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

TECHNICAL ADVISORY COMMITTEE
OF THE
SEASIDE BASIN WATER MASTER

DATE: Wednesday, July 10, 2019
MEETING TIME: 1:30 p.m.
Monterey One Water 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 (515) 604-9094. 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

The next regular meeting will be held on Wednesday August 14, 2019 at 1:30 p.m. at the M1W Board Room.

SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	July 10, 2019
AGENDA ITEM:	2.A
AGENDA TITLE:	Approve Minutes from the June 12, 2019 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
June 12, 2019

Attendees: TAC Members

City of Seaside – Rick Riedl
California American Water – Nina Miller (via telephone)
City of Monterey – Max Rieser (via telephone)
Laguna Seca Property Owners – No Representative
MPWMD – Jon Lear
MCWRA – Peter Kwiek (via telephone))
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
None

Others
Kurt Overmeyer – City of Seaside Economic Development Director

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The meeting was convened at 1:33 p.m. after a quorum was established.

1. Public Comments
There were no public comments.

2. Administrative Matters:

A. Approve Minutes from the May 8, 2019 Meeting
On a motion by Mr. Gomez, seconded by Mr. Rieser, the minutes were unanimously approved as presented.

3. Report on Geochemical Modeling for the Pure Water Monterey Project AWT Water
Mr. Jaques introduced this agenda topic by summarizing the agenda packet materials.

Mr. Lear provided an overview of the geochemical evaluation work that had been performed. He explained that drilling materials (cuttings) taken from wells drilled for the Pure Water Monterey project, and Advance Water Treatment water from the Monterey One Water pilot project were used to perform lab testing to evaluate geochemical interactions in the aquifer.

Mr. Riedl asked for an explanation of the term "leaching" as mentioned by Mr. Lear. Mr. Lear explained that leaching was evaluated by comparing water quality before interaction with the cuttings and after interaction with the cuttings. The results indicated there were no significant changes in water quality. Water was in contact with the soil matrix for 48 hours during the lab tests.

Mr. Jaques commented that the geochemical evaluation Technical Memorandum's recommendations for pH and alkalinity apparently may not be met by the Pure Water Monterey Advanced Water Treatment water quality, since the low end of the range of values that the Pure Water Monterey Advanced Water Treatment facility is expected to operate falls below the level recommended in the Technical Memorandum.

Mr. Lear said that MPWMD agrees with the comments from Monterey One Water that operating within the State-prescribed range of values for pH and alkalinity should be adequate. He explained that the consultant could only report in the Technical Memorandum based on the water quality that was available from the pilot plant.

Mr. Lear also said he felt recommendation number three in the Technical Memorandum for silt density index is an operational issue, not a water quality issue, so it should not be added to the storage and recovery agreement. Based on this input, Mr. Jaques said he was comfortable not including that recommendation in the storage and recovery agreement.

Mr. Riedl said he agreed with Mr. Jaques' comments with regard to pH and alkalinity. He felt that this needs to be addressed.

Mr. Lear reported that the Advanced Water Treatment facility is designed to operate between a pH of 7.5 and 8.0. He went on to say that this range of operating values is contained in the discharge requirements from the Regional Water Quality Control Board.

Mr. Riedl noted that the testing was done to determine if any water quality problems would result from injecting the water.

Ms. Miller said that although the State has a range it uses for everyone in terms of pH, this geochemical evaluation work was done to see what results would occur specifically in the Seaside Basin soil matrix. She questioned why the consultant did not put the State's range of pH and alkalinity values in the Technical Memorandum.

Mr. Lear said he felt the consultant would be willing to edit the Technical Memorandum to address these concerns regarding recommendations one and two.

Ms. Miller said she concurred with Mr. Jaques' concerns regarding those recommendations. She also noted that recommendation four of the Technical Memorandum is to do further testing when desalination water becomes available.

Mr. Riedl requested that Table 2 of the Technical Memorandum should have the Reporting Limit and Maximum Contaminant Level values added to it. Mr. Lear said he would have this done for those constituents that have Maximum Contaminant Level values established.

There was consensus to continue this item for further discussion at the July TAC meeting, at which a revised version of the Technical Memorandum addressing these concerns would be presented.

Note: At this point in the meeting, just prior to taking up Agenda Item 4, Mr. Riedel recused himself and stepped out of the meeting room.

4. Application from the City of Seaside for a Storage and Recovery Agreement

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

Mr. Overmeyer recapped Mr. McLaughlin's description of the basis for submitting the application for a storage and recovery agreement, as contained in Attachment 1 of the agenda packet.

Ms. Miller said she concurred with Mr. Jaques' recommendation to refer the matter to the Board for a legal determination, but also noted that she supported the concept of using recycled water for golf course irrigation in-lieu of using pumped groundwater.

A motion was made by Mr. Lear to refer the City of Seaside's application to the Board for their direction on legal issues, but to also report to the Board that the TAC supports the use of recycled water for golf course irrigation. The motion was seconded by Mr. Gomez and passed unanimously.

5. Schedule
Mr. Jaques reported that there were no significant changes in the schedule.

6. Other Business
Mr. Lear reported that the Monterey Peninsula Water Management District (MPWMD) is proposing an ordinance pertaining to restricting wells within a zone around the Pure Water Monterey injection wells, as required by the Division of Drinking Water for the Pure Water Monterey project.

He went on to say that the Division of Drinking Water has asked MPWMD to establish this zone to control the construction of drinking water wells. The Ordinance will go to the MPWMD Board of Directors starting next week for its first reading, and then a public comment period, followed by a second reading. The draft will be available for review on the MPWMD website by this Friday. (Note: the draft ordinance can be reviewed in the MPWMD board agenda packet at this link: _https://www.mpwmd.net/wp-content/uploads/June-17-2019-Board-Mtg-Agenda.pdf).

Mr. Lear also reported that by 2023, draft direct potable reuse regulations are expected to be released by the Division of Drinking Water. He said that those regulations may allow the control zone requirements to sunset.

Mr. Jaques will include this topic as an informational item on the next TAC agenda for any discussion or input by TAC members.

The next regular meeting will be held on Wednesday July 10, 2019 at 1:30 p.m. at the M1W Board Room.

The meeting adjourned at 2:33 p.m.

SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	July 11, 2018
AGENDA ITEM:	2.B
AGENDA TITLE:	Reminder About Use of the Teleconference Line for Participation in TAC Meetings
PREPARED BY:	Robert Jaques, Technical Program Manager

SUMMARY:

At its July 11, 2018 meeting the TAC expressed its support for use of the conference line as an exception, where it is impossible for a TAC member to attend in person, and there was consensus that TAC members would attend meetings in person, rather than routinely using the conference line.

In recent months the number of TAC members participating by the conference line has increased and at the most recent TAC meeting only two members were present in person.

It will be appreciated for TAC members to make a sincere effort to attend meetings in person. This should help make input from TAC members and others in the audience more clearly communicated, and help make the meetings more productive.

ATTACHMENTS:	None
RECOMMENDED ACTION:	None required – information only

SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	July 10, 2019
AGENDA ITEM:	2.C
AGENDA TITLE:	MPWMD Activities Update
PREPARED BY:	Robert Jaques, Technical Program Manager

SUMMARY:

In the course of updating the Schedule that is contained in each TAC Agenda packet, I recently learned from Jon Lear that instead of compiling the Q1 and Q2 Water Quality and Water Level data and sending it to the Watermaster for posting on our website, he has been spending the hours allocated in MPWMD's Request for Service (RFS) for performing that work to prepare and submit data to the California Statewide Groundwater Elevation Monitoring Program (CASGEM). The Watermaster must submit that data to CASGEM as part of DWR's Adjudicated Basin reporting requirements.

Mr. Lear noted that the original purpose of compiling the Q1/Q2 report was to make the data available to interested parties more frequently than on a yearly basis. (The full year's data is contained in the report MPWMD provides to the Watermaster to include in the Watermaster's Annual Reports to the Court.) He pointed out that CASGEM data is available to anyone to query. He explained that Adjudicated basins are the first basins under DWR's SGMA requirements to begin reporting data through the CASGEM porthole, and that this process has encountered numerous "bugs" and that has resulted in his having to spend over twice the hours allocated for this activity in MPWMD's RFS working with DWR staff to make the data upload process more efficient.

In view of the fact that the Watermaster has not received any inquiries from the public regarding the Q1/Q2 data, and since that data, along with the Q3/Q4 data, is included in the Watermaster's Annual Reports, it appears that it would be acceptable to discontinue Q1/Q2 reporting. Any parties inquiring of the Q1/Q2 data could be referred to the CASGEM website to obtain it. If there is TAC concurrence with the suggestion, this task will be dropped from the Schedule and it will be reflected in the 2020 M&MP, which is discussed in Agenda Item No. 5.

Mr. Lear also reported that with the startup of the Pure Water Monterey Project, MPWMD staff will be required to collect and manage a large amount of data to support project operations. He indicated that due to this increased workload, beginning in 2020 it may be necessary for MPWMD to reduce its support for Watermaster programs. He will further discuss this topic at today's meeting.

ATTACHMENTS:	None
RECOMMENDED ACTION:	Approve discontinuing the posting of Q1/Q2 Water Quality and Water Level data on the Watermaster's website

SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	July 10, 2019
AGENDA ITEM:	3
AGENDA TITLE:	Continued Discussion of Technical Memorandum on Geochemical Modeling of the Pure Water Monterey AWT Water
PREPARED BY:	Robert Jaques, Technical Program Manager

SUMMARY:

At its June 12, 2019 meeting the TAC chose to continue discussion of this topic to today's meeting. The purpose of continuing the discussion was to provide MPWMD with the opportunity to present to the TAC a revised Technical Memorandum containing recommendations that address the issues of concern raised by the TAC at the June 12 meeting. One of those concerns was that the original Technical Memorandum's recommendations for pH and alkalinity apparently might not be met by the Pure Water Monterey Advanced Water Treatment water quality, since the low end of the range of values within which the Pure Water Monterey Advanced Water Treatment facility is expected to operate fall below the levels recommended in the original Technical Memorandum. Additionally, it was requested that some clarifying information be added to some of the tables in the Technical Memorandum.

Mr. Lear reported at the June 12 meeting that he would ask his consultant, Pueblo Water Resources, to revise their Technical Memorandum to address these issues, and would present the revised Technical Memorandum to the TAC at today's meeting. The revised Technical Memorandum, along with MPWMD's transmittal letter, are attached. Note that Attachments A and C of the Technical Memorandum are included, but that only the Conclusions and Recommendations Sections of Attachment B are included because it is 32 pages long, is a very technically complex document, and pertains only to the evaluation of the Santa Margarita geologic matrix performed by the MPWMD in 2008 at ASR Well No. 2. Also, the water quality and soils analysis Appendix provided by MPWMD containing the laboratory detection limits and methodologies used for the analyses is not included because it is approximately 90 pages long. However, it was included as an attachment to the email with the Meeting Notice and Agenda for today's meeting.

In my June 12 agenda transmittal to the TAC on this topic, I recommended that certain of the recommendations in the Technical Memorandum be included in the Storage and Recovery Agreement for the PWM water by issuing an amendment to the December 2018 Storage and Recovery Agreement. I believe that Recommendation No. 1 in the revised Technical Memorandum is appropriate to add to the Storage and Recovery Agreement by issuing an amendment. This should not pose any operational problems for the PWM Project, since the AWT plant is designed to comply with this recommendation, but will help ensure that the quality of AWT water from that Project does not pose any geochemical adverse impacts on the Seaside Basin.

ATTACHMENTS:	MPWMD transmittal letter and Revised Technical Memorandum describing geochemical modeling of the PWM AWT water.
RECOMMENDED ACTION:	1. Accept the Revised Technical Memorandum as satisfactorily fulfilling MPWMD's obligation to perform geochemical modeling of the PWM AWT water. 2. Accept the Revised Technical Memorandum's recommendation to defer geochemical modeling work on the desalination plant water at this time. 3. Include the first of the Revised Technical Memorandum's recommendations in the PWM Storage and Recovery Agreement by issuing an amendment to that Agreement.

MONTEREY PENINSULA WATER MANAGEMENT DISTRICT

5 HARRIS COURT, BLDG. G
POST OFFICE BOX 85
MONTEREY, CA 93942-0085 • (831) 658-5600
FAX (831) 644-9560 • http://www.mpwmd.dst.ca.us

July 1, 2019

Bob Jaques
Technical Program Manager
Seaside Groundwater Basin Watermaster
83 Via Encanto
Monterey, CA 93940

Subject: Geochemical Interaction Modeling Assessment

Dear: Mr. Jaques

The Agreement for Storage and Recovery of Non-Native Water from the Seaside Basin (Agreement) signed February 2019 by Monterey Peninsula Water Management District (MPWMD) and the Watermaster Board requires the completion of the Modeling Assessment. The Agreement states, "prior to the injection of AWT Water, demonstrate to the reasonable satisfaction of the Watermaster that sufficient measures will be taken to avoid Material Injury." This letter transmits the assessment performed on Pure Water Monterey Pilot Plant product water to satisfy the requirement for a Modeling Assessment in the Agreement. The attached Geochem Technical Memorandum and Appendix satisfies this requirement as it concludes that Pure Water Monterey (PWM) water did not have any ion exchange, redox and dissolution reactions with Santa Margarita Sandstone lithology that would adversely affect drinking water quality down to a pH of 7.5. MPWMD has included a water quality and soils analysis appendix containing the laboratory results used for this analysis to address the detection limits and methodologies questions asked by the City of Seaside at the June 13, 2019 Watermaster TAC Meeting.

