M E E T I N G N O T I C E A N D A G E N D A

TECHNICAL ADVISORY COMMITTEE
OF THE
SEASIDE BASIN WATER MASTER

DATE: Wednesday, April 12, 2017
MEETING TIME: 1:30 p.m.
Monterey Regional Water Pollution Control Agency Offices
5 Harris Court, Building D (Ryan Ranch)
Monterey, CA 93940

If you wish to participate in the meeting from a remote location, please call in on the Watermaster Conference Line by dialing (712) 432-1212. Use the Meeting ID 355890617. Please note that if no telephone attendees have joined the meeting by 10 minutes after its start, the conference call will be ended.

OFFICERS
Chairperson: Nina Miller, California American Water Company
Vice-Chairperson: Jon Lear, MPWMD

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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SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

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

MEETING DATE:	April 12, 2017
AGENDA ITEM:	2.A
AGENDA TITLE:	Approve Minutes from the February 8, 2017 Meeting
PREPARED BY:	Robert Jaques, Technical Program Manager

SUMMARY:

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

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

D-R-A-F-T
MINUTES

Seaside Groundwater Basin Watermaster
Technical Advisory Committee Meeting
February 8, 2017

Attendees: TAC Members

City of Seaside – Scott Ottmar and Rick Riedl (via telephone)
California American Water – Nina Miller
City of Monterey – Laurie Williamson (via telephone)
Laguna Seca Property Owners –No Representative
MPWMD – Jon Lear
MCWRA – Tamara Voss
City of Del Rey Oaks – No Representative
City of Sand City – Leon Gomez (via telephone)
Coastal Subarea Landowners – No Representative

Watermaster
Technical Program Manager - Robert Jaques

Consultants
HydroMetrics – Georgina King (via telephone)

Others
None

The meeting was convened at 1:43 p.m. after a quorum had been established.

1. **Public Comments**

There were no public comments.

2. Administrative Matters:

A. Approve Minutes from the January 11, 2017 Meeting

On a motion by Mr. Lear, seconded by Ms. Voss, the minutes from this meeting were unanimously approved.

B. Sustainable Groundwater Management Act (SGMA) Update

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

C. Progress Update on Salinas River Groundwater Basin Investigation Model TAC

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

3. Continued Discussion of Technical Memorandum Regarding Results from Resampling Verification of Wells

Mr. Jaques introduced this item and passed out to those TAC members that were present corrected pages 28 through 29 of the agenda packet where some editing errors had been found.

Ms. King summarized the revisions that had been made and reviewed the revised Conclusions and Recommendations. She noted that an Executive Summary had been added at the request of the Watermaster's legal counsel.

She summarized the revisions as follows:

- Iodide analyses came in after the earlier draft had been prepared and are included in the tables on pages five through nine.
- Added discussion regarding the piper diagrams. She noted that Ms. Voss had provided helpful advice and guidance on this.
- Added discussion about seawater intruded aquifers (Technical Memorandum page 21) and included Figure 9 showing an intruded aquifer example.
- Added discussion regarding stiff diagrams and included a sea water intrusion sample in Figure 12.
- Added further discussion regarding other potential causes of water quality changes.
- Added/revised some of the Conclusions and made them consistent with the Recommendations.
- Added/revised some Recommendations per TAC and consultant input.

Ms. Voss provided Mr. Jaques some grammatical/typographical edits. He will provide them to Ms. King. Ms. Voss referred to the wording on page 14 about changes in chloride levels likely resulting from chronically low groundwater levels. She asked that some support discussion be provided for this statement. She went on to note that on page 15 it would be desirable to add "reanalysis" by the lab of existing samples to weed out laboratory error. This should be done before resampling. She requested that the symbol on Figure 6 (page 30 of the agenda packet) be changed so that it can be more readily seen in that diagram. On page 39 in Section 5.4 she asked if lab error had been ruled out. Ms. King responded that the anions and cations plotted where they normally do, thus indicating that laboratory error was unlikely. She commented further that in Conclusion No. 1 it would be more accurate to replace the word "increased" with the word "continued." In Conclusion No. 9 she requested that reanalysis of samples be included in the wording there. She went on to say that she felt the revised document was much better now.

Ms. Miller asked for clarification regarding the wording in the Executive Summary and the Conclusions which refers to continuing the recently implemented process for the review of water quality results. Mr. Jaques explained that in the past sampling results generally were not examined in detail until it was time to prepare the Seawater Intrusion Analysis Report which occurs in the late fall of each year. The new procedure is to have all sampling data provided immediately to HydroMetrics who will promptly review the data to identify any abnormalities or issues of concern so they can be acted on in a timely manner.

TAC members suggested that the laboratory be requested to notify us immediately if any new data is out of line with previous values. Mr. Jaques asked Ms. King if she would please prepare a list of target values for the lab to use in order to provide this notification to the Watermaster.

Ms. King asked Mr. Lear when well owners take their water quality samples. Mr. Lear responded that this varies and also that some data goes directly to the Watermaster and not to him. Mr. Jaques will ask Ms. Dadiw to send all water quality data directly to Ms. King.

Mr. Riedl asked Mr. Lear if surface contamination into the Ord Terrace well had been ruled out. Mr. Lear responded yes, that the only water that gets into the well is rainwater which would presumably dilute the sample. Mr. Riedl said that salt on the surface of the ground could be carried into the well by rainwater entering the well. Ms. King said that the Ord Terrace well anions/cation plots are similar to prior data. Mr. Lear noted that the wellhead is located above grade so runoff would not flow directly into it.

Regarding the Sentinel Wells Mr. Riedl expressed concern about the sanitary seals and felt that better sanitary seals need to be installed there. Mr. Jaques said he would ask Mr. Feeney to address this and also to contact Mr. Riedl directly to discuss the matter.

Ms. Voss made a motion to accept the Technical Memorandum including today's edits. The motion was seconded by Mr. Lear and passed unanimously.

4. Work Plan to Investigate Cause(s) of Changing Water Quality in Sentinel Wells and Approval to Authorize HydroMetrics to Perform the Initial Portions of the Work Plan

Mr. Jaques introduced this agenda item and Ms. King described the work that would be performed under the proposed Work Plan. She noted that fluctuations in groundwater quality appear seasonal, but that the cause of water quality changes in the Sentinel Wells needs to be investigated. The Work Plan has two phases in it: (1) use existing data to evaluate possible causes, (2) if an explanation is not found in the first phase then in the second phase undertake isotopic analyses to try to determine the cause.

[Note: At this point in the meeting Mr. Lear had to depart for an urgent call from MPWMD, but rejoined the meeting via telephone shortly after leaving].

Only Phase I is proposed at this point in the cost proposal described in the *Estimated Cost for Phase I* and Table 1 on pages 60 through 61 of the agenda packet.

Mr. Ottmar commented that Mr. Riedl's concerns about the sanitary seals on the Sentinel Wells did not appear to be addressed in the Work Plan. Mr. Jaques said he would pursue this with Mr. Feeney and that Ms. King would address this in the report that will be prepared under the Work Plan.

Any problems with the sanitary seals on the wells will be taken care of before any further sampling is done. Ms. King commented that the samples taken at the lower depths are where the water quality changes are appearing, not in the shallower samples. She noted that all of the samples are very deep, and that none are near the surface, so it appears unlikely that surface water entering the well could be the cause of the water quality changes.

Ms. Voss commented that the downhole conductivity sampling will be helpful in investigating this.

Mr. Ottmar requested that this be reported on in the report prepared under the Work Plan, and Ms. King confirmed that it would.

Ms. Voss said that pH data (described on page 54 of the agenda packet) will potentially be helpful if pH can be measured downhole. She also noted that on page 58 of the agenda packet Figure 3 should be corrected to read Figure 4.

Mr. Jaques reported that he had discussed performing the conductivity and temperature profiling in the Sentinel Wells with Mr. Feeney, and that Mr. Feeney had provided him an initial budget estimate to perform this work that was slightly less than $6,000.

Mr. Ottmar asked if there was budget available to carry out the Work Plan Mr. Jaques responded that in the Management and Monitoring Program budget there are tasks that could be used for this purpose, and there is also contingency money available under that budget to cover these types of cost.

A motion was made by Mr. Ottmar to approve having HydroMetrics proceed with the Work Plan at the not-to-exceed $25,600 amount described in their cost proposal, and also to approve having Mr. Feeney conduct the conductivity and temperature profiling (which will be analyzed under Task 4 of the Work

Plan) at an amount not-to-exceed $6,000. The motion was seconded by Ms. Voss and unanimously approved.

5. Discuss Updating the Basin Management Action Plan

Mr. Jaques briefly introduced this agenda item. Following a brief discussion by TAC members Ms. Voss made a motion to have Mr. Jaques obtain a scope and cost proposal from HydroMetrics to update the Basin Management Action Plan. The motion was seconded by Ms. Williamson and passed unanimously.

6. Schedule

Mr. Jaques reported that there was nothing to highlight in the schedule and there was no further discussion on this item.

7. Other Business

There was no Other Business to discuss.

8. Set Next Meeting Date

The next regular meeting was set for Wednesday March 8, 2017 at 1:30 p.m. at the MRWPCA Board Room.

The meeting adjourned at 2:47 p.m.

SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

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

MEETING DATE:	April 12, 2017
AGENDA ITEM:	2.B
AGENDA TITLE:	Sustainable Groundwater Management Act (SGMA) Update
PREPARED BY:	Robert Jaques, Technical Program Manager

At the State level:
No recent notices or informational messages that impact the Seaside Basin Watermaster have been received from the State.

On March 16, 2017 I submitted to DWR the Watermaster's WY 2016 documentation, as required by SGMA for adjudicated basins. The documentation is contained in Attachment 2, which was taken off of DWR's data reporting portal.

Included with that documentation was an estimate of the change in groundwater storage that occurred during WY 2016. The estimated change (amount of water drawn from storage) of 540 AF is lower than the 1,580 AF that was estimated for WY 2015, but still indicates that more water is being taken out of the basin than is being replenished. As the HydroMetrics Memo indicates, updating the Groundwater Model would improve the accuracy of the estimates. This is part of the scope and cost proposal from HydroMetrics to update the Basin Management Action Plan contained in Agenda Item No. 5.

At the Monterey County level:
The work of the Collaborative Work Group has now been finished and presumably that Group will no longer meet. The Inaugural Meeting of the Salinas Valley Basin Groundwater Sustainability Agency (GSA) Joint Powers Agency Board of Directors was held in Salinas on March 9, 2017. A copy of the agenda from that meeting is attached.

As the agenda indicates, the JPA is in the very early formative stage, and is just starting the process of creating a staff and consultants to begin carrying out the work required of GSAs under SGMA. The JPA Board has set up its meeting schedule for the next six months as follows: Meetings will be scheduled for 4:00 pm on the Second Thursday of each month. The meetings will be held in the Salinas City Hall Rotunda, 200 Lincoln Salinas, CA.

I plan to attend one or more of the JPA's upcoming meetings to get acquainted with who is on the Board and to learn when they anticipate beginning work to develop their Groundwater Sustainability Plan.

ATTACHMENTS:	1. HydroMetrics Memo on Change in Storage 2. SGMA documentation reported to DWR 3. Agenda from March 9, 2017 Salinas Valley GSA JPA Meeting 4. Work Plan
RECOMMENDED ACTION:	None required – information only

Attachment 1

HydroMetrics WRI

1814 Franklin St, Suite 501
Oakland, CA 94612

TECHNICAL MEMORANDUM

To: Bob Jaques, Technical Program Manager
Seaside Basin Watermaster

From: Georgina King

Date: March 1, 2017

Subject: Seaside Basin Change in Groundwater Storage between Water Years 2015 and 2016

Under the Sustainable Groundwater Management Act, adjudicated groundwater basins are required to report the overall change in groundwater storage volume that takes place each year starting April 1, 2016. Last year, the Seaside Basin Watermaster submitted its first change in groundwater storage estimate for Water Year 2015. The Seaside Basin Groundwater Flow Model is a tool capable of calculating storage changes over any time interval from January 1987 through December 2013. With model results unavailable from the 2014-2016 period, the annual change in groundwater storage in the Seaside Groundwater Basin was instead estimated using groundwater elevation data collected for the annual Seawater Intrusion Analysis Reports (SIAR). This technical memorandum provides the change in groundwater storage volume for Water Year2016, using the same method of estimation used last year.

The Seaside Basin Watermaster has prepared an annual Seawater Intrusion Analysis Report (SIAR) for the Seaside Basin since water year 2007. In addition to a thorough chemical analysis, groundwater elevation conditions are evaluated and reported on groundwater elevation contour maps. Contour maps are produced for the 2nd and 4th quarter of each water year for both the shallow and deep aquifer zones. These maps are prepared by manually drawing elevation contours based upon observed groundwater elevations in wells screened in each aquifer zone. Wells assigned to the shallow depth zone generally correlate to the Paso Robles Formation where it exists in the Seaside Basin. Wells assigned to the deep zone correlate with the Santa Margarita Sandstone where it exists in the Seaside Basin.

Groundwater storage change was estimated between water years 2015 and 2016 using the following steps:

1. Interpolate contour levels over the entire basin;

2. Calculate groundwater level change over the water year;
3. Multiply the change in groundwater level by aquifer storage coefficients to determine change in storage;
4. Aggregate change in storage for each aquifer zone; and
5. Add shallow and deep zone change in storage to arrive at change in storage for the entire basin.

In step 1, the contour levels from the 4th quarter of water years 2015 (already done last year for the Watermaster's first submission to DWR), and 2016 for both shallow and deep aquifer zones were separately interpolated onto regular grids covering the adjudicated area of the Seaside Groundwater Basin. For the second step, gridded 2015 groundwater levels were subtracted from the gridded 2016 levels to calculate the change in groundwater elevations between water year 2015 and 2016. In step 3, the change in groundwater level at each grid cell was multiplied by the storage coefficient from the groundwater model for that cell; with the specific yield from model layer 2 used for the shallow zone and specific storage from model layer 5 used for the deep zone. Specific yield is the storage coefficient used for unconfined aquifers such as the shallow zone and specific storage is the storage coefficient used for confined aquifers such as the deep zone. This yielded a volumetric storage change for each cell in the grid produced in the first step. In step 4, all of these individual cell values were added together to produce separate volumetric change in storage values for the shallow zone and the deep zone. Finally, all the change in storage volumes for all cells in both the shallow and deep zones were added together to produce a total change in storage for the entire Seaside Groundwater Basin. The results of these calculations are shown in Table 1.

Table 1: Estimated Annual Change in Storage

Time Period	Change in Storage (AF)
Water Year 2015 10/1/14 - 9/30/15	-1,580
Water Year 2016 10/1/15 - 9/30/16	-510

The method described above requires data that is already being prepared on an annual basis for the Watermaster. However, this method is subject to an unknown but potentially high degree of uncertainty as a result the lack of data over a large portion of the Northern Inland subarea. The SIAR contour maps include only roughly estimated contours for most of the northern inland subarea. Unfortunately, the large size of the

Northern Inland subarea means that these uncertain contour levels have a large influence on the storage estimates for the basin as a whole. The groundwater flow model, by honoring the physics of groundwater flow and the spatial distribution of recharge and pumping, would produce more accurate groundwater elevations and thus more accurate change in storage estimates. The model would only be preferable if it were updated annually to reflect each year's groundwater pumping and aquifer recharge, which in turn are used by the model to simulate groundwater levels. The Seaside Basin Watermaster will look into the cost feasibility of updating the groundwater flow model annually for this purpose.

Attachment 2

Department of Water Resources

ADJUDICATED BASINS ANNUAL REPORTING SYSTEM

Seaside Basin Annual Report 10/01/2015 - 09/30/2016

WATERMASTER INFORMATION

Adjudicated Area
Seaside Basin

B.118 Groundwater Basin(s)
3-04.08 SALINAS VALLEY - SEASIDE AREA

COURT CASE INFO

Case Name	Case Number	Case Date
California American Water vs. numerous Defendants and Intervenors	M66343	02/09/2007

WATER MANAGER OR WATERMASTER

Name	Address	City	Zip
Seaside Basin	2600 Garden Road, Suite 228	Monterey	93940

Email	Phone	Fax
watermasterseaside@sbcglobal.net	(831) 641-0113	None

POINT OF CONTACT

Name	Address	City	Zip
Bob Jaques	83 Via Encanto	Monterey	93940

Email	Phone	Fax
bobj83@comcast.net	(831) 375-0517	

Final Judgement/Amendments
Amended Court Decision 2-9-07 3-26-13.doc (572kB)

Adjudication Boundary
HydroMetrics SGWB Shape File Boundary Map Adj_Bndry 3-11-16 (6.2kB)

Additional Information Website
http://www.seasidebasinwatermaster.org

A GROUNDWATER LEVEL

Is water level data submitted to the CASGEM Program?

Yes

Does this watermaster collect or receive additional groundwater levels?

Yes

Does this watermaster measure groundwater levels?

Yes

Comment(s)

Monterey Peninsula Water Management District (MPWMD) is the CASGEM Monitoring Entity for the Seaside Basin. MPWMD submits water level data for the additional wells that are monitored by them for the Seaside Basin Watermaster.

B GROUNDWATER USE

Reporting Period

From 10/01/2016 To 09/30/2017

Total Annual Groundwater Extraction (AF)

2,913.5

Method used to determine extraction (if available):

	Volume (AF)	Explanation	Uncertainty
Meters	2,913.5	All extraction is from metered wells.	Low
Electrical records			
Land use			
Groundwater model			
Reported by pumper	2,913.5	All extraction is from metered wells.	Low
Other method			

Groundwater Extraction by water use sector (if available):

Sector	Volume (AF)	Explanation	Uncertainty
Urban	2,913.5	All extraction is from metered wells.	Low
Large Landscape	824.4	Parks and golf courses	Low
Commericial			
Industrial			
Residential	2,089.1	Combined residential and commercial	Low
Agricultural			
Managed Wetlands			
Managed Recharge			
Other sector			

C SURFACE WATER USE

Reporting Period

From 10/01/2015 To 09/30/2016

Surface Water Supply (AF)

699.2

Method used to determine

Metered

Uncertainty

Low

Water available for recharge or in-lieu use by source type (if available):

	Volume (AF)	Explanation	Uncertainty
Local Surface Deliveries			
Local Imported Deliveries	699.2	Surface water imported from the Carmel River Basin for the aquifer storage and recovery project	Low
Colorado River Deliveries			
CVP Base and Project Deliveries			
Other Federal Deliveries			
State Water Project Deliveries			
Recycled Water			
Desalination Water			
Other	0.1	Groundwater imported from Marina Coast Water District for irrigation of Seaside golf courses	Low

D TOTAL WATER USE

These data are not available
Explanation

It is not impossible to accurately determine total water use in the Basin because ground and surface waters from multiple sources (Seaside Basin and Carmel River Basin as well as Sand City?s desalination plant) are comingled within the Cal Am distribution system which serves the Seaside Basin as well as the rest of Cal Am?s customers. In addition MCWD provides service to some users within the Basin boundaries. These water purveyors do not have any direct means of extracting that consumption data from their account records.

