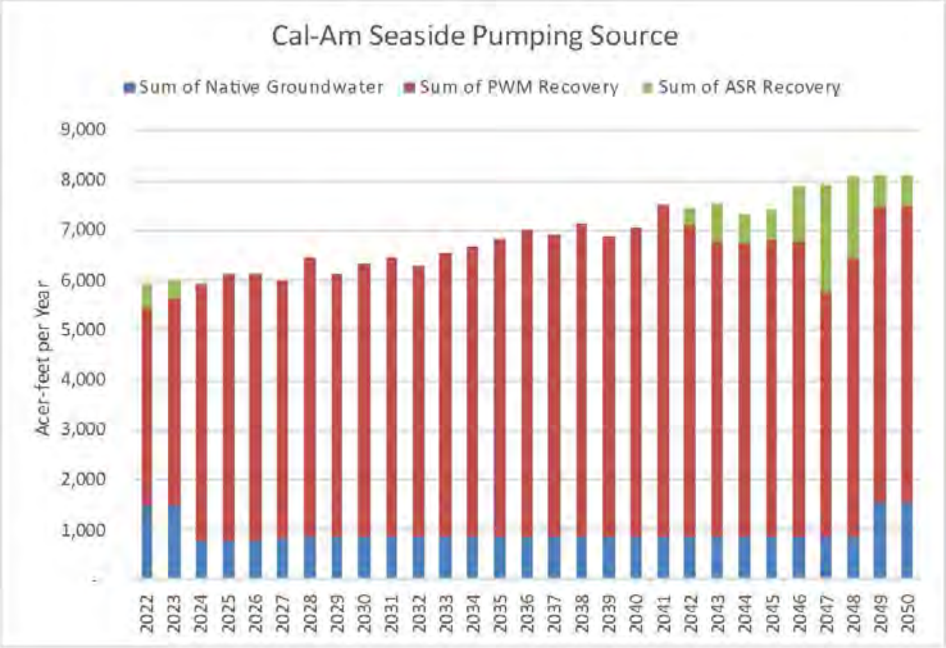

Figure 7. Projected Cal-Am Seaside Basin Pumping by Water Right

Updated Aquifer Parameters in the Vicinity of PWM Project Wells

The updated baseline model incorporates modifications made in 2019 to the model's hydrogeologic parameters in the region of the PWM project to incorporate data from aquifer tests conducted in the 2 existing deep injection wells DIW-1 and DIW-2, 4 MPMWD ASR wells, and the Paralta well. Data from those tests were used to adjust horizontal hydraulic conductivity, aquifer storativity, and aquifer thickness (M&A, 2019a). These updates are also now incorporated into the historical model.

Initial Conditions

Simulated groundwater levels for September 2017 from the historical model are used as the initial conditions for groundwater levels in the baseline model.

REPLENISHMENT SCENARIOS

In addition to the baseline scenario detailed above, which includes the 25-year Cal-Am 700 AFY in-lieu replenishment and the PWM Expansion project both starting in WY 2024, 3 additional replenishment simulations are run to evaluate the impact on achieving protective elevations:

- Additional replenishment of 500 acre-feet per year starting in WY 2024
- Additional replenishment of 100 acre-feet per year starting in WY 2024
- Additional replenishment of 1,500 acre-feet per year starting in WY 2024

For the additional replenishment scenarios, the water is assumed to be injected into the Santa Margarita formation at the six PWM DIW wells. The total annual additional replenishment volume is assumed to be distributed throughout the year in the same monthly proportions as the PWM injection rates at each DIW well. The additional replenishment injections do not affect the projected recovery of PWM water by Cal-Am.

MODEL RESULTS

Model assumptions for the scenarios discussed above are integrated into the Seaside Basin groundwater flow model, and the model is run separately for each scenario. Results of the model runs are presented in the subsections below. The first subsection discusses the ability of each simulated scenario to reach protective elevations at coastal monitoring wells. The second subsection discusses changes in simulated net inflow of water to the basin from offshore aquifers.

Groundwater Levels at Coastal Monitoring Wells

The simulated groundwater elevations for each scenario are evaluated in 6 monitoring wells used for establishing protective elevations against seawater intrusion (HydroMetrics LLC, 2009). These monitoring wells are: MSC Deep, MSC Shallow, PCA-West Deep, PCA-West Shallow, Sentinel Well 3 (also referred to as SBMW-3), and CDM MW-4 (Figure 9).

Hydrographs of simulated groundwater levels at the 6 monitoring wells where protective elevations are established are shown on Figure 10 through Figure 15, along with the protective elevation adjusted for sea level rise for each well. For comparison with actual current conditions the hydrographs also show the most recent measured groundwater levels in each well from WY 2018 – 2021.

Protective elevations were established under modeled steady state conditions. Because groundwater levels rise and fall seasonally because of seasonal demand, for the purposes of comparing simulated groundwater levels to protective elevations, annually averaged groundwater levels are compared rather than the highest or lowest groundwater level within a given year.

For all 3 replenishment scenarios, and at all the protective elevation wells, except for CDM MW-4[4], the annual average groundwater levels rise steadily starting in WY 2024 (when both the PWM Expansion and the Cal-AM replenishment repayment period begin) through WY 2033. After WY 2033 mean annual groundwater levels begin to either level off and/or drop to varying degrees in response to periods of drought. During years when the Carmel River water year is classified as Below Normal, Dry, or Critically Dry, the volume of both ASR injection and Table 13 Carmel River diversion to meet Cal-Am Monterey District demand are greatly reduced, as previously shown on Figure 3. Similarly, drought conditions in the CSIP service area result in a marked reduction in injected PWM water (shown on **Error! Reference source not found.**), as source water is diverted to augment the CSIP irrigation supply and also as Cal-Am recovers credited water from the "banked" drought reserve. In all the scenarios, groundwater levels drop markedly in the last several years of the simulation period (WY 2046 – 2050) because of the impacts of a simulated multi-year drought period[5] during which both ASR and PWM injection are greatly reduced, Table 13 diversions are reduced and Cal-Am begins recovering banked ASR water credits to meet their system demand. The last 2 years of this period also coincides with the end of Cal-Am's repayment period, such that Cal-Am can exercise their full native groundwater rights during WY 2049 – 2050.

The direct correlation of decreased Carmel River diversions and PWM injection during these dry years and the sharp drops in groundwater level can be clearly seen in Figure 8 which shows the annually averaged groundwater levels in each of the wells, overlain with the total replenishment from ASR injection and PWM injection during the baseline simulation.

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[4] As has been observed in previous modeling, because of its very shallow depth, the groundwater levels at CDM MW-4 are largely insensitive to injection in the Santa Margarita formation.

[5] The WY 2046 – 2050 drought is based on the repeated hydrology of the recent 2012-2015 drought

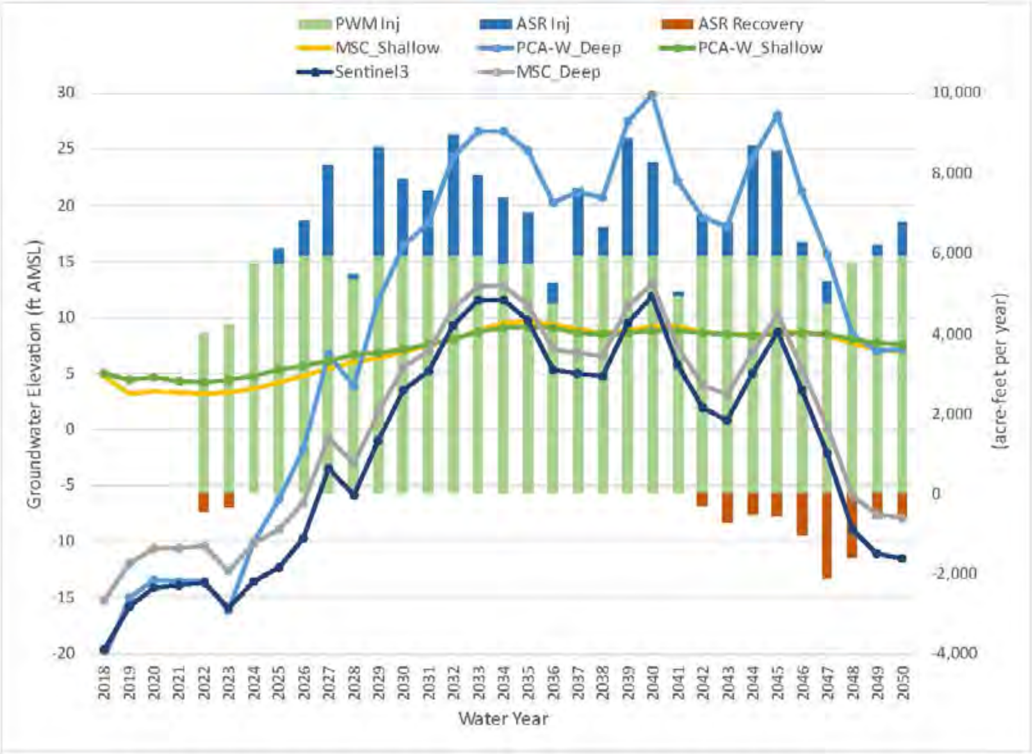

Figure 8. Annually Averaged Groundwater Elevations in Protective Elevation Wells Compared to PWM and ASR Injection and ASR Recovery (right axis) for the Baseline Simulation Scenario

Table 5 and **Error! Reference source not found.** present summary values for a range of metrics for comparing the success of different replenishment amounts in achieving protective elevations at each of the monitoring wells. The metrics are calculated for the 25-year Cal-Am repayment period from WY 2024 -2048. For each scenario the tables identify:

- during which water year the protective elevation is first reached at the well,
- the number of years it takes to reach the protective elevation,
- the number of water years during which the annually averaged groundwater level is at or above the protective elevation (within +/- 0.5 feet),
- the percentage of years during the 25-year period that the protective elevation is achieved or exceeded,

- the maximum head difference (ΔH) between the initial average groundwater level at the start of the 25-year period and the groundwater levels during the replenishment period,
- the increase in the maximum head difference for the scenario simulation ($\Delta H_{scenario}$) relative to the head difference during the baseline simulation ($\Delta H_{baseline}$), and
- the incremental change in max head difference per each additional 500 AF increase in the annual replenishment amount.

Sentinel 3 (Deep aquifer)

Groundwater levels in Sentinel 3 start off below its protective elevation but quickly rise above it in all the simulations, including the baseline. The protective elevation is reached within 7 years from the start the PWM Expansion project for the baseline simulation, and incrementally sooner with each additional increase in annual replenishment volume, to as short as within 3 years for the 1,500 AFY replenishment scenario. As described above, however, the average annual groundwater levels plateau and then start fluctuating in response to periodic drought conditions and the protective elevation is not maintained for the entire 25-year period. However, even in the baseline scenario, the protective elevation is achieved during 52% (13 years) of the 25-year period, and 88% of the time for both the 1,000 AFY and 1,500 AFY replenishment scenarios. The biggest incremental increase in groundwater levels occurs between the 500 AFY scenario and the 1,000 AFY scenario.

PCA-West (Deep) and MSC (Deep)

The groundwater level response in PCA-West (Deep) and MSC (Deep) is very similar to that of Sentinel 3, with similar ranges of average groundwater level increases of between 26 to 48 feet relative to the initial levels at start of the repayment period. However, because of the higher protective elevation designated at these wells, the protective elevation is never reached in the baseline simulation, though the protective elevation is achieved in all the replenishment scenarios, albeit less frequently than in Sentinel 3. Protective elevations in both wells are achieved within 9 years for the 500 AFY scenario but are only achieved for 8-12% of the 25-year period. Protective elevations are achieved at both wells 52-56% percent of the years during the 1,000 AFY scenario, and between 68-72% of the years for the 1,500 AFY scenario. As in the case of Sentinel 3, the biggest incremental increase in groundwater levels and in frequency of maintaining protective elevations occurs in the 1,000 AFY replenishment scenario.