The post processing of PWM water is designed to produce water with a pH between 7.5 and 8.5 and alkalinity between 40-80 mg/L as $CaCO_3$. These values were selected because they are the regulatory limits set by LA County Department of Public works to manage injection of Advanced Treated water in the West Basin near Los Angeles. These limits were developed using the experience gained over the past 30 years where injection of Advanced Treated water has been used to augment water supply in the West Basin. The PWM Final Engineering Report and EIR were prepared as requirements for the issuance of Department of Drinking Water and Regional Water Control Board Permits for PWM. These reports also mirror the same limits for pH and Alkalinity. The PWM Waste Discharge Requirements and Water Reclamation Requirements implement all requirements specified in the Central Coast Basin Plan and procedures determined necessary by the Regional Water Board to protect the beneficial uses of Seaside Groundwater Basin including the Sources of Drinking Water Policy and the Anti-Degradation Policy.

Due to the short time that remains before project startup and tracer testing begins, MPWMD asks the Watermaster to bring this letter, complete report and appendix to the Technical Advisory Committee for consideration in concert with the Storage Agreement at the earliest possible opportunity.

Sincerely,

Jonathan Lear PG, CHg
Water Resources Division Manager

Enclosure: Pueblo Water Resources Geochem TM

TECHNICAL MEMORANDUM
Pueblo Water Resources, Inc.
4478 Market St., Suite 705
Ventura, CA 93003

Tel: 805.644.0470
Fax: 805.644.0480

To: Jonathan Lear, CHg; District Hydrogeologist

Date: July 1, 2019

From: Stephen Tanner, PE; Principal Engineer

Stephen A. Short, PhD; Geochemist

Project No: 12-0048

Copy To: Robert Marks, CHg.; Pueblo Water Resources

Subject: Summary of Geochemical Interaction Investigation of PWM Waters for Artificial Recharge of the Santa Margarita Sandstone Aquifer System

In accordance with our scope of services authorized by your Board in November 2017, this Technical memorandum (TM) presents Pueblo Water Resources (PWR) findings and conclusions regarding the geochemical interactions between the proposed Pure Water Monterey (PWM) treated recycled water and the mineralogy of the Santa Margarita Sandstone (Tsm), and the general suitability of the PWM treated water as a source for artificial recharge of the Tsm aquifers in the eastern Seaside Groundwater Basin (SGB). This phase of the investigation included the development and implementation of bench-scale verification testing of geochemical interactions between the minerals comprising the Tsm geologic matrix and the proposed PWM treated water; the results of this analysis were compared with similar interaction studies of Tsm mineralogy with existing recharge waters successfully utilized in the MPWMD/Cal-Am ASR artificial recharge program which has been in service since 2000 in the Northern Inland Sub-Area of the SGB.

Although the long term regional water supply program for the Monterey Peninsula also includes the utilization of desalinated seawater (Desal) for both direct potable use and SGB artificial recharge, the lack of actual Desal waters for geochemical analysis and testing precluded its inclusion into the study at this time.[1] The evaluation of Desal waters and its geochemical compatibility with the other regional water supply components (ie the SGB Tsm matrix, treated Carmel River waters for the Cal-Am ASR recharge supply, native SGB Tsm groundwaters (NGW), and PWM-treated waters) will necessarily be addressed in later phases of the investigation.

[1]It has been suggested that utilizing product water from the Sand City Desalination plant as a proxy for water produced from the regional plant could be implemented; however the availability of Tsm cuttings is extremely limited. It is of greater importance to have the limited amount of remaining cuttings available for bench testing of the actual Desal water proposed to be injected and stored in the Seaside Basin.

The bench testing investigation of the suitability of treated PWM water for SGB recharge included the assessment of its geochemical stability, the intermixing of SGB NGW's and treated Carmel River ASR program recharge waters, and its interaction potential with the mineralogy of the Tsm aquifer matrix was performed. The bench scale investigation of PWM-Tsm interactions included the following sequential tasks:

- Complete chemical analysis of the treated PWM water
- Complete chemical analysis of the geologic matrix of the Tsm by screening and selection of representative cuttings taken from the recently constructed DIW-2 test injection well
- Preparation and slurry mixing of treated PWM water and pulverized Tsm cuttings
- Separation of the slurry into residual solids and supernatant liquids via centrifuge, filtration and drying
- Post-reaction laboratory analysis of residual cuttings and filtered PWM supernatant

Figure 1 presents a flow chart of this sequential investigative procedure.

Samples of the PWM-treated water were obtained through Trussell Technologies from the PWM demonstration pilot plant located at the MRWPCA regional wastewater treatment plant located in Marina. The pilot plant takes secondary treated effluent from the existing Regional Treatment Plant and processes it through a series of operations known as the Advanced Water Treatment Facility (AWTF) process. This multistage multiple barrier process includes the following:

- Pre-ozonation
- Membrane Filtration
- Reverse Osmosis
- Advanced Oxidation (UV/Ozone/Peroxide)
- Lime stabilization

Samples of the Tsm geologic matrix were selected from drill cuttings collected during the construction of the PWM DIW-2 injection demonstration well, located on the former Fort Ord approximately 1000 feet Southeast of the existing MPWMD Santa Margarita ASR facility at 1910 General Jim Moore Blvd. in Seaside. Cuttings samples were collected from intervals every 5-10 feet as the well bore was advanced, vacuum sealed, and these cuttings were then visually segregated for lithologic similarity, cross referenced with the e-log, and then analytically screened via laboratory analyses to identify the samples best suited for further bench scale analysis. This selection process is detailed in PWR's November 2018 TM on the subject (Attachment A).

The two resulting cuttings samples were identified as:

- 465' , Tsm matrix, clean fine grained granular sand marking the transition between the upper and lower Tsm; high in transition metals content
- 595', Tsm/Tm transition zone, silty sand with a petroleum odor, high in minerals and transition metals

The selection of samples high in transition metals was made to demonstrate a 'worst case' scenario in leachability when the cuttings were tumbled in the PWM-treated water; noting that the resulting slurry would create an environment approximating full geochemical equilibrium between the water and geologic matrix, thus allowing a near quantitative analysis of any reactions that might occur when PWM waters were injected into the SGB.

Although the Tsm geologic matrix has been evaluated previously by the MPWMD at ASR 2 (Attachment B), the analyses primarily focused on major mineralogy of the formation rather than the minor/trace minerals contained therein. Mineralogy analysis of the Tsm identified the following major compounds:

- Quartz SiO_2 (68%)
- K-Feldspar; $KAlSi_3O_8$ (11%)
- Plagioclase Feldspar; $(Ca,Na)AlSi_3O_8$ (12%)
- Calcite; $CaCO_3$ (5%)
- Clays (predominantly Montmorillonites); $Na_{0.3}(Al,Mg)_2Si_4O_{10}(OH)_2 –xH_2O$ (4%)

The above mineralogical analysis did not, however, provide trace-level analyses of all possible compounds; the laboratory quantification limits for the analyses were approximately 1% by weight. While the trace mineral content is insignificant in the assessment of hydrogeologic and aquifer properties, these trace elements can sometimes play an important role in geochemical reactivity, particularly with respect to the leaching potential of non-native waters that would saturate the aquifer during artificial recharge operations.

Although the Tsm formation is generally considered a very clean Quartz-rich sandstone matrix, the results showed the presence of a variety of low level transition metals, including Cadmium, Copper, Iron, Manganese, Mercury, Nickel, Uranium, and Zinc. These constituents can impair ground water quality, and although the Tsm NGW has historically shown the presence of trace levels of variably soluble transition metals, their presence has historically been below the levels promulgated in California Drinking Water Standards (Title 22 Standards).

Bench Scale Testing Program

The bench scale testing was performed by McCampbell Analytic Laboratories of Pittsburg, CA, in accordance with procedures outlined in PWR's January 2019 Technical Memorandum and analyte methods jointly developed by PWR and McCampbell (Attachment C). The same procedure was used to evaluate the use of treated Carmel River water produced by Cal-Am as a potable water supply for municipal and industrial use within the Monterey Peninsula, and will also be utilized in assessment of Desal waters from the regional desalination facility when it becomes available.

The initial step in the bench scale testing program was to evaluate the chemical composition of the DIW-2 cuttings; Table 1 below presents the results for the 465' and 595' cuttings analyses.

Table 1 – Chemical Composition of DIW-2 Borehole Cuttings

ANALYTE	UNITS	465' CUTTINGS	595' CUTTINGS
Chloride	mg/kg-dry	35	50
Sulfate	mg/kg-dry	77	2000
Phosphorous	mg/Kg	800	3000
Cadmium	mg/kg-dry	0.56	23
Calcium	mg/kg-dry	4000	81000
Copper	mg/kg-dry	1.9	26
Iron	mg/kg-dry	4900	16000
Magnesium	mg/kg-dry	1900	35000
Manganese	mg/kg-dry	42	220
Mercury	mg/kg-dry	0.042	0.098
Nickel	mg/kg-dry	5.6	40
Selenium	mg/kg-dry	ND	4.3
Strontium	mg/kg-dry	17	150
Uranium	mg/kg-dry	2.2	12
Zinc	mg/kg-dry	25	120
% Moisture	wet wt%	23.0	25.8
Bicarbonate	mg $CaCO_3$/kg-dry	1640	3290
Carbonate	mg $CaCO_3$/kg-dry	ND	ND
Hydroxide	mg $CaCO_3$/kg-dry	ND	ND
Total Alkalinity	mg $CaCO_3$/kg-dry	1640	3290

As shown in Table 1, the 465' and 595' samples vary substantially in composition, particularly with respect to major cations / anions and total alkalinity. This selection was intended to provide

a wide variability in mineralogy to assess PWM treated water stability during aquifer storage conditions. In addition, while both samples contain measurable levels of transition metals Cd, Cu, Fe, Mn, Hg, Ni, Se, Sr, U, and Zn in various mineral or elemental forms, the 465 sample (which is more typical of Tsm formation) contains these compounds in lesser concentrations. As noted above, the Tsm NGW also shows trace levels of these transition metal compounds, which is unremarkable given the aquifer residence time the Tsm minerals have been in contact with the NGW. The PWM treated water, however, is void of essentially all of these transition metals, having been processed through the AWTF facilities.

The second step in the bench testing program was to mix the PWM treated water and pulverized cuttings samples in a 10:1 mix ratio followed by tumbling of the slurry mix for 48 hours. This process facilitates solid-liquid contacting and provides an opportunity for rapid geochemical equilibration between the two phases. After contacting, the solid material and liquids were separated by centrifugation and the liquid supernatant was filtered through a 0.45 micron membrane filter before analysis. The wet centrifuged sludge was dried at 60° C before being analyzed. The results of the PWM-treated water analyses before and after equilibration are presented in Table 2 below.

Table 2- PWM treated Water Composition Before and After Tsm Equalization

ANALYTE	UNITS	PWM water	465' Cuttings Equilibrated w/ PWM water	595' Cuttings Equilibrated w/ PWM water
Chloride	mg/L	10	13	14
Sulfate	mg/L	0.17	6.6	280
Bicarbonate	mg $CaCO_3$/L	54.5	65.9	122
Carbonate	mg $CaCO_3$/L	ND	ND	ND
Hydroxide	mg $CaCO_3$/L	ND	ND	ND
pH	UNITS	7.96	7.98	8.11
Total Alkalinity	mg $CaCO_3$/L	54.5	65.9	122
Phosphorous	mg/L	ND	ND	ND
Cadmium	µg/L	ND	ND	ND
Calcium	mg/L	18	15	96
Copper	µg/L	4.5	ND	ND
Iron	µg/L	42	ND	ND
Magnesium	mg/L	0.19	2.5	26
Manganese	µg/L	ND	ND	ND
Mercury	µg/L	ND	ND	ND
Nickel	µg/L	ND	ND	ND
Selenium	µg/L	ND	ND	ND
Strontium	µg/L	8.5	ND	390
Uranium	µg/L	ND	ND	9.2
Zinc	µg/L	ND	ND	ND

As shown in Table 2 above, the predominant geochemical interactions appear to be a minor uptake (leaching) of Magnesium (Mg), Sulfate (SO_4), and Chloride (Cl) in the 465' cuttings; with a similar but substantially greater uptake of major cations and anions occurring in the 595' cuttings. There was essentially no leaching of transition metals in the 465' cuttings, and only a very minor uptake of Strontium (Sr) (approximately 390 ug/L) and U (9.2 ug/L) in the 595' cuttings. These findings indicate that the PWM-treated water does not exacerbate the solubilization of transition metals, nor of other trace minerals that might compromise the composition of recovered waters at proximate SGB extraction well locations. The results also indicate that the PWM treated water appears to be controlled in a narrow Bicarbonate-based (HCO_3) alkalinity range, buffering the solution at a stable pH of approximately 8.0 (7.96 – 8.11). This suggests that as long as PWM waters maintain a pH range of 7.5 - 8.5 (approximately) that no transition metal leaching should occur.

A comparison of the cuttings compositions before and after equilibration also (qualitatively) reflect the geochemical reaction mechanisms of the PWM-treated water analyses, (ie dissolution of Cl, Ca, and SO_4. Tables 3a and 3b below present the initial and final chemical composition of the 465' and 595' (respectively) cuttings.