E CHANGE IN GW STORAGE

Reporting Period

From 10/01/2015 To 09/30/2016

Change in storage (AF)

-510.0

Method used to determine

Groundwater model and groundwater contour interpretations

Uncertainty

Medium

F REQUIRED DOCUMENTS

Reporting Period

From 10/01/2015 To 09/30/2016

Please submit an electronic (PDF preferred) copy of your annual report.

2016 Final Annual Report 12-8-16.pdf (32.7MB) Uploaded on 03/16/2017 at 10:44PM

Please submit additional reports or documents.

Attachment 3

Salinas Valley Basin
Groundwater Sustainability Agency

AGENDA

March 9, 2017

Agenda for a meeting of the Salinas Valley Groundwater Sustainability Agency to be held on THURSDAY March 9, 2017 at 4:30 p.m., in the CITY HALL ROTUNDA, 200 Lincoln Avenue, Salinas, California, 93901.

The Chairperson may limit the length of individual presentations, Public Comments limited to 2 minutes.

1. **Call to order**

2. **Swearing-in of Directors**

3. **Roll call**

4. **Pledge of allegiance**

5. **Election of officers:**
   a. Chair,
   b. Vice-chair.

6. **Public Comment**

   Members of the public may comment on matters within the jurisdiction of the Agency but not on the agenda. Public comments generally are limited to two minutes per speaker; the Chair may further limit the time for public comments depending on the agenda schedule. Inappropriate language will not be tolerated. Please refrain for using profanity.

7. **Receive a presentation on the basics of the Brown Act (California Open Meeting law) and Political Reform Act, and direct preparation of an Agency Conflict of Interest Code.**

8. **Adopt regular meeting schedule, including date, time and location**.

9. **Consider establishing Board committees:**
   a. Executive,
   b. Budget and Finance,

c. Planning.

10. Consider establishing an Advisory Committee.

11. Consider authorizing issuance of Requests for Proposals or Requests for Qualifications:

a. General Manager Position for the SVBGSA,
b. Groundwater Sustainability Plan consultant(s),
c. Legal services,
d. Financial consultant.
e. Auditing

12. Consider providing direction regarding other services:

a. Clerk,
b. Secretarial and other support.
c. Direct General Manager to prepare draft FY 17/18 SVBGSA Budget
d. Direct General Manager to establish banking services and interim financial services for SVBGSA

13. Meeting Stipend

a. Reimbursement timing

14. Receive a presentation on the general requirements for the filing of a Notice of Intent (NOI) with the Department of Water Resources including a report on the status of other GSAs in the Salinas Valley Groundwater Basin; provide direction to staff to prepare an NOI for the SVBGSA in the Salinas Valley Groundwater Basin.

15. Receive a report and provide direction on future agenda items.

a. Agreements with the City of Salinas and County for interim administrative and legal services;
b. Insurance (D&O, worker's compensation, etc.);
c. Other

16. Adjourn.

Attachment 4

SALINAS VALLEY BASIN GSA JPA

WORKPLAN – TO SEPTEMBER 2017

JPA- FORMATION

Responsible	Product	Date	Responsible (will make sure it happens)	Comments
1. **Organize Committees**	a. Executive b. Budgeting Finance c. Planning	April 13, 2017 April 13, 2017 April 13, 2017	Gary Petersen With Board Direction	Could be considered at the 3/9 meeting or organized prior tot 4/13
2. **Issuance of Requests for Proposals or Requests for Qualifications:**	a. General Manager Position for the SVBGSA, b. Groundwater Sustainability Plan consultant(s) c. Legal services, d. Financial consultant	April 13, 2017 June 8, 2017 April 13, 2017 June 8, 2017	Gary Petersen Les Girard Board Approval	April dates to get work running June dates to begin process that will allow for GM to participate in the selection process.
3. **Secure or acquire other services:**	a. Clerk, b. Secretarial and other support. c. Financial (checking banking etc.)	May11, 2017 April 13, 2017 April 13, 2017	Gary Petersen	Arrangement of services. Clerk services available through May.

1

4. Prepare draft FY 17/18 SVBGSA Budget	a. Draft Budget	May 11, 2017	Gary Petersen Finance Budget Committee	Draft Budget for discussion approval in June
5. Agreement for Services	a. administrative and legal services; b. Insurance (D&O, worker's compensation, etc.);	April 13, 2017	Gary Petersen Monterey County Executive Committee	

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SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

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

MEETING DATE:	April 12, 2017
AGENDA ITEM:	2.C
AGENDA TITLE:	Progress Update on Salinas River Groundwater Basin Investigation Model TAC
PREPARED BY:	Robert Jaques, Technical Program Manager

I attended the most recent meeting of this TAC, held on March 14, at which presentations were made on the progress toward development of the Salinas Valley Watershed and Integrated Hydrologic Models. Much work has now been completed and inputting of additional data, performing sensitivity analyses, calibration, and performing updates are some of the next steps that will be undertaken.

No date was set for a next meeting of the TAC. MCWRA staff indicated they expect to reconvene the TAC sometime in late 2017, after the model has been updated with 2015 and 2016 data – prior to any presentation of the model updates to the County Board of Supervisors. They said they expected that the March 14th TAC meeting was probably the last one for a while.

ATTACHMENTS:	None
RECOMMENDED ACTION:	None required – information only

SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

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

MEETING DATE:	April 12, 2017
AGENDA ITEM:	2.D
AGENDA TITLE:	Draft EIR/EIS for the Monterey Peninsula Water Supply Project
PREPARED BY:	Robert Jaques, Technical Program Manager

The California Public Utilities Commission (CPUC) has posted the Draft EIR/EIS for Cal Am's Monterey Peninsula Water Supply Project at this link:

http://www.cpuc.ca.gov/Environment/info/esa/mpwsp/comms_n_docs.html

I reviewed the Executive Summary of this document and found that it conformed to the project as generally described to us in prior draft documents, and that it appeared to accurately identify and discuss issues of concern to the Watermaster. Public hearings on it were held in February and the comment deadline, which was extended from 45 to 75 days after the Draft EIR/EIS was released, was March 29, 2017.

The CPUC's schedule for completion of the environmental review process is as follows:

Final EIR/EIS Published	Fourth Quarter 2017
CPUC Proposed Decision	First Quarter 2018

ATTACHMENTS:	None
RECOMMENDED ACTION:	None required – information only

SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

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

MEETING DATE:	April 12, 2017
AGENDA ITEM:	2.E
AGENDA TITLE:	RWQCB Issuance of Waste Discharge Requirements (WDR) for the Pure Water Monterey Project
PREPARED BY:	Robert Jaques, Technical Program Manager

When I reviewed the proposed Final WDR to be issued for this project I found that the comments on the Draft WDR in the letter mailed by the Watermaster to the RWQCB in January 2017 had not been addressed. When I inquired of the RWQCB about this the staff member handling this matter stated he had not received the comment letter, but that if I resent it to him electronically he would review and consider it in his staff report to his Board.

Some of the Watermaster's comments were addressed by revisions to the Draft WDR, but the RWQCB staff indicated that they did not have the authority to require the project owners to take some of the actions requested by the Watermaster. Those requests were to have the Watermaster included on the distribution list of documents pertaining to monitoring reports and sampling protocols for the project, once it goes into operation. The RWQCB agreed that having those documents sent to the Watermaster was a good idea and recommended that the Watermaster make those requests directly to MRWPCA. I subsequently sent a letter containing those requests to MRWPCA.

The portion of the RWQCB Staff Report pertaining to the Watermaster's comments, which was included in the RWQCB's March 9, 2017 meeting agenda packet, is attached.

The WDR adopted by the RWQCB on March 9, 2017 is available at this link:

http://www.waterboards.ca.gov/centralcoast/board_decisions/adopted_orders/2017/monterey_pure/pwm_order_and_mrp.pdf

ATTACHMENTS:	Portion of the RWQCB Staff Report pertaining to the Watermaster's comment letter on the Pure Water Monterey Project's WDR, from the RWQCB's March 9, 2017 meeting agenda packet
RECOMMENDED ACTION:	None required – information only

STATE OF CALIFORNIA
REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL COAST REGION

SUPPLEMENTAL SHEET FOR REGULAR MEETING OF MARCH 7-9, 2017
Prepared on March 3, 2017

ITEM NUMBER: **16**

SUBJECT: Waste Discharge Requirements and Water Reclamation Requirements for the Pure Water Monterey Advanced Water Purification Project, Monterey Regional Water Pollution Control Agency, Monterey County

KEY INFORMATION: Staff did not receive a comment letter dated January 12, 2017, from the Seaside Basin Watermaster until February 22, 2017. The Watermaster contacted staff when the agenda material on this matter did not contain their comment letter in the associated documents. This supplemental sheet contains the Watermaster's comments and Water Board staff's responses. This supplemental also contains staff-proposed changes requested by the Discharger subsequent to their comment letter and typo corrections.

Seaside Basin Watermaster Comments and Water Board Staff Responses

1. In Section V of the Findings, paragraph number 30 states that the storage capacity of the "subbasin" is estimated to be 1,000,000 acre-feet (af). Our consultants have estimated that the storage capacity of the adjudicated Seaside Basin is approximately 52,000 af. The storage volume stated in the WDR appears to be significantly overstated.

Staff Response: California Groundwater Bulletin 118 for the Salinas Valley Groundwater Basin, Seaside Area Subbasin states in relevant part: "The storage capacity of the subbasin was estimated to be 1,000,000 af based on the storage of 630,000 af of groundwater in the southern half of the subbasin (Muir 1982)." No changes will be made to the Order.

2. In Section V of the Findings, paragraph number 31 states that the Seaside Groundwater Basin Salt and Nutrient Management Plan was submitted to the RWQCB by the Monterey Peninsula Water Management District in 2014, but has still not been adopted by the RWQCB. Please explain what is preventing adoption of that Plan and what additional information or steps will be needed in order for it to be adopted.

Staff Response: The draft Seaside basin SNMP lacks measurable objectives and specific implementation actions that would result in tangible water quality protection or improvement over time. The SNMP incorrectly states that native groundwater quality is not a high-quality water resource per antidegradation policy and incorrectly concludes that an antidegradation analysis is not required. Water Board staff does not intend to recommend that the Water Board adopt the Seaside SNMP because the plan does not meet the intent of the Recycled Water Policy. However, we will use information included in the SNMP as appropriate when permitting projects.

3. Many of the Water Quality Goals listed in Table 1 (page 8) of the WDR are missing from the list of constituents in the Recycled Water Reinjection Discharge Limits in Table 4 (page 15) of the WDR. All of the goals should be included in that table, or required elsewhere in the WDR.

Staff Response: Staff revised Table 1 to more closely match Table 4. The pollutants now listed in Table 1 either have effluent limits associated with them or are metals of concern due to high concentrations in existing groundwater (see Table 2). Advanced treatment systems such as the one proposed do an excellent job at removing metals, and staff therefore proposes that no effluent limits are needed for those metals. It is not necessary to list in the order the water quality goal for every possible pollutant.

Seaside Basin Watermaster Requests

1. That the WDR include language stating that all of the reports required under the Monitoring and Reporting Program (in Section I thereof) also be sent to the Watermaster at the same time they are sent to the RWQCB. Sending them directly to the Watermaster, rather than relying on other blanket forms of notification, will ensure that important information contained in those reports is not missed or delayed in receipt, so that the Watermaster can take response actions, if appropriate.

Staff Response: While we agree that MRWPCA should send monitoring reports directly to the Watermaster, the Water Board does not have the authority to require that monitoring reports be sent to outside entities. The Watermaster should make this request to directly to MRWPCA.

2. That a description of the monitoring program protocols required under Section II.3 of the Monitoring and Reporting Program also be sent to the Watermaster, for our use in preparing various reports and in compiling other information for our Annual Report to the Court.

Staff Response: The Water Board does not have the authority to require that MRWPCA provide the written groundwater sampling protocols referenced in MRP section II (3) to the basin Watermaster. The Watermaster should make this request to directly to MRWPCA.

SEASIDE BASIN WATER MASTER TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	April 12, 2017
AGENDA ITEM:	3
AGENDA TITLE:	Discussion of Response to Board Questions and Comments about HydroMetrics' Technical Memorandum - *Seaside Groundwater Basin Analysis of Wells Sampled in December 2016*
PREPARED BY:	Robert Jaques, Technical Program Manager

SUMMARY:

At its February 8, 2017 meeting the TAC approved HydroMetrics' Technical Memorandum - *Seaside Groundwater Basin Analysis of Wells Sampled in December 2016.* The Memorandum was presented to the Board at its March 1, 2017 meeting and the Board accepted it, but several questions or comments were raised by Board members that warrant a response, as follows:

1. Comment: Mayor Edelen of Del Rey Oaks noted that acts of vandalism and other things have occurred on the former Fort Ord, sometimes in an apparent effort to block redevelopment projects. He wanted to know if it was possible that someone could have contaminated any of the Sentinel Wells.

   Proposed Response: The monitoring well heads are located in boxes that have bolted-down steel covers. Within these boxes the actual top of the well casing, which is made of PVC, has a PVC cap on it. While it would be possible for someone with the proper sized wrench to open the cover and remove the cap in order to introduce a contaminant into the well casing, this seems unlikely given the remote locations of the Sentinel Wells. Also, the higher chloride levels were found in the lower portion of the wells, not in the shallower portions of the wells, so if a substance containing a high concentration of chloride were poured into the well casing, it would logically appear in the upper portion of the casing at a higher concentration than it would in the lower portion of the casing. However, in response to this concern, the well heads are being outfitted with lockable caps which will be installed prior to the next sampling event at these wells.

   Comment: Mr. Sabolsice wondered if spikes in the water levels in two of the recent years at Sentinel Well SBWM-4 could have been caused by injection of water into the ASR wells. The TAC will check to determine if groundwater levels spike in winters when water is available for ASR injection, and if groundwater levels do not spike as much in winters when little or no water is available for ASR injection.

   Proposed Response: This is one of the Sentinel Wells that is partially in the Santa Margarita aquifer, and therefore it is possible that the water level in this well could be raised by injection of water into the ASR wells.

2. Comment/Question: HydroMetrics recommended in the Technical Memorandum that instead of doing Sentinel Well sampling in January and July, those dates be changed to March and September which correspond to the months when the highest and lowest water levels are typically experienced. Mayor Rubio noted that changing the sampling times would alter the historic pumping data trends. If samples were taken at both the old dates and the recommended new dates, what would be the additional cost to collect and analyze the samples?

   Proposed Response: Derrik Williams commented that it would be better to make the change in sample collection dates now, rather than waiting until a future time, and that it was likely not worth the expense of taking samples on both the old as well as the new dates, since the old and new dates are

AGENDA ITEM:	3 (Continued)

only two months apart. However, if data from the new sampling dates creates new questions or concerns, or the change in the data results is so great that conclusions cannot be drawn, then it could be worthwhile to conduct future sampling on both sets of dates.

The current cost for sampling and induction logging the four Sentinel Wells twice per year, as contained in RFS No. 2017-01 to Martin Feeney, is $25,685.56. That figure includes performing induction logging as well as collecting and analyzing the water quality samples.

Mr. Feeney provided a cost estimate to perform water quality sampling four times per year (duplicate water quality sampling), and to perform induction logging only two times per year (as is currently being done), as shown in the attachment. The estimated cost to perform this work is approximately $38,546. Thus, there would be approximately $12,900 per year in additional costs to conduct this duplicate water quality sampling.

ATTACHMENTS:	Cost Estimate from Martin Feeney to conduct duplicate water quality sampling
RECOMMENDED ACTION:	Approve the Technical Program Manager's proposed responses as presented, or modify them

Estimated Costs to Perform Water Quality Sampling Four Times a Year (January, March, July, and September) and to Perform Induction Logging Only Two Times a Year (either January and July, or March and September)

		SENTINEL WELLS LOGGING/SAMPLING WL DATA COLLECTION PROGRAM					
			2017				
Pacific Surveys			Unit Cost	Number	Event Cost	# per annum	Annual Cost
	Service Charge		1085	1	1085	4	$ 4,340.00
	Induction Logging		0.75	5310	3982.5	2	$ 7,965.00
	Rinse Only Depth Specific Samples		275	28	7700	1	$ 7,700.00
	E-file generation/transmittal		115	1	115	2	$ 230.00
	mileage		0.99	422	417.78	4	$ 1,671.12
	per diem		175	2	350	4	$ 1,400.00
							$ 23,306.12
Lab Costs							
	General Mineral Analysis plus Ba and I		225	28	6300	1	$ 6,300.00
Professional Services							
	Supervise Logging/Download Data Loggers		165	10	1650	4	$ 6,600.00
	Process Induction Data		195	4	780	2	$ 1,560.00
	Transmit Water Level Data		195	2	390	2	$ 780.00
							$ 8,940.00
						Total	$ 38,546.12

SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

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

MEETING DATE:	April 12, 2017
AGENDA ITEM:	4
AGENDA TITLE:	Continued Discussion of Work Plan to Investigate Cause(s) of Changing Water Quality in Sentinel Wells and Approvals to HydroMetrics and Martin Feeney to Perform the Initial Portions of the Work Plan
PREPARED BY:	Robert Jaques, Technical Program Manager

SUMMARY:

At its February 8, 2017 meeting the TAC approved:

1. Carrying out Phase I (the initial work) of the Work Plan developed by HydroMetrics to try to identify the source of fluctuating chloride concentrations in the Sentinel Wells, and
2. That downhole conductivity and temperature profiling of these wells be conducted by Martin Feeney as part of the Phase I work.