PCA-West (Shallow)

The general pattern of the groundwater level response in PCA-West (Shallow) is similar to that in the deep wells, but at a lesser scale. Maximum annual average head differences are only on the order of 5-6 feet. The groundwater levels start off already above the protective elevation and remain so for the entire 25-year period, for all the simulations including the baseline.

MSC (Shallow)

MSC Shallow also follows the same general pattern as the other wells, though with slightly greater increase in groundwater levels of between 6-8.5 feet. However, because of the higher protective elevation for this well, the average annual groundwater level never reaches the protective elevation for either the baseline or the 500 AFY scenario. During the 1,000 AFY scenario, the protective elevations are achieved in WY 2035 after 11 years of replenishment, but the protective elevation is only maintained for the that 1 year. With the 1,500 AFY scenario, the protective elevation is reached within 10 years and is achieved for 5 of the 25 years (20% of the simulation).

CDM MW-4 (Shallow Aquifer)

The groundwater level response in CDM MW-4 is very different from all the other wells. As described in previous modeling studies the sharp spikes in groundwater level in the well are responses to shallow recharge events at the land surface, and because of its very shallow depth the groundwater levels are insensitive to changes in replenishment in the Santa Margarita aquifer. The groundwater levels in the well also appear to be heavily influenced by sea level rise, as the base groundwater level follows the sea level rise trend visible in the adjusted protective elevation curve. Although the simulated groundwater levels at CDM MW-4 are slightly below the protective elevation, comparison with measured groundwater levels in the well indicates that the model generally underpredicting the groundwater levels at the well by about a foot, and that the simulated groundwater levels in the well should actually be at or above the protective elevation for the entire 25-year period.

Table 5. Summary of Results for Deep Aquifer Wells

Sentinel 3 (Deep)							
Scenario	1st Year Protective Elevation Reached	# Years to Reach Protective Elevation	# Years ≥ Protective Elevation	% Years Reached	max ΔH (ft)	$\Delta H_{scenario} - \Delta H_{baseline}$	ΔH (ft) per 500 AFY Increase
Baseline	2031	7	13	52%	28	-	-
1) 500 AFY	2030	6	18	72%	33	5	5
2) 1,000 AFY	2029	5	22	88%	42	14	9
3) 1,500 AFY	2027	3	22	88%	46	18	4
4) 1,500 AFY + Q	2027	3	21	84%	44	16	-2
PCA-W (Deep)							
Scenario	1st Year Protective Elevation Reached	# Years to Reach Protective Elevation	# Years ≥ Protective Elevation	% Years Reached	max ΔH (ft)	$\Delta H_{scenario} - \Delta H_{baseline}$	ΔH (ft) per 500 AFY Increase
Baseline	not reached	-	0	0%	30	-	
1) 500 AFY	2033	9	3	12%	35.3	6	6
2) 1,000 AFY	2031	7	14	56%	44.4	15	9.1
3) 1,500 AFY	2030	6	18	72%	48	18	4
4) 1,500 AFY + Q	2031	7	16	64%	46	16	-2
MSC (Deep)							
Scenario	1st Year Protective Elevation Reached	# Years to Reach Protective Elevation	# Years ≥ Protective Elevation	% Years Reached	max ΔH (ft)	$\Delta H_{scenario} - \Delta H_{baseline}$	ΔH (ft) per 500 AFY Increase
Baseline	not reached	-	0	0%	26	-	
1) 500 AFY	2033	9	2	8%	30	5	5
2) 1,000 AFY	2032	8	13	52%	38	13	8
3) 1,500 AFY	2030	6	17	68%	41	16	3
4) 1,500 AFY + Q	2031	7	16	64%	40	14	-2

Table 6. Summary of Results for Shallow Aquifer Wells

PCA-W (Shallow)

Scenario	1st Year Protective Elevation Reached	# Years to Reach Protective Elevation	# Years ≥ Protective Elevation	% Years Reached	max ΔH (ft)	$\Delta H_{scenario}$ - $\Delta H_{baseline}$	ΔH (ft) per 500 AFY Increase
Baseline	already reached	0	25	100%	4.8	-	-
1) 500 AFY	already reached	0	25	100%	5.2	0.4	0.4
2) 1,000 AFY	already reached	0	25	100%	5.8	1.0	0.6
3) 1,500 AFY	already reached	0	25	100%	6.0	1.2	0.2
4) 1,500 AFY + Q	already reached	0	25	100%	6.3	1.5	0.3

MSC (Shallow)

Scenario	1st Year Protective Elevation Reached	# Years to Reach Protective Elevation	# Years ≥ Protective Elevation	% Years Reached	max ΔH (ft)	$\Delta H_{scenario}$ - $\Delta H_{baseline}$	ΔH (ft) per 500 AFY Increase
Baseline	not reached	-	0	0%	6.3	-	-
1) 500 AFY	not reached	-	0	0%	7.1	0.8	0.8
2) 1,000 AFY	2035	11	1	4%	8.0	1.7	0.9
3) 1,500 AFY	2034	10	5	20%	8.5	2.2	0.5
4) 1,500 AFY + Q	2033	9	10	40%	8.7	2.4	0.2

CDM MW-4 (Shallow)

Scenario	1st Year Protective Elevation Reached	# Years to Reach Protective Elevation	# Years ≥ Protective Elevation	% Years Reached	max ΔH (ft)	$\Delta H_{scenario}$ - $\Delta H_{baseline}$	ΔH (ft) per 500 AFY Increase
Baseline	already reached	0	25	100%	2.4	-	
1) 500 AFY	already reached	0	25	100%	2.4	0.0	0.0
2) 1,000 AFY	already reached	0	25	100%	2.4	0.0	0.0
3) 1,500 AFY	already reached	0	25	100%	2.4	0.0	0.0
4) 1,500 AFY + Q	already reached	0	25	100%	2.5	0.1	0.1

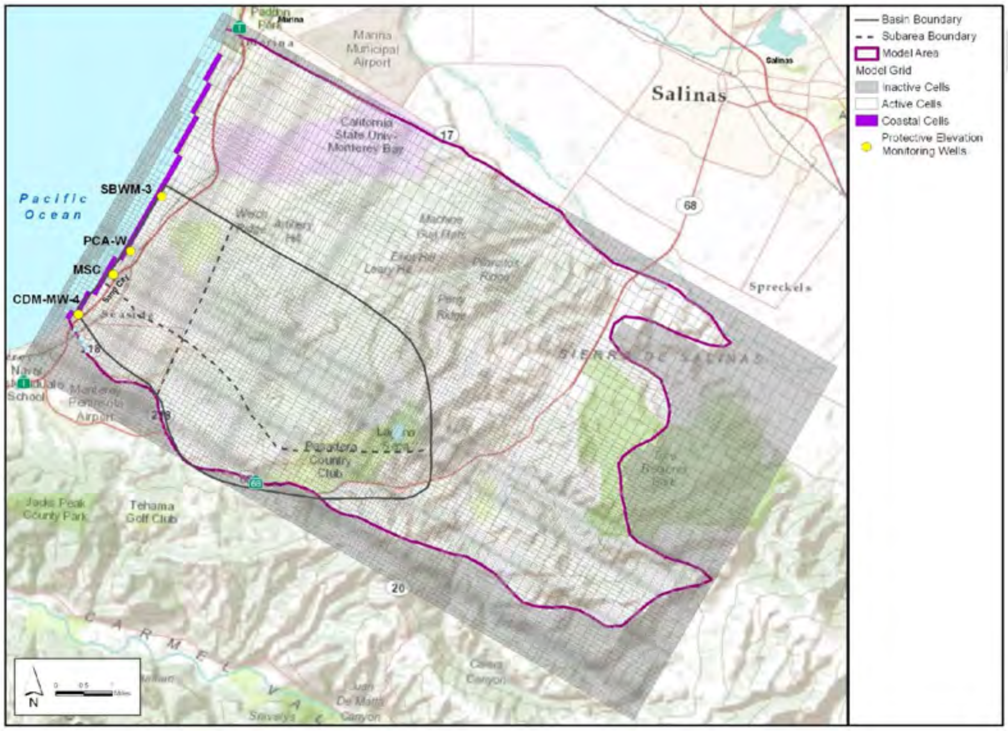

Figure 9. Location of Protective Elevation Monitoring Wells

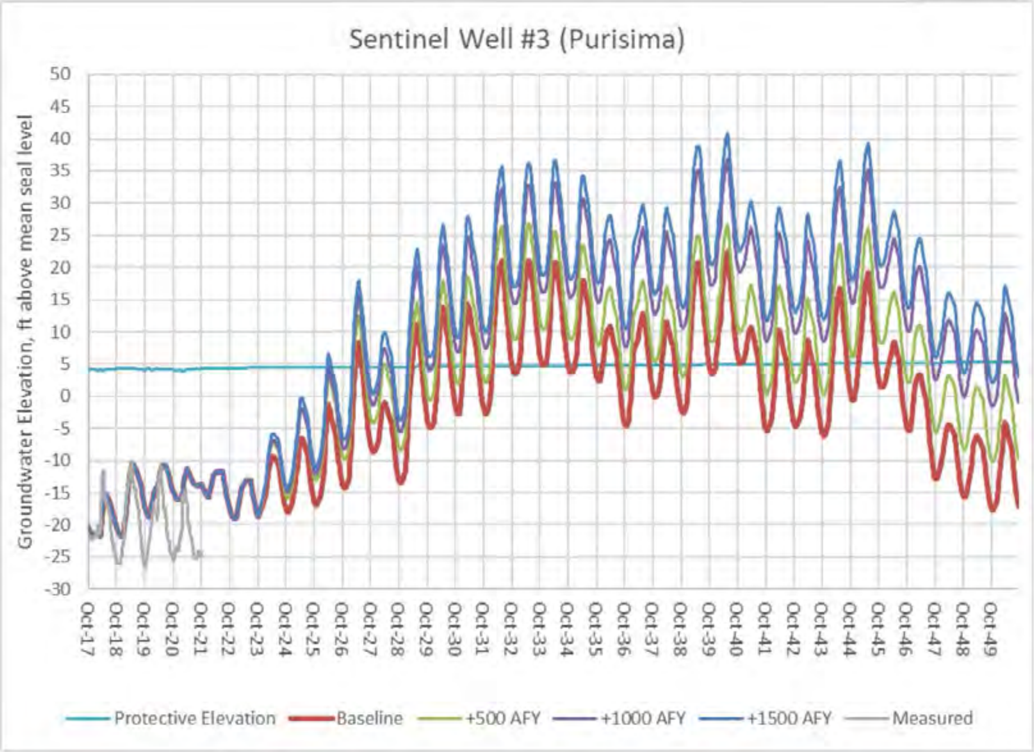

Figure 10. Simulated Groundwater Elevations and Protective Elevation at Sentinel Well #3