Table 3a- 465' Cuttings Composition Before and After PWM-treated Water Equilibration

ANALYTE	UNITS	465' Cuttings Before Equilibration	465' Cuttings After Equilibration
Sample wt. (dry)	grams	38.5	37.4
% Moisture	wet wt%	23.0	45.8
Chloride	mg/kg-dry	35	19
Sulfate	mg/kg-dry	77	17
Phosphorous	mg/kg-dry	800	1300
Cadmium	mg/kg-dry	0.56	0.70
Calcium	mg/kg-dry	4000	5100
Copper	mg/kg-dry	1.9	2.7
Iron	mg/kg-dry	4900	5500
Magnesium	mg/kg-dry	1900	2100
Manganese	mg/kg-dry	42	60
Mercury	mg/kg-dry	0.042	0.028
Nickel	mg/kg-dry	5.6	6.0
Selenium	mg/kg-dry	ND	ND
Strontium	mg/kg-dry	17	17
Uranium	mg/kg-dry	2.2	3.0
Zinc	mg/kg-dry	25	23
Bicarbonate	mg $CaCO_3$/kg-dry	1640	3140
Carbonate	mg $CaCO_3$/kg-dry	ND	ND
Hydroxide	mg $CaCO_3$/kg-dry	ND	ND
Total Alkalinity	mg $CaCO_3$/kg-dry	1640	3140

Table 3b- 595' Cuttings Composition Before and After PWM-treated Water Equilibration

ANALYTE	UNITS	595' Cuttings Before Equilibration	595' Cuttings After Equilibration
Sample wt.	grams	37.1	33.5
% Moisture	wet wt%	25.8	49.2
Chloride	mg/kg-dry	50	19
Sulfate	mg/kg-dry	2000	760
Phosphorous	mg/kg-dry	3000	2200
Cadmium	mg/kg-dry	23	27
Calcium	mg/kg-dry	81000	54000
Copper	mg/kg-dry	26	25
Iron	mg/kg-dry	16000	9700
Magnesium	mg/kg-dry	35000	20000
Manganese	mg/kg-dry	220	200
Mercury	mg/kg-dry	0.098	0.074
Nickel	mg/kg-dry	40	34
Selenium	mg/kg-dry	4.3	4.3
Strontium	mg/kg-dry	150	86
Uranium	mg/kg-dry	12	9.9
Zinc	mg/kg-dry	120	100
Bicarbonate	mg $CaCO_3$/kg-dry	3290	16600
Carbonate	mg $CaCO_3$/kg-dry	ND	2480
Hydroxide	mg $CaCO_3$/kg-dry	ND	ND
Total Alkalinity	mg $CaCO_3$/kg-dry	3290	19100

Although these data are necessarily less accurate than the supernatant analyses due to the large differences in moisture content and possible loss of solids in the post equalization supernatant filtration step, the results qualitatively support the solubilization of cuttings minerals, particularly Ca, Mg, SO_4, and HCO_3, with the corresponding increases in these ions in the post-equilibrated PWM water samples. Mineral dissolution was relatively minor in the 465' Tsm cuttings as shown in Table 3a with a net loss of 1.1 grams in the 38.5 gram sample; however, as shown in Table 3b, the losses in the 595' Monterey formation transitional cuttings were more substantial with 3.6 grams lost in the 37.1 gram sample, which corresponded to a theoretical increase in equalized Total Dissolved Solids (TDS) of over 400 mg/L. It is important to note that this TDS increase occurred with only a very minor change in pH, demonstrating that the buffering capacity of the PWM water was not exceeded; this is the likely reason that transition metal dissolution did not occur. This also suggests that pH monitoring would provide a useful surrogate for monitoring aquifer conditions during operation of the PWM program.

Conclusions

Based on our evaluation of the water quality and bench scale test program and our experience with similar artificial recharge project applications, we conclude the following:

1- The bench scale testing program results were in general agreement with the geochemical modeling study performed by Pueblo Water related to the Carmel River ASR 2 well.

2- The use of PWM-treated produced waters appears to be geochemically suitable for artificial recharge operations within the Tsm formations of the SGB aquifer.

3- The program results verified that equalized PWM-treated water met the Title 22 standards for inorganic chemical constituents after contacting Tsm mineral in a simulated aquifer storage scenario.

4- Water quality changes during bench scale testing were observed, including Ion Exchange, Redox, and Dissolution reactions, although pH remained stable throughout the bench testing program. Even though these reactions were at times substantial (particularly with respect to Ca, Mg, and SO_4 solubilization) they did not adversely affect final water quality with respect to inorganic drinking water standards. The pH stability throughout the test program indicates that the buffering capacity of the PWM water was not exceeded even with increased bicarbonate alkalinity after equilibration with Tsm cuttings.

5- Overall, the geochemical nature of the PWM-treated water, with it's robust bicarbonate alkalinity buffering capacity appears to resist transition metal leaching; this was demonstrated in the substantially different cuttings compositions of the 465' and 595' samples used for the bench scale testing. Because of this empirical demonstration of geochemical stability, we conclude that specific modeling of interactions between PWM-treated waters and Carmel Valley-derived treated waters is not necessary at this time, as the PWM water appears to enhance, rather than impair adverse leaching potential due to its buffering capacity and lack of transition metal content. We opine that intermixing of PWM and Carmel River waters will likely improve the stability of Carmel River water with respect to inhibiting transition metal leaching potential.

6- Biochemical reactivity was not monitored in the bench testing program due to sample preservation issues and loss of microbes that would occur during bench testing procedures. If present, it did not measurably affect final water quality with respect to inorganic drinking water standards.

7- Overall, the bench test program results did not identify any fatal flaws or critical issues that would jeopardize the feasibility of a long term artificial recharge program implemented using PWM-treated water in the Tsm aquifer.

Recommendations

Based on the results of the bench testing program and our experience with artificial recharge operations via direct injection into the Tsm aquifer system, we provide the following recommendations regarding advancement of the PWM artificial recharge program in the SGB:

1- The water quality of PWM-treated AWTF water should be maintained as closely as possible with the waters tested in the bench scale test program. In particular, the pH and alkalinity of the AWTF process should be maintained to achieve a pH of between 7.5 and 8.5, and a Total Alkalinity of at least 50 mg/L as $CaCO_3$.

2- When Desal water becomes available, water quality analyses should be compared to existing PWM-treated waters with respect to geochemical similarity. At that time, additional bench scale testing with Tsm cuttings and Desal product water and potentially with other native and/or artificial recharge waters should be conducted. If large variations are observed between the PWM and Desal bench testing results, geochemical modeling should be performed to ascertain the mechanism(s) observed from the bench testing program. Because of the large range of variability in water quality between the various regional recharge waters, and the observed variability in mineralogy of the Tsm and Tm transitional formations, we opine that the combination of empirical bench testing followed by geochemical modeling will provide more accurate results than geochemical modeling simulations alone.

Attachment A

TECHNICAL MEMORANDUM
Pueblo Water Resources, Inc.
4478 Market St., Suite 705
Ventura, CA 93003

Tel: 805.644.0470
Fax: 805.644.0480

To: Jonathan Lear, CHg; District Hydrogeologist

Date: November 08, 2018

From: Stephen Tanner, PE, Principal Engineer

Project No: 12-0048

Copy To: Robert Marks, Pueblo Water Resources

Subject: Analysis of Santa Margarita Well Cuttings, Monterey One Water Well DIW-2

Jon:

In accordance with our recent meetings and discussions, This memorandum summarizes our findings and recommendations for analysis of the recently acquired cuttings samples from the Monterey One Water's DIW-2 well, which penetrates the Santa Margarita Sandstone (Tsm). Because of this well's proximity to the Santa Margarita ASR facility (SM Facility) at 1910 General Jim Moore Blvd. and the fact that the boring for this well encountered aquifer zones encountered at SM ASR Wells 1 and 2, we believe that the cuttings from DIW-2 should be representative of the mineralogy present at the SM Facility.

As you know, the goals for the recent analyses and the ongoing testing program for the ASR wells are to quantify and speciated trace minerals present in the Tsm geologic matrix. The DIW-2 well penetrates the Tsm aquifer, and the depth and extent of the Tsm formation appears distinctly in both the SM ASR wells. Comparing the drill cuttings from the two sites, the following visual indicators are present and are summarized in Table 1:

Table 1 – Hydrogeologic Features Comparison Summary

Lithologic Feature	ASR-1 Depth Interval (ft bgs)	DIW-2 Depth Interval (ft bgs)
Santa Margarita Sandstone	480 to 720	380 to 575
Hardpan Aquitard	590 to 610	440 to 470
Monterey Shale	730+	585+

The Tsm thickness of 240 ft vs 195 ft, the aquitard thickness of 20 ft vs 30 ft, the consistent vertical offset of approximately 145 ft, and the visual similarity of cuttings suggest that the cuttings mineralogy are likely also similar. In comparing the cuttings samples, we found 13 groupings of contiguous samples which appear to be essentially identical in character. These groupings are summarized in the table below:

Table 2 – Cuttings Summary

Cuttings Interval (ft bgs)	Notes
380-400	Top of Tsm
405-410	Tsm
415-420	Tsm
425-440	Tsm
445-470	Hard clay
480-485	Tsm - Fine sand
490-505	Tsm- Coarse sand
510-520	Tsm
525-555	Tsm
560-570	Tsm
555-570	Tsm
570-585	Clay

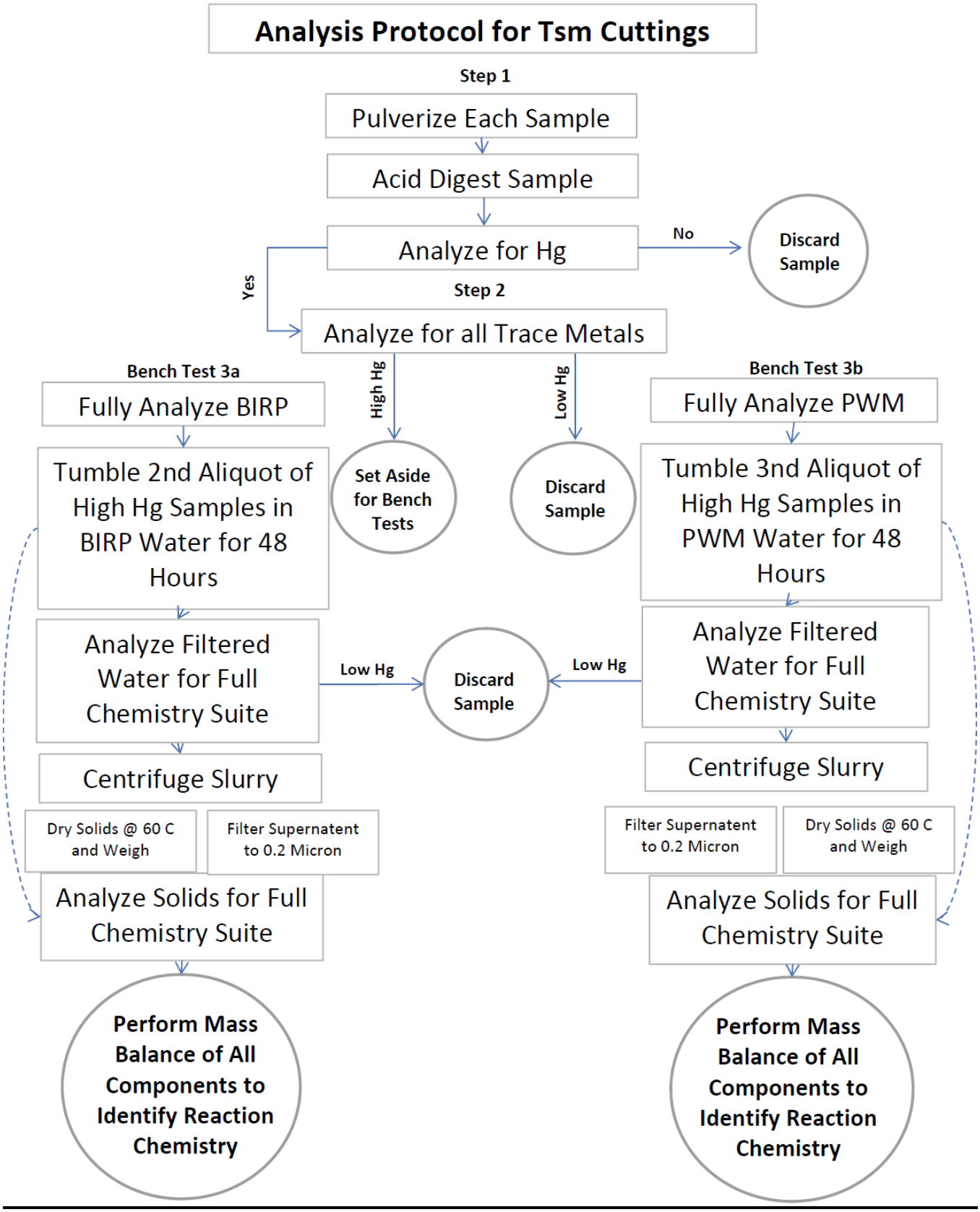
The similarities of these cuttings suggest that individual samples of these intervals need not all be analyzed for trace metals; we recommend for the initial screening analyses that one sample aliquot from each of the 13 horizons above be selected, along with the unique samples from the other cuttings between 360' and 595 feet.

Based on the above, we opine that matrix samples of approximately 100 grams each be taken from the following cuttings: 365', 375', 390', 410', 420', 435', 455', 475', 485', 485', 495', 500', 515', 525', 535', 575', 585', and 600'; (ie 18 samples).The samples should be gleaned from well-homogenized mixes of each original sample bag, then stored in vacuum-sealed bags for shipment to McCampbell Laboratories in Pittsburg, CA. The procedure McCampbell will use to analyze the samples is generally as follows:

1- Dry and weigh each sample
2- Acidify and digest each sample in acid
3- Analyze the dissolved sample for trace metals: Cu, Zn, Cd, Ni, Hg,
4- Report the trace metals concentrations in ug/kg of original dried sample weight.

This initial analysis will identify which geologic horizon contains trace elements of interest for further analyses; the subsequent investigation will include both reactivity testing and potentially direct analysis and quantification of specific mineral composition of these compounds.