The HydroMetrics portion of this work was for $25,600 and Martin Feeney's portion of this work was for $5668.24. I have attached the HydroMetrics proposal from the February 8 meeting, and Martin Feeney's proposal, to provide background information on this matter.

This recommendation was presented to the Board at its March 1, 2017 meeting. The Board discussed the recommendation and sent the item back to the TAC for further discussion, rather than approving it.

I was not able to attend the March 1 Board meeting myself, so I spoke with Eric Sabolsice, the Cal Am Board member, as well as with Derrik Williams (who made the in-person presentation to the Board on this item) and to the Watermaster's Administrative Officer Laura Dadiw who attended that meeting, to get as clear a possible understanding of why the Board decided not to approve the TAC's recommendations.

The principle concerns on the part of the Board about proceeding with this work seemed to be:

- There is a significant cost in performing the Phase I work (total of approximately $31,200) but there is no assurance that carrying out Phase I of the proposed Work Plan would lead to a definitive determination as to the source(s) of the fluctuating chloride concentrations.
- Lacking a conclusive result from the Phase I work, significant additional costs might be associated with moving ahead with the Phase II work.
- Is it really essential to move ahead at this time with the Work Plan, or would it be better to wait to make that decision until after the summer 2017 water quality sampling has been completed so we will be able to see if the chloride levels are more in keeping with their historical levels, or whether ongoing water quality changes are occurring?

I discussed the fluctuating chloride levels with Tamara Voss, the MCWRA representative on the TAC who has considerable experience and expertise in evaluating groundwater quality data in conjunction with looking for signs of seawater intrusion. It is her belief that the fluctuations that appeared in the July 2016 samples are NOT indications of seawater intrusion coming in from Monterey Bay, but rather are indicative of some other water source contributing chlorides to the samples. Similarly, Mr. Feeney is of

AGENDA ITEM:	3 (Continued)

the belief that the increase in chloride levels is being caused by something other than incoming seawater intrusion from Monterey Bay.

I discussed this matter with HydroMetrics and they said they are comfortable with deferring a decision on the Work Plan until after the summer sampling data has been received and analyzed. That sampling will be performed in September starting this year, rather than in July as it has been performed in the past, as recommended in HydroMetrics' Technical Memorandum that the TAC approved and the Board accepted at their last respective meetings. All of these parties, however, agreed that conducting the downhole conductivity and temperature profiling late this summer would add valuable information at modest cost, and should therefore be performed.

My recommendation is that the TAC revise its recommendation to the Board to be as follows:

1. Do not proceed with Phase I of the Work Plan at this time. Defer the decision on whether or not to proceed with the Phase I work until after the summer 2017 water quality data has been received and analyzed.
2. Approve Amendment No. 2 to RFS No. 2017-1 with Martin Feeney in order for him to conduct the downhole conductivity and temperature profiling late this summer, because it will add valuable information at modest cost ($5,668.24).

ATTACHMENTS:	1. HydroMetrics Proposed Work Plan and Cost Proposal to Investigate Sources of Fluctuating Chlorides in the Sentinel Wells 2. Martin Feeney's Proposal to Perform Conductivity and Temperature Profiling of the Sentinel Wells
RECOMMENDED ACTION:	Approve the Technical Program Manager's recommendation as presented, or modify it

HydroMetrics WRI

1814 Franklin St., Suite 501
Oakland, CA 94612

Mr. Robert S. Jaques
Seaside Groundwater Basin Watermaster
83 Via Encanto
Monterey, CA 93940

February 2, 2017

Subject: Proposed Work Plan to Investigate Sources of Fluctuating Chlorides in the Sentinel Wells

Mr. Jaques:

This letter outlines a proposed Work Plan to investigate sources of fluctuating chloride in some of the Seaside Basin's coastal sentinel wells. Preparation of the Work Plan was approved at the Technical Advisory Committee's January 11, 2017 meeting.

The Work Plan objectives are:

1. Investigate the source(s) of elevated chlorides.
2. Determine the mechanism causing the chloride fluctuations observed in recent groundwater samples.

Objective 1 – Investigate the Source of Elevated Chlorides

No single water quality analysis, or ratio between water quality constituents, can definitively differentiate between potential sources of chloride. This is partially because the source of the elevated chlorides may be from similar sources, e.g. ocean water. Figure 1 shows a number of potential salinization mechanisms, with three mechanisms highlighted are potential mechanisms introducing higher chloride water to the groundwater basin. Upwelling is not shown on Figure 1. The source of any potential upwelling water is the underlying Monterey Shale, which is a marine sediment containing connate water (seawater trapped at the time of sedimentation) that reflects its marine origin. The differences in the water chemistry of the various sources reflect

the amount of time the saline water has been separated from the ocean, and the amount of time the saline water has interacted with sediments. The proposed analyses can assess whether the chlorides are from recent seawater, or seawater that has been in contact with sediments for an extended period of time. Seawater intrusion, however, could occur through sediments that have had seawater in them for an extended period of time (bottom arrow on Figure 1), and that are geochemically similar to connate water. For this reason, the analyses may not definitively identify the source of the chlorides.

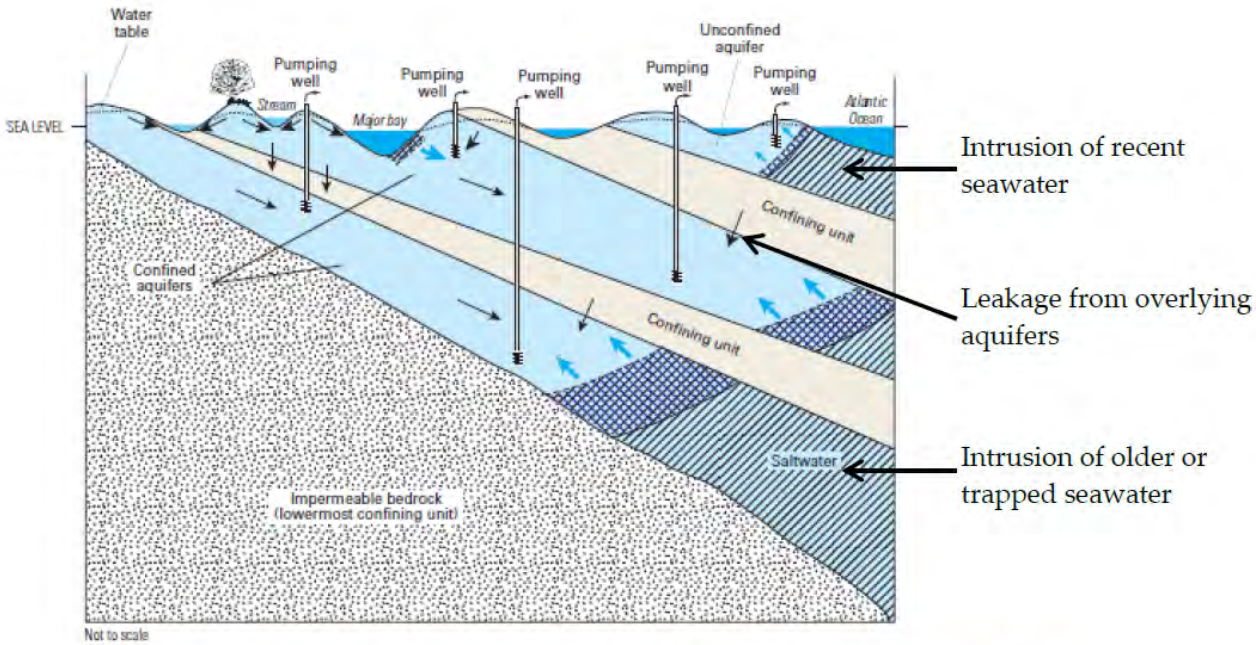

Figure 1: Potential Salinization Mechanisms (from Barlow, 2003)

As described above, comparing results from a number of analyses can suggest the source of elevated chlorides, although not always definitively. Typically, all or a combination of the following analyses are undertaken to investigate chloride sources (Izbicki et al., 2005; Martin, 1984; Klassen et al., 2014):

- Physical properties (temperature, pH, specific conductivity);
- Major-ion composition (piper and stiff diagrams; Na/Cl, Ca/Mg, Ca/(HCO_3 and SO_4), and Cl/EC plots);
- Selected minor ion and trace-element concentrations: boron, iodide, bromide, and barium;
- Minor ion ratio vs. chloride plots, e.g., Cl/Br vs. Cl, Cl/I vs. Cl, Cl/Ba vs. Cl, Cl/B vs. Cl); and
- Isotopic composition of groundwater using the stable isotopes of deuterium in hydrogen, oxygen-18 in oxygen, sulfur-34 in sulfur, and carbon-13 in inorganic carbon.

To control the costs of differentiating between differing chloride sources, we have divided the chloride source assessment into two phases.

Phase I

Phase I will compare the groundwater quality from the Northern Coastal Subarea with (1) seawater and (2) the groundwater quality in selected Laguna Seca wells or other nearby wells that are influenced by connate water in the underlying Monterey Shale. Most of the analyses on major ions are already included in the annual SIARs, but they do not provide an indication of the source(s) of the elevated chloride levels in the Sentinel Wells.

For Phase I, we recommend focusing analyses on the minor ions of boron, iodide, bromide, and barium, and including some additional major ion analyses as listed in the bullets below. The minor ion analyses were also recommended in the 2016 SIAR and have been used together with other indicators in similar studies to determine chloride sources in Santa Barbara and Oxnard (Martin, 1984 and Izbicki et al., 2005, respectively). The Watermaster has been analyzing samples from selected coastal monitoring and production wells for iodide, bromide, boron, and barium since 2012. Figure 2 shows the location of wells with minor ion data.

The Phase I work will consist of:

- Compare chloride to iodide ratios. Iodide is strongly depleted in seawater as a result of biological sequestration by marine organisms, such as kelp. Enriched iodide in groundwater indicates long residence time where iodide has had the opportunity to leach out of the sediments and may build up in groundwater (Kim et al., 2002). Changes in the chloride to iodide ratio in high-chloride water are often diagnostic of the source of high-chloride water in coastal aquifers (Kim et al., 2002).
- Compare barium concentrations. High barium concentrations are presumptive (but not conclusive) evidence that the source of high chloride in groundwater might be from the underlying Monterey Shale and not seawater. Barium is a reactive chemical constituent. Its concentrations may provide a means of determining whether ocean water or water from the Monterey Shale is the source of increasing chloride levels in the groundwater. The concentration of barium in seawater is typically less than 100 μg/L, whereas its concentration in groundwater from connate water sources is generally greater.

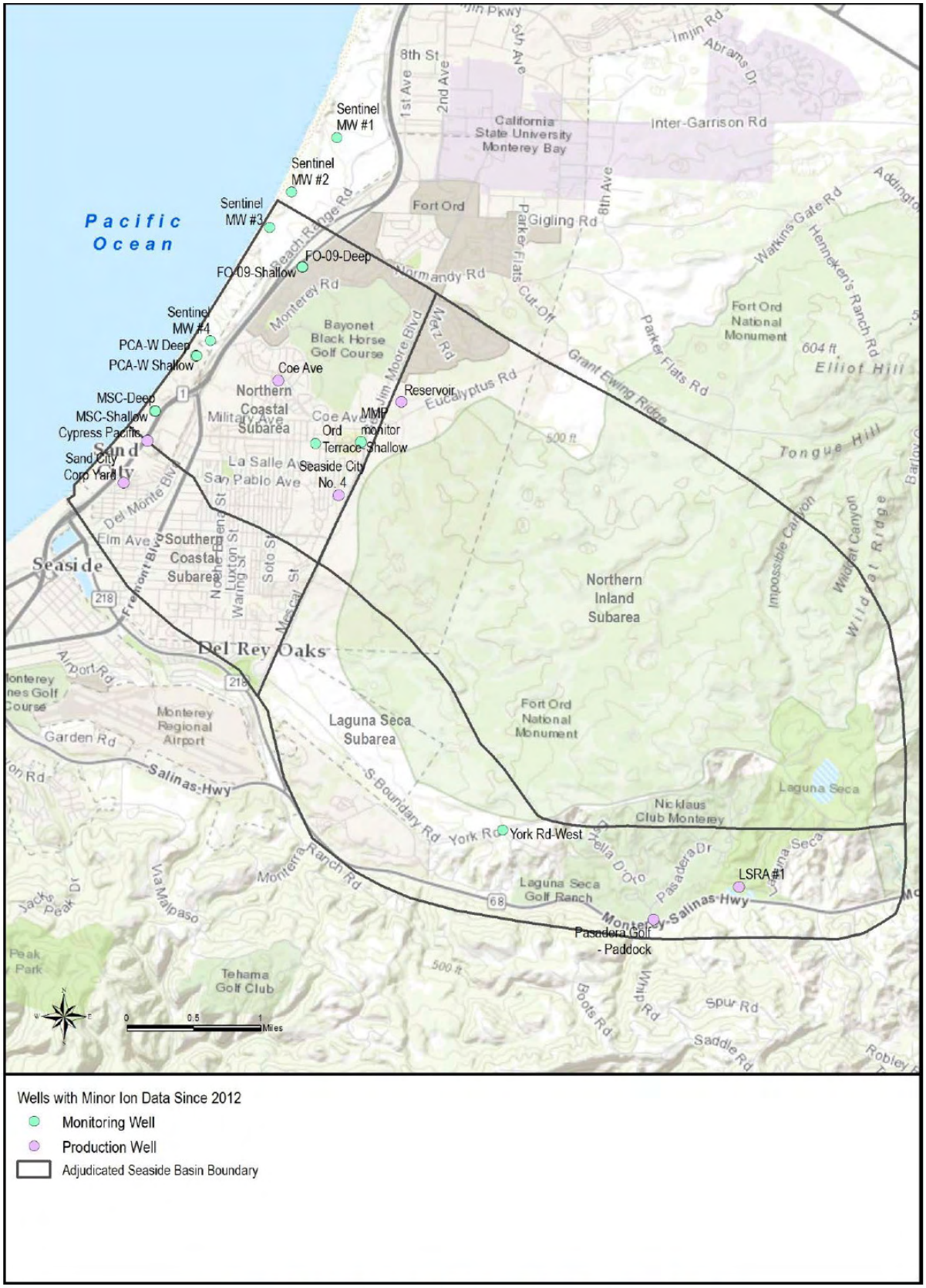

Figure 2: Location of Wells with Minor Ion Data

- Compare chloride to boron ratios. Chloride-to-boron ratios in the higher-chloride groundwater samples in the Sentinel Wells that are substantially less than the ratio for seawater is presumptive evidence that the source of the increased chloride levels is groundwater from the underlying Monterey Shale.
- Compare chloride to bromide ratios. Bromide is a generally nonreactive dissolved species, and like chloride, it behaves conservatively in groundwater environments (i.e., it does not take part in significant ion exchange reactions, nor are adsorbed onto mineral surfaces). Seawater typically has a bromide concentration of about 67 mg/L. Chloride-to-bromide ratios plotting along the native freshwater/seawater mixing line (blue line on Figure 2) may indicate evidence of groundwater mixing with seawater.

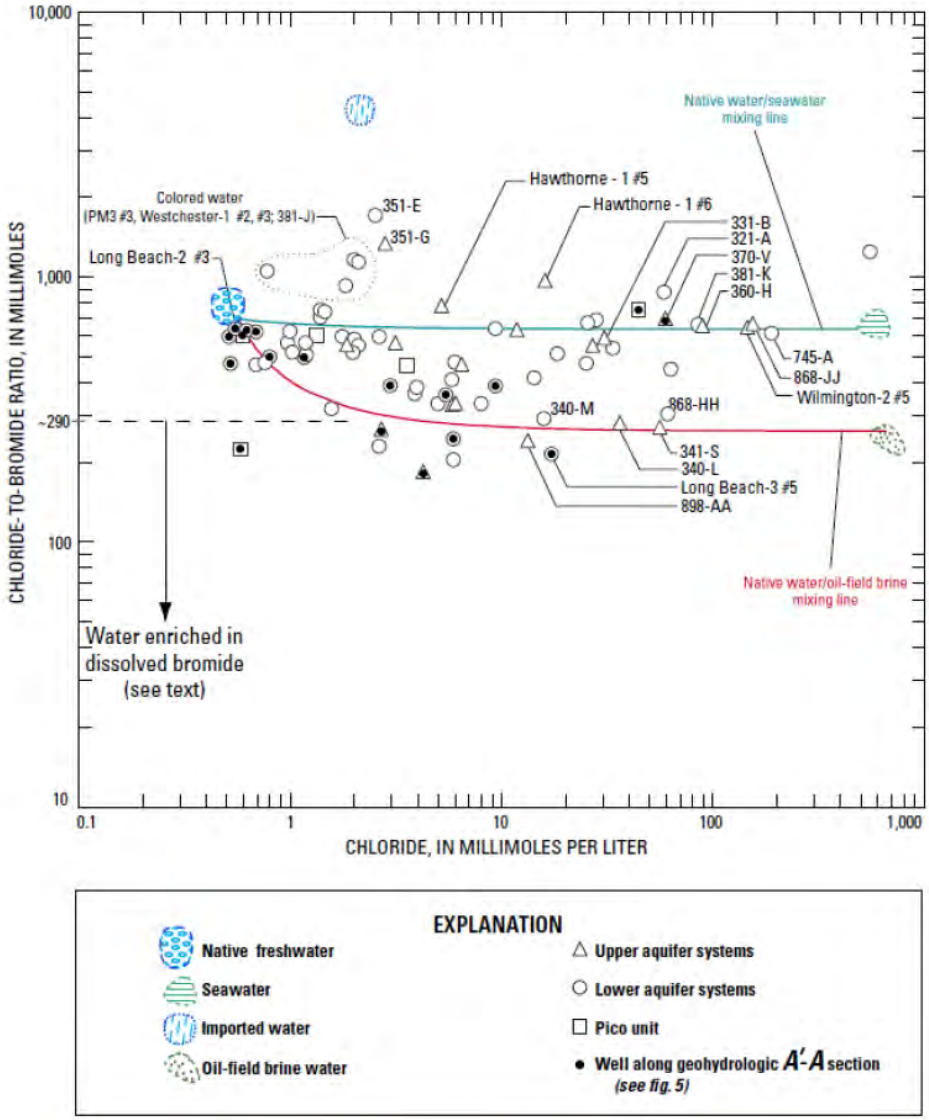

Figure 3: Example Chloride-to-Bromide Ratio of a Function of Chloride (from Land et al., 2004)

- Investigate whether calcium enrichment has occurred in any coastal monitoring wells. Evaluate whether calcium enrichment is taking place by plotting ratios of Ca/Mg and Ca/(HCO_3 and SO_4). Calcium enrichment may be occurring if Ca/Mg > 1 and Ca/(HCO_3 and SO_4) > 1. If it calcium enrichment is taking place, it may indicate incipient seawater intrusion.
- Profiling conductivity and temperature within each of the Sentinel Wells when they are next sampled in September/October 2017 may indicate whether upwelling is occurring within the wells.