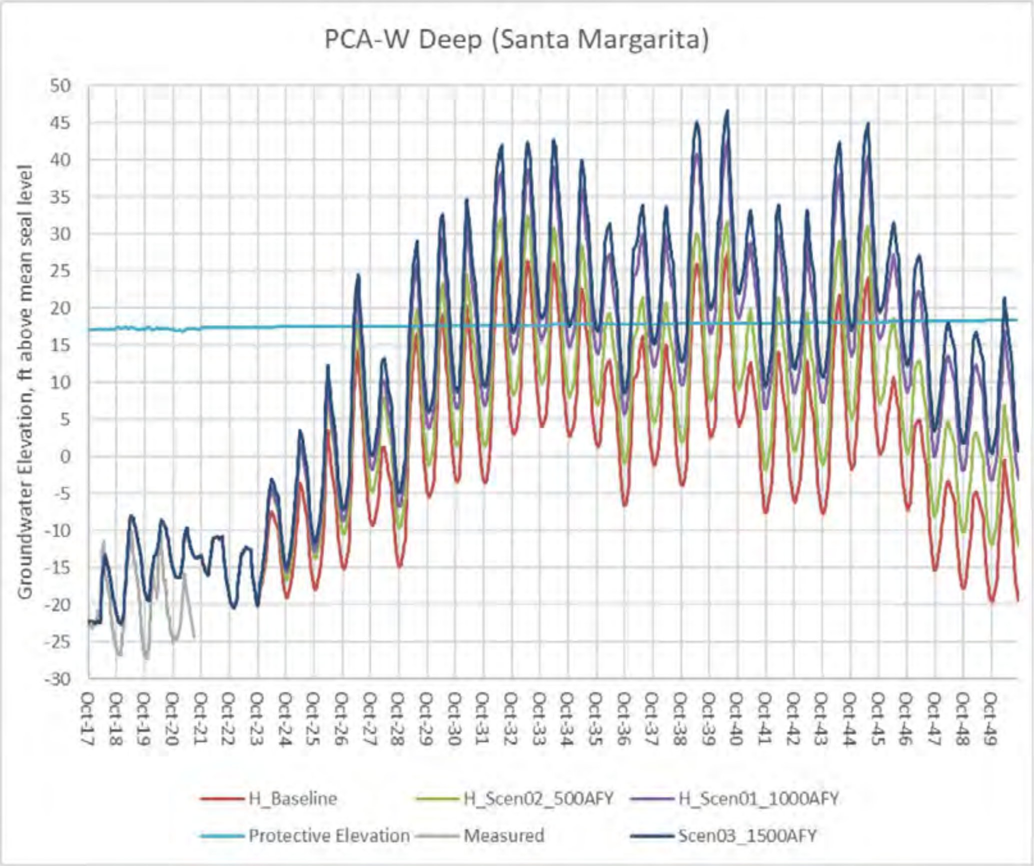

Figure 11. Simulated Groundwater Elevations and Protective Elevation at PCA-West Deep

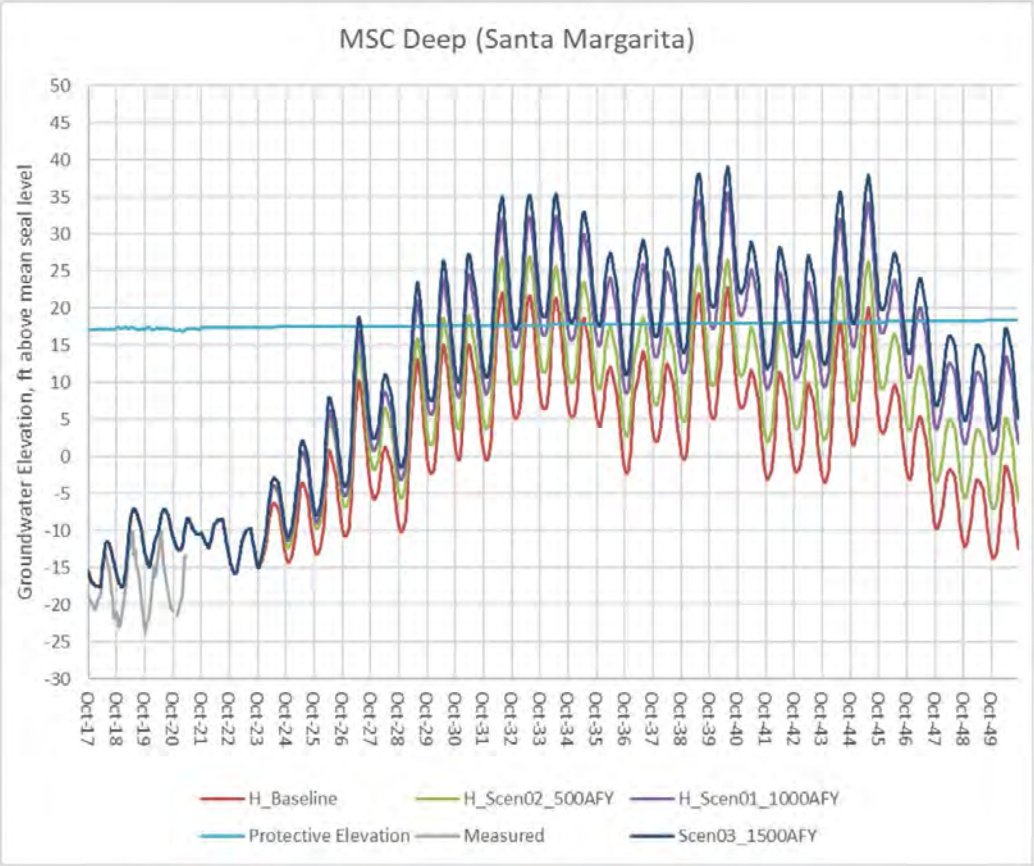

Figure 12. Simulated Groundwater Elevations and Protective Elevation at MSC Deep

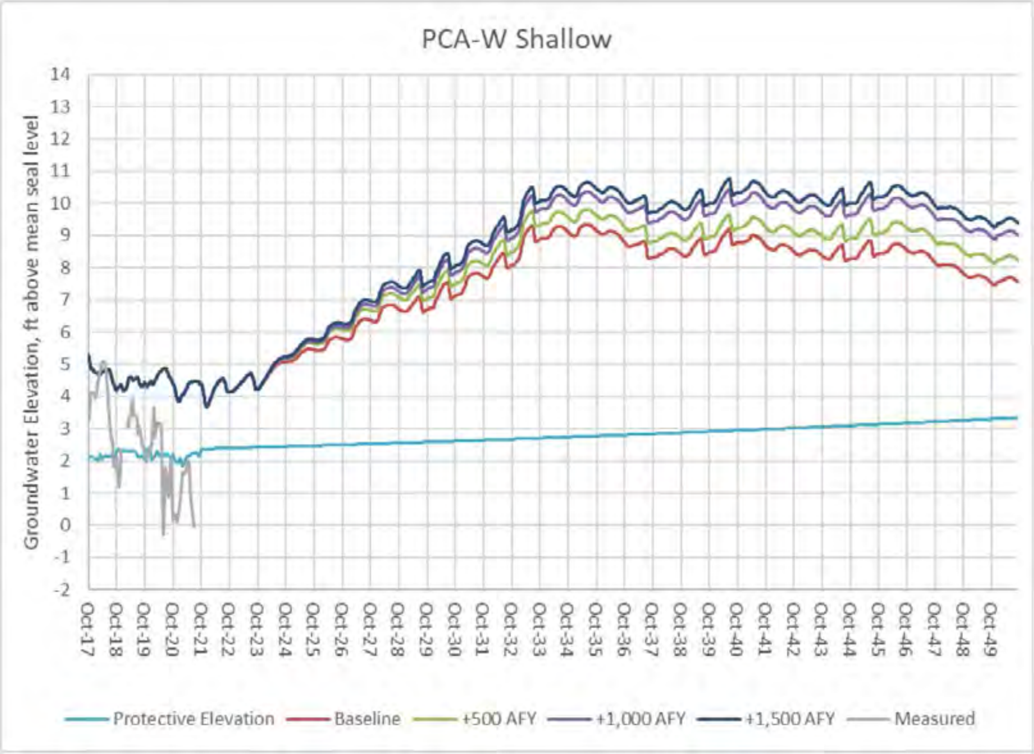

Figure 13. Simulated Groundwater Elevations and Protective Elevation at PCA-West Shallow

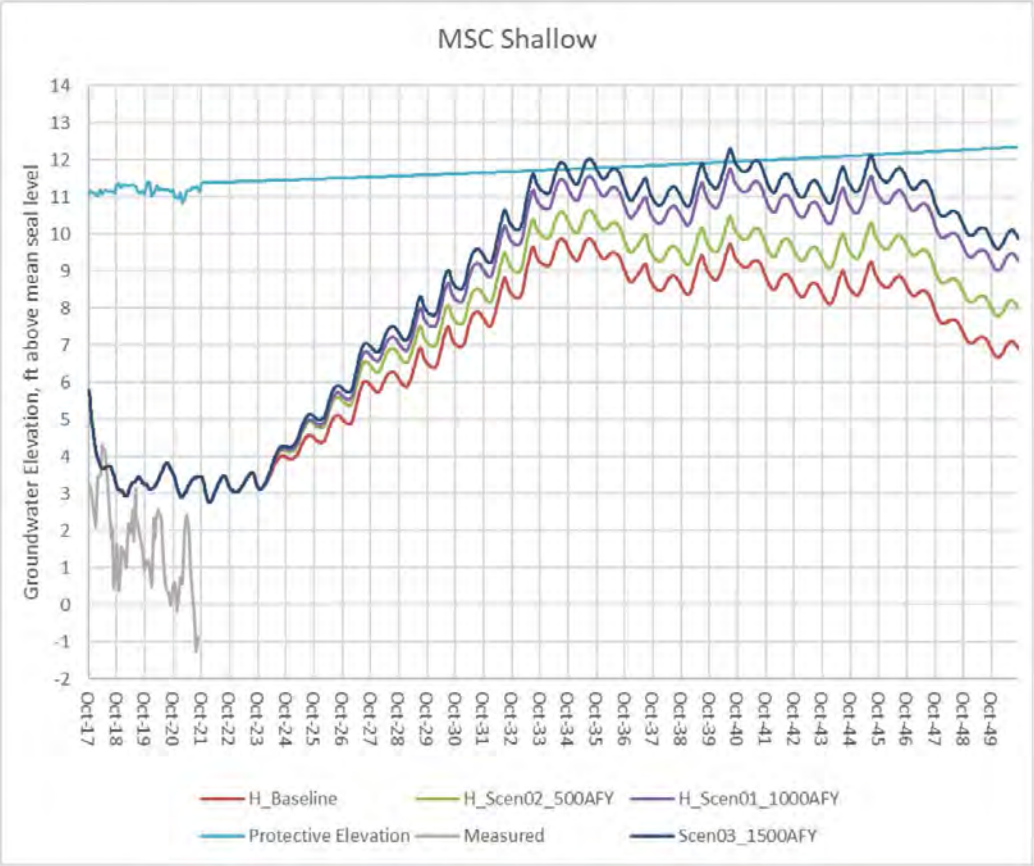

Figure 14. Simulated Groundwater Elevations and Protective Elevation at MSC Shallow