Also as we discussed, a visual examination of the cuttings should be made for indications of Pyrite for each sample; this would appear as shiny gold-colored speck in the cuttings matrix. Any sample with evidence should be specifically noted on the Chain of Custody and noted for possible future analyses be special procedures.


Analysis Protocol for Tsm Cuttings
Step 1
Pulverize Each Sample
Acid Digest Sample
Analyze for Hg
No
Discard Sample
Yes
Step 2
Analyze for all Trace Metals
High Hg
Low Hg
Bench Test 3a
Fully Analyze BIRP
Tumble 2nd Aliquot of High Hg Samples in BIRP Water for 48 Hours
Set Aside for Bench Tests
Discard Sample
Bench Test 3b
Fully Analyze PWM
Tumble 3nd Aliquot of High Hg Samples in PWM Water for 48 Hours
Analyze Filtered Water for Full Chemistry Suite
Low Hg
Discard Sample
Low Hg
Analyze Filtered Water for Full Chemistry Suite
Centrifuge Slurry
Dry Solids @ 60 C and Weigh
Filter Supernatent to 0.2 Micron
Filter Supernatent to 0.2 Micron
Dry Solids @ 60 C and Weigh
Analyze Solids for Full Chemistry Suite
Analyze Solids for Full Chemistry Suite
Perform Mass Balance of All Components to Identify Reaction Chemistry
Perform Mass Balance of All Components to Identify Reaction Chemistry

Attachment B Conclusions and Recommendations Sections

4. CONCLUSIONS AND RECOMMENDATIONS

4.1 PRECIPITATION AND SCALING

4.1.1 SMTIW#2 Well Injection and Storage

It can be seen that the only significant model-predicted scalant in both of the SMTIW#2 (ASR-2) mixing scenarios A and B (refer **Section 3.2**) is chalcedony (opaline silica). This minor siliceous scaling potential around the well screens and the mixing zone in the aquifer (of about 2 – 4 mg/L) is predicted regardless of whether the mix is predominantly NGW and is reducing, or is predominantly MCWD water and is oxidizing.

In the SMTIW#2 (ASR-2) mixing scenarios with MCWD (refer **Section 3.2**) it can be seen that this siliceous scaling is predicted to increase with increasing admixture of MCWD water. This arises because the MCWD water contains slightly more dissolved silica (19.73 mg/L as Si) than the SMTIW#2 NGW (18.33 mg/L as Si). Likewise, the siliceous scale potential will decrease when using the more typical injectate , CAW water, due to its low silica content.

Calcite, magnesite and dolomite are shown to be unsaturated in these mixes, therefore calcareous scaling is not expected.

In the reducing mixtures this silica scalant may be accompanied by minor amounts of trace heavy metal sulfide precipitation, although this likelihood is primarily in the early stages of injection (i.e. <10% MCWD water) and these should generally be rapidly oxidized as further MCWD water is injected. This precipitate will likely see subsequent adsorption / coprecipitation with Fe- and Mn- oxyhydroxides present in the aquifer.

The predictions for ferruginous and manganiferous precipitation on the well screens and in the adjacent aquifer are very minor, even at late stage injection when the NGW is largely replaced by MCWD water. Such precipitation may not be observable at the low levels predicted by the model.

As noted in **Section 3.2,** FCO_3Apatite (i.e. Francolite) was chosen as the model compound representative of calcareous phosphate and fluoride-based scaling, because it was observed in both the Upper and Lower Interval leaches that trace P and F removal onto the cutting's substrates correlated very approximately in a 2 : 1 mole ratio. It is therefore likely that if the predicted minor siliceous scaling does occur, it would likely contain trace amounts of Ca, P and F; however these are highly unlikely to contribute significantly to its bulk.

It is important to note that as injection continues over time, and subsequent and successive pore volume exchanges with MCWD (or CAW) waters occur, the level of pH depression and associated silicious precipitation will attenuate due to the equilibration of the mineralogy with the injected waters.

4.1.2 SMTIW#1 Well Injection and Storage

It can be seen that the model-predicted principal scalant in the three SMTIW#1 (ASR-1) mixing scenarios C, D and E (refer **Section 3.3**) is also chalcedony (opaline silica).

As in the case of SMTIW#2 above, very minor siliceous scaling of the well screens and the mixing zone in the aquifer of (approximately of 0.2 – 2 mg/L) is likely, regardless of whether the mix is predominantly NGW (and is reducing) or is predominantly MCWD and/or CAW water (and is oxidizing).*Phase 1 ASR Project Water Year 2008 Seaside Basin Monterey Peninsula Water Management District By ECOENGINEERS Pty Ltd* REVISIONS STATUS AND RELEASE DATE: Revision: 5 Printed: 4 June, 2015 WP REF: MPWMD Phase 1 ASR Project WY2008 Geochemical Assessment Page 22

In the SMTIW#1 (ASR-1) mixing scenarios with bulk MCWD water (refer **Section 3.3**) it can be seen that the siliceous scaling is predicted to increase with increasing admixture of MCWD water. This arises because the MCWD water contains more dissolved silica (19.73 mg/L as Si) than the SMTIW#1 NGW (18.33 mg/L as Si) or the CAW BIRP water (8.41 mg/L as Si.) As with the ASR-2 model predictions, the higher the proportion of CAW BIRP water present, the less the degree of siliceous scaling is expected.

Calcite, magnesite and dolomite are unsaturated in these mixes so calcareous scaling is not expected, as was similarly determined for the case of SMTIW#2 above.

However, the very minor silica scaling will invariably be accompanied by a more significant proportion of calcium phosphate/fluoride-type material than for the newer SMTIW#2 well.

This arises principally because SMTIW#1 NGW has exhibited a more significant total P concentration (0.46 mg/L) than the MCWD water (<0.03 mg/L) or the CAW BIRP water (0.34 mg/L), or even the present indications for the newer SMTIW#2 NGW.

The amount of calcium phosphate-based scaling is predicted to still be very minor but to lie in the range 0.2 – 1.5 mg/L (i.e. comparable with the siliceous scaling). As it is well known that calcium phosphate-type scaling is relatively hard and intractable, this implies that the older SMTIW#1 well may require more frequent cleaning of well screens with organic or mineral acid mixtures than the SMTIW#2 well.

In support of the above model prediction, Pueblo's operational experience over the past 6 years has confirmed minor plugging of the SMTIW#1 well; however, overall injection efficiency has not been impaired, and formal well rehabilitation in 2007 fully restored the wells' performance.

Predictions for ferruginous and manganiferous precipitation on the well screens and in the adjacent aquifer for the SMTIW#1 well are very minor, even at late stage injection when the NGW is largely replaced by MCWD or CAW BIRP water. Nevertheless more ferruginous and manganiferous scaling is predicted for this well in comparison with the newer SMTIW#2 well.

Similarly to the case of SMTIW#2, as injection continues over time and subsequent and successive aquifer pore volumes exchange with MCWD (or CAW) waters, the level of pH depression induced and hence the degree of associated siliceous precipitation will attenuate due to the depletion of available oxidizable organic carbon in the accessible mineralogy of the aquifer.

4.2 BIOFOULING POTENTIAL

Biofouling is a much more difficult phenomenon to predict. It is quite likely that the growth of aerobic or facultative biofilms on the well screens is determined by the available nitrogen (N) and phosphorus (P) nutrient supply and the availability of readily utilizable small MW organic compounds in the injectates and in the NGWs.

In our view there is a distinct possibility that:

- the availability of dissolved C1 – C4 hydrocarbon gases, especially methane in the respective SMTIW#1 and SMTIW#2 NGWs;
- the leachability of DOC from the respective lithologies of the SMTIW#1 and #2 wells; and
- the levels of the limiting P nutrient in the injectates or in situ mixes,

are likely the most critical determinants of the likely level of long term biofouling of the well screens and the adjacent aquifer.

Unfortunately there is no available information on typical concentrations of dissolved C1 – C4 hydrocarbon gases in the SMTIW#1 and SMTIW#2 NGWs. We have made some recommendations in the following **Section 4.3** about the benefits of obtaining data on dissolved C1 – C4 hydrocarbon gases in NGWs.

There is some evidence that the lithology of the SMTIW#1 and #2 wells is such that, under reducing conditions DOC is leached into the NGWs at about the same level i.e. around 0.9 – 1.0 mg/L but this may differ under conditions of exposure to an oxidizing injectate.

Residual dissolved Total Phosphorus (TP) concentrations in the SMTIW#2 (ASR-2) mixing scenarios A and B ranged from 0.3 – 0.4 µg/L, whereas residual dissolved TP concentrations in the SMTIW#1 (ASR-1) mixing scenarios C, D and E ranged from 2 – 3 µg/L. It may therefore be concluded that the limitation to biofouling due to lower Phosphorus levels is likely to be significantly better in the newer SMTIW#2 well than in the older SMTIW#1 well.

4.3 LEACHING OF POTENTIALLY TOXIC TRACE ELEMENTS

Assessment of Upper and Lower Interval cuttings recovered from installation of the SMTWI#2 well using the standard USEPA TCLP leach protocol showed than only Zn could be detected above method detections limits ('MDLs') for this high solids leachant (sodium acetate- acetic acid). Zinc (Zn) was also the only element present (22 mg/L) above the State Maximum Contaminant Levels ('MCLs') (5.0 mg/L) in the TCLP leach of the Lower Interval cuttings (refer **Table 2.5, Section 2.3**).

It is important to note that this leaching simulation is highly conservative because of the use of a weakly acidic leachant to maximize the dissolution of minerals from the geologic matrix.

As discussed in **Section 2**, Pueblo also engaged McCampbell to conduct equivalent leaches of the SMTIW#2 Upper and Lower Intervals cuttings using the same solid : liquid mass : volume ratio, and identical 18 hour exposure period with tumbling, but using the CAW BIRP water as a leachate in an oxidizing context. The data from these leaches is also tabulated in **Table 2.5** in **Section 2.3**.

The outcomes from the CAW BIRP water leaches showed that no potentially toxic elements were leached sufficiently to produce an aqueous concentration which exceeded MCLs, and in most cases were significantly lower by one or two orders of magnitude.

In addition, as discussed in the early part of Section 3.3, it is absolutely clear that these laboratory leaches are likely to produce aqueous concentrations of potentially toxic trace elements which are approximately 15 times greater than would arise during injection and storage in the Tsm.

It is therefore concluded that it is highly unlikely that injection and storage of CAW BIRP water or MCWD water in the Tsm could induce concentrations of potentially toxic elements in those waters which would be found to exceed California Drinking Water MCLs upon extraction. Indeed, experience with the injection of CAW water in SMTIW#1 over the last 6 years has shown that the well consistently yielded recovered waters that meet all drinking water MCLs.

4.4 RECOMMENDATIONS

It is recommended that future total analyses of well-mixed and finely ground cuttings or crushed (e.g. to <10 mm) drill core material should be analyzed for at least the major elements Na, K, Ca, Mg, Ba, Sr, Al, and Fe.

It is particularly useful to know the total amount of Fe present as this will give an indication of the amount of pyrite present in shaley material and this can then checked against the reactive pyrite fraction determined by inverse modeling of laboratory leaches.

Should relatively higher levels of Fe be found then it is also recommended that testing to determine the amount of pyritic sulfur in recovered aquifer solid material be conducted.

In addition, it is strongly recommended that such rock material be analyzed for Total Organic Carbon ('TOC') and Total (Organic) Nitrogen ('TN') by some sort of combustion-based method. This is because the inverse modeling of the leaches which McCampbell conducted with Upper and Lower Interval SMTIW#2 borehole cuttings and CAW water showed quite clearly that it is reaction of the Dissolved Oxygen ('DO') (and also any free chlorine) in the injectates with available organic carbon in the cuttings e.g. located in shaley material, which generates CO_2, which in turn dissolves in the water to drive pH down. At the same time CO_2 is generated, trace organic nitrogen associated with the organic carbon is also released, probably largely as ammonia nitrogen (NH_3-N) but this is also oxidized on the 18 hour timescale of the leach to nitrate/nitrite nitrogen ('NO_x-N'). It is very likely that these reactions are biologically mediated even during the leaching period by natural aerobic or iron dissimilatory bacteria contained in the cuttings.

Regardless of the mechanism, when inverse modeling of such leaches actually quantifies the input of CO_2 and NH_3-N/NO_x-N to the water, it also provides an accurate measure of the available TOC and TN in the leached cuttings. This then can be related back to the overall TOC and TN in the cuttings to derive another 'scale-up or scale-down factor' (going from cuttings leaches outcomes to model-simulated *in situ* aquifer outcomes) for direct comparison with the CEC-derived scale-up or scale-down factor.

If these inferred scaling factors for modeling purposes proved to be somewhat different i.e. simply reflecting different distributions of available organic matter to available clays within the rock mass, these changes can be incorporated as different scale-up (or scale-down) factors in PHREEQC-2 modeling of the actual aquifer injection and storage scenarios.

It is also recommended that CEC determinations generally be conducted with a reagent which is not susceptible to trace dissolution of calcite. Ammonium acetate, even adjusted to pH 7.0 is likely to dissolve some calcite. This tends to bias the percent exchangeable of Ca a little too high. In addition, use of an ammonium-based catex reagent obviates the determination of the percent exchangeable NH_4X sites.

When the aquifer lithology is known, from Rietvelt powder XRD analysis, to contain a significant, even if minor fraction of calcite, then it would be preference to determine CEC on cuttings or crushed drill core using a reagent such as Silver Thiourea or Nickel Ethylenediamine to determine CEC and distribution of percent exchangeable.