Phase II

If determination of the source of elevated chloride levels in the Sentinel Wells from Phase I is inconclusive, it may be necessary to evaluate the isotopic composition of the coastal groundwater as a second phase of study. Isotopic analysis may be used to distinguish between waters of similar chemical character and to understand the source and movement of groundwater near the coast. Typically, the stable isotopes of deuterium in hydrogen and oxygen-18 in oxygen are the only isotopes analyzed. However, in Oxnard, Izbicki et al. (2005) included analysis of the stable isotopic composition in sulfur and inorganic carbon to evaluate the source of these dissolved constituents and to evaluate geochemical processes that may have altered their concentration and isotopic composition over time. If this phase is necessary, laboratory analyses will be needed from either Lawrence Livermore Laboratory, U.C Santa Cruz, University of Arizona or the USGS. If Phase II is required, a detailed work plan will be developed for TAC and Board approval.

Objective 2 – Mechanism for Fluctuating Chloride Concentrations

To determine a mechanism for the fluctuations in chloride concentrations in the Sentinel Wells, we will first need to identify the likely source of chloride (Objective 1) and also examine groundwater quality results from the October 2017 sampling event. These data are key to establishing a relationship between groundwater levels and chloride fluctuations.

As part of the analysis of fluctuating chloride concentrations, we propose to use a specialized diagram that can be used to categorize the hydrochemical environment of water types, also known as a hydrochemical facies evolution diagram (Figure 3) that has been used to track the onshore (intrusion) and offshore (freshening) movement of seawater in aquifers (Giménez-Forcada, 2010). Using the percentage content of principal major ions, the multi-rectangular diagram classifies groundwater by hydrochemical environment.

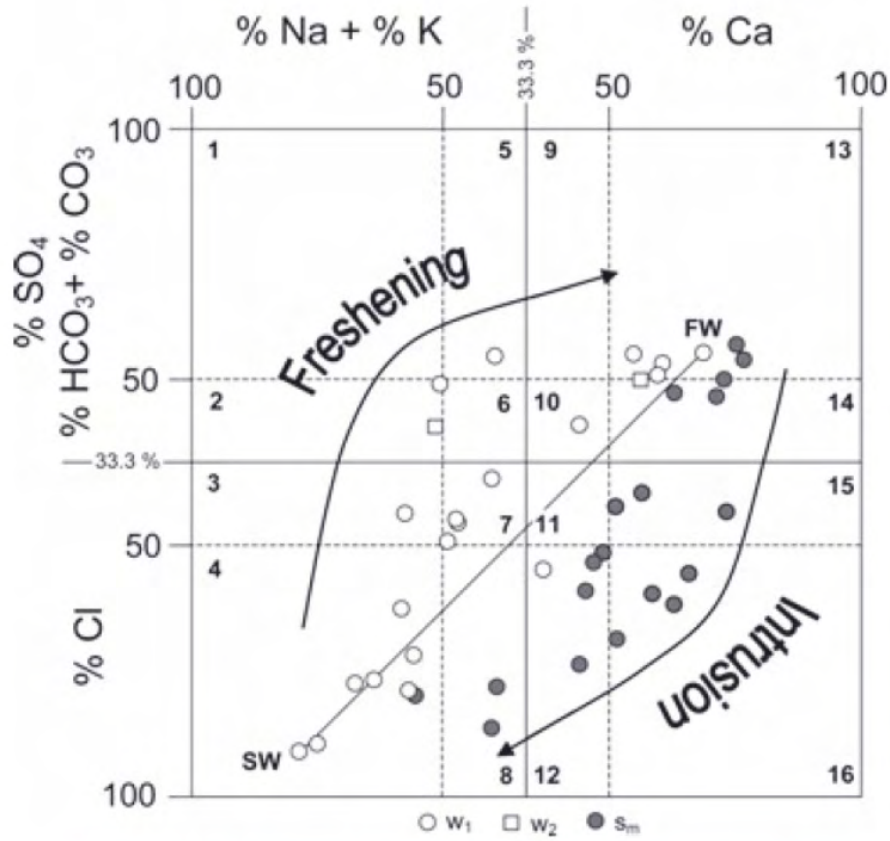

Figure 4: Example Hydrochemical Facies Diagram

References

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United States Geological Survey. 1996. Seawater intrusion in a coastal California aquifer. Fact Sheet 6.

Estimated cost for Phase I

The estimated cost for Phase I (Objectives 1 and 2) are included in Table 1 at the end of this Work Plan. Work to investigate the source of elevated chlorides can be completed within six weeks from receiving a notice to proceed. However, work on determining the mechanism causing the chloride fluctuations can only be completed in November 2017 once the 4th quarter samples have been analyzed and conductivity and temperature profiling has been completed.

It is assumed that HydroMetrics WRI will prepare for and attend two TAC meetings by phone to present the results. The cost estimate includes time for Derrik Williams to present study results in-person at up to two Board meetings, if needed.

Please call if you have any questions.

Sincerely,

Georgina King, Principal Hydrogeologist
HydroMetrics Water Resources Inc.

Table 1: Cost Estimate for Phase I

Phase I Tasks	HydroMetrics WRI Labor				Other Direct Costs	TOTALS
	Derrik Williams	Georgina King	Labor Total			
	President	Principal Hydrogeologist				
Rates	$220	$195	Hours	($)	($)	($)
Task 1. Characterize Monterey Shale Groundwater Chemistry	2	12	14	$ 2,780	$ -	$ 2,780
Task 2. Analyze Major Ions	1	8	9	$ 1,780	$ -	$ 1,780
Task 3. Analyze Minor Ions	2	16	18	$ 3,560	$ -	$ 3,560
Task 4: Analyze Conductivity and Temperature Profiling Data	2	8	10	$ 2,000	$ -	$ 2,000
Task 5: Prepare Technical Memorandum with Charts and Maps	6	32	38	$ 7,560	$ -	$ 7,560
Task 6: Prepare for and Present Results by Phone to TAC (assume 2 meetings)	4	8	12	$ 2,440	$ -	$ 2,440
Task 7: Prepare for and Present Results in Person to Board (assume 2 meetings)	16	8	24	$ 5,080	$ 400	$ 5,480
TOTAL			***125***	***$ 25,200***	***$ 400***	***$ 25,600***

Notes

Cost estimate does not include field work related to conductivity and temperature profiling in Sentinel Wells

Other direct costs include per diem, transportation, office supplies, photocopies, postage, and equipment rental

Per diem rate is $150 per day, mileage is at current IRS rate

February 6, 2017

Seaside Basin Watermaster
PO Box 51502
Pacific Grove CA.
93950

Attention: Bob Jaques, PE

Subject: Sentinel Well Data Collection Program 2017– Amendment No. 2 to RFS No. 2017-01

Dear Bob:

Following up on our discussions, I'm pleased to provide this amendment to the existing scope of work for assistance with the Seaside Basin Watermaster (Watermaster) data collection from the Sentinel Wells for the upcoming year. Presented in this proposal are an outline of the new tasks and an estimate of associated costs.

As you are aware, the on-going data collection program has detected fluctuating chloride levels in several of the Sentinel Wells. The cause of these fluctuations is still undermined, but HydroMetrics has developed a workplan to gather new data and further analyze previously collected, but not analyzed, data. Part of this workplan includes continuous electrical conductivity logging of each of the Sentinel Wells. This would be done as part of a separate mobilization of a local geophysical contractor (Newman Well Surveys) to reduce costs and assure that the water column in the wells is not disturbed for the on-going downhole sampling/induction logging effort.

The additional work would include coordination with State Parks and geophysical contractor, supervision of logging activities, review of collected data and transmittal of the data to HydroMetrics. Costs for the above described work is anticipated as follows:

Task Description	**Cost**
Hydrogeologic Services – Office – 4 hours	780.00
Hydrogeologic Services - Field Time – 12 hours	1,920.00
Newman Well Surveys (including 10% markup)	2,968.24
Total	**$5,668.24**

The opportunity to assist is appreciated. Please call if you have any questions.

Sincerely,

Martin Feeney

Newman Well Surveys
6080 Sherry Lee Ln.
Salinas, CA 93907

Fax Quote

Date	Quote #
1/13/2017	1263

831-809-5461

Martin Feeney
P.O.Box 23240
Ventura, CA 93002

Well Name				
Fort Ord State Park				
Item	Qty	Cost	Description	Total
Service Charge	1	550.00	Service Charge	550.00
Res Log	5,240	0.41	Fluid Conductivity Log	2,148.40
Prices good for 90 days			**Total**	$2,698.40

SEASIDE BASIN WATER MASTER TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	April 12, 2017
AGENDA ITEM:	5
AGENDA TITLE:	Discuss HydroMetrics' Scope and Cost Proposal for Updating the Basin Management Action Plan (BMAP)
PREPARED BY:	Robert Jaques, Technical Program Manager

SUMMARY:

At its February 8, 2017 meeting the TAC discussed the topic of updating the BMAP and supported the recommendation to solicit a scope and cost proposal from HydroMetrics to perform that work. Attachment 1 is an excerpt of the agenda transmittal for that item from the February 8 agenda packet.

Attachment 2 is the proposal received from HydroMetrics to prepare the Update. Their proposal includes updating and recalibrating the Groundwater Model as a step that would proceed updating the BMAP. HydroMetrics recommends that the Model be updated and recalibrated in order for the information in the updated BMAP to be as accurate as possible. As shown in Attachment 2, HydroMetrics' proposed cost to update the BMAP is approximately $43,880, and their proposed cost to update and recalibrate the Groundwater Model is approximately $46,160.

Attachments 3 and 4 are excerpts from the previous contracts issued to HydroMetrics to develop the Groundwater Model and to prepare the original BMAP. This previous contract information is provided as background data regarding scope and costs. As shown in Attachment 4 the cost to prepare the original BMAP in 2008-2009 was approximately $74,980. As shown in Attachment 3 the cost to develop the current Groundwater Model was approximately $141,600.

The 2017 Management and Monitoring Program budget is contained in Attachment 5. No amount was provided in that budget to update the groundwater model, and the line-item amount for preparing a BMAP update is $25,000. This is the same amount we have budgeted each year in case the Board decided it wanted to update the BMAP. It is just a placeholder amount, since no specific scope or cost was available when the budgets were prepared. The proposed costs from HydroMetrics are significantly higher than the amounts budgeted for this work. Therefore, I anticipate that the Board will be very reluctant to proceed with the work, at least not at this time, since there currently is no compelling reason to update the BMAP.

It is requested that the TAC develop a list of reasons for performing this work that the Board can consider when they deliberate whether or not to proceed with updating the Groundwater Model and the BMAP, and if the Board wishes to prepare these updates, when that work should be performed.

Here are some reasons that would justify performing the work:

1. Even though pumping in recent years has been close to or even below the Natural Safe Yield (NSY) amount of 3,000 AFY authorized in the Decision, groundwater levels have continued to fall. This suggests that the NSY in the Decision may be too high. An updated value for NSY is needed in order to make proper basin management decisions to prevent seawater intrusion and continued declines in water levels from occurring.

SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

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

AGENDA ITEM:	5 (Continued)

2. In the not-too-distant future the Watermaster will begin interacting with the new Salinas Valley Basin Groundwater Sustainability Agency (GSA) and their consultants. We will need to have up-to-date documents in order to work with them to jointly resolve the problem of declining water levels in the Laguna Seca and Corral de Tierra subareas.

With regard to funding the work, one option for the Board, if they wish to proceed with the proposed work, would be to do some of it this year, and to do some of it next year. For example, the Groundwater Model could be updated in 2017 and the BMAP could be updated early in 2018. This would have the effect of reducing the size of the budget overrun that would be caused by authorizing all of this work to be performed in 2017. Alternatively, all of this work could be deferred until 2018 by including it in the 2018 M&MP budget. Since the work of the new Salinas Valley Basin GSA will likely not get into detailed assessments of the Corral de Tierra subarea until at least sometime in 2018, deferring this work until then would not appear to pose a problem.

ATTACHMENTS:	1. Excerpt from February 8, 2017 TAC agenda packet 2. Scope and Cost Proposal from HydroMetrics to Update the BMAP 3. HydroMetrics RFS Scope and Cost for Original Development of the Groundwater Model 4. HydroMetrics RFS Scope and Cost for Original Development of the BMAP 5. 2017 M&MP Budget
RECOMMENDED ACTION:	Develop a List of Reasons for Board Consideration that Would Justify Updating the Groundwater Model and the BMAP

Attachment 1

Excerpt from February 8, 2017 TAC Agenda Packet

Background

The Basin Management Action Plan (BMAP) summarizes both short-term and long-term strategies to manage the Basin in accordance with the Adjudication Decision and the Watermaster's Management and Monitoring Program. Included in the BMAP are:

- A description of the state of the Seaside Groundwater Basin with emphasis on those basin properties that are called out in the Amended Decision, e.g. groundwater storage, and which have an impact on basin management;
- Potential supplemental supplies that are being considered for long-term augmentation of production from the Seaside Groundwater Basin,
- Potential management actions and interim water supplies that could be implemented in the short-term prior to developing supplemental supplies, and
- Recommended management actions and strategies that the Watermaster should support and/or encourage, which will help meet the groundwater pumping reductions required by the Amended Decision, and help prevent seawater intrusion.

Also discussed in the BMAP are issues from the Decision that the Watermaster is required to address, including (with Decision section shown in parenthesis):

- Determining *Total Useable Storage Space* and allocated storage for each producer in the Basin (III.H.4);
- Addressing efficiencies of storage (III.H.5); and
- Monitoring and studying the Seaside Groundwater Basin and all Seaside Groundwater Basin activities (III.L.3.j.xxi).

This BMAP is one of a number of documents and actions necessary for managing the Seaside Groundwater Basin. It is in effect a seawater intrusion prevention plan that focuses on providing groundwater management options to control groundwater levels, that if allowed to decline would lead to seawater intrusion. This document is intended to be used in coordination with the Watermaster's ongoing activities and the Seawater Intrusion Response Plan. Implementing the recommendations included in the BMAP is intended to result in a number of actions and strategies that will be necessary for effective groundwater management in the Seaside Groundwater Basin.

Discussion

The BMAP is a document for the Watermaster to use to help achieve the following two objectives: (1) bring the Basin into balance (pumping and other losses are less than or equal to natural recharge and inflows so that groundwater levels are stabilized and no longer falling due to overpumping), and (2) bring groundwater levels up to elevations that will prevent seawater intrusion from occurring (these are called "protective levels"). It is the tool for the Watermaster to use to develop plans for future projects or activities that will be needed to achieve these two objectives, after the currently in-progress supplemental water projects (Cal Am's Monterey Peninsula Water Supply Project (MPWSP) consisting of the desalination facilities and the Pure Water Monterey Groundwater Replenishment Project) have been implemented.

Numerous studies and evaluations have been performed after the BMAP was prepared in February 2009. These include:

1. Development of a groundwater model (updated with data through September 2013).

2. Development of protective groundwater elevations at the coast.
3. Modeling of the impacts of Cal Am's MPWSP on groundwater levels in the Seaside Basin.
4. Modeling the impacts of Cal Am's 700 AFY-for-25 years over-pumping payback plan.
5. Modeling of the potential benefit of installing coastal injection wells to form a seawater intrusion barrier.
6. Modeling of the Laguna Seca Subarea and the causes of declining groundwater levels in that subarea.
7. Modeling of the impacts of MRWPCA's Pure Water Monterey groundwater replenishment project. Some of this analysis takes into account recent operating assumptions on Cal Am's MPWSP.

In addition considerable additional data (8 years worth) on groundwater quality and groundwater levels throughout the Basin have been collected since the BMAP was prepared. Drought conditions have also been experienced over the past four years, which has impacted aquifer recharge more than anticipated in 2009. Also, even though pumping in recent years has been below the amounts authorized in the Decision, groundwater levels have continued to fall. This suggests that the Natural Safe Yield of 3,000 AFY in the Decision may be too high.

Integrating this information into an updated BMAP would be beneficial to provide a more complete understanding of the state of the basin. This information could also be used to refine the earlier findings, conclusions, and recommendations contained in the 2009 BMAP. An updated BMAP could provide improved knowledge of:

1. The useable quantities of groundwater stored in the basin.
2. The annual loss of storage in the basin due to overpumping. (The BMAP estimated this to be between 1,300 and 1,430 AFY).
3. The Natural Safe Yield of the basin. (This is the quantity of water than can be extracted through pumping while achieving the first of the two objectives listed above. The Decision set this at an assumed value of 3,000 AFY).