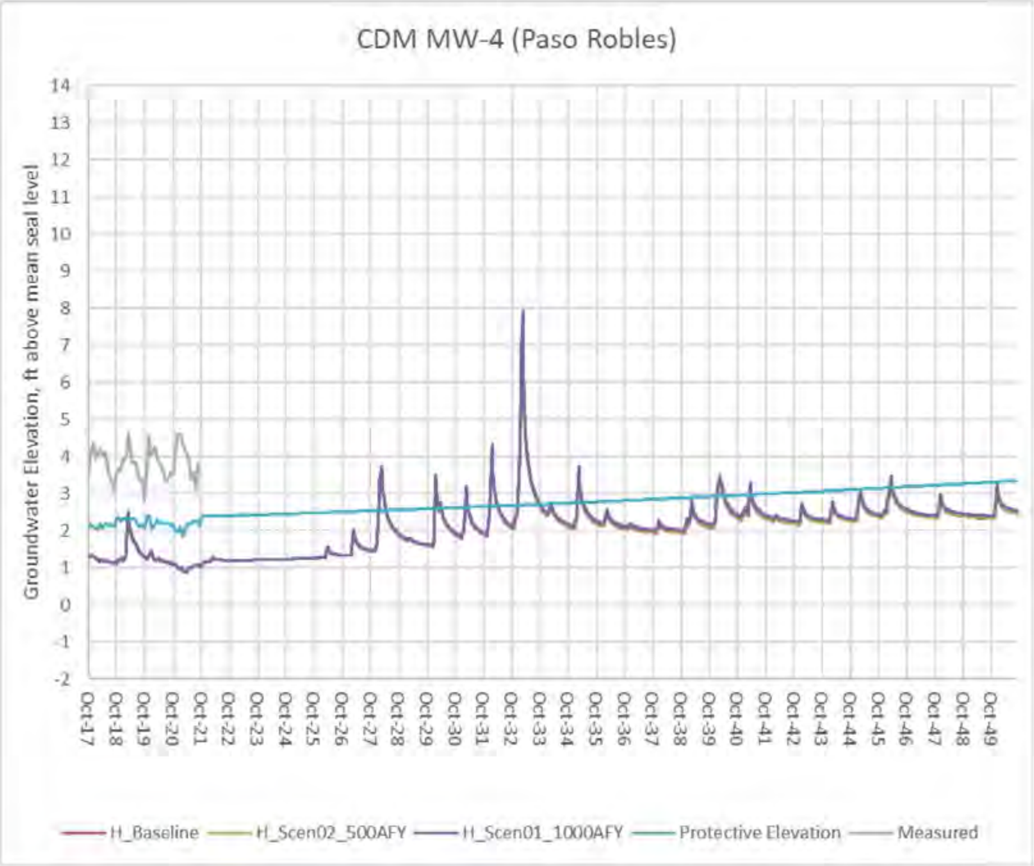

Figure 15. Simulated Groundwater Elevations and Protective Elevation at CDM MW-4

Change in Net Inflow to the Basin from Offshore Area

In addition to evaluating how the replenishment scenarios succeed in raising groundwater levels to protective elevations, a water budget analysis of the model results in Figure 16 shows the net annual inflow of groundwater into the Seaside Basin from the offshore portions of the aquifer for the scenario of 1,000 AFY replenishment (Scenario 2). Positive values represent net inflow of groundwater moving from offshore across the coastline into the basin. Negative values represent net outflow of water from the onshore aquifers into the offshore region. The blue line represents the net inflow into the Northern Coastal subarea of the basin, and it shows that prior to the start of the replenishment and repayment period in WY2024 there is a net inflow of water to the basin along the coastal boundary associated with the multi-year drought period. While not necessarily implying seawater intrusion, this represents conditions that would increase the potential for sea water intrusion. Shortly after the start of the replenishment projects as groundwater levels in the basin begin to rise, simulated flows change to reflect a net outflow of groundwater from the basin towards the offshore aquifers. Offshore groundwater flow minimizes the potential for seawater intrusion. The orange line represents the Southern Coastal subarea, which as would be expected appears to be largely insensitive to the replenishment projects. This analysis suggests that even if protective elevations are not maintained 100% of the time because of periods of drought, the basin would still maintain a net outflow to the ocean during the 1,000 AFY replenishment scenario.

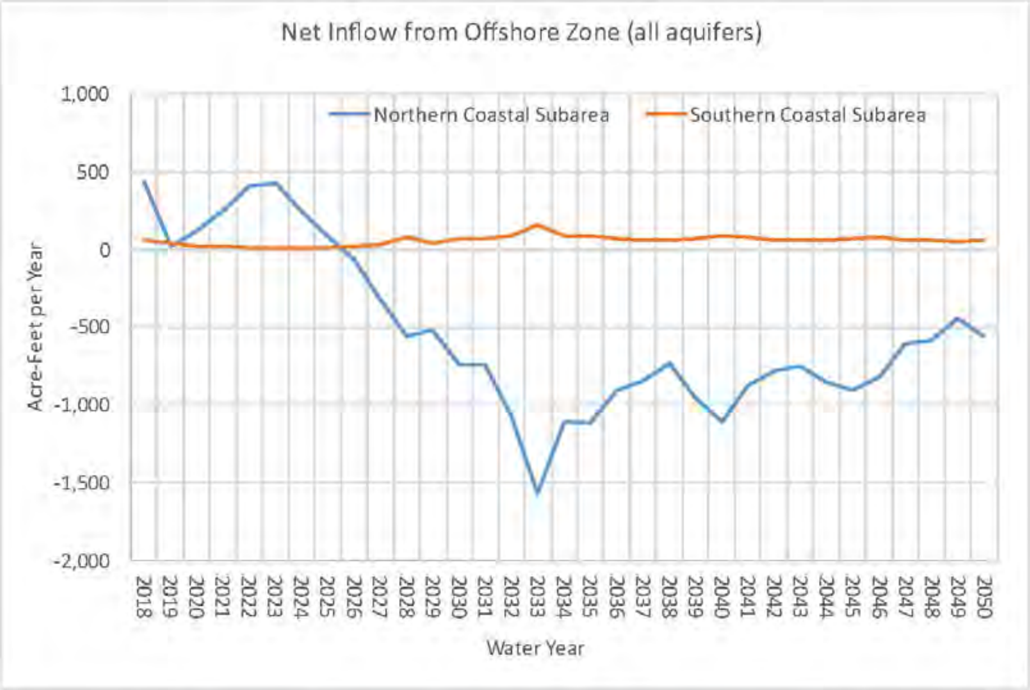

Figure 16. Net Groundwater Inflow to the Seaside Basin from Offshore Aquifers for Scenario 2 (1,000 AFY of Additional Replenishment)

Conclusions

1. Under the 1,000 AFY replenishment scenario, protective groundwater elevations are reached, at least initially, in all protective elevation wells within 11 years. Average annual groundwater levels remain above protective elevations for over 50 percent of the water years during the 25-year replenishment period, except at MSC Shallow, at which the protective elevation is reached only once, in WY 2035. After this year, groundwater levels stop increasing and slowly decline.

2. Even with increasing replenishment to 1,500 AFY, there is only a slight improvement at MSC Shallow, with 5 out of 25 years reaching the protective elevation, and only marginal increases in protective elevation metrics at the other protective elevation wells.

3. Water budget analysis of the net inflow of water from offshore areas into the basin indicates that the 1,000 AFY scenario reverse the flow from a net inflow of water from offshore to a net outflow of water to the offshore regions, even with periods of time when protective elevations are not being met at all the wells.

4. Because both the other shallow aquifer protective elevation monitoring wells, PCA-W Shallow and CDM MW-4), start off already meeting protective elevations, this suggests that there is limited benefit in trying to continue to raise the groundwater levels at MSC Shallow by increasing injection in the deeper Santa Margarita formation. Rather, other alternatives could be considered and evaluated such as redistributing pumping from wells screened completely or partially in the Paso Robles, increased use of recycled water for irrigation purposes, such as at Mission Memorial, and simulating additional recharge directly to the Paso Robles aquifer.

5. The original 2013 replenishment modeling did not explicitly account for impacts of a drought on the availability of Carmel River water for ASR injection and other Cal-Am use. Instead, it used a constant average injection and recovery rate each year rather having it fluctuate with hydrologic cycles. The results of the updated model simulations illustrate the significant impact these multi-year droughts can have on the availability of replenishment water, both in terms of Carmel River water for ASR injection, but also reductions in PWM injection to provide water for CSIP. The 2009 modeling that established the protective elevations was based on a steady state assumption, and it is not evident for how long a period groundwater levels can stay below protective elevations intermittently without greatly increasing the risk of sea water intrusion.

6. In addition to the constant 1,000 AFY replenishment, additional "booster" injections could be considered following protracted drought periods to make up the lost water.

7. Results of the current model simulations show that groundwater levels will rise quickly in response to additional replenishment during periods of Normal and Above Normal water years, such as occur at the start of the simulated replenishment period. This suggests that groundwater levels would again rise after the drought periods, such as the one that occurs at the end of the simulation period. However, as the model simulation ends before Normal or Above Normal water years occur again it is unclear what impact there would be after Cal-Am's 25-year repayment period ends. It is also not clear what the impact of future climate change might be in terms of increased frequency and duration of drought events. Additional modeling of projected future climate scenarios could be used to evaluate this.

REFERENCES

California Natural Resources Agency, Ocean Protection Council (OPC), 2018. State of California Sea-Level Rise Guidance, 2018 Update, 2018, 84 p.

HydroMetrics Water Resources, LLC. 2009. Seaside Groundwater Basin Modeling and Protective Groundwater Elevations, report prepared for Seaside Basin Watermaster, November, 151 p.

HydroMetrics Water Resources, Inc., 2013. Technical Memorandum, Groundwater Modeling Results of Replenishment Repayment in the Seaside Basin, April.

Monterey One Water (M1W), 2021. Addendum to the Expanded Pure Water Monterey/Groundwater Replenishment Project Supplemental Environmental Impact Report; State Clearinghouse No. 2013051094, For the Deep Injection Well #6 Changes., November 2021.

Monterey Peninsula Water Management District (MPWMD) & Monterey One Water, 2019a. Final Technical Memorandum: Expanded Pure Water Monterey Project Supplemental Environmental Impact Report Project Description for Potable Extraction Wells. August 12, 2019.

Monterey Peninsula Water Management District (MPWMD), 2019b. Supply and Demand for Water on the Monterey Peninsula, September.

Montgomery & Associates, Inc., 2019a. Technical Memorandum, Pure Water Monterey Project Wellfield Design Modeling Results with Updated Local Santa Margarita Aquifer Properties and 70/30 Deep/Shallow Recharge Split, March.

Montgomery & Associates, Inc., 2019b. Technical Memorandum, Expanded PWM/GWR Project SEIR Groundwater Modeling Analysis, October.

Montgomery & Associates, Inc., 2021. Draft Technical Memorandum, PWM Intrinsic Tracer Study Analysis & Operational Modeling, August.

U.S. National Oceanic and Atmospheric Administration (NOAA), 2021, Tides & Currents / Sea Level Trends – Relative Sea Level Trend 9413450 Monterey, California, accessed November 3, 2021 at https://www.tidesandcurrents.noaa.gov/sltrends/sltrends_station.shtml?plot=intannvar&id=9413450

Water Systems Consulting, Inc. (WSC), 2021. California American Water Central Division – Monterey County District 2020 Urban Water Management Plan, prepared for California American Water, June.