It is note from **Table 3.1, Section 3.1** that the PHREEQC-2 modeling of the effective CEC in equilibrium with the groundwaters in wells SMTIW#1, SMTIW#2 and MW-1 slightly underestimated Ca concentrations. This is clearly due to a slight over-estimation of the percent exchangeable Ca on the catex sites and possible derives from:

- slight dissolution of calcite by the McCampbell ammonium acetate CEC reagent, tending to overestimated percent exchangeable Ca); and
- some minor contribution of natural NH_4X (and possible ZnX_2) occupied catex sites to the overall CECs of the cuttings, also tending to overestimate percent exchangeable Ca.

It is therefore also recommended that laboratory CEC and percent exchangeable determinations measure ammonium and Zn percent exchangeable as well.

In the presence of lithologies which contain shales, it is likely that carbonaceous material in the shales is out gassing trace C1 – C4 hydrocarbon gases etc into the NGW.

It is expected that any dissolved methane etc in NGWs would be immediately available for oxidation by aerobic and iron dissimilatory bacteria , thereby leading to biofouling. The higher the concentration of dissolved C1 – C4 gases available, the higher the probability of the development of aerobic biomass in, and around the injection well upon injection of the DO-containing injectate.

Methane is also a potential reactant with the free chlorine contained in candidate injectates for the production of trihalomethanes ('THM') Disinfection By-Products ('DBPs'), but conversely it is also well known that decay of THMs *in situ* is more rapid under anaerobic electron donor conditions. Lack of knowledge of that capacity impairs the measurement and modeling of the degree of anaerobiosis possible under various *in situ* mixing scenarios.

For these reasons, it is also strongly recommended that all NGWs and any re-extracted injectate/NGW mixes be routinely analyzed for dissolved C1 – C4 hydrocarbon gases (as well as TOC, DOC, NH_3-N, Filterable TKN and NO_x-N etc).

It is noted that, on occasion, analysis for NH_3-N have been less than ideal, employing methods with Method Detection Limits ('MDLs') of only about 0.2 mg/L, thus forcing assumption of a level of 0.1 mg/L in modeling. It is recommended that analysis for NH_3-N be conducted with methods which provide an MDL of 0.01 or 0.005 mg/L.

Attachment C

TECHNICAL MEMORANDUM
Pueblo Water Resources, Inc.
4478 Market St., Suite 705
Ventura, CA 93003
Tel: 805.644.0470
Fax: 805.644.0480

To:	Stephen A. Short, PhD	Date:	November 26, 2018
Copy to:	Jonathan Lear, PG, CHg ,	Project No:	14-0048
From:	Stephen Tanner, PE		
Subject:	Geochemical Interaction Assessment – Bench Scale Testing Program		

Steve –
Per our ongoing discussions, I have summarized the McCampbell procedure for analyses for the Tsm cuttings as follows.

Procedure for Analyses of Tsm Cuttings

1- Dry the entire aliquot of each sample (at 60 C); pulverize and homogenize the material, then weigh a portion and analyze the matrix for total Hg. Report results to us to determine the need for further analyses. If Hg is present in sufficient quantity, then Pueblo will direct you to proceed with additional analyses (below).
Results of this total Hg analysis should be reported on a dry-weight basis (mg/kg or ug/g) for each sample. Also report the total weight of dry, un-used sample for each sample.

2- For the samples with adequate Hg as determined by Pueblo from step #1 above; analyze for the following constituents: Ca, Mg, Sr, Cl, SO_4, P, Fe, Mn, Cu, Ni, Zn, U, Cd, alkalinity/carbonate, and Se. Report the results on a dry-weight basis as in 1 above. This will be a TTLC extraction, except for SO_4, P, and Cl; which will be an unacidified vortex extraction; the P analysis will be by Skalar.

3- After this, we may request further analysis of some of the samples. These would involve the following process:

   a. Pueblo will provide 4 liters of one (or more) process waters from the system to Mc Campbell. This water will be used to tumble the dry solid samples to test the leachability of the various waters with the solid samples. Initially, analyze the water for the following parameters:
      - Cl, F, N, NO3, NO2, NH3, TKN, SO_4, Alk., pH, EC, Si, P

- As, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Ag, Th, U, V, Zn
- Al, Ca, Li, Mg, K, Na, Sr, DOC, Iodine, ORP

b. Using a new aliquot of the dried/pulverized sample, tumble a weighed portion for 48 hrs in a measured aliquot of the water provided by Pueblo.

c. Centrifuge the tumbled sample to separate the supernatant from the solids. Filter the supernatant in a 0.2 micron filter and analyze for the constituents listed in #3a above by aqueous methods.

d. Take the centrifuged solids, dry at 60° C, weigh a portion and analyze for all constituents listed in #2 above. Report the results on a dry-weight basis.

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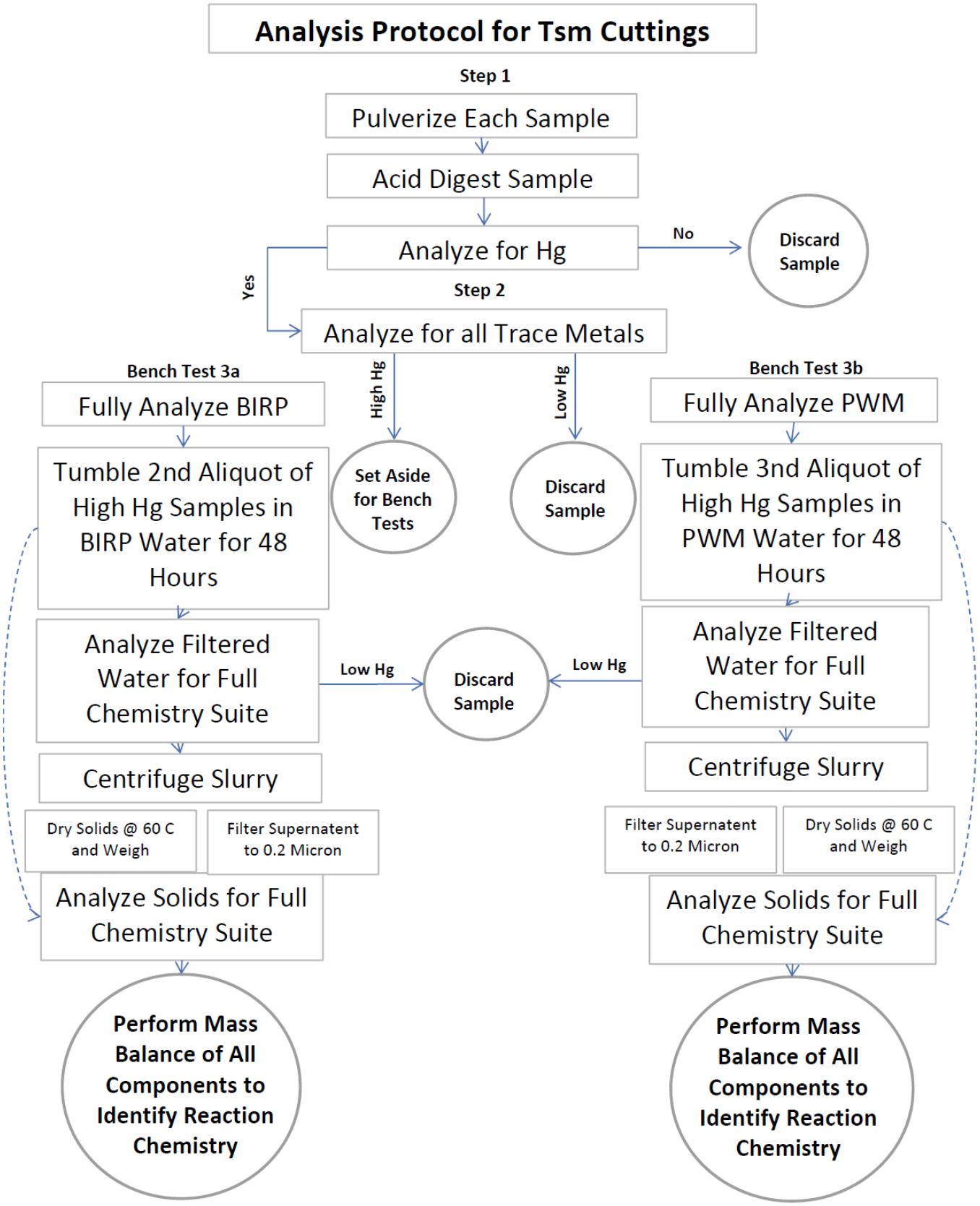
Analysis Protocol for Tsm Cuttings
Step 1
Pulverize Each Sample
Acid Digest Sample
Analyze for Hg
No
Discard Sample
Yes
Step 2
Analyze for all Trace Metals
High Hg
Low Hg
Bench Test 3a
Fully Analyze BIRP
Tumble 2nd Aliquot of High Hg Samples in BIRP Water for 48 Hours
Set Aside for Bench Tests
Discard Sample
Bench Test 3b
Fully Analyze PWM
Tumble 3nd Aliquot of High Hg Samples in PWM Water for 48 Hours
Analyze Filtered Water for Full Chemistry Suite
Low Hg
Discard Sample
Low Hg
Analyze Filtered Water for Full Chemistry Suite
Centrifuge Slurry
Dry Solids @ 60 C and Weigh
Filter Supernatent to 0.2 Micron
Filter Supernatent to 0.2 Micron
Dry Solids @ 60 C and Weigh
Analyze Solids for Full Chemistry Suite
Analyze Solids for Full Chemistry Suite
Perform Mass Balance of All Components to Identify Reaction Chemistry
Perform Mass Balance of All Components to Identify Reaction Chemistry

SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	July 10, 2019
AGENDA ITEM:	4
AGENDA TITLE:	Proposed MPWMD Pure Water Monterey Well Ordinance
PREPARED BY:	Robert Jaques, Technical Program Manager

SUMMARY:

Mr. Lear of MPWMD reported that his District is preparing an ordinance pertaining to wells associated with the Pure Water Monterey project. A draft copy of the proposed ordinance is attached.

Mr. Lear will explain his District's need to enact such an ordinance and respond to TAC questions about it at today's meeting.

ATTACHMENTS:	Draft MPWMD Ordinance No. 183 establishing zones of control over the construction of drinking water wells
RECOMMENDED ACTION:	Concur with MPWMD's enactment of this Ordinance

MONTEREY PENINSULA WATER MANAGEMENT DISTRICT

ORDINANCE NO. 183

AN ORDINANCE OF THE BOARD OF DIRECTORS OF THE MONTEREY PENINSULA WATER MANAGEMENT DISTRICT ADDING RULE 20-E ESTABLISHING A ZONE OF CONTROLLED DRINKING WATER WELL CONSTRUCTION AND A ZONE OF POTENTIAL CONTROLLED DRINKING WATER WELL CONSTRUCTION RELATED TO PURE WATER MONTEREY INJECTION OF HIGHLY PURIFIED WATER

FINDINGS

1. The Monterey Peninsula Water Management District (MPWMD) was created to address ground and surface water resources in the Monterey Peninsula area, which the Legislature found required integrated management, and was endowed with the powers set forth in the Monterey Peninsula Water Management District Law (Chapter 527 of the Statutes of 1977, found at West's Water Code, Appendix, Section 118-1, et seq.).

2. Monterey One Water (M1W) was formed in 1972 to regionalize wastewater treatment on the Monterey Peninsula and became a Joint Powers Authority in the late 1980's. M1W operates a regional waste water plant north of the City of Marina and has been supplying the Castroville Seawater Intrusion Project treated water for irrigation since 1998.

3. Marina Coast Water District (MCWD) was formed in 1970 and currently operates the water and wastewater systems for the City of Marina, California State University of Monterey Bay and the former Fort Ord. MCWD is the future water purveyor for the former Fort Ord referenced in the MCWD 5-year plan as the Ord Community (**Exhibit 1)**.

4. MPWMD is partnered with M1W in the construction and operation of the Pure Water Monterey (PWM), a water resources project that will produce 100% recycled water in compliance with Title 22 Section 60320.216 requirements lain out in the California Code of Regulations.

5. PWM will bring 3,500 Acre Feet per year of advanced treated water from the Advanced

Water Purification Facility (AWPF) and inject it into the Paso Robles Aquifer and the Santa Margarita Sandstone in the Seaside Groundwater Basin (SGB). The injected water will be recovered through the California American Water and MPWMD wells in the SGB.

6. Title 22 Section 60320.200 (e) Part 2 requires, "a boundary representing a zone of controlled drinking water well construction, the greatest of the horizontal and vertical distances reflecting the retention times required pursuant to sections 60320.208 and 60320.224." A zone of moratorium on installing drinking water wells shall be established around the PWM injection well field.

7. Title 22 Section 60320.200 (e) Part 3 also requires, "a secondary boundary representing a zone of potential controlled drinking water well construction, depicting the zone within which a well would extend the boundary in Part 2 to include existing or potential future drinking water wells, thereby requiring further study and potential mitigating activities prior to drinking water well construction." A zone shall be established where proposed installation of drinking water wells are required to undergo further study prior to installation.

8. Agreement No. A-06181 between MPWMD, Monterey County Water Resources Agency (MCWRA), and Pajaro Valley Water Management Agency signed in 1993 gives MPWMD, "exclusive authority to regulate the management of the Seaside Groundwater Basin within the present Fort Ord boundaries, and MCWRA will comply with any such ordinance enacted by MPWMD."

9. For establishment of the zone of controlled drinking water well construction, an area representing the 180 day travel time of injected water is required to be identified. This prevents wells from being installed inside the zone where groundwater has not achieved full Logarithmic Virus Removal Credits under Title 22 Section 60320.200 (e) Part 2. An area representing a 2 year travel time of injected water is required to establish the secondary zone of potential controlled drinking water well construction as required in Title 22 Section 60320.200 (e) Part 3. Figures 5-2 and 5-3 from the Title 22 Engineering report prepared for PWM show the modeled particle paths for water injected into the Paso Robles Aquifer and the Santa Margarita Sandstone respectively. These figures are included as **Exhibit 2** and **Exhibit 3** of Ordinance 183.