Specific portions of the BMAP that would benefit from being updated include:

1. The listing and discussion of Supplemental Water Supply Projects in Section 3 of the BMAP. The BMAP explains that implementing the projects listed in this section would help to halt the decline in groundwater levels, but would not create protective water levels throughout the basin, thus leaving the basin vulnerable to seawater intrusion at some unknown future date. Additional supplemental water supplies will be needed to achieve protective water levels.
2. The northern and eastern boundaries of the Basin have been determined to be dynamic rather than static boundaries. This means that they can move depending on pumping rates and other changeable conditions. More may be known now about these boundary conditions, as a result of the modeling work that has been done, than was known when the BMAP was prepared. Integrating this knowledge into the BMAP might help produce more accurate projections of future groundwater conditions in the basin.
3. The optimal locations of extraction wells to make the most efficient use of useable stored groundwater would benefit from being updated based on the data obtained since the BMAP was prepared.
4. The listing of Groundwater Management Actions in Section 4 of the BMAP is out of date and would benefit from being updated to reflect actions that have already been taken as well, actions that are no longer viable, and potential future actions that could be taken.
5. The Recommendations contained in Section 5 of the BMAP would benefit from being updated to reflect actions that have already been taken and to identify future actions that could be taken to achieve the two objectives listed above.
6. Development of a long-term financing plan for replenishment water, as discussed in Section 5, would be especially beneficial, since the monies collected through the Decision-mandated Replenishment Assessment process do not address the acquisition of replenishment water to offset overpumping that occurred <u>prior</u> to the date of the Decision.

7. In addition, the Watermaster's Seaside Basin Groundwater Model is currently only updated to end of WY2013. HydroMetrics recommends updating the model to reflect the last three years of data. HydroMetrics did some modeling for the Pure Water Monterey Project, but the purpose of that modeling was to see if the Project would harm the Basin, not to see if groundwater levels would rise to protective elevations.

Recommendation

Update the BMAP to:

- Reflect the additional information obtained since the 2009 BMAP was prepared.
- Provide an updated listing of findings, conclusions, and recommendations.
- Provide an updated listing and description of potential future actions that the Watermaster could consider taking to bring the basin into balance and to achieve protective groundwater elevations that will prevent seawater intrusion from occurring in the future.

Attachment 2

HydroMetrics WRI

1814 Franklin St., Suite 501
Oakland, CA 94612

Mr. Robert S. Jaques
Seaside Groundwater Basin Watermaster
83 Via Encanto
Monterey, CA 93940

March 24, 2017

Subject: Scope and Cost to Update the Seaside Basin Management Action Plan

Mr. Jaques:

Thank you for the opportunity to provide you with this scope and cost to update the Seaside Groundwater Basin's Basin Management Action Plan (BMAP). The scope we have put together addresses the BMAP items that were presented at the February 2017 Technical Advisory Committee meeting.

The Watermaster's first BMAP was completed in February 2009 (HydroMetrics LLC, 2009a). The BMAP constitutes the basic plan for managing the Seaside Groundwater Basin. The BMAP identifies both short-term actions and long-term strategies intended to protect the groundwater resource while maximizing the beneficial use of groundwater in the basin. It provides the Watermaster a logical set of actions that can be undertaken to manage the basin to its Safe Yield. Over the eight years since the BMAP was completed, the Watermaster has collected much groundwater level and quality data, and conducted various studies to improve the understanding of the basin. This improved understanding should be incorporated into an updated BMAP to facilitate ongoing responsible management of the groundwater resource.

At the time the 2009 BMAP was prepared, a groundwater model had not yet been developed for the basin, and the analysis contained in the BMAP was completed using analytical methods. Following the BMAP recommendation that a groundwater model be constructed to assist with groundwater management decisions, a calibrated model was completed in November 2009 (HydroMetrics LLC, 2009b). The model simulated

groundwater conditions in the basin between January 1987 and December 2008. In 2014, the model was updated with data through September 2013 (HydroMetrics WRI, 2014) but not recalibrated because its accuracy was still acceptable. The 2014 update found that the uncalibrated portion of the model (January 2009 – September 2013) tended to simulate higher groundwater levels than measured levels. Periodic recalibration of the model is necessary to ensure the model simulates groundwater levels within an acceptable industry standard accuracy. If simulated groundwater levels are not accurate this reduces the accuracy of all output from the model such as groundwater storage and water budget.

The scope of work provided below assumes the model will be used to develop estimates of groundwater storage, water budget, and safe yield; and to test impacts of potential management actions. The groundwater model was developed to assist in making basin management decisions, and for providing the simulated results that are required for analysis in the BMAP. As the model currently only includes input data through September 2013, groundwater storage, water budget, and safe yield estimates can only reliably be obtained from the model up through Water Year 2013. The model needs to be updated through Water Year 2016 to be used for current estimates. It is likely recalibration of the model will be required so that it more accurately simulates the historic low groundwater levels currently occurring in the basin.

The scope outlined below starts with an update and recalibration of the groundwater model, and then generally updates each of the main sections of the BMAP.

Task 1: Update Seaside Basin Groundwater Flow Model.

Subtask 1.1. Update Model Input Data.

Groundwater production, groundwater levels, injected water, and precipitation data will be sourced and compiled for input into the groundwater model. In addition to precipitation, estimates of storm water percolation, septic tank leakage, and system losses are also needed as they all contribute to the recharge of the basin. Most data are already available from MPWMD or Watermaster, but some other pumpers such as Cal Water Service and Marina Coast Water District, which do not fall under the Watermaster will be contacted for their data.

The updated model input data will be incorporated into the groundwater model. Once the model has been updated and is successfully running, hydrographs comparing measured and simulated groundwater levels will be prepared. The hydrographs produced will be the same ones used in the 2009 model report.

Subtask 1.3. Model Recalibration.
Model calibration is a process that involves varying relatively uncertain and sensitive parameters such as horizontal and vertical hydraulic conductivities, over a reasonable range of values. Calibration will be completed when simulated results match the measured data within an acceptable measure of accuracy, and when successive calibration attempts do not notably improve the calibration statistics. Estimating the effort involved in model calibration is difficult because there is no defined set of steps that can be followed. The costs provided with this scope reflect our best estimate, but additional costs may be necessary to complete calibration successfully.

Subtask 1.4. Model Update Technical Memorandum.
A Draft Technical Memorandum will be prepared documenting the model update and calibration results. After presenting the Tech Memo to the TAC and receiving comments, a Final Tech Memo will be prepared for submission to the Board. For purposes of the cost estimate, we have assumed HydroMetrics WRI will present the findings to the TAC and to the Board. One presentation will be in-person and one will be by telephone.

Task 2: Update BMAP Section 2 - State of the Seaside Groundwater Basin.
Subtask 2.1. Update Basin Conceptual Model. Since the 2009 BMAP was completed, a significant amount of modeling has been undertaken that has assisted in improving our hydrogeologic understanding of the basin. In particular, it has been found that the northern and eastern boundaries of the basin are dynamic and therefore change depending on pumping and recharge conditions. How this affects the movement of groundwater across the boundaries is important for managing the basin's groundwater resource.

Subtask 2.2. Analyze Groundwater Levels Trends. Since 2009, eight years of groundwater level data have been collected, some of it using data loggers that record groundwater levels multiple times a day. This has allowed us to vastly improve our understanding of both seasonal and long-term trends. The basin has also experienced a recent drought and Court-mandated pumping reductions. How groundwater levels have responded to these changes has also improved our understanding of the basin. Furthermore, protective groundwater elevations developed after the 2009 BMAP should be included and discussed in an updated BMAP.

Subtask 2.3. Update Estimates of Groundwater Storage. The updated BMAP will include updates of estimated total stored groundwater, usable storage space, and total useable storage space. The Watermaster is required under the Decision to recalculate Total Usable Storage Space and adjust the allocation as needed.

The groundwater model and protective groundwater elevations should be used to quantify these storage estimates for the Seaside Basin. The 2009 BMAP did not have the benefit of site specific protective elevations and thus used Ghyben-Herzberg generated elevations. This updated BMAP will instead use protective elevations developed using groundwater models that estimate onshore groundwater elevations that keeps the productive onshore aquifers fresh (HydroMetrics LLC, 2009b).

Subtask 2.4. Update Groundwater Budget. A current groundwater budget should be developed to enhance our understanding of the groundwater system. Similar to Subtask 2.3, the groundwater budget can be readily generated from groundwater model output. However, the groundwater model needs to be updated through September 2016 and recalibrated for it be used reliably to evaluate the current and historical water budget.

Subtask 2.5. Review Natural Safe Yield Estimates. The State of California has experienced a recent drought which has impacted natural aquifer recharge more than was anticipated in the 2009 BMAP. Also, even though pumping in recent years has been below the amounts required under the Decision, groundwater levels have continued to fall. This suggests that the Natural Safe Yield of 3,000 AFY in the Decision may be too high.

The water budget for each subarea together with the Zero Net Draft method of estimating Safe Yield will be used to reevaluate the Natural Safe Yield. The Zero Net Draft method relies on selecting a historical period of time that has the same starting and end mean depth to groundwater and comparing it to groundwater production for the same period. The groundwater production during that period can be considered a measure of the safe yield.

The reevaluated Safe Yield will be compared against other Safe Yield estimates that were included in the 2009 BMAP. If appropriate, a revised Safe Yield to replace the Decision-established Natural Safe Yield of 3,000 AFY will be provided for basin management purposes.

Task 3: Update Section 3 – Supplemental Water Supplies.

This section will be updated with current information on projects being considered to meet the long-term water needs in the Seaside Basin. Included will be MRWPCA's Pure Water Monterey groundwater replenishment project and Cal Am's Monterey Peninsula Water Supply Project (MPWSP). Recent Environmental Impact Reports will be used to update the information. If any other projects are in early planning stage, they will also be included in the update.

Task 4: Update Section 4 – Groundwater Management Actions.
This section will be updated to reflect actions and interim water supplies that have already been implemented, eliminate actions that are no longer viable, and add potential future actions and interim water supplies that could be implemented to address basin imbalances in the short-term before the long-term supply projects in Section 3 of the BMAP can be permitted, built and operated.

An example of a local management action would be to identify optimal extraction well locations such that those wells can make more efficient use of useable stored groundwater. The groundwater model is the most appropriate tool for this as it is able to simulate cumulative impacts by taking into account long-term projects and any other short-term projects while optimizing well locations.

It is beyond the scope of the BMAP update to prepare preliminary costs for potential future actions and interim water supplies. However, as cost is an important factor in deciding which actions to pursue, the Watermaster may need to engage a financial expert to provide preliminary cost estimates for those actions that do not already have cost estimates associated with them.

Task 5: Update Section 5 – Recommended Management Strategies.
After developing the groundwater management actions, we will present the results to the TAC with the purpose of soliciting input that will allow each action to be ranked in order of preference. The top actions will become recommended management strategies that the Watermaster should consider going forward.

Task 6: Prepare Draft, Final Draft and Final Updated BMAP.
A Draft Updated BMAP will be prepared that follows the format of the 2009 BMAP. After the TAC has reviewed the Draft Updated BMAP, comments received will be incorporated into a Final Draft Updated BMAP that will be presented to the Board. If comments are received from the Board, these will be included in a Final Updated BMAP. Up to 15 bound hardcopies will be provided to the Watermaster. We assume that HydroMetrics WRI will attend one TAC and one Board meeting in person to present the Updated BMAP.

Estimated Budget
The total cost to update and recalibrate the groundwater model through September 2016, and to update the BMAP is provided in Table 1.

Schedule
We expect it will take six weeks to develop the automated model update system and to update and recalibrate the groundwater model.

The Updated BMAP draft can be completed in approximately six weeks after the model update.

References

HydroMetrics LLC. 2009a. Basin Management Action Plan. Seaside Groundwater Basin, Monterey County, California, prepared for Seaside Groundwater Basin Watermaster. February.

HydroMetrics LLC. 2009b. Seaside Groundwater Basin Modeling and Protective Groundwater Elevations, prepared for Seaside Groundwater Basin Watermaster. November.

HydroMetrics WRI. 2014. Technical Memorandum – 2014 Seaside Groundwater Model Update, prepared for Seaside Groundwater Basin Watermaster. July 31.

Please call if you have any questions.

Sincerely,

Georgina King
Principal Hydrogeologist
HydroMetrics Water Resources Inc.

Table 1: Cost Estimate for Basin Management Action Plan Update

Tasks	HydroMetrics WRI Labor			Labor Total		Other Direct Costs	TOTALS
	Derrik Williams	Georgina King	Hanieh Haeri				
	President	Principal Hydrogeologist	Hydrologist				
Rates	$220	$195	$130	Hours	($)	($)	($)
Task 1: Update Groundwater Model & Recalibrate							
Subtask 1.1. Update Model Input Data	8	24	40	72	$ 11,640	$ -	$ 11,640
Subtask 1.2. Model Recalibration	40	8	90	138	$ 22,060	$ -	$ 22,060
Subtask 1.3. Model Update and Recalibration Technical Memorandum	12	28	32	72	$ 12,260	$ 200	$ 12,460
Subtotal Task 1	***60***	***60***	***162***	***282***	***$ 45,960***	***$ 200***	***$ 46,160***
Task 2: Update BMAP Section 2 - State of the Seaside Groundwater Basin							
Subtask 2.1. Update Basin Conceptual Model	1	8	2	11	$ 2,040	$ -	$ 2,040
Subtask 2.2. Analyze Groundwater Levels Trends	1	16	4	21	$ 3,860	$ -	$ 3,860
Subtask 2.3. Update Estimates of Groundwater Storage	4	4	16	24	$ 3,740	$ -	$ 3,740
Subtask 2.4. Update Groundwater Budget	4	4	16	24	$ 3,740	$ -	$ 3,740
Subtask 2.5. Review of Natural Safe Yield Estimates	4	10	16	30	$ 4,910	$ -	$ 4,910
Subtotal Task 2	***14***	***42***	***54***	***110***	***$ 18,290***	***$ -***	***$ 18,290***
Task 3: Update BMAP Section 3 – Supplemental Water Supplies	***4***	***12***	***0***	***16***	***$ 3,220***	***$ -***	***$ 3,220***
Task 4: Update BMAP Section 4 – Groundwater Management Actions	***8***	***20***	***12***	***40***	***$ 7,220***	***$ -***	***$ 7,220***
Task 5: Update BMAP Section 5 – Recommended Management Strategies	***4***	***10***	***0***	***14***	***$ 2,830***	***$ -***	***$ 2,830***
Task 6: Prepare Draft, Final Draft and Final BMAP	***6***	***40***	***20***	***66***	***$ 11,720***	***$ 600***	***$ 12,320***
TOTAL for GROUNDWATER MODEL UPDATE	**60**	**60**	**162**	**282**	**$ 45,960**	**$ 200**	**$ 46,160**
TOTAL for BMAP UPDATE	**36**	**124**	**86**	**246**	**$ 43,280**	**$ 600**	**$ 43,880**
TOTAL	***96***	***184***	***248***	***528***	***$ 89,240***	***$ 800***	***$ 90,040***

Notes

Other direct costs include travel expenses, office supplies, photocopies, postage, and equipment rental

Scope of Work for Protective Elevations

Task 1: Develop Protective Groundwater Elevation Goals and Objectives

Protective groundwater elevations depend strongly on the depth and location of the aquifer that will be protected. Protecting a deep aquifer at the shoreline requires a higher groundwater level than protecting a shallow aquifer inland.

In coordination with TAC members, the desired locations and depths for the freshwater/seawater interface will be determined. It is anticipated that the location will either be at the coastline or some point offshore. Additionally, the Professional will work with the TAC to determine if groundwater should be held in offshore storage for drought supply.

With the assistance of the TAC, a determination will be made of how many protective groundwater elevation locations are required. Generally, protective groundwater elevations are only useful at existing or future monitoring well locations. Useful existing and potential new coastal monitoring well locations will be identified for modeling.

For costing purposes, it is assumed that five well locations will be modeled, and that one meeting with the TAC will be required to develop the goals and objectives for the protective groundwater modeling.

Deliverables: Not less than 10 days prior to the meeting with the TAC, a Technical Memo will be provided to the Watermaster's Technical Program manager in electronic format describing the issues the TAC should consider in providing direction on the Goals and Objectives to be developed under this Task, and any recommendations the Professional would like the TAC to also consider in providing that direction.

Task 2: Develop Protective Groundwater Elevations

A series of cross-sectional models will be created that show where the freshwater/seawater interface is located for known groundwater elevations in monitoring wells. These models will then be used to determine target groundwater elevations that maintain the position of the interface sufficiently far offshore to protect the Basin's aquifers.

The position of the freshwater/seawater interface depends on the density difference between freshwater and seawater, and on the groundwater level at the monitoring well. This modeling will require a density dependent groundwater flow model. The USGS SEAWAT model will be used to for this Task.

A cross-sectional, two-dimensional model will be developed at each of the coastal monitoring well or potential monitoring well locations. The cross-sectional model of each site will be layered to reflect the aquifer and aquitard units according to the current conceptual hydrogeologic model. These cross-sectional models will span the depth of the aquifer units and extend offshore beneath the ocean. Aquifer parameters e.g. hydraulic conductivity, storativity, etc. for each unit will be taken from existing estimates of these parameters for the various aquifer units.

Results from this task will include a range of reasonable groundwater elevations that are protective of seawater intrusion of the Basin's aquifers.

Deliverables: At the conclusion of work on this Task a Draft Technical Memo will be provided to the Watermaster's Technical Program manager in electronic format describing the work that was performed under this Task, including the modeling results, and any recommendations the Professional would like the TAC to consider. Following review by the TAC, the Professional will address any questions or comments from the TAC by preparing a Final Technical Memo.

Scope of Work for Groundwater Flow Model

Figure *1* presents the steps that will be taken in developing the Seaside Groundwater Basin model.

Task 3: Develop Model Goals and Objectives

General objectives of the basin wide groundwater model include:

- Evaluating selected supplemental water projects,
- Evaluating selected management actions,
- Determining storage efficiency of recharged water, and
- Verifying Total Useable Stored Groundwater and Total Useable Storage Space.