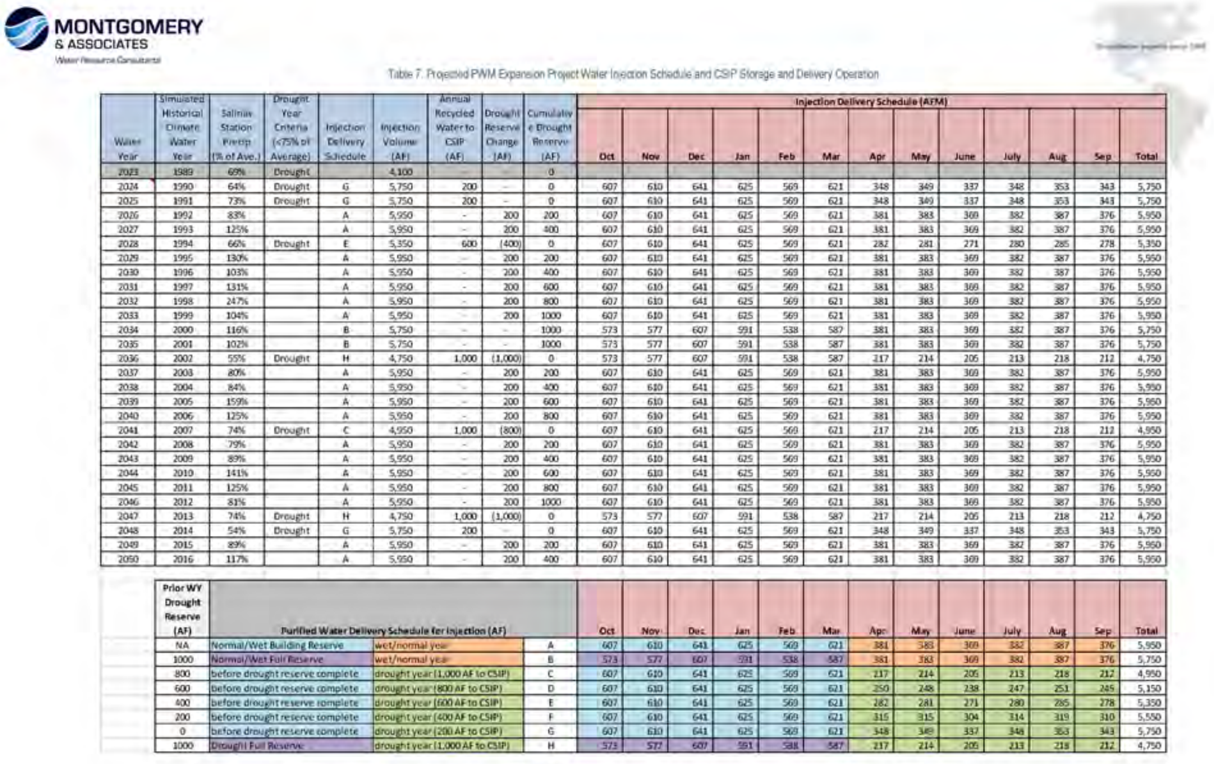

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Table 7. Projected PWM Expansion Project Water Injection Schedule and CSIP Storage and Delivery Operation

Water Year	Simulated Historical Climate Water Year	Salinas Station Precip (% of Ave.)	Drought Year Criteria (<75% of Average)	Injection Delivery Schedule	Injection Volume (AF)	Annual Recycled Water to CSIP (AF)	Drought Reserve Change (AF)	Cumulative Drought Reserve (AF)	Injection Delivery Schedule (AFM)												
									Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Total
2023	1989	69%	Drought(		4,100	-	-	0													
2024	1990	64%	Drought	G	5,750	200	-	0	607	610	641	625	569	621	348	349	337	348	353	343	5,750
2025	1991	73%	Drought	G	5,750	200	-	0	607	610	641	625	569	621	348	349	337	348	353	343	5,750
2026	1992	83%		A	5,950	-	200	200	607	610	641	625	569	621	381	383	369	382	387	376	5,950
2027	1993	125%		A	5,950	-	200	400	607	610	641	625	569	621	381	383	369	382	387	376	5,950
2028	1994	66%	Drought	E	5,350	600	(400)	0	607	610	641	625	569	621	282	281	271	280	285	278	5,350
2029	1995	130%		A	5,950	-	200	200	607	610	641	625	569	621	381	383	369	382	387	376	5,950
2030	1996	103%		A	5,950	-	200	400	607	610	641	625	569	621	381	383	369	382	387	376	5,950
2031	1997	131%		A	5,950	-	200	600	607	610	641	625	569	621	381	383	369	382	387	376	5,950
2032	1998	247%		A	5,950	-	200	800	607	610	641	625	569	621	381	383	369	382	387	376	5,950
2033	1999	104%		A	5,950	-	200	1000	607	610	641	625	569	621	381	383	369	382	387	376	5,950
2034	2000	116%		B	5,750	-	-	1000	573	577	607	591	538	587	381	383	369	382	387	376	5,750
2035	2001	102%		B	5,750	-	-	1000	573	577	607	591	538	587	381	383	369	382	387	376	5,750
2036	2002	55%	Drought	H	4,750	1,000	(1,000)	0	573	577	607	591	538	587	217	214	205	213	218	212	4,750
2037	2003	80%		A	5,950	-	200	200	607	610	641	625	569	621	381	383	369	382	387	376	5,950
2038	2004	84%		A	5,950	-	200	400	607	610	641	625	569	621	381	383	369	382	387	376	5,950
2039	2005	159%		A	5,950	-	200	600	607	610	641	625	569	621	381	383	369	382	387	376	5,950
2040	2006	125%		A	5,950	-	200	800	607	610	641	625	569	621	381	383	369	382	387	376	5,950
2041	2007	74%	Drought	C	4,950	1,000	(800)	0	607	610	641	625	569	621	217	214	205	213	218	212	4,950
2042	2008	79%		A	5,950	-	200	200	607	610	641	625	569	621	381	383	369	382	387	376	5,950
2043	2009	89%		A	5,950	-	200	400	607	610	641	625	569	621	381	383	369	382	387	376	5,950
2044	2010	141%		A	5,950	-	200	600	607	610	641	625	569	621	381	383	369	382	387	376	5,950
2045	2011	125%		A	5,950	-	200	800	607	610	641	625	569	621	381	383	369	382	387	376	5,950
2046	2012	81%		A	5,950	-	200	1000	607	610	641	625	569	621	381	383	369	382	387	376	5,950
2047	2013	74%	Drought	H	4,750	1,000	(1,000)	0	573	577	607	591	538	587	217	214	205	213	218	212	4,750
2048	2014	54%	Drought	G	5,750	200	-	0	607	610	641	625	569	621	348	349	337	348	353	343	5,750
2049	2015	89%		A	5,950	-	200	200	607	610	641	625	569	621	381	383	369	382	387	376	5,950
2050	2016	117%		A	5,950	-	200	400	607	610	641	625	569	621	381	383	369	382	387	376	5,950

Prior WY Drought Reserve (AF)	Purified Water Delivery Schedule for Injection (AF)			Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Total
NA	Normal/Wet Building Reserve	wet/normal year	A	607	610	641	625	569	621	381	383	369	382	387	376	5,950
1000	Normal/Wet Full Reserve	wet/normal year	B	573	577	607	591	538	587	381	383	369	382	387	376	5,750
800	before drought reserve complete	drought year (1,000 AF to CSIP)	C	607	610	641	625	569	621	217	214	205	213	218	212	4,950
600	before drought reserve complete	drought year (800 AF to CSIP)	D	607	610	641	625	569	621	250	248	238	247	251	245	5,150
400	before drought reserve complete	drought year (600 AF to CSIP)	E	607	610	641	625	569	621	282	281	271	280	285	278	5,350
200	before drought reserve complete	drought year (400 AF to CSIP)	F	607	610	641	625	569	621	315	315	304	314	319	310	5,550
0	before drought reserve complete	drought year (200 AF to CSIP)	G	607	610	641	625	569	621	348	349	337	348	353	343	5,750
1000	Drought Full Reserve	drought year (1,000 AF to CSIP)	H	573	577	607	591	538	587	217	214	205	213	218	212	4,750

SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	January 12, 2022
AGENDA ITEM:	5
AGENDA TITLE:	Discuss Additional Replenishment Water Modeling Using Different Assumptions
PREPARED BY:	Robert Jaques, Technical Program Manager

SUMMARY:

At its October 20, 2021 meeting the TAC discussed a list of assumptions the consultants would use in performing the replenishment water modeling work,. Subsequent to that meeting, input from some TAC members indicated a desire to potentially explore other modeling scenarios with slightly different assumptions. Specifically:

The City of Seaside commented that:

1. Based upon the 2018 Water Supply Assessment by MCWD, the Campus Town project may need upwards of 301.1 AFY, but that would be phased in starting in 2023 and planned for completion over couple/few years say by 2025 or 2026. The City may have also allocated some additional Fort Ord water to the Campus Town project since the Water Supply Assessment was prepared, but the Water Supply Assessment indicates up to 301.1 AFY of needed water and that is all the information that is currently available.
2. The remaining amount of golf course allocation (up to 240 AFY??) is more difficult to project. There are water demand needs for other development of the former Fort Ord, but the City does not have a schedule for those developments. The City also anticipates that its municipal system will eventually exhaust its built-up credit (from in-lieu replenishment by using water provided by MCWD). However, absent another water supply project, the pumping demands of the municipal water system also need to be accounted for in the long run and that might come from the in-lieu recycled water.

Cal Am recommended :

1. Using different (lower) injection quantities of water for the Carmel River ASR program.
2. Not counting on the PWM Expansion Project providing 5,750 AFY of water.
3. Not assuming that Cal Am will reduce its pumping from the Seaside Basin by 700 AFY to repay its historical overpumping, and that it will continue to pump up to 1,474 AFY from the Basin.
4. Not assuming that Cal Am will reduce its Laguna Seca pumping water rights.
5. Assuming that Standard Producers will continue to pump at recent pumping levels (average of the past 5 to 10 years) and that they will be expected to pump additional amounts if necessary to meet demands.
6. Cal Am's demands will be those set forth in Cal Am's Urban Water Management Plan, and not those set forth in MPWMD's demand forecast.
7. For sea level rise, use the Coastal Commission's most recent guidance.

SEASIDE BASIN WATER MASTER
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** * * AGENDA TRANSMITTAL FORM * * **

AGENDA ITEM:	5 (Continued)

Because the scope of work and costs thus far authorized to Montgomery & Associates to perform the replenishment water modeling work were based on the attached set of assumptions, asking them to perform additional modeling scenarios to reflect different assumptions would require a contract amendment.

At today's meeting the TAC should discuss this input and provide recommendations regarding any additional scenarios the TAC would like to see modeled to determine replenishment water needs of the Basin.

ATTACHMENTS:	List of Assumptions Discussed at the TAC's October 20, 2021 Meeting
RECOMMENDED ACTION:	Provide input to the Technical Program Manager regarding performing additional modeling scenarios to reflect input from the City of Seaside and Cal Am

LIST OF ASSUMPTIONS TO BE USED IN PERFORMING THE REPLENISHMENT WATER MODELING

(Presented at the TAC's October 20, 2021 Meeting)

1. Use the full 31-year historical hydrology and climate dataset as the basis for all predictive modeling. This extended hydrology would repeat the 31-year hydrology from 1987 – 2017, so that the baseline scenario is extended out 31-years from 2018 to 2048.

2. The modeling will determine how much replenishment water is needed to achieve protective coastal elevations in 20 years.

3. PWM injection of 3,500 AFY based on hydrology and planned amount extracted each year.

4. Carmel River ASR quantities will be assumed to be the same as current planned operations which are based on cycled historical Carmel River hydrology.

5. The Proposed Pure Water Monterey Expansion Project will increase PWM injection up to 5,750 AF/year starting in 2024.

6. Cal-Am's 700 AFY reduction in pumping of native groundwater as part of its 25-year groundwater overpumping replenishment program will be assumed to begin in 2024, following completion of the Pure Water Monterey Expansion Project.

7. Cal-Am's ceases pumping from the Ryan Ranch and Bishop Units in the Laguna Seca subarea starting in WY2021. Pumping will continue from the Hidden Hills Unit which is located just outside the Laguna Seca subarea.

8. The actual monthly injection rates for WY2020 and WY2021 will be used, followed by a projected injection schedule for the remainder of the simulation, using an injection delivery spreadsheet previously developed for the PWM modeling updated for the simulated future hydrology.