10. **Exhibit 4** shows the zones of controlled drinking water well construction for both aquifer units representing 180 day travel times as well as the secondary zone of potential controlled

drinking water construction representing a 2 year travel time required by Title 22 regulations. As a component of PWM startup a tracer test will be conducted. If the results of the tracer test are different than the modeled groundwater travel times, Exhibit 4 will be revised by MPWMD Board resolution.

11. Establishment of the control zones will not have adverse effects on the ability of water purveyors to provide water to the communities. The area inside of the control zones will be incorporated into the City of Seaside upon the transfer of land from Fort Ord Reuse Authority and will be developed according to the City's General Plan. Agreement No. A-06181 gives MCWRA the authority to regulate water delivery systems that deliver water to the area within the Fort Ord Boundaries and the MPWMD Boundary.

12. MCWRA recognizes MCWD as the water purveyor to serve the Ord Community development and MCWD cannot drill wells in the Seaside Groundwater Basin as they are not a named producer in the Seaside Groundwater Basin Adjudication Decision.

13. It is recognized that the Title 22 regulations are currently being reviewed by the State of California and in the future direct potable use (raw water augmentation) of highly treated water may be permitted. If PWM were to pursue and obtain permits for raw water augmentation, the control zones will sunset. The sunset of the control zones will be conducted by MPWMD.

14. This ordinance adds Rule 20-E to establish the injection control zones for PWM highly purified water.

15. This Ordinance is exempt from review under the California Environmental Quality Act ("CEQA") (California Public Resources Code Section 21000 et seq.). Pursuant to State CEQA Guidelines section 15307 (14 Cal. Code Regs.,§ 15307), this Ordinance is covered by the CEQA Categorical Exemption for actions taken to assure the maintenance, restoration, enhancement, or protection of a natural resource where the regulatory process involves procedures for protection of the environment.

NOW THEREFORE be it ordained as follows:

ORDINANCE

Section One: **Short Title**

This ordinance shall be known as the Pure Water Monterey controls zone for construction of drinking water Wells.

Section Two: **Purpose**

The Monterey Peninsula Water Management District (MPWMD) enacts this ordinance to comply with the Title 22 requirements establishing a control zone for drinking water Well construction and a secondary control zone requiring further study near the Pure Water Monterey (PWM) injection well field in the Paso Robles Formation and the Santa Margarita Sandstone.

Section Three: **Addition of Rule 20-E, Zones of Controlled Drinking Water**

The following text shall be added as Rule 20-E – Zones of Controlled Drinking Water

RULE 20-E – ZONES OF CONTROLLED DRINKING WATER

A. Figure 10-1 from Todd Groundwater is a map showing the Zones of controlled drinking water and will be included in Rule 20-E. If the map needs to be updated in the future it will be done through MPWMD Board Resolution.

B. Prohibition of installation of drinking water Wells within the control zones in the Paso Robles Aquifer and the Santa Margarita Sandstone shall be enacted once the Pure Water Monterey (PWM) begins injecting as required by Title 22 Regulations. Maps identifying the control zones are included with this Rule. The process shall be as follows:
    1. Monterey County Environmental Health (MCEH) requires MPWMD review and comment of all proposed well construction permits prior to the approval of a well construction permit if the proposed Well site is within the MPWMD boundaries.
    2. At the time of permit review, if the Well is determined to be inside the control zone, the permit will be denied.

C. An elevated level of study is required prior to MPWMD approving the permit in the MCEH review process in accordance with Title 22 Regulations. The study must demonstrate that Wells proposed to be installed in the secondary control zone will not capture water injected into the PWM injection wells that have had travel time shorter than 180 days from the injection well. The process shall be as follows:
    1. MCEH requires MPWMD review and comment of all proposed well construction permits prior to the approval of a well construction permit if the proposed Well site is within the MPWMD boundaries.
    2. At the time of permit review, if the Well is determined to be inside the secondary control zone, MPWMD will work with MCEH and the Applicant to demonstrate appropriate travel time to the proposed Well.
    3. The cost of this study will be borne by the Applicant.

D. The term "drinking water well" as used in these Regulations refers to any Well proposed to be used as a Potable supply of water for any reasonable and beneficial use.

E. Title 22 Regulations are under review at the State level. Direct potable use of advanced treated water (raw water augmentation) may be permitted in the future. If PWM obtains permits for raw water augmentation, MPWMD will repeal Rule 20-E.

Section Four: Effective Date and Sunset

Ordinance 183 shall take effect on the first day PWM begins injecting advanced treated water. MPWMD shall sunset Ordinance 183 if PWM obtains permits for raw water augmentation.

Section Five: Severability

If any subdivision, paragraph, sentence, clause or phrase of this ordinance is, for any reason, held to be invalid or unenforceable by a court of competent jurisdiction, such invalidity shall not affect the validity or enforcement of the remaining portions of this ordinance, or of any other provisions of the Monterey Peninsula Water Management District Rules and Regulations. It is the District's express intent that each remaining portion would have been adopted irrespective of the fact that one or more subdivisions, paragraphs, sentences, clauses, or phrases be declared invalid or unenforceable.