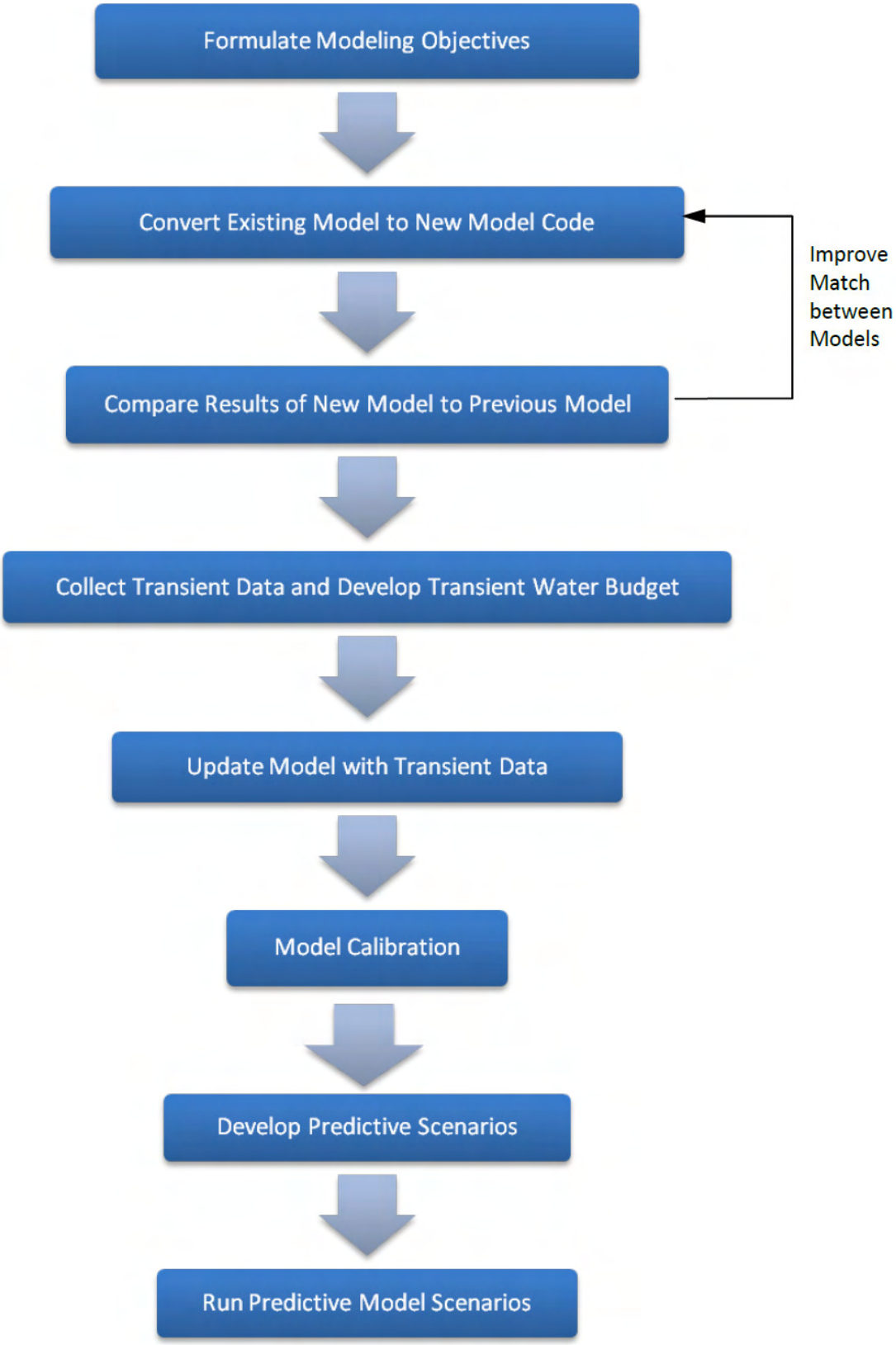


Figure 1: Model Development Process

The first step in developing the groundwater model will be a workshop with the TAC to agree upon specific model objectives. This will include developing a list of probable questions the model may be used to answer. The workshop will be facilitated by HydroMetrics LLC.

The defined model objectives will dictate which features of the Basin should be represented in the model, and to what degree of accuracy. In some cases averaged groundwater levels taken over large areas may be satisfactory, while in others groundwater levels at specified points may be necessary. The time periods simulated by the model (annual, quarterly or monthly) will also need to be decided upon based on the goals and objectives for the model.

Deliverables: Not less than 10 days prior to the workshop with the TAC, a Technical Memo will be provided to the Watermaster's Technical Program manager in electronic format describing the issues the TAC should consider in providing direction on the Goals and Objectives to be developed under this Task, and any recommendations the Professional would like the TAC to also consider in providing that direction.

Following the workshop, a written summary of the issues discussed during the workshop, and the conclusions and decisions reached at the workshop, will be prepared by the Professional and provided to the Technical Program Manager in electronic format to memorialize these actions.

Task 4: Develop Groundwater Flow Model

Subtask 4.1: Convert Existing Groundwater Model to New Model Code

The existing Seaside Basin Groundwater Model was developed using the USGS FEMFLOW model. This model is well documented and adequately checked, however the model code is not commonly used. Because this model is not commonly used, there are limited programs available for analyzing and modifying it. Other, more commonly used models are better suited for model modification, calibration, and display of model results.

The present model will be converted to either the FEFLOW or MODFLOW codes. Coordination with TAC members will be done to identify the pros and cons of each model code. After importing all relevant data to the new model code, it will be demonstrated that the model results from the new code are similar, although not identical, to the FEMFLOW results. This will confirm that all relevant information has been correctly transferred to the new model.

One meeting with the TAC is assumed for this subtask.

Deliverables: Not less than 10 days prior to the meeting with the TAC, a Technical Memo will be provided to the Watermaster's Technical Program manager in electronic format describing the

pros and cons of each model, so that the TAC can provide informed direction on the model to be used. The Professional will also provide any recommendations it would like the TAC to also consider in providing that direction.

Following the meeting, a written summary of the issues discussed during the meeting, and the conclusions and decisions reached at the meeting, will be prepared by the Professional and provided to the Technical Program Manager in electronic format to memorialize these actions.

Subtask 4.2: Collect Transient Data and Develop Transient Water Budget

Two important modifications to the existing Seaside Groundwater Basin model will be converting it to a transient (or time dependent) model, and developing a complete water budget separate from the groundwater model. These recommendations were presented in an earlier memorandum on the existing groundwater model (HydroMetrics LLC, September 27, 2007).

Historical hydrologic data will be required to convert the model to a transient model. Historical groundwater pumping data, historical groundwater elevation data, historical precipitation and evaporation data, as well as any other data necessary for a developing a complete water budget will be collected. It is assumed that the Monterey Peninsula Water Management District (MPWMD) will provide historical pumping data. Where possible, the Seaside Groundwater Basin Database will be accessed for data such as groundwater elevations.

The data will be combined into a complete water budget that includes estimates of flow across the coastline and other potential boundary flows. These boundary flows will be estimates that guide model calibration.

For budgetary purposes, it is assumed that one trip to MPWMD will be made to co-ordinate data collection.

Deliverables: At the conclusion of work on this Subtask a brief Technical Memo will be provided to the Watermaster's Technical Program manager in electronic format describing the work that was performed under this Task.

Subtask 4.3: Update and Calibrate Groundwater Model

Historical pumping, recharge, and groundwater elevation data, will all be incorporated into the groundwater model. The model will be calibrated to within acceptable tolerances, as agreed to by the TAC during the workshop on modeling objectives in Task 3.

Up to two meetings are assumed for this subtask to discuss technical modeling issues with the TAC. These meetings will also be used as progress meetings.

Deliverables: Not less than 10 days prior to each meeting with the TAC, a Memo will be provided to the Watermaster's Technical Program manager in electronic format describing the topics and issues the Professional wishes to discuss at the meeting, so that the TAC will be prepared for those discussions. The Memo will also include any recommendations the Professional would like the TAC to consider during those discussions.

Following the two meetings, a written summary of the issues discussed during the meetings, and the conclusions and decisions reached at the meetings, will be prepared by the Professional and provided to the Technical Program Manager in electronic format to memorialize these actions.

Task 5: Develop and Run Predictive Model Scenarios

Subtask 5.1: Develop Predictive Model Scenarios

In coordination with TAC members predictive model scenarios that represent realistic projects to supplement water supply in the Seaside Groundwater Basin will be developed. It is assumed that analyses of the projects have been completed and that only the input (recharge) and output (groundwater extraction) components will be considered in the model scenarios. For costing purposes, developing up to five scenarios is anticipated. Example scenarios may include developing in-lieu recharge by providing supplemental sources in excess of the annual basin overdraft; injecting water into the existing MPWMD ASR wells in excess of the annual basin overdraft; developing an injection barrier along the coast; or recharge of highly treated wastewater via MRWPCA's proposed Ground Water Recharge Project using either surface spreading, vadose zone injection wells, and/or direct aquifer injection wells.

One TAC meeting will be held to discuss and select five model scenarios. The final model calibration from Subtask 4.3 will also be presented at this meeting.

Deliverables: Not less than 10 days prior to the meeting with the TAC, a Memo will be provided to the Watermaster's Technical Program manager in electronic format describing the topics and issues the Professional wishes to discuss at the meeting, so that the TAC will be prepared for those discussions. The Memo will also include any recommendations the Professional would like the TAC to consider during those discussions.

Following the meeting, a written summary of the issues discussed during the meeting, and the conclusions and decisions reached at the meeting, will be prepared by the Professional and provided to the Technical Program Manager in electronic format to memorialize these actions.

Subtask 5.2: Run and Evaluate Predictive Model Scenarios

Using the calibrated groundwater model developed in Subtask 4.3, the five predictive scenarios developed in Task 5.1 will be simulated. The Seaside Groundwater Basin model will be run with each scenario and the results analyzed based on:

- Ability to meet protective elevations,
- Storage efficiency of recharged water (i.e., how much of the recharged water can be extracted), and
- Change in basin wide groundwater flow directions, especially along the northern basin boundary.

Deliverables: No deliverables are required under this Subtask. The work performed under this Subtask will be described and discussed in the Model Report to be prepared under Task 6.

Task 6: Report

A Model Report will detail the methodology and results from all of the activities included in Tasks 1 through 5. The report serves as both a record of the models' development, and as reference documents for future model users. Our documentation will include a discussion of data adequacy, provide suggestions for strengthening the existing data set, and present guidelines for regularly updating and improving the model.

Deliverables: The Watermaster's Technical Program Manager will be provided with both draft and final documents for distribution to TAC members for their review. Fifteen printed and bound copies of the Draft Model Report and 15 printed and bound copies of the Final Model Report will be provided. Additionally, the final document will be provided to the Technical Program Manager in electronic format in MS Word.

COST

The estimated costs to complete the work described in the above scope are included in Table 1.

SCHEDULE

The work will be performed in accordance with the attached time Schedule.

TABLE 1. ESTIMATED COSTS

	Hours				Cost					
	Derrik Williams	Cameron Tana	Georgina King	Dave Van Brocklin	Derrik Williams	Cameron Tana	Georgina King	Dave Van Brocklin	Direct Costs	Total Costs
PROTECTIVE ELEVATIONS										
Task 1: Develop Protective Groundwater Elevation Goals	20	0	40	0	$3,600	$0	$6,400	$0	$700	**$10,700**
Task 2: Model Protective Groundwater Elevations	12	80	0	80	$2,160	$12,800	$0	$10,400	$400	**$25,760**
GROUNDWATER FLOW MODEL										
Task 3: Develop Model Goals and Objectives	20	0	20	0	$3,600	$0	$3,200	$0	$150	**$6,950**
Task 4: Develop Groundwater Flow Model										
Subtask 4.1 Convert Groundwater Model to New Code	50	40	0	120	$9,000	$6,400	$0	$15,600	$300	$31,300
Subtask 4.2 Develop Transient Water Budget	40	40	80	160	$7,200	$6,400	$12,800	$20,800	$700	$47,900
Subtask 4.3 Update and Calibrate Groundwater Model	80	180	0	140	$14,400	$28,800	$0	$18,200	$1,000	$62,400
Task 4 Total	170	260	80	420	$30,600	$41,600	$12,800	$54,600	$2,000	**$141,600**
Task 5: Develop and Run Predictive Model Scenarios										
Subtask 5.1: Develop Predictive Model Scenarios	20	0	40	8	$3,600	$0	$6,400	$1,040	$250	$11,290
Subtask 5.2: Run and Evaluate Predictive Model Scenarios	40	60	40	120	$7,200	$9,600	$6,400	$15,600	$100	$38,900
Task 5 Total	60	60	80	128	$10,800	$9,600	$12,800	$16,640	$350	**$50,190**
Task 6: Report	36	16	140	120	$6,480	$2,560	$22,400	$15,600	$4,000	**$51,040**
Total	**318**	**416**	**360**	**748**	**$57,240**	**$66,560**	**$57,600**	**$97,240**	**$7,600**	**$286,240**

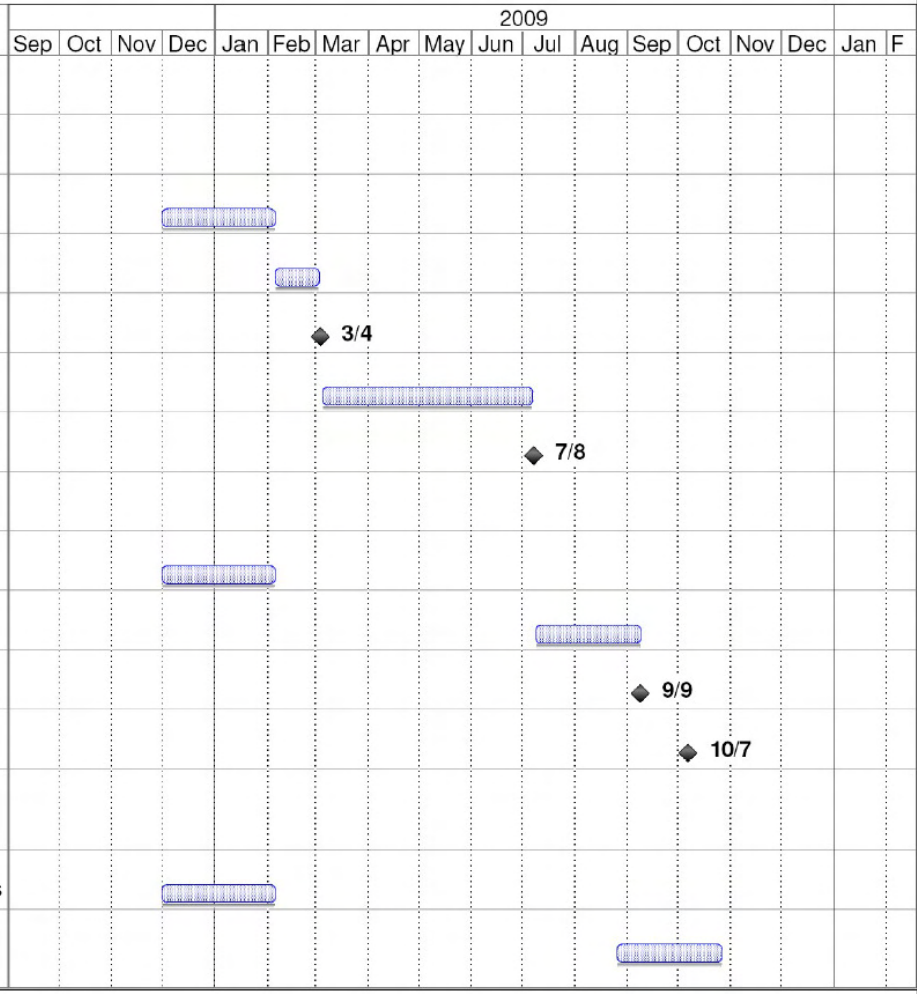
Hourly Rates:

Derrik Williams	$180
Cameron Tana	$160
Georgina King	$160
Dave Van Brocklin	$130

SCHEDULE

HydroMetrics LLC
RFS No. 2009-02
Work Schedule

ID	Task Name
1	**I.3.a ENHANCED SEASIDE BASIN GROUNDWATER MODEL**
2	**I.3.a.1 Update the Existing Model**
3	Prepare and Execute Contract with HydroMetrics to Update the Existing Model
4	TAC Identifies Questions to be Answered by Updated Model
5	Board Concurs with Questions to be Answered by Updated Model, or Adds Additional Questions
6	HydroMetrics Updates the Model
7	HydroMetrics Makes Summary Report to TAC on Updating of the Model
8	**I.3.a.2 Develop Protective Water Levels**
9	Prepare and Execute Contract with HydroMetrics to Develop Protective Water Levels
10	HydroMetrics Develops Protective Water Levels
11	HydroMetrics Makes Summary Report to TAC on Protective Water Levels
12	HydroMetrics Makes Summary Report to Board on Protective Water Levels
13	**I.3.a.3 Evaluate Replenishment Scenarios and Develop Answers to Basin Management Questions**
14	Prepare and Execute Contract with HydroMetrics to Evaluate Replenishment Scenarios and Develop Answers
15	HydroMetrics Evaluates Replenishment Scenarios and Develops Answers to Basin Management Questions



HydroMetrics RFS No 2009-2 Work Schedule 1-14-09

Page 1

HydroMetrics LLC
RFS No. 2009-02
Work Schedule

ID	Task Name	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	F
						2009													
16	HydroMetrics Makes Summary Report to TAC Regarding Evaluation of Replenishment Scenarios and Answers to Basin Management Questions														Special TAC Meeting 10/28				
17	HydroMetrics Makes Summary Report to Board Regarding Evaluation of Replenishment Scenarios and Answers to Basin Management Questions															11/4			

Attachment 4

Task 1: Develop Basin Management Action Plan

The Basin Management Action Plan (BMAP) constitutes the basic plan for managing the Seaside Groundwater Basin. The BMAP identifies both short-term actions and long-term plans intended to protect the groundwater resource while maximizing the beneficial use of groundwater in the basin. It provides the WATERMASTER a logical set of actions that can be undertaken to manage the basin for its maximum yield. Subtasks that HydroMetrics LLC will undertake to develop and produce the BMAP are detailed below.