9. All Standard Producers are will be assumed to be meeting their safe yield allocations of native Seaside basin groundwater from WY2021 forward. Predicted Standard and Alternative Producer pumping will be set at measured WY 2021 volumes from WY 2021 onwards (or capped at 2021 SPA or APA allocations), with a few specific exceptions.

10. Based on input from Cal Am, it will be assumed that the Cease and Desist Order on Cal Am's extractions from the Carmel River Basin will not be lifted in 2024 following start-up of the Pure Water Monterey Expansion Project.

11. The demand assumptions in the MPWMD demand forecast model (e.g. in terms of total Cal-Am demand) will be used.

12. The SNG development will be supplied from Cal-Am wells under an agreement with Cal-Am. Cal-Am will use SNG's native groundwater water right of 149.7 acre-feet/year. Lacking any other information about the schedule for this project, the SNG project will be assumed to be completed in 2025 with usage estimated to be 25 AF/year in 2025, 30 AF/year in 2026, 50 AF/year in 2027, and 70 AF/year from 2028 onwards.

13. The City of Seaside will replace its golf course irrigation with PWM recycled water starting in 2023, and will use their 540 AFY golf course irrigation allocation for their Municipal Water System, specifically their Muni Well #4. This will result in a decrease in pumping from the Paso Robles aquifer, but will result in an increase in pumping in the Santa Margarita aquifer.
    <u>Question</u>: What will be the projected increase in pumping by the City's Municipal Water System as a result of this?
    <u>Response from Scott Ottmar of the City of Seaside (after the TAC meeting was over)</u>:
    Based upon the 2018 Water Supply Assessment (WSA) by MCWD, Campus Town may need upwards of 301.1 AFY, but that would be phased in starting in 2023 and planned for completion over couple/few years say by 2025 or 2026. The city may have also allocated some additional Fort Ord water to the Campus Town project since the WSA was prepared, but the Water Supply Assessment indicates up to 301.1 AFY of needed water and that is all the information I have at the moment.
    The remaining amount of golf course allocation is more difficult to project. Obviously there will be water demand needs for other development of the former Fort Ord, but I don't have a schedule for those developments. I would also anticipate the municipal system will first exhaust its built up credit. However, absent another water supply project, the pumping demands of the municipal water system also need to be accounted for in the long run and that might come from the in-lieu recycled water.
14. Incorporate sea level rise and adjust protective elevations accordingly. Use a "1 in 20 aversion" level, which is similar to a medium level aversion, in doing this. The sea level rise predictions come from the California Natural Resource Agency and Ocean Protection Council's Sea Level Rise Guidance document, which indicates that by 2050 there would be a sea level rise of 1.3 feet.

15. Use pumping rates in adjacent subbasins as they currently are, and do not assume any projects in the GSPs will be implemented.

SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	January 12, 2022
AGENDA ITEM:	6
AGENDA TITLE:	Discuss and Provide Direction on Concerns About the Final Draft Groundwater Sustainability Plan for the Monterey Subbasin
PREPARED BY:	Robert Jaques, Technical Program Manager

SUMMARY:

The Final Draft Groundwater Sustainability Plan (GSP) for the Monterey Subbasin was recently posted for review and comment. I reviewed it to see how the Watermaster's comments on the draft chapters, which were released individually over a period of months during 2021, had been responded to. I found that most of the comments seemed adequately addressed, but I continue to have concerns about some parts of the Final Draft GSP on issues that I did not find to have been addressed. Attached are two documents: (1) A discussion of my concerns, and (2) Some excerpts from that document that highlight my concerns.

I do not know whether the concerns contained in my comments about the Final Draft GSP will be addressed in the Final GSP. If they are not, one avenue available to the Watermaster to continue to raise those concerns would be to submit a letter to the Department of Water Resources (DWR), the agency that will review and approve the GSP, asking that it not be approved until those issues are addressed in the GSP.

I am seeking TAC input and direction on whether the concerns described in the attachments to this agenda item would warrant submitting such a letter to DWR.

ATTACHMENTS:	(1) Discussion of concerns (2) Excerpts from Final Draft Monterey Subbasin Groundwater Sustainability Plan
RECOMMENDED ACTION:	Discuss and provide direction on what action, if any, the Watermaster should take regarding these concerns

Concerns Regarding the Monterey Subbasin Final Draft GSP

1. With regard to inter-subbasin groundwater flows, there are differences between the findings of the Seaside Basin groundwater model (the one prepared for the Watermaster by HydroMetrics and Montgomery & Associates) as presented in Tables 10 and 11 of the 2018 Updated Basin Management Action Plan (BMAP) and the EKI model (the one prepared for the MCWDGSA and which is being used by the MCWDGSA and the SVBGSA to help develop the Monterey Subbasin GSP). The Final Draft GSP states that "…modeling limitations are to be addressed within the first five years of GSP implementation." I am concerned that five years is a long time to come to resolution of these modeling differences, and that the GSAs could start working on projects and management actions that might not be accurate in addressing those differences.

2. We had asked that this language (in italics) be included in the Final Draft GSP, but the authors declined to include it:

> *The Seaside Basin Watermaster's modeling (using the Seaside Basin Groundwater Flow Model) found that it would be impossible for the Laguna Seca subarea of the Seaside subbasin to be managed such that groundwater levels would remain stable in that subarea in the future. The reason for this is that even if all pumping within the Laguna Seca Subarea were to be discontinued (an infeasible undertaking) groundwater would flow in an easterly direction out of the Laguna Seca subarea and into the Corral de Tierra subarea. This would be caused by low groundwater levels in the Corral de Tierra subarea compared to groundwater levels in the easterly portion of the Laguna Seca subarea. This highlights the importance of raising groundwater levels within the Corral de Tierra in order to not impede the ability of the Seaside subbasin to be sustainably managed.*

I am concerned that the impact on the Laguna Seca Subarea from pumping within the Corral de Tierra Subarea is not sufficiently identified as an issue to be addressed through the implementation of projects and management actions under the Final Draft GSP.

3. Table 8-3 in the Final Draft GSP that lays out how the implementation of projects and management actions will, over the 20-year period of GSP implementation, cause groundwater levels in the Corral de Tierra subarea to reverse their historical decline and achieve sustainable levels. Appendix 8-B contains hydrographs of the Monterey Subbasin's Representative Monitoring Wells showing how they anticipate reversing the declining water levels in many of them. The document states that:

> *"These projects and management actions are early in their planning phases and will require coordination with adjacent subbasins and collaborating partners. As such, time will be required to implement these projects and management actions, and begin monitoring for the expected benefits. Groundwater interim milestones are established to reflect the timeline for project implementation, and realization of project benefits over time.*
>
> *Within the Monterey Subbasin, for wells in the 400-Foot Aquifer, Deep, and El Toro Primary Aquifer System Aquifers where groundwater levels have been declining, groundwater elevation interim milestones are defined based on a trajectory informed by current (fourth quarter of 2020) groundwater levels, historical groundwater elevation trends, and measurable objectives. This trajectory allows for and assumes a continuation of historical groundwater elevation trends during the first 5-year period of GSP implementation, a deviation from that trend over the second 5-year period, and a recovery towards the measurable objectives in the third and fourth (last) 5- year period."*

However, no explanation is provided as to how the time line for recovery of declined groundwater levels was developed. The estimated costs to implement the numerous projects and management actions identified in this GSP and the GSP for the 180/400-foot subbasin run into the hundreds of millions of dollars, and some are likely to encounter extensive environmental and permitting issues. Some may potentially be determined to be infeasible, either from a financial or a permitting standpoint. Thus, implementing them will be a formidable task. This leaves me concerned that the recovery timeline is more a “wish” and a “hope” than something for which there is reasonable assurance of being achieved. I feel that the feasibility for the timeline for recovery of declined groundwater levels should be discussed in the document.

4. It is apparent from the GSPs for most, if not all, of the subbasins within the Salinas Valley Groundwater Basin that those subbasins will need replenishment water to reverse their declining water levels, just as is the case in the Seaside subbasin. Many projects are identified in those GSPs that involve using recycled wastewater to replace groundwater that is currently being pumped to meet demands. In some cases this is recycled water for landscape or agricultural irrigation. In other cases it is recycled water for indirect potable reuse by injecting it into the groundwater and later recovering it (as is done with the Pure Water Monterey Project). It appears that most, if not all, of these recycled water projects rely on wastewater coming into the Monterey One Water Regional Wastewater Treatment Plant. The total flow into that plant is already needed to supply the Castroville Seawater Intrusion Project (CSIP) and the PWM and PWM Expansion Projects. Thus, there may not be enough recycled water to supply all of these other GSP projects. I feel this is an issue that needs to be addressed in the Final Draft GSP.

Excerpts from Final Draft Monterey Subbasin Groundwater Sustainability Plan

(Yellow highlighted items are of particular concern to the Watermaster)

Section 6.5.6.2: Corral de Tierra Area information regarding the sustainable yield of the groundwater system underlying the Corral de Tierra Area can be garnered based on the projected water budget for the historical water budget data and the "No Project" scenario. The simplifying assumption for estimating historical sustainable yield is that a first-order estimate can be developed by subtracting the historical average overdraft from the historical average extractions.

Data show that the historical pumping in the Corral de Tierra Area was 1,296 AFY, and the historical overdraft was 2,803 AFY. This calculation leads to an estimated sustainable yield in the Corral de Tierra Area of -1,507 AFY. While this is only a rough first-order estimate, the negative sustainable yield suggests that no amount of pumping reduction in the Corral de Tierra Area could have historically brought the area into balance. The outflows to adjacent subbasins and the Marina-Ord Area result in an overdraft independent of Corral de Tierra pumping.

Using the same method to estimate the current sustainable yield, the annual pumping during the current period in the Corral de Tierra Area was 1,771 AFY, and the historical overdraft was 1,818 AFY. This leads to an estimated sustainable yield in the Corral de Tierra Area of -47 AFY.

The baseline projected water budget, which includes no projects, with boundary conditions set at measurable objectives in adjacent subbasins results in an annual average storage decrease of 89 AFY over the 30-year of the analog period that represents stabilized boundary conditions. Under the "No Project" scenario, annual rates of groundwater extraction over the 30-year analog period average 2,188 AFY. Subtracting the average annual overdraft from the average annual pumping yields a long-term sustainable yield of the Corral de Tierra Area WBZ of 2,100 AFY. This is a first-order estimate, and further analysis is needed to assess if this sustainable yield avoids all undesirable results.

This estimate of sustainable yield is the sustainable yield to hold groundwater levels where they are after the first 20 years of GSP implementation if there are no projects undertaken. Since groundwater levels are declining, this groundwater level would be significantly below current groundwater levels and below groundwater level Minimum Thresholds (MTs). Therefore, this sustainable yield estimate of 2,100 AFY is likely an overestimate of the true sustainable yield where all undesirable results are avoided.

The historical and current sustainable yield estimates are for information only and do not guide groundwater management activities in this GSP. The projected sustainable yield provides a first-order estimate of anticipated sustainable pumping if no projects are implemented. However, simply reducing pumping to within the sustainable yield is not proof of sustainability, which must be demonstrated by avoiding undesirable results for all six sustainability indicators. Further analysis is necessary to refine estimates of where pumping should be reduced to address all sustainability indicators.