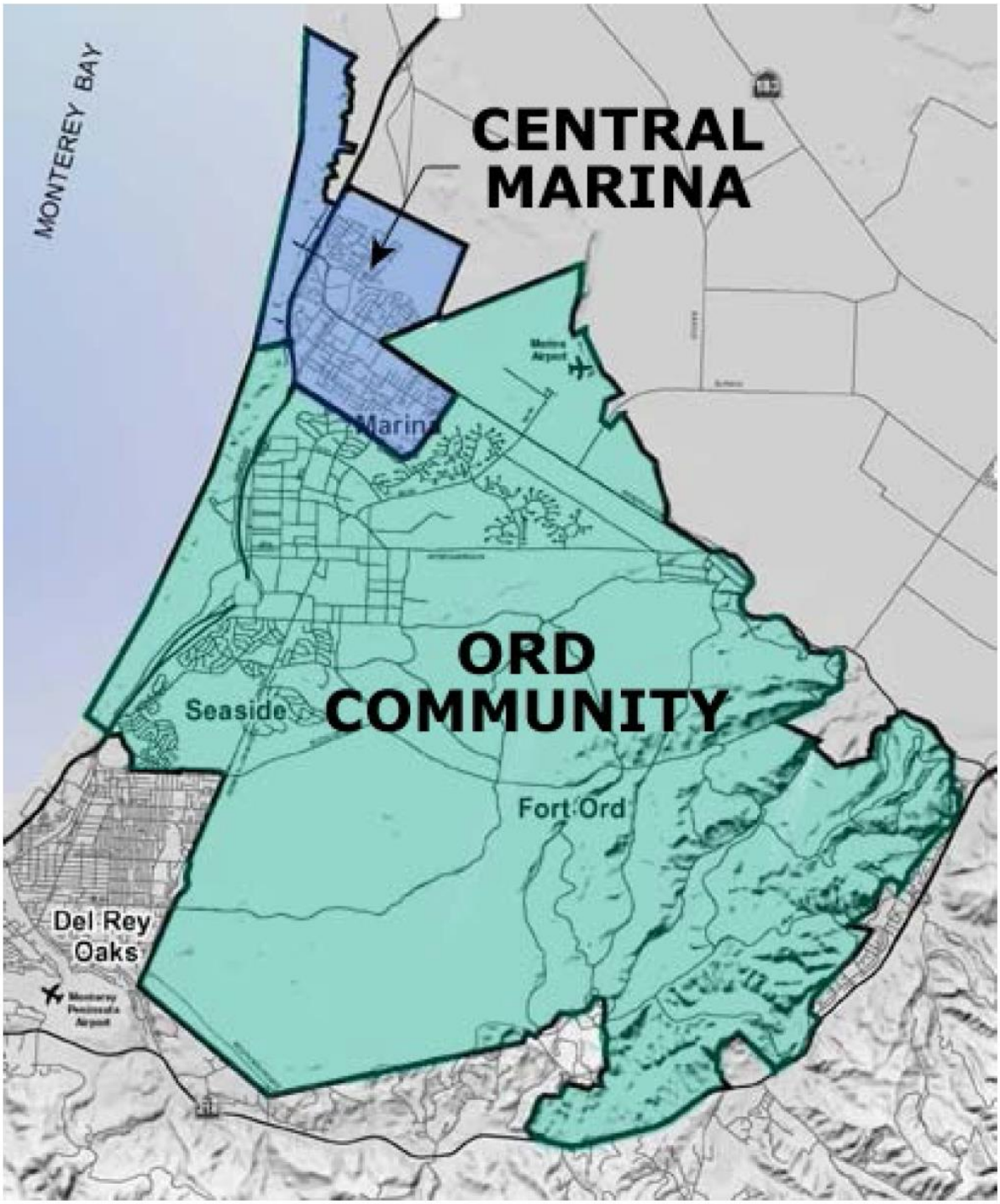

EXHIBIT 1 – Area of Ord Community Proposed to be Served by MCWD

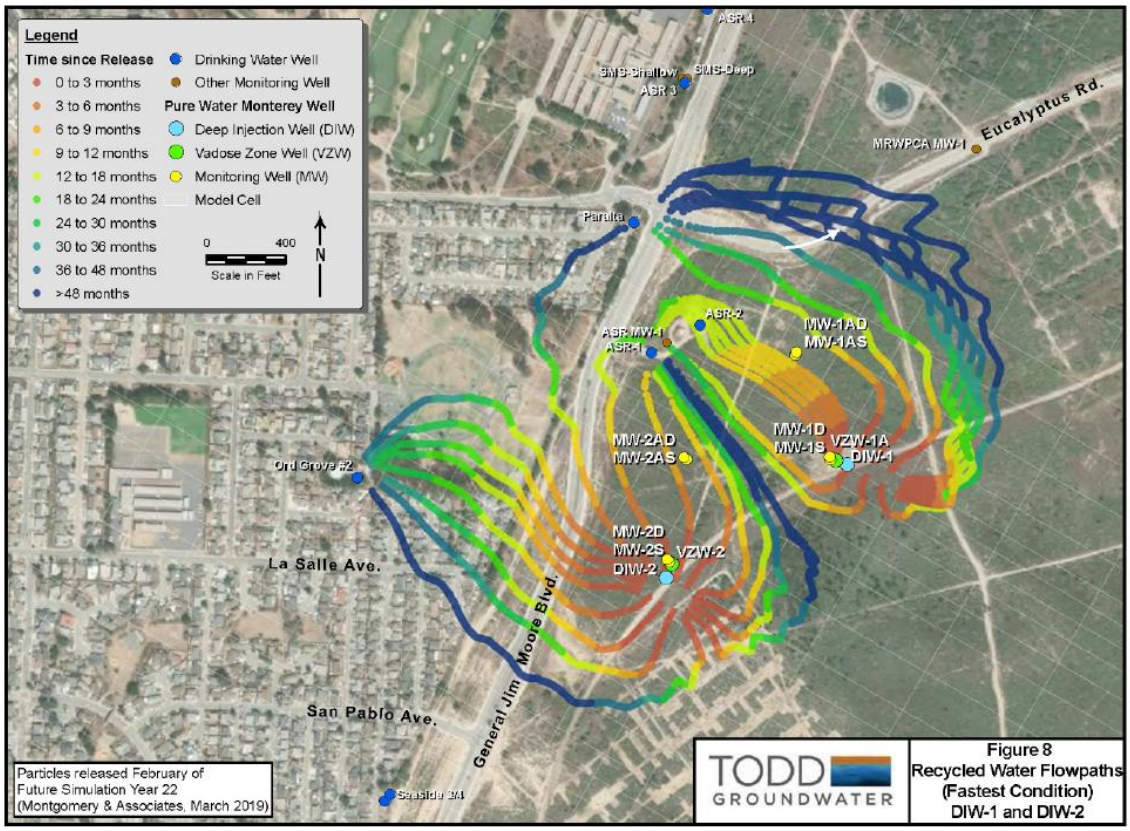

EXHIBIT 2 –Particle Paths for Water Injected into the Santa Margarita Sandstone

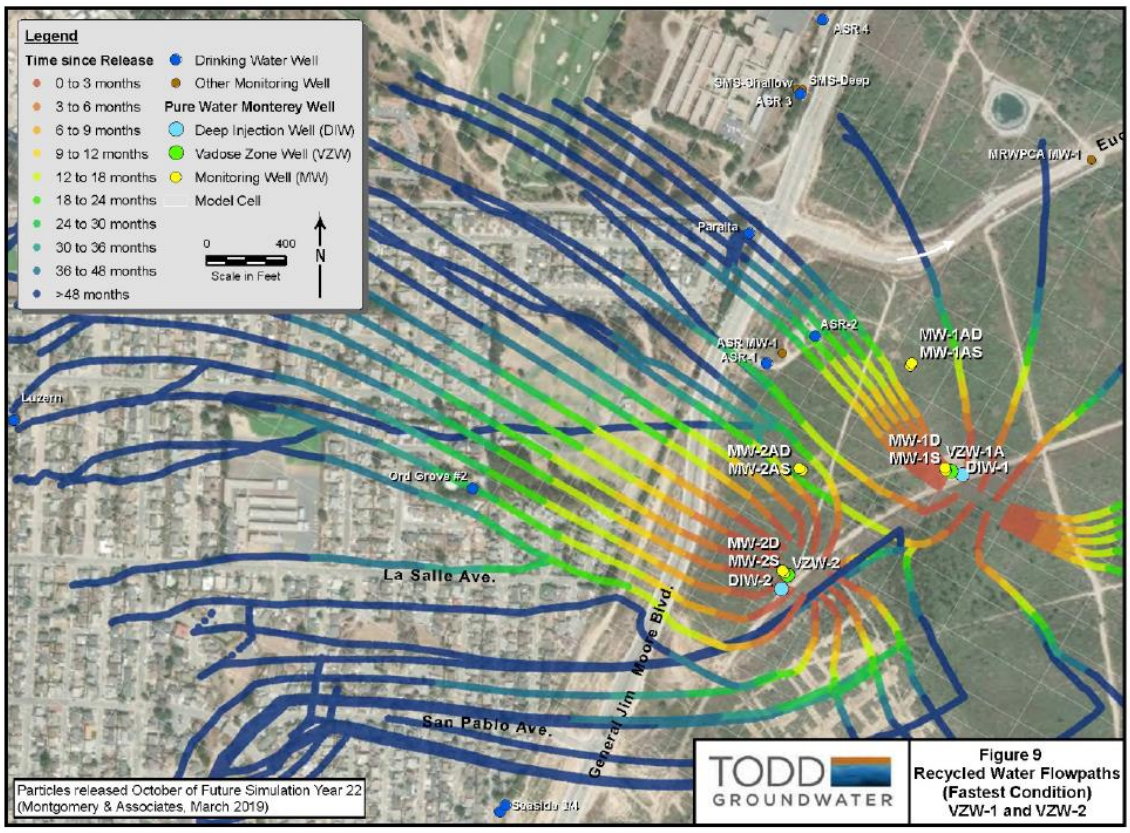

EXHIBIT 3 –Particle Paths for Water Injected into the Paso Robles Aquifer

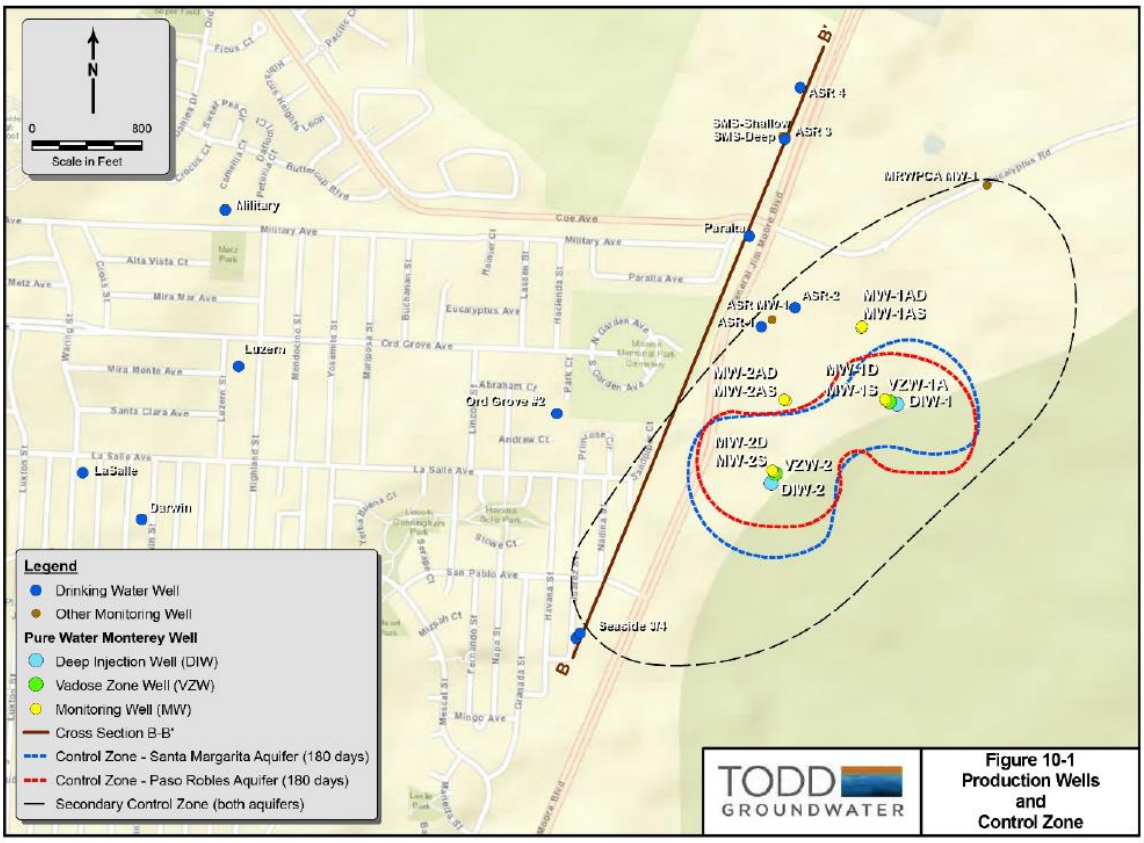

EXHIBIT 4 – Control Zone for the Paso Robles Aquifer and Santa Margarita Sandstone and Secondary Control Zone for both Geologic Units

On motion of Director, and second by Director, the foregoing ordinance is adopted upon this _____ day of _____, 2019, by the following vote:

AYES:

NAYS:

ABSENT:

I, David J. Stoldt, Secretary to the Board of Directors of the Monterey Peninsula Water Management District, hereby certify the foregoing ordinance was duly adopted on the _____ day of _____, 2019.

Witness my hand and seal of the Board of Directors this ____ day of _____, 2019.

_____
David J. Stoldt, Secretary to the Board

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SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	July 10, 2019
AGENDA ITEM:	5
AGENDA TITLE:	Initial Discussion Regarding Scope of Work for Monitoring and Management Program (M&MP) for FY 2020
PREPARED BY:	Robert Jaques, Technical Program Manager

SUMMARY:

The Schedule calls for the TAC to approve an FY 2020 Work Plan and Budget for the 2020 Management and Monitoring Program (M&MP) at its August 2019 meeting. This will then go on to the Board for approval at its October 2019 meeting.

In order to obtain TAC input and direction regarding these items, I have reviewed the FY 2019 M&MP and have edited it to reflect those work items that I anticipate being performed in FY 2020. A copy of this Proposed Work Plan is contained in Attachment 1.

Items highlighted in yellow are costs and/or descriptions for the various tasks that I will evaluate and update as necessary, based on the TAC's input at today's meeting and discussions with our consultants.

Other than the obvious need to change the dates in the M&MP from 2019 to 2020 (which I have done), all other proposed changes from the 2019 M&MP are shown in Track-Change format (deletions in ~~red~~ strikeout and additions in blue underlines) for the TAC to consider in preparing the 2020 M&MP. Most of the proposed revisions are relatively minor, but I have included in Task I.3.a.3 some new modeling work pertaining to injection of water to raise groundwater levels.

Attachment 2 contains the Recommendations section from the recently updated Basin Management Action Plan (BMAP). The TAC is requested to provide direction on whether some of these should also be included in the 2020 M&MP. They are summarized below:

Recommendation 1: Encourage Implementation of Selected Management Actions

1. **Install New Southern Coastal Subarea Wells**. Who would carry this work out, and how it would be funded, would need to be determined, as well as where the wells would be located and how much they could produce without causing harm to the Basin in the Southern Coastal Subarea, and how much benefit they would provide to the Northern Coastal Subarea.
2. **Recycled Water for Laguna Seca Golf Courses**. Where the recycled water would come from and how it would be delivered to the golf courses, as well as how this would be funded, would need to be determined.
3. **Water Conservation**. This is already being carried out and reportedly to essentially its maximum practical extent.
4. **Coordination with the Salinas Valley Basin Groundwater Sustainability Agencies**. This is already being done through the Watermaster's representation on the Advisory Committee of the SVBGSA. When MCWD forms a similar advisory body, the Watermaster has been told that it will be invited to be a member.

SEASIDE BASIN WATER MASTER TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

AGENDA ITEM:	5 (Continued)

5. **Enhanced Storm Water Recharge within the City of Seaside**. This appears to be something that would be carried out by the City of Seaside, but the Watermaster could be supportive of this.

Recommendation 2: Groundwater Modeling to Determine a Combination of Management Actions and Supplemental Supply Projects that Achieve Protective Groundwater Elevations. This would be the Sustainable Yield approach to Basin management. The Board determined to defer any action on this pending completion of the Groundwater Sustainability Plans for the Salinas Valley Groundwater Basin.

Recommendation 3: Continue Ongoing Groundwater Monitoring. We are already doing this.

Recommendation 4: Develop Long-Term Financing Plan for Replenishment Water. This seems like a good thing to do, but first it would seem necessary to identify the source(s) of replenishment water, so the costs and other things related to that could be defined.

If there are other revisions the TAC would like to make to prepare the M&MP for 2020 they can be brought up at today's meeting. The final M&MP for 2020, which will reflect any revisions or additions/deletions that come up at today's meeting, will be on the TAC's August 14, 2019 Agenda for approval.

ATTACHMENTS:	1. Seaside Groundwater Basin Monitoring and Management Program – Preliminary Proposed FY 2020 Work Plan 2. Recommendations in the Updated BMAP
RECOMMENDED ACTION:	Provide Input to Technical Program Manager Regarding Any Corrections or Additions to the Preliminary Proposed FY 2020 Work Plan

Attachment 1

Seaside Groundwater Basin
2020 Monitoring and Management Program

The tasks outlined below are those that are anticipated to be performed during 2020. Some Tasks listed below are specific to 202019, while other Tasks are recurring such as data collection, database entry, and Program Administration Tasks.

Within the context of this document the term "Consultant" refers either to a firm 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.

M.1 Program Administration

M. 1. a **Project Budget and Controls** **($0)**	Consultants will provide monthly or bimonthly invoices to the Watermaster for work performed under their contracts with the Watermaster. Consultants will perform maintenance of their internal budgets and schedules, and management of their subconsultants. The Watermaster will perform management of its Consultants.
M. 1. b **Assist with Board and TAC Agendas** **($0)**	Watermaster staff will prepare Board and TAC meeting agenda materials. No assistance from Consultants is expected to be necessary to accomplish this Task.
M. 1. c. & M. 1. d **Preparation for and Attendance at Meetings** **($11,500)**	The Consultants' work will require internal meetings and possibly meetings with outside governmental agencies and the public. For meetings with outside agencies, other Consultants, or any other parties which are necessary for the conduct of the work of their contracts, the Consultants will set up the meetings and prepare agendas and meeting minutes to facilitate the meetings. These may include planning and review meetings with Watermaster staff. The costs for these meetings will be included in their contracts, under the specific Tasks and/or subtasks to which the meetings relate. The only meeting costs that will be incurred under Tasks M.1.c and M.1.d will be: • Those associated with attendance at TAC meetings (either in person or by teleconference connection), including providing periodic progress reports to the Watermaster for inclusion in the agenda packets for the TAC meetings, when requested by the Watermaster to do so. These progress reports will typically include project progress that has been made, problem identification and resolution, and planned upcoming work. • From time-to-time when Watermaster staff asks Consultants to make special presentations to the Watermaster Board and/or the TAC, and which are not included in the Consultant's contracts for other tasks. Appropriate Consultant representatives will attend TAC meetings when requested to do so by Watermaster Staff (either in person or by teleconference connection), but will not be asked to prepare agendas or meeting minutes. As necessary, Consultants may provide oral updates to their progress reports (prepared under Task M.1.d) at the TAC meetings.

M. 1. e **Peer Review of Documents and Reports** **($7,500)**	When requested by the Watermaster staff, Consultants may be asked to assist the TAC and the Watermaster staff with peer reviews of documents and reports prepared by various other Watermaster Consultants and/or entities.
M. 1. f **QA/QC** **($0)**	A Consultant (MPWMD) will provide general QA/QC support over the Seaside Basin Monitoring and Management Program. These costs are included in the other tasks.
M.1.g **Prepare Documents for SGMA Reporting** **($2,140)**	Section 10720.8 of the Sustainable Groundwater Management Act (SGMA) requires adjudicated basins to submit annual reports. Most of the documentation that needs to be reported is already generated by the Watermaster in conjunction with preparing its own Annual Reports. However, some information such as changes in basin storage is not currently generated and will require consultant assistance to do so. This task will be used to obtain this consultant assistance, as needed.

I. 2 Comprehensive Basin Production, Water Level and Water Quality Monitoring Program

I. 2. a. Database Management

I. 2. a. 1 **Conduct Ongoing Data Entry and Database Maintenance/ Enhancement** **($17,004)**	The database will be maintained by a Consultant (MPWMD) performing this work for the Watermaster. MPWMD will enter new data into the consolidated database, including water production volumes, water quality and water level data, and such other data as may be appropriate. Another Consultant will periodically post database information to the Watermaster's website, so it will be accessible to the public and other interested parties. No enhancements to the database are anticipated during 2020.
I. 2. a. 2 **Verify Accuracy of Production Well Meters** **($0)**	To ensure that water production data is accurate, the well meters of the major producers were verified for accuracy during 2009 and again during 2015. No additional work of this type is anticipated during 2020.

I. 2. b. Data Collection Program

I. 2. b. 1 **Site Representation and Selection** **($0)**	The monitoring well network review that was started in 2008 has been completed, and sites have been identified where future monitoring well(s) could be installed, if it is deemed necessary to do so in order to fill in data gaps. No further work of this type is anticipated in 2020.
I. 2 b. 2 **Collect Monthly Manual Water Levels** **($3,726)**	Each of the monitoring wells will be visited on a regular basis. Water levels will be determined by either taking manual water levels using an electric sounder, or by dataloggers. The wells where the use of dataloggers is feasible or appropriate have been equipped with dataloggers. All of the other wells will be manually measured. This Task includes the purchase of one datalogger and parts for the datalogger to keep in inventory as a spare if needed.