Subtask 1.1: Update Basin Geology and Water Budget. The Basin geology and water budget provide the conceptual basis for our understanding of the state of the basin. Components of the water budget include estimates of Natural Safe Yield, the recent Operating Yield, estimates of Primary and Secondary Recharge, and the Total Usable Storage Space. All of these concepts will be updated based on recent data. In particular, the following will be analyzed:

- **Geologic Framework.** The geologic framework of the Basin will be updated based on the information collected in the recent sentinel well drilling program. This update fulfills one of the recommendations in the report on the sentinel wells project (Feeney, 2007). The sentinel well data will be integrated into a comprehensive subsurface geologic framework.
- **Storage Capacity and Recharge**. Estimates of the estimated usable storage space (sometimes referred to in the *Adjudication Decision* as "Total Usable Storage Space") and natural recharge will be updated. A conceptual model of groundwater storage capacity, describing the physical mechanisms by which water is stored in the Basin and addressing important spatial and temporal aspects of storing and withdrawing water will be provided. Quantitative estimates of total and usable storage capacity in the Seaside Basin, and updated estimates of primary and secondary recharge based on the most recent data, will be documented. A discussion of techniques for estimating "efficiencies of Storage" in the Basin, as described in the *Adjudication Decision*, will be provided.
- **Groundwater Extractions**. The natural safe yield and the operating yield of the Basin will be updated. The hydrogeologic information obtained from construction of the new sentinel wells, as well as from other existing wells and previously prepared reports, will be taken into account in performing this work, as will the monitoring data from all of these wells. The WATERMASTER will provide the PROFESSIONAL access to the WATERMASTER's comprehensive database of well construction, monitoring, and production data for the PROFESSIONAL's use in performing this work.
- **Material Injury**. Based on the water level and water quality data, PROFESSIONAL will make a determination of whether or not any "Material Injury" is occurring, or is likely to occur, to the Basin, as defined on page 12 of the *Adjudication Decision.* If Material Injury is occurring, or is likely to occur, then a modified Operating Yield shall be determined to mitigate such injury.

The results of this subtask will be incorporated as Chapter 2 of the BMAP.

Subtask 1.2: Update Analysis of Long-Term Water Supply Solutions.
Using information available from project proponents, including but not limited to projects proposed by California American Water, Monterey Regional Water Pollution Control Agency, Monterey Peninsula Water Management District, the City of Sand City, and the California Public Utilities Commission, the status of proposed non-potable replenishment or out-of-basin import

supplies will be reviewed. The updated analysis of long-term water supply solutions will include:

- Summarizing these projects' costs and environmental documentation as available
- Providing an overview of distribution and delivery system improvements required for implementation
- Reviewing mandatory conservation efforts being implemented by the MPWMD and California American Water
- Assessing non-potable water resources
- Assessing out-of-Basin imports
- Assessing the timing and feasibility of these projects as potential replenishment sources, taking into account issues pertaining to environmental constraints, costs, regulatory acceptance, and public acceptance

The results of this subtask will be incorporated as Chapter 3 of the BMAP

Subtask 1.3: Develop Local Groundwater Management Actions. Both before and after the supplemental water supplies become available, a number of management actions can extend the life of the Seaside Groundwater Basin and maximize the use of groundwater stored in the basin. Local groundwater management actions are those that the WATERMASTER could undertake to optimize the storage capacity of the Seaside Basin. Each groundwater management action will be analyzed in terms of how it meets various basin management objectives including:

- Minimizing local drawdown
- Reducing the threat of seawater intrusion
- Optimizing the usable storage of the Seaside Basin

A preliminary list of groundwater management actions that will be considered include:

- Reallocating pumping among existing wells
- Installing new municipal wells
- Transferring groundwater between users or sub-basins
- Initiating voluntary or mandatory cutbacks
- Inter-basin transfers

These actions will be developed by the PROFESSIONAL in coordination with staff from the WATERMASTER and the WATERMASTER's TAC. The actions will cover groundwater management throughout the Seaside Basin, including the Ryan Ranch area. Each action will be accompanied by a plan for how the action might be implemented.

The results of this subtask will be incorporated as Chapter 4 of the BMAP

Subtask 1.4: Rank Actions and Develop the Basin Management Action Plan. After developing the local groundwater management actions, the PROFESSIONAL will meet with staff from the WATERMASTER to rank the various actions. This meeting will allow the WATERMASTER to understand the proposed actions and modify the implementation plans before they are drafted into the BMAP. Additionally, the PROFESSIONAL will identify which of the supplemental supply projects should be pursued, and the likely schedule for implementation of each of these projects. It is anticipated that the WATERMASTER may initially need to pursue multiple supplemental supply options to ensure that an adequate water supply is available.

The various components of a BMAP will be developed under this task, in coordination with the WATERMASTER's staff. The detailed BMAP will summarize the work described above, and will present conclusions and recommendations for management of the Basin. The BMAP will include development of concrete steps for implementation of these recommendations over specific time-periods, including near-term and long-term actions. Components that will be developed include:

- Ranking the management actions.
- Identifying the superior supplemental supply solutions.
- Developing techniques for estimating efficiencies of storage.
- Recommending tools and techniques for Basin management. This will include discussions on the status of the database and utility and need for using the Groundwater Model developed by Tim Durbin as a basin management tool. This section updates the *Groundwater Model Report* prepared by Hydrometrics in 2007
- Recommendations and suggestions for continued monitoring. This section will support, and build on (as necessary) the recommendations contained in Attachment 9 of the WATERMASTER's 2007 *Annual Report*.

A schedule will be developed that outlines steps the WATERMASTER can take to manage the Seaside Groundwater Basin. The schedule will include both short-term actions, as well as actions that lead to securing a supplemental supply.

The results of this subtask will be incorporated as Chapters 5 and 6 of the BMAP.

Subtask 1.5: Draft and Finalize the Basin Management Action Plan. The following is an outline of the BMAP. The Draft BMAP will be provided to the WATERMASTER for review. The WATERMASTER will provide its review comments and those of its TAC members, consolidated into a single document, and the PROFESSIONAL will address all of these comments in a Final BMAP. The PROFESSIONAL will provide the WATERMASTER two CDs containing an electronic version of the entire Draft and Final BMAPs, along with 15 printed and bound copies of both the Draft and Final BMAPs.

Outline of BMAP

Section 1 – Background and Purpose. This is a short section that sets out the necessary background for the BMAP. This section will serve to show how the WATERMASTER is taking the necessary and logical steps in managing the Seaside Basin by developing the BMAP. The relevant parts of the *Adjudication Decision* will be cited to provide justification for the report. Other documents, such as the Monitoring and Management Program will be further cited to demonstrate that the BMAP is part of a logical basin management strategy.

Section 2 – Conceptual Model of the Seaside Basin.

Section 2.1 – Geologic Structure. This section will update the geologic framework of the Seaside Basin, incorporating results from the 2007 sentinel well drilling program.

Section 2.2 – Groundwater Recharge. This section will update the Basin's estimated Natural Yield. Updated estimates of primary and secondary recharge will be detailed in this section

Section 2.3 – Groundwater Extractions. This section will update the Basin's current operating yield. Groundwater Production data included in the WATERMASTER's 2007 *Annual Report* will be compared with data from previous years to demonstrate the evolution of the operating yield. Carryover credits will be discussed in this Section.

Section 2.4 – Subsurface Inflows and Outflows. Subsurface inflows and outflows will be identified, and quantified to the extent possible. These quantifications may have substantial margins of error, which will be noted.

Section 2.5 – Groundwater in Storage. The amount of total groundwater in storage, usable groundwater in storage, and changes from the previous year will be detailed. These estimates will provide the WATERMASTER with the Total Usable Storage Space of the Basin.

Section 2.6 – State of the Basin. This final section is a concluding narrative that summarizes the status of the groundwater resources in the Seaside Basin, and identifies whether material injury has occurred as defined by the *Adjudication Decision*.

Section 3 – Long-Term Water Supply Solutions. The long-term water supply solutions comprise the supplemental water supply options available to the WATERMASTER. A sub-section will be included for each potential supplemental supply project.

Section 4 – Local Groundwater Management Actions. The actions identified in this section will be groundwater management activities that are independent of a new source of water. These actions may have a number of objectives including:

- Extending the life of the Seaside basin prior to developing the supplemental supplies.
- Optimizing the existing natural recharge and basin storage capacity
- Managing and reducing the near-term threat of seawater intrusion

As with the long-term water supply solutions, a sub-section will be included for each potential groundwater management action. Each action will be analyzed by its potential to meet one or more of the objectives listed above, and each action will be accompanied by a plan for how the action might be implemented. The actions will include at a minimum:

- Installing new wells
- Mandatory pumping reductions due to overdraft
- Ryan Ranch system production capacity issues and a range of options to resolve this problem.

Section 5 – Recommended Management Strategy. Based on the information presented in Sections 2, 3, and 4, as well as meetings with the WATERMASTER, a generalized management strategy will be developed. The management strategy will include the following elements:

- Recommending management actions.
- Recommending supplemental supply strategies.
- Recommending techniques for estimating efficiencies of storage.

- Recommending tools and techniques for Basin management.
- Recommendations and suggestions for continued monitoring.
- Reiterating the requirement for annual reporting.

Section 6 – Implementation Plan and Schedule. A time line will show when the WATERMASTER should implement the recommended management actions, and when the supplemental water supply projects are anticipated to become operational. The schedule will serve to demonstrate how the WATERMASTER will bring the Seaside Basin into hydrologic balance. The schedule will acknowledge the technical and financial uncertainties inherent in the Basin's management.

Table 1. Labor by Task (hours)

	HydroMetrics LLC					RMC Consulting	
	Derrik Williams	Cameron Tana	Gus Yates	Martin Feeney	Lew Rosenberg	Stephanie Hughes	Ryan Alameda
Task 1: Develop Basin Management Action Plan							
Subtask 1.1: Update Basin Conceptual Model	12		40	40	20		
Subtask 1.2: Update Analysis of Long-Term Water Supply Solutions	16		4			12	50
Subtask 1.3: Develop Local Groundwater Management Actions	40	16	8	16			8
Subtask 1.4: Draft the Basin Management Action Plan	70	20	16	16		8	24
Subtask 1.5: Finalize the Basin Management Action Plan	20	8	4	4		4	8
Task 1 Total	**158**	**44**	**72**	**76**	**20**	**24**	**90**
Task 2: Develop SIRP							
Subtask 2.1: Review and Compare Relevant Documents	16	4	4				
Subtask 2.2: Develop Contingency Plan	60	20	20	8		4	12
Subtask 2.3: Draft and Finalize SIRP	40	20	12	8			4
Task 2 Total	**116**	**44**	**36**	**16**	**0**	**4**	**16**
Task 3: Update the 2007 Seawater Intrusion Analysis Report	**40**	**32**	**16**				**16**
Task 4: Meetings and Presentations	**64**	**18**		**8**		**8**	**8**
Task 5: Ongoing Hydrogeologic Support	**12**		**4**	**4**			
Totals	**390**	**138**	**128**	**104**	**20**	**36**	**130**

Table 2. Cost by Task

	HydroMetrics LLC					RMC Consulting			
	Derrik Williams	Cameron Tana	Gus Yates	Martin Feeney	Lew Rosenberg	Stephanie Hughes	Ryan Alameda	Direct Costs	Total Costs
Task 1: Develop Basin Management Action Plan									
Subtask 1.1: Update Basin Conceptual Model	$1,740	$0	$5,600	$6,000	$3,200	$0	$0	$0	$16,540
Subtask 1.2: Update Analysis of Long-Term Water Supply Solutions	$2,320	$0	$560	$0	$0	$2,520	$8,250	$0	$13,650
Subtask 1.3: Develop Local Groundwater Management Actions	$5,800	$2,000	$1,120	$2,400	$0	$0	$1,320	$0	$12,640
Subtask 1.4: Develop the Basin Management Action Plan	$10,150	$2,500	$2,240	$2,400	$0	$1,680	$3,960	$0	$22,930
Subtask 1.5: Finalize the Basin Management Action Plan	$2,900	$1,000	$560	$600	$0	$840	$1,320	$2,000	$9,220
Task 1 Total	**$22,910**	**$5,500**	**$10,080**	**$11,400**	**$3,200**	**$5,040**	**$14,850**	**$2,000**	**$74,980**
Task 2: Reporting									
Subtask 2.1: Review and Compare Relevant Documents	$2,320	$500	$560	$0	$0	$0	$0	$0	$3,380
Subtask 2.2: Develop Contingency Plan	$8,700	$2,500	$2,800	$1,200	$0	$840	$1,980	$0	$18,020
Subtask 2.3: Draft and Finalize SIRP	$5,800	$2,500	$1,680	$1,200	$0	$0	$660	$2,000	$13,840
Task 2 Total	**$16,820**	**$5,500**	**$5,040**	**$2,400**	**$0**	**$840**	**$2,640**	**$2,000**	**$35,240**
Task 3: Update the 2007 Seawater Intrusion Analysis Report	**$5,800**	**$4,000**	**$2,240**	**$0**	**$0**	**$0**	**$2,640**	**$2,000**	**$16,680**
Task 4: Meetings and Presentations	**$9,280**	**$2,250**	**$0**	**$1,200**	**$0**	**$1,680**	**$1,320**	**$0**	**$15,730**
Task 5: Ongoing Hydrogeologic Support	**$1,740**	**$0**	**$560**	**$600**	**$0**	**$0**	**$0**	**$0**	**$2,900**
Totals	**$56,550**	**$17,250**	**$17,920**	**$15,600**	**$3,200**	**$7,560**	**$21,450**	**$6,000**	**$145,530**

Attachment 5

Revised Management and Monitoring Plan Operations Budget
For Tasks to be Undertaken in 2017

Task	Subtask	Sub-Subtask	Cost Description	CONSULTANTS & CONTRACTORS (3)			Total
				MPWMD	Private Consultants	Contractors	
Labor							
			Technical Project Manager	$0	$60,000	$0	$60,000
M.1 Program Administration							
	M.1.a		Project Budget and Controls	$0	$0	$0	$0
	M.1.b		Assist with Board and TAC Agendas	$0	$0	$0	$0
	M.1.c & M.1.d		Preparation for and Attendance at Meetings (8)	$0	$7,000	$0	$7,000
	M.1.e		Peer Review of Documents and Reports (8)	$0	$7,376	$0	$7,376
	M.1.f		QA/QC	$0	$0	$0	$0
	M.1.g		SGMA Documentation Preparation	$0	$1,900	$0	$1,900
I.1 Initial Phase 1 Monitoring Well Construction (Task Completed in Phase 1)							
I.2 Production, Water Level and Quality Monitoring							
	I. 2. a.		Database Management				
		I. 2. a. 1.	Conduct Ongoing Data Entry/ Database Maintenance/Enhancement	$11,052	$2,400	$0	$13,452
		I. 2. a. 2.	Verify Accuracy of Production Well Meters	$0	$0	$0	$0
	I. 2. b.		Data Collection Program				
		I. 2. b. 1.	Site Representation and Selection (7)	$0	$0	$0	$0
		I. 2. b. 2.	Collect Monthly Water Levels (6)	$7,192	$0	$0	$7,192
		I. 2. b. 3.	Collect Quarterly Water Quality Samples (1)(5)(6)	$29,834	$0	$25,686	$55,520
		I. 2. b. 4.	Update Program Schedule and Standard Operating Procedures.	$0	$0	$0	$0
		I. 2. b. 5.	Monitor Well Construction (7)	$0	$0	$0	$0
		I. 2. b. 6.	Reports	$2,688	$0	$0	$2,688
		I. 2. b. 7.	CASGEM Data Submittal for Watermaster's Voluntary Wells	$1,792	$0	$0	$1,792
I.3 Basin Management							
	I. 3. a.		Enhanced Seaside Basin Groundwater Model	(Costs Shown in Subtasks Below)			
		I. 3. a. 1	Update the Existing Model	$0	$0	$0	$0
		I. 3. a. 2	Develop Protective Water Levels	$0	$0	$0	$0
		I. 3. a. 3	Evaluate Replenishment Scenarios and Develop Answers to Basin Management Questions (10)	$0	$40,000	$0	$40,000
	I. 3. b.		Complete Preparation of Basin Management Action Plan	$0	$0	$0	$0
	I. 3. c.		Refine and/or Update the Basin Management Action Plan (11)	$0	$25,000	$0	$25,000
	I. 3. d		Evaluate Coastal Wells for Cross-Aquifer Contamination Potential	$0	$0	$0	$0
I.4 Seawater Intrusion Contingency Plan							
	I. 4. a.		Oversight of Seawater Intrusion Detection and Tracking	$0	$0	$0	$0
	I. 4. b.		Provide focused area hydrogeologic investigation for Sand City Public Works Yard	$0	$0	$0	$0
	I. 4. c.		Annual Report- Seawater Intrusion Analysis	$896	$20,890	$0	$21,786
	I. 4. d.		Complete Preparation of Seawater Intrusion Response Plan (2)	$0	$0	$0	$0
	I. 4. e.		Refine and/or Update the Seawater Intrusion Response Plan (2) (9)	$0	$0	$0	$0
	I. 4. f.		If Seawater Intrusion is Determined to be Occurring, Implement Contingency Response Plan (2)	(No Costs are Included for This Task, as This Task Will Likely Not be Necessary During 2017. If it Does Become Necessary, Use of Contingency Funds or a Budget Modification Will Likely be Necessary)			
		TOTALS CONSULTANTS & CONTRACTORS		**$53,454**	**$164,566**	**$25,686**	
						SUBTOTAL not including Technical Program Manager =	$183,706
						Contingency (not including Technical Program Manager) @ approximately 10% (4) =	$12,091
						Technical Program Manager =	$60,000
						TOTAL=	**$255,797**

Footnotes:

(1) Under this Subtask the Watermaster will directly contract with an outside contractor to perform the Sentinel Well induction logging work, and to also collect and analyze water quality samples in conjunction with doing the induction logging. MPWMD will perform the other portions of the work of this Subtask.

(2) The response plan would only be implemented in the event sea water intrusion is determined to be occurring.

(3) Within the context of this document the term "Consultant" refers either to a Private Consultant providing professional engineering or other types of technical services, or to the Monterey Peninsula Water Management District (MPWMD). The term "Contractor" refers to a firm providing construction or field services such as well drilling, induction logging, or meter calibration.

(4) Due to the uncertainties of the exact scopes of some of the Tasks listed above at the time of preparation of this Budget, e.g. Tasks I.3.a.3 and I.3.c, it is recommended that a Contingency of approximately 10% be included in the Budget.

(5) Includes $1,000 to maintain equipment previously installed for this purpose. Also includes lab costs to analyze for barium and iodide ions in certain of these wells as was done in preceding years beginning in 2012.