Section 9.6: : The Marina-Ord Water Augmentation "Project" Scenario with Variable Boundary Conditions scenario assumes that a portion of MCWD's projected water demand will be satisfied through some form of water supply augmentation. For evaluation purposes, this projected water budget assumes that all recycled water generated by MCWD will be used to augment water supplies within its service area. This project is consistent with the Recycled Water Reuse Through Landscape Irrigation and Indirect Potable Reuse project described in Section 9.4.6, project M3. It simulates an incremental increase in augmented water supplies beginning at 600 AFY in 2023 and up to 5,495 AFY by 2040. The impacts of this Project are evaluated under variable boundary conditions along the 180/400-Foot Aquifer Subbasin, consistent with those identified in Section 6.5. These boundary conditions include:

o Minimum Threshold (MT) Boundary Conditions
o Measurable Objective (MO) Boundary Conditions, and
o Seawater Intrusion (SWI) Protective Boundary Conditions.

Each of these boundary condition scenarios is predicated on the assumption that the 180/400-Foot Aquifer Subbasin will be managed to its SMCs over the 50-year projected model, as described further in Chapter 6 period. In addition, boundary conditions for the Seaside Subbasin, which is an adjudicated subbasin, are assumed to remain stable at 2017 levels.

Table 9-4 summarizes projected water budget results for the Marina-Ord Water Augmentation "Project" scenario with variable boundary conditions. The project scenario results in an average annual pumping rate over the 50-year analog period of 4,488 AFY within the Marina-Ord Area WBZ. This average annual pumping rate is below the estimated average annual recharge within the Subbasin under all projected climate scenarios, which ranges between (6,356 AFY and 7,509 AFY). This average annual pumping rate represents a 4,279 AFY reduction in projected pumping from the "No Project" scenario (see Table 6-5). The project scenario does not, however, result in a similar net annual increase in groundwater storage over the "No Project" scenario (see Section 6.5.5). Net annual changes in groundwater storage for this project only average 200 AFY more than the "No Project" scenario. The limited increase in net groundwater storage is the result of projected increases in net outflows to the 180/400-Foot Aquifer Subbasin and decreases in net inflows from the Seaside Subbasin and ocean under this "Project" scenario.

The Corral de Tierra Water Augmentation "Project" Scenario with MO boundary Conditions scenario analyzes a hypothetical and extreme condition where all of Corral de Tierra Area projected water demand (2,188 AFY) is met by some form of water supply augmentation. The scenario assumes MO Boundary Conditions are achieved at the 180/400-Foot Aquifer Subbasin boundary and water levels along the Seaside Subbasin boundary remain stable at 2017 levels . This scenario has been evaluated to provide insights regarding the pumping reductions that would be required to raise groundwater elevations and achieve SMCs within the Corral de Tierra Area.

<u>Section 9.6.2</u>: Table 9-5 summarizes projected water budget results for the Corral de Tierra Water Augmentation "Project" scenario under MO Boundary Conditions. However, it should be noted that the 180/400-Foot Aquifer Subbasin only needs to reach its groundwater level MTs to avoid undesirable results if projects (e.g., extraction and/or injection barriers) are implemented to achieve seawater intrusion MTs.

The "Project" scenario results show that the Corral de Tierra Area is projected to remain in slight overdraft over the 50-year analog period, even if the 180/400-Foot Aquifer Subbasin is managed to its water level MOs and significant investments in alternative water suppliers are made. This project scenario shows that even if all pumping was replaced with alternative supplies and pumping was eliminated in the Corral de Tierra Area, the Corral de Tierra Area would still need recharge projects to reach sustainability.

This project scenario shows one potential path forward to help reach sustainability; however, different sets of projects and management actions could be undertaken. Projects and management actions will be prioritized and selected early during GSP implementation.

<u>Appendix 6B p. 35 and 36:</u> The Seaside model [this is the model developed for the Watermaster by HydroMetrics and Montgomery and Associates] does not explicitly simulate groundwater flow from each Principal Aquifer unit defined in the Monterey Subbasin GSP, but rather uses a unique conceptualization of aquifer units that is primarily based on the main geologic formations encountered in the Seaside Area Subbasin (i.e., the Aromas Sands, Paso Robles Formation, and Santa Margarita/Purisima Formations). As such, there is considerable uncertainty surrounding the assumptions employed to link outputs from the Seaside model to individual layers of the MBGWFM [this is the model developed by EKI for the MCWDGSA and which is being used by the MCWDGSA and the SVBGSA to model the Monterey Subbasin], which may impact resulting calculations of Seaside Area Subbasin exchanges within the water budget.

Table 9-4. Projected Water Budget Results Under Marina-Ord Area Water Augmentation "Project" Scenario with Variable Boundary Conditions and 2030 Climate Condition

Net Annual Groundwater Flows (a) (AFY)	Projected Annual Inflows/Outflows (b) 2030 Climate Conditions		
	Minimum Threshold Boundary Conditions	Measurable Objective Boundary Conditions	Seawater Intrusion Protective Boundary Conditions
Recharge			
● Rainfall, leakage, irrigation	**6,823**	**6,823**	**6,823**
Well Pumping			
● Well Pumping (c)	**-4,488**	**-4,488**	**-4,488**
Net Inter-Basin Flow			
● Seaside Subbasin	1,776	612	-1,115
● 180/400-Foot Aquifer Subbasin	-6,833	-4,901	-1,788
● Ocean (Presumed Freshwater)	-738	-764	-806
● Ocean (Presumed Seawater)	2,617	2,047	989
	-3,178	**-3,006**	**-2,721**
Net Intra-basin Flow			
● Corral de Tierra Area (Water Budget Zone)	**898**	**1,001**	**958**
Net Surface Water Exchange			
● Salinas River Exchange	**0**	**0**	**0**
NET ANNUAL CHANGE IN GROUNDWATER STORAGE	**55**	**330**	**572**

Notes:

(a) The Marina-Ord Area Zone Budget includes inflows to and outflows from the portion of Corral de Tierra that is north of Reservation Rd.

(b) Positive values indicate a net inflow and negative values indicate a net outflow.

	-3,109
Net Intra-basin Flow ● From Marina-Ord Area WBZ	**-1,352**
Net Surface Water Exchange ● Salinas River Exchange	**207**
NET ANNUAL CHANGE IN GROUNDWATER STORAGE	**-148**

l de Tierra Area Zone Budget does not include inflows to and outflows from the portion of Corral Area that is north of Reservation Rd.

alues indicate a net inflow and negative values indicate a net outflow.

boundary flows are reflective of 100% freshwater as no seawater inflows to the Subbasin reach de Tierra Area.

Stream gauge data was unavailable from El Toro Creek for the historical period, and thus eek was not directly simulated in the model. See further discussion in Section 6.4.1.1.3.

Table 9-5. Projected Groundwater Water Budget Results under Corral de Tierra Area Water Supply Augmentation "Project" Scenario with MO Boundary Condition and 2030 Climate Condition

Net Annual Groundwater Flows (AFY) (b)	Projected Annual Inflows/Outflows Measurable Objective Boundary Conditions
Recharge	
● Rainfall, leakage, irrigation	**4,105**
Well Pumping	
● El Toro Primary Aquifer System	**0**
Net Inter-Basin Flow (Presumed Freshwater) (c)	
● Seaside Subbasin	-381
● 180/400-Foot Aquifer Subbasin	-2,728
● Ocean	0
	-3,109
Net Intra-basin Flow	
● From Marina-Ord Area WBZ	**-1,352**
Net Surface Water Exchange	
● Salinas River Exchange	**207**
NET ANNUAL CHANGE IN GROUNDWATER STORAGE	**-148**

Notes:

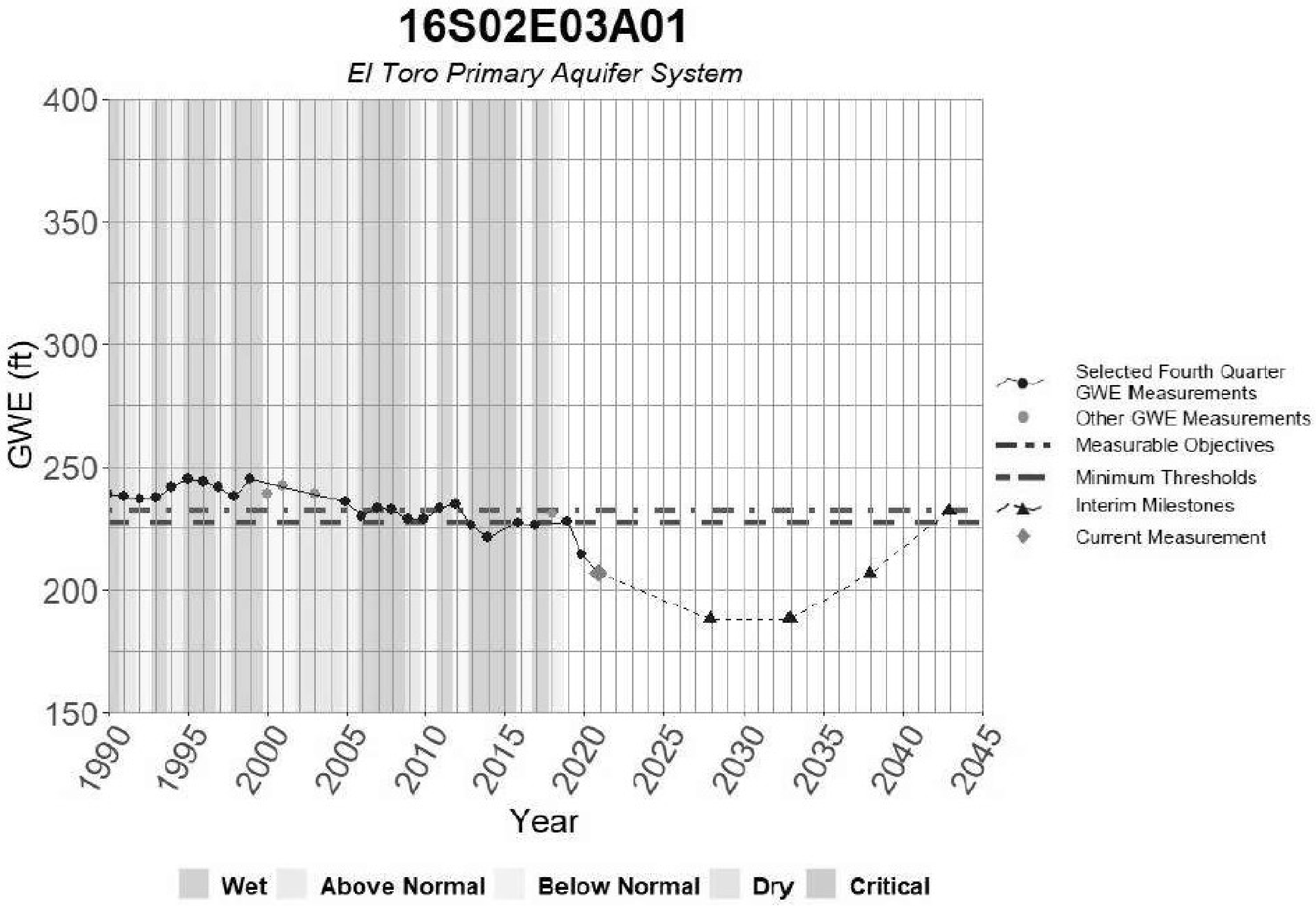
(a) The Corral de Tierra Area Zone Budget does not include inflows to and outflows from the portion of Corral de Tierra Area that is north of Reservation Rd.

(b) Positive values indicate a net inflow and negative values indicate a net outflow.

(c) Net cross boundary flows are reflective of 100% freshwater as no seawater inflows to the Subbasin reach the Corral de Tierra Area.

~~(c)~~(d) Stream gauge data was unavailable from El Toro Creek for the historical period, and thus El Toro Creek was not directly simulated in the model. See further discussion in Section 6.4.1.1.3.