(6) Does not include costs for MPWMD to collect water level data or water quality samples from wells other than those that are part of the basic monitoring well network, i.e. for private well owners who have requested that the Watermaster obtain this data for them. Costs to obtain that data are to be reimbursed to the Watermaster by those well owners, so there should be no net cost to the Watermaster for that portion of the work under these Tasks. Includes the purchase and installation of four new and/or replacement dataloggers at a price of $680, plus $50 for installation parts, for each datalogger.

(7) No additional monitoring well is expected to be constructed in 2016.

(8) For HydroMetrics and Todd Groundwater to provide hydrogeologic consulting assistance to the Watermaster, beyond that associated with performing other specified Tasks, when requested to do so by the Technical Program Manager.

(9) If work under this Task is found to be necessary, it will be funded through the Contingency line item in this Budget.

(10) If requested by the Board.

(11) If necessary to reflect knowledge gained from modeling work or other data sources.

SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

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

MEETING DATE:	April 12, 2017
AGENDA ITEM:	6
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 is performing certain portions of the work.

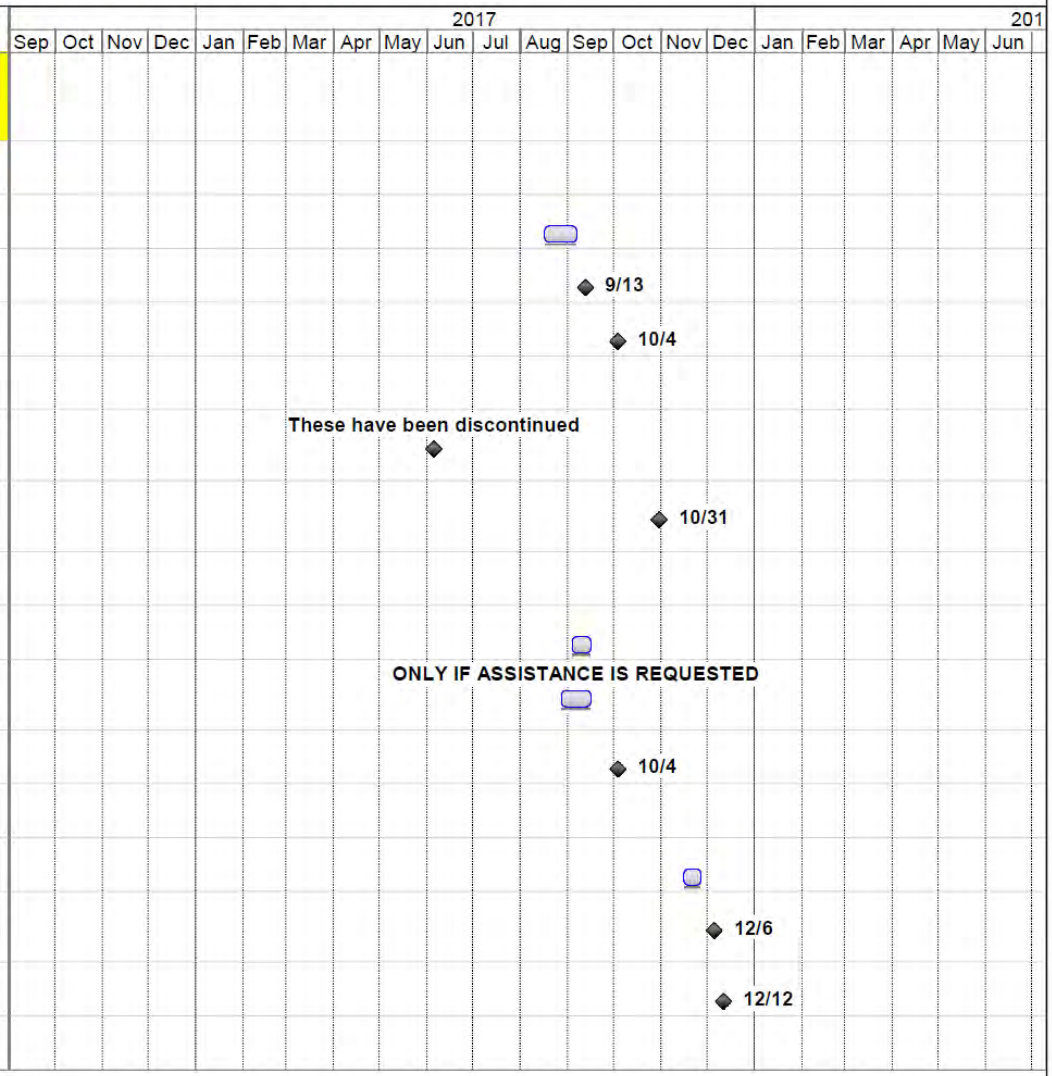
Attached is the most recent update of the Work Schedule for FY 2017.

In this update I have included a new Task for the TAC's discussion of recommendations to the Board that the Groundwater Model and the BMAP be updated. I anticipate this may span several TAC meetings until consensus is achieved regarding this issue, and that a recommendation would probably not be made to the Board until their July meeting.

ATTACHMENTS:	Schedule of Work Activities for FY 2017
RECOMMENDED ACTION:	Provide Input to Technical Program Manager Regarding Any Corrections or Additions to the Schedule

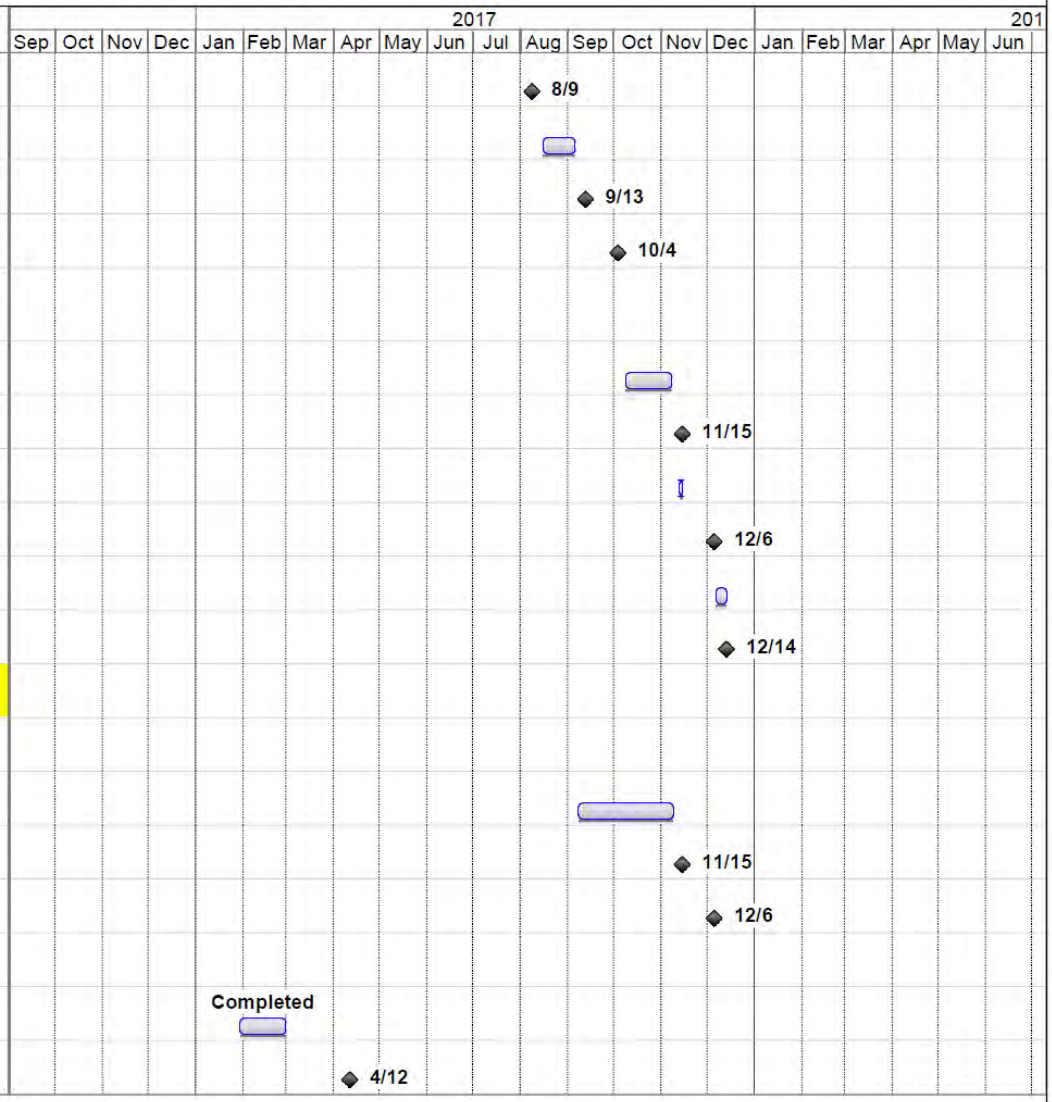
Seaside Basin Watermaster
Monitoring and Management Program
2017 Work Schedule

ID	Task Name
1	***CRITICAL PROJECT MILESTONES ASSOCIATED WITH TAC, BOARD, AND/OR CONSULTANT WORK***
2	**2017 Administration, Operations and Replenishment Budgets**
3	Prepare M&MP Draft Budgets (Same as Task 19)
4	TAC Approves M&MP Budgets (Same as Task 20)
5	Board Approves M&MP Budgets (Same as Task 21)
6	**Watermaster Prepares Quarterly Water Production, Water Level, and Water Quality Reports**
7	Watermaster Prepares Combined Quarterly Water Production, Water Level, and Water Quality Reports for 1st & 2nd Quarters (Same as Task 46)
8	Watermaster Prepares Annual Water Production, Water Level, and Water Quality Report for 2016 (Same as Task 42)
9	**Replenishment Assessment Unit Costs for Water Year 2018**
10	B&F Committee Develops Replenishment Assessment Unit Cost for 2018 Water Year
11	If Requested, TAC Provides Assistance to B&F Committee in Development of 2018 Water Year Replenishment Assessment Unit Cost
12	Board Adopts and Declares 2018 Water Year Replenishment Assessment Unit Cost
13	**Replenishment Assessments for Water Year 2017**
14	Watermaster Prepares Replenishment Assessments for Water Year 2017
15	Watermaster Board Approves Replenishment Assessments for Water Year 2017 (At December Meeting)
16	Watermaster Levies Replenishment Assessment for 2017
17	**Monitoring & Management Program (M&MP) Budgets for 2018 and 2019**



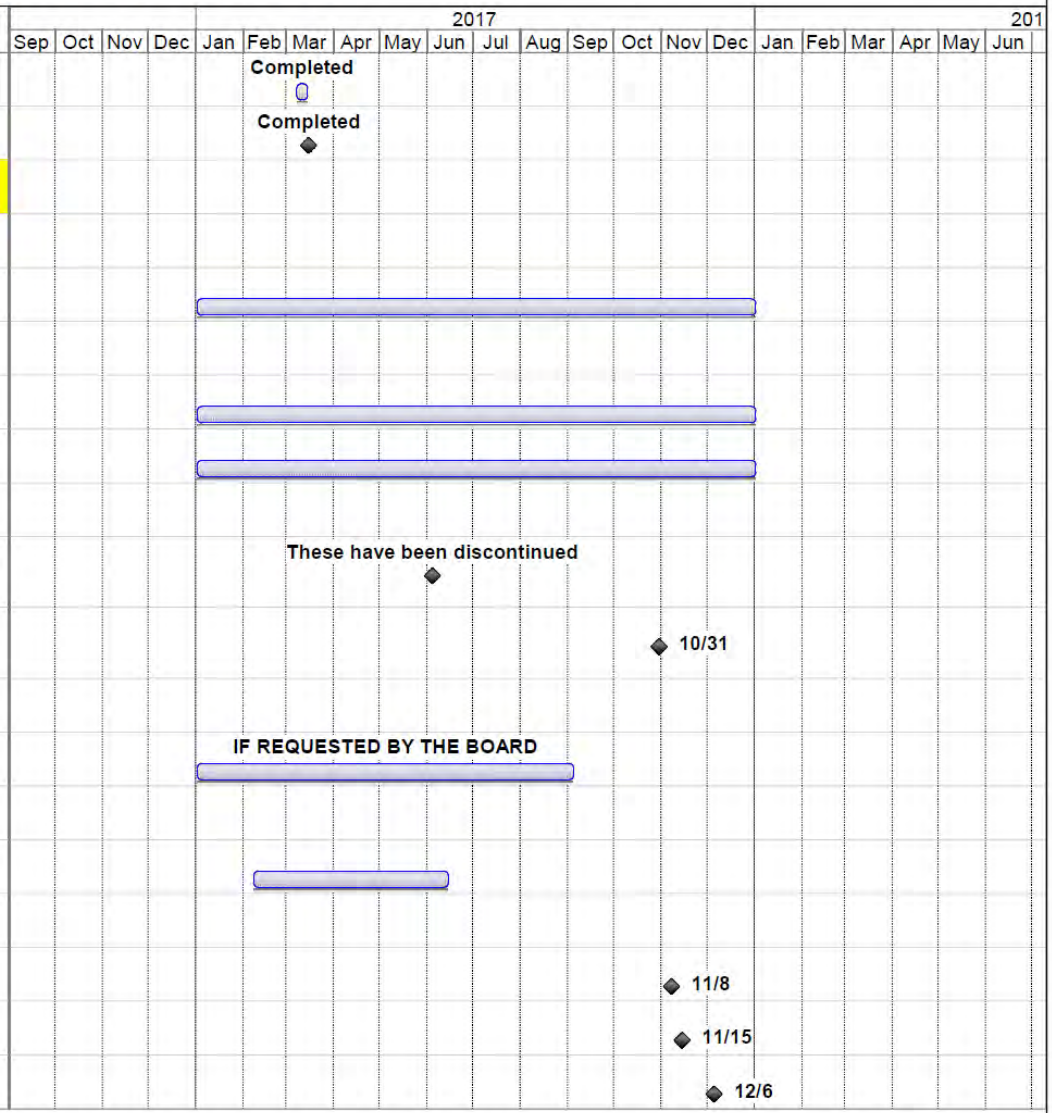
Seaside Basin Watermaster
Monitoring and Management Program
2017 Work Schedule

ID	Task Name
18	Preliminary Discussion of Potential Scope of Work for 2018 M&MP
19	Prepare Draft 2017 M&MP Work Plan and 2018 and 2019 O&M and Capital Budgets
20	TAC approves Draft 2017 M&MP Work Plan and 2018 and 2019 O&M and Capital Budgets
21	Board approves 2018 M&MP O&M and Capital Budgets
22	**2017 Annual Report (Note: Schedule Reflects Court Approval of Later Submittal Date for Annual Report)**
23	Prepare Preliminary Draft 2017 Annual Report
24	TAC Provides Input on Preliminary Draft 2017 Annual Report
25	Prepare Draft 2017 Annual Report (Incorporating TAC Input)
26	Board Provides Input on Draft 2017 Annual Report (At December Board Meeting)
27	Prepare Final 2017 Annual Report (Incorporating Board Input)
28	Watermaster Submits Final 2017 Annual Report to Judge
29	***MANAGEMENT***
30	**M.1 PROGRAM ADMINISTRATION**
31	Prepare Initial Consultant Contracts for 2018
32	TAC Approval of Initial Consultant Contracts for 2018
33	Board Approval of Initial Consultant Contracts for 2018
34	**M.1.g – Sustainable Groundwater Management Act Reporting Requirements**
35	HydroMetrics Prepares Draft Groundwater Storage Analysis
36	TAC Reviews HydroMetrics Draft Storage Analysis



Seaside Basin Watermaster
Monitoring and Management Program
2017 Work Schedule

ID	Task Name
37	HydroMetrics Revises Draft Storage Analysis if Necessary
38	Submit SGMA Documentation to DWR
39	***IMPLEMENTATION***
40	**I.2.a DATABASE MANAGEMENT**
41	**I.2.a.1 Conduct Ongoing Data Entry/Database Maintenance**
42	**I.2.b DATA COLLECTION PROGRAM**
43	**I.2.b.2 Collect Monthly Water Levels (MPWMD)**
44	**I.2.b.3 Collect Quarterly Water Quality Samples (MPWMD)**
45	**I.2.b.6 Reports (from MPWMD)**
46	Watermaster Prepares Combined Quarterly Water Production, Water Level, and Water Quality Reports for 1st & 2nd Quarters
47	Watermaster Prepares Annual Water Production, Water Level, and Water Quality Report for 2016
48	**I.3.a ENHANCED SEASIDE BASIN GROUNDWATER MODEL**
49	Develop and Schedule Additional Tasks as Directed by Board
50	**I.3.c Refine and/or Update the BMAP**
51	TAC Discusses Whether or Not to Recommend Updating the BMAP
52	**I.4.c Annual Seawater Intrusion Analysis Report (SIAR)**
53	HydroMetrics Provides Draft SIAR to Watermaster
54	TAC Approves Annual Seawater Intrusion Analysis Report (SIAR)
55	Board Approves Annual Seawater Intrusion Analysis Report (SIAR)



Seaside Basin Watermaster
Monitoring and Management Program
2017 Work Schedule

ID	Task Name	2017															201					
		Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
56	**I.4.d Complete Preparation of Seawater Intrusion Response Plan (SIRP)**	**WORK COMPLETED - NO FURTHER WORK PLANNED IN 2017**																					
57	**I.4.e Refine and/or Update the SIRP**	**ONLY IF FOUND TO BE NECESSARY**																					

SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

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

MEETING DATE:	April 12, 2017
AGENDA ITEM:	7
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

SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

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

MEETING DATE:	April 12, 2017
AGENDA ITEM:	8
AGENDA TITLE:	Set Next Meeting Date
PREPARED BY:	Robert Jaques, Technical Program Manager

SUMMARY:
There does not appear to be any pressing business that would need to be conducted at a May TAC meeting. Additionally, I will be unavoidably out-of-town on the normal May meeting date of May 10.

For these reasons I recommend that the May TAC meeting be cancelled, and that the next TAC meeting be on the normal June date of Wednesday June 14, 2017.

ATTACHMENTS:	None
RECOMMENDED ACTION:	None required – information only