Example Hydrograph from Appendix 8-B for a Monitoring Well in the Corral de Tierra Subarea



SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	January 12, 2022
AGENDA ITEM:	7
AGENDA TITLE:	Schedule
PREPARED BY:	Robert Jaques, Technical Program Manager

SUMMARY:

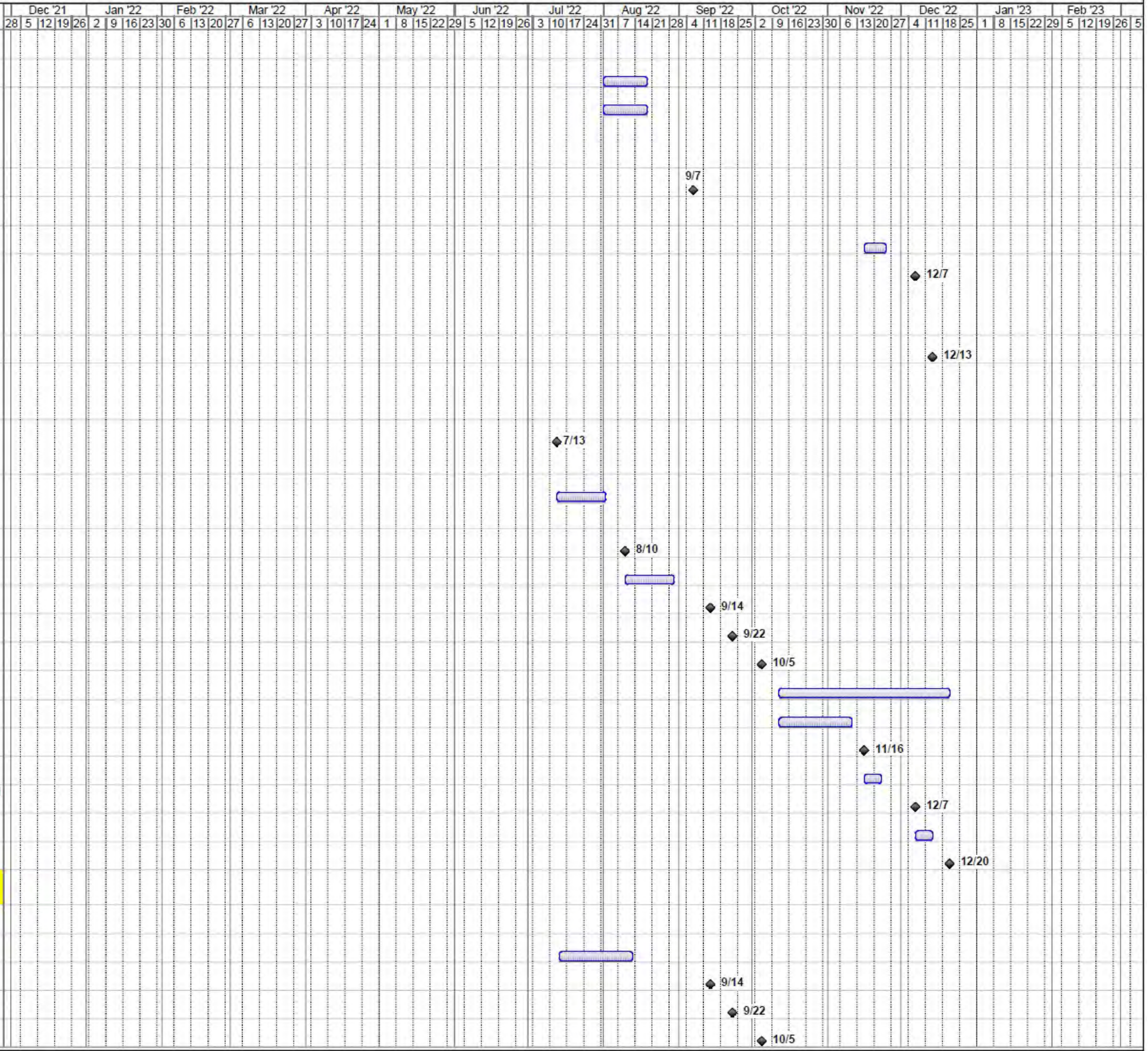
As a regular part of each monthly TAC meeting, I will provide the TAC with an updated Schedule of the activities being performed by the Watermaster, its consultants, and the public entity (MPWMD) which are performing certain portions of the work.

Attached is the updated schedule for 2022 activities.

ATTACHMENTS:	Schedule of Work Activities for FY 2022
RECOMMENDED ACTION:	Provide Input to Technical Program Manager Regarding Any Corrections or Additions to the Schedules

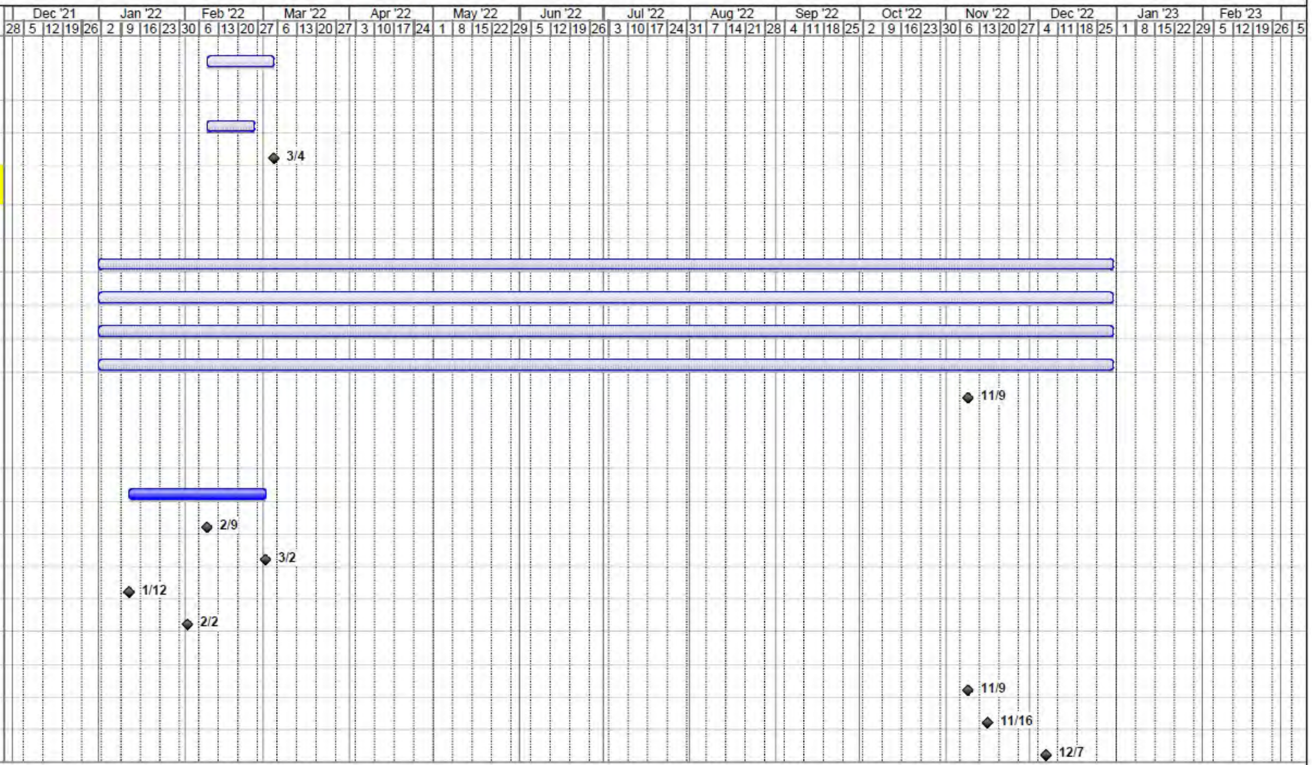
Seaside Basin Watermaster
2022 Monitoring and Management Program
Work Schedule

ID	Task Name
1	**Replenishment Assessment Unit Costs for Water Year 2023**
2	B&F Committee Develops Replenishment Assessment Unit Cost for 2023 Water Year
3	If Requested, TAC Provides Assistance to B&F Committee in Development of 2023 Water Year Replenishment Assessment Unit Cost
4	Board Adopts and Declares 2023 Water Year Replenishment Assessment Unit Cost
5	**Replenishment Assessments for Water Year 2022**
6	Watermaster Prepares Replenishment Assessments for Water Year 2022
7	Watermaster Board Approves Replenishment Assessments for Water Year 2022 (At December Meeting)
8	Watermaster Levies Replenishment Assessment for 2022
9	**Monitoring & Management Program (M&MP) Budgets for 2023 and 2024**
10	Preliminary Discussion of Potential Scope of Work for 2023 M&MP
11	Prepare 2023 M&MP
12	TAC approves 2023 M&MP
13	Prepare 2023 and 2024 O&M and Capital Budgets
14	TAC approves 2023 and 2024 O&M and Capital Budgets
15	Budget & Finance Committee Approves 2023 M&MP and 2024 O&M and Capital Budgets
16	Board approves 2023 M&MP and 2024 M&MP O&M and Capital Budgets
17	**2021 Annual Report**
18	Prepare Preliminary Draft 2022 Annual Report
19	TAC Provides Input on Preliminary Draft 2022 Annual Report
20	Prepare Draft 2022 Annual Report (Incorporating TAC Input)
21	Board Provides Input on Draft 2022 Annual Report (At December Board Meeting)
22	Prepare Final 2022 Annual Report (incorporating Board Input)
23	Watermaster Submits Final 2022 Annual Report to Judge
24	***MANAGEMENT***
25	**M.1 PROGRAM ADMINISTRATION**
26	Prepare Initial Consultant Contracts for 2023
27	TAC Approval of Initial Consultant Contracts for 2023
28	Budget & Finance Committee Approves Initial Consultant Contracts for 2023
29	Board Approval of Initial Consultant Contracts for 2022



Seaside Basin Watermaster
2022 Monitoring and Management Program
Work Schedule

ID	Task Name
30	**M.1.g – Sustainable Groundwater Management Act Reporting Requirements**
31	Montgomery & Associates Prepares Draft Groundwater Storage Analysis
32	Submit SGMA Documentation to DWR
33	***IMPLEMENTATION***
34	**I.2.a DATABASE MANAGEMENT**
35	**I.2.a.1 Conduct Ongoing Data Entry/Database Maintenance**
36	**I.2.b DATA COLLECTION PROGRAM**
37	**I.2.b.2 Collect Monthly Water Levels (MPWMD)**
38	**I.2.b.3 Collect Quarterly Water Quality Samples (MPWMD)**
39	**I.2.b.6 MPWMD provides annual water quality and water level data to Montgomery & Associates for inclusion in the 2021 SIAR**
40	**I. 3. a. 3 Evaluate Replenishment Scenarios and Develop Answers to Basin Management Questions**
41	Montgomery & Associates Presents Flow Direction and Flow Velocity Modeling Report to the TAC
42	Montgomery & Associates Presents Flow Direction and Flow Velocity Modeling Report to the Board
43	Montgomery & Associates Presents Replenishment Water Modeling Report to the TAC
44	Montgomery & Associates Presents Replenishment Water Modeling Report to the Board
45	**I.4.c Annual Seawater Intrusion Analysis Report (SIAR)**
46	Montgomery & Associates Provides Draft 2022 SIAR to Watermaster
47	TAC Approves 2022 SIAR
48	Board Approves 2022 SIAR



SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	January 12, 2022
AGENDA ITEM:	8
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