I. 2. b. 3 **Collect Water Quality Samples.** **($42,083)**	Water quality data will be collected quarterly from certain of the monitoring wells, but will no longer be collected from the four coastal Sentinel Wells. Discontinuing water quality sampling in those wells is the result of the finding made in 2018 that the water quality samples being extracted from those wells are not representative of the aquifer. Those wells were designed for the purpose of electric induction logging, and will therefore continue to be induction logged twice a year in WY 2020. In 2012 water quality analyses were expanded to include barium and iodide ions, to determine the potential benefit of performing these additional analyses. These two parameters have been useful in analyzing seawater intrusion potential in other vulnerable coastal groundwater basins, and are briefly mentioned in the Watermaster's annual Seawater Intrusion Analysis Reports. These parameters were added to the annual water quality sampling list for the four Watermaster Sentinel wells (SBWM-1, SBWM-2, SBWM-3, and SBWM-4), and also for the 3 most coastal MPWMD monitoring wells (MSC, PCA, and FO-09). Barium and iodide analyses will continue being performed on the 3 most coastal MPWMD monitoring wells in 2020, but will no longer be performed on the Watermaster's coastal Sentinel Wells as discussed above. Water quality data may come from water quality samples that are taken from these wells and submitted to a State Certified analytic laboratory for general mineral and physical suite of analyses, or the data may come from induction logging of these wells and/or other data gathering techniques. The Consultant or Contractor selected to perform this work will make this judgment based on consideration of costs and other factors. Under this Task in 2013 retrofitting to use the low-flow purge approach for getting water quality samples was completed on all of the wells that are sampled. This sampling equipment sits in the water column and may periodically need to be replaced or repaired. Accordingly, an allowance to perform maintenance on previously installed equipment has been included in this Task. Also, in the event a sampling pump is found to be no longer adequate due to declining groundwater levels, or if a sampling pump needs to be installed on a Sentinel Well, an allowance to purchase a replacement sampling pump has been included in this Task. Improvements to the QA/QC program for the water quality sampling work were adopted in mid-2017 and will be included in this work in 2020.
I. 2. b. 4 **Update Program Schedule and Standard Operating Procedures.** **($0)**	All recommendations from prior reviews of the data collection program have been implemented. No additional work of this type is anticipated in 2020.
I. 2. b. 5 **Monitor Well Construction** **($0)**	An additional monitoring well was installed in 2009. No further work of this type is anticipated in 2020.

I. 2. b. 6 Reports ($3,576)	~~The groundwater level and water quality monitoring will be conducted on a monthly, quarterly, semi-annual or annual basis, as described in the Consultant's Scope of Work. Reports summarizing data collected and analyzed will be submitted to the Watermaster on a schedule to be established during the year, and will consist of:~~The groundwater level and water quality monitoring will be conducted by MPWMD on a monthly basis. A report summarizing and analyzing the data collected will be submitted by MPWMD to the Watermaster at the end of each Water Year. This work is further described below: ~~1. A review of the water quality and water level data at the end of each quarter of the Water Year, including tabularized data summaries of the WQ/WL data twice per year, once for the Q1 and Q2 period and once for the Q3 and Q4 period, so this data can be posted to WATERMASTER's website. No reporting on a quarterly basis is required but the Consultant will promptly notify the Watermaster of any missing data or data collection irregularities that were encountered during the quarterly reporting period.~~ 1. Water quality and water level data will be reviewed by MPWMD at the end of each quarter of the Water Year. No reporting on a quarterly basis is required but MPWMD will promptly notify the Watermaster of any missing data or data collection irregularities that were encountered during the quarterly reporting period. **2.** MPWMD will prepare an annual report summarizing the water quality and water level data for the Water Year, and containing tables of this data for the complete Water Year. The report will include a brief cover letter describing any missing data or data collection irregularities that were encountered during the reporting period, and any recommendations for changes to be made to the data collection program.
I.2.b.7 CASGEM Data Submittal ($2,384)	On the Watermaster's behalf MPWMD will compile and submit data on the Watermaster's "Voluntary Wells" into the State's CASGEM groundwater management database. The term "Voluntary Well" refers to a well that is not currently having its data reported into the CASGEM system, but for which the Watermaster obtains data. This will be done in the format and on the schedule required by the Department of Water Resources under the Sustainable Groundwater Management Act.
I. 3 Basin Management	
I. 3. a. Enhanced Seaside Basin Groundwater Model (Costs listed in subtasks below)	The Watermaster and its consultants use a Groundwater Model for basin management purposes.
I.3.a.1 Update the Existing Model ($0)	The Model, described in the report titled "Groundwater Flow and Transport Model" dated October 1, 2007, was updated in 2009 in order to develop protective water levels, and to evaluate replenishment scenarios and develop answers to Basin management questions. The Model was again updated in 2014. In 2018 the Model was recalibrated and updated. No further work of this type is anticipated in 2020.

I. 3. a. 2
Develop Protective Water Levels
($0)

A series of cross-sectional models was created in 2009 in order to develop protective water levels for selected production wells, as well as for the Basin as a whole. This work is discussed in Hydrometrics' "Seaside Groundwater Basin Protective Water Elevations Technical Memorandum." In 2013 further work was started to refine these protective water levels, but it was found that the previously developed protective water levels were reasonable. Protective water levels will be updated, if appropriate, as part of the work of Task I.3.c.

I. 3. a. 3
Evaluate Replenishment Scenarios and Develop Answers to Basin Management Questions
($~~2~~70,000)

In 2009 the updated Model was used to evaluate different scenarios to determine such things as the most effective methods of using supplemental water sources to replenish the Basin and/or to assess the impacts of pumping redistribution. This work is described in HydroMetrics' "Seaside Groundwater Basin Groundwater Model Report." In 2010, and again in 2013, HydroMetrics used the updated Model to develop answers to some questions associated with Basin management.

Modeling performed to date indicates that the solution to the problem of water levels in the Seaside Basin being below Protective Water Levels will be to inject water. In the not-too-distant future there might be the ability of Monterey Peninsula Water Supply Project's desalination plant (if it gets built) to provide additional water for Basin injection on an interim basis until California American Water's demand level reaches the desalination plant's design capacity. There is some growth built into that plant's capacity for such things as lots of record and economy bounce back, which will likely not all be needed for some years into the future.

Also, if the Pure Water Monterey Project were to be expanded this could be another source of water, at least some of which could be injected and left in the Basin to bring up water levels.

Montgomery & Associates agrees that injection is the quickest way to bring groundwater level up in the Seaside Basin, and that there are a number of different configurations that could be considered for doing this. For example having the injection wells closer to the coast will be better than inland locations. The scope and budget for previous modeling was estimated at about $14,000 per model scenario. Montgomery & Associates anticipates that it would take a minimum of 3 scenarios to perform an initial assessment of the most cost-effective method of using injected water to raise groundwater levels. This Task includes a $50,000 allowance to perform this modeling, if so directed by the Watermaster Board.

Modeling performed in 2014, 2015, and 2016 led to the conclusion that groundwater levels in parts of the Laguna Seca Subarea will continue to fall even if all pumping within that subarea is discontinued, because of the influence of pumping from areas near to, but outside of, the Basin boundary. Additional modeling work may be performed in 2020 to further examine this situation. This Task also includes a $20,000 allowance to perform modeling or other work to develop answers to basin management questions, if so directed by the Watermaster Board.

I. 3. b. **Complete Preparation of Basin Management Action Plan** **($0)**	The Watermaster's Consultant completed preparation of the Basin Management Action Plan (BMAP) in February 2009. The BMAP serves as the Watermaster's long-term seawater intrusion prevention plan. The Sections that are included in the BMAP are: Executive Summary Section 1 – Background and Purpose Section 2 – State of the Seaside Groundwater Basin Section 3 – Supplemental Water Supplies Section 4 –Groundwater Management Actions Section 5 – Recommended Management Strategies Section 6 – References
I. 3. c. **Refine and/or Update the Basin Management Action Plan** **($0)**	During 2018-2019 the BMAP was updated based on new data and knowledge that has been gained since it was prepared in 2009. No further work of this type is anticipated in 2020. However, after the Groundwater Sustainability Plan (GSP) for the adjacent Monterey Subbasin of the Salinas Valley Groundwater Basin is completed, it may be appropriate to further update the BMAP to reflect the impacts of implementing that GSP. That GSP is scheduled to be completed by early 2022.
I. 3. d. **Evaluate Coastal Wells for Cross-Aquifer Contamination Potential** **($0)**	If seawater intrusion were to reach any of the coastal wells in any aquifer, and if a well was constructed without proper seals to prevent cross-aquifer communication, or if deterioration of the well had compromised these seals, it would be possible for the intrusion to flow from one aquifer to another. An evaluation of this was completed in 2012 and is described in MPWMD's Memorandum titled "Summary of Seaside Groundwater Basin Cross-Aquifer Contamination Wells Investigation Process and Conclusions" dated August 8, 2012. This Memorandum did not recommend performing any further work on this matter at this time, other than to incorporate into the Watermaster's Database data from wells that were newly identified by the work performed in 2012. That data has now been incorporated into the Database, and no further work by the Watermaster on this matter is anticipated. In late 2017 a request was made to MPWMD to destroy one of its no-longer-used monitoring wells that is perforated in multiple aquifers (Well PCA-East Multiple). MPWMD performed this work in 2018. No further work of this type is anticipated in 2020.

I. 3. e.
Seaside Basin Geochemical Model
($10,000)

When new sources of water are introduced into an aquifer, with each source having its own unique water quality, there can be chemical reactions that may have the potential to release minerals which have previously been attached to soil particles, such as arsenic or mercury, into solution and thus into the water itself. This has been experienced in some other locations where changes occurred in the quality of the water being injected into an aquifer. MPWMD's consultants have been using geochemical modeling to predict the effects of injecting Carmel River water into the Seaside Groundwater Basin under the ASR program.

In order to predict whether there will be groundwater quality changes that will result from the introduction of desalinated water and additional ASR water (under the Monterey Peninsula Water Supply Project) and advance-treated ~~waste~~water (under the Pure Water Monterey Project) ~~a~~ geochemical evaluations, and potentially modeling, ~~was developed in 2018 and is being used~~will be performed in the areas of the Basin where injection of these new water sources will occur.

In 2019 a geochemical evaluation of introducing advance-treated water from the Pure Water Monterey Project was performed. That evaluation concluded that there would be no adverse geochemical impacts as a result of introducing that water into the Basin. A similar evaluation of the impact of introducing ASR water also concluded that there would be no adverse geochemical impacts. An evaluation of introducing desalinated water will be performed if the Monterey Peninsula Water Supply Project's desalination plant proceeds into the construction phase.

If any of the geochemical evaluations~~modeling~~ indicate~~s~~ the potential for problems to occur, then Montgomery and Associates may use the Watermaster's updated groundwater model, and information about injection locations and quantities, injection scheduling, etc. provided by MPWMD for each of these projects, to develop model scenarios to see if the problem(s) can be averted by changing delivery schedules and delivery quantities. This Task includes an allowance of $10,000 to have Montgomery and Associates perform such modeling, if necessary.

If the modeling predicts that there may be adverse impacts from introducing these new sources of water, measures to mitigate those impacts will be developed under a separate task that will be created for that purpose when and if necessary.

I. 4 Seawater Intrusion Response Plan (formerly referred to as the Seawater Intrusion Contingency Plan)

I. 4. a.
Oversight of Seawater Intrusion Detection and Tracking
($0)

Consultants will provide general oversight over the Seawater Intrusion detection program under the other Tasks in this Work Plan.

I. 4. b. **Focused Hydrogeologic Evaluation** **($0)**	MPWMD attempted to compile historical and current water quality data in the coastal area to provide more in-depth evaluation of conditions in the shallow Dune Sand/Aromas Sand aquifer in the vicinity of the Sand City Public Works well, where unique water quality conditions and variability have recently been observed as discussed at TAC meetings. However, it was found that no historical water quality data from Cal Am's now-abandoned wells existed, and consequently it was not possible to answer the question of why water quality in the Sand City Public Works well differs from water quality in other wells in the Basin. The Sand City desalination plant could be affecting water quality in this area, but without the prior water quality data from now-abandoned wells, this could not be determined. The results of this work were summarized in 2013 in a brief Technical Memorandum prepared by MPWMD with conclusions and recommendations, and no further work on this matter is planned.
I. 4. c. **Annual Report- Seawater Intrusion Analysis** **($22,742)**	At the end of each water year, a Consultant will reanalyze all water quality data. Semi-annual chloride concentration maps will be produced for each aquifer in the basin. Time series graphs, trilinear graphs, and stiff diagram comparisons will be updated with new data. The annual EM logs will be analyzed to identify changes in seawater wedge locations. All analyses will be incorporated into an annual report that follows the format of the initial, historical data report. Potential seawater intrusion will be highlighted in the report, and if necessary, recommendations will be included. The annual report will be submitted for review by the TAC and the Board. Modifications to the report will be incorporated based on input from these bodies, as well as Watermaster staff.
I. 4. d **Complete Preparation of Seawater Intrusion Response Plan** **($0)**	The Watermaster's Consultant (HydroMetrics) completed preparation of the long-term Seawater Intrusion Response Plans (SIRP) in February 2009. The Sections that are included in the SIRP are: Section 1 – Background and Purpose Section 2 – Consistency with Other Documents Section 3 – Seawater Intrusion Indicators and Triggers Section 4 –Seawater Intrusion Contingency Actions Section 5 - References No further work on the SIRP is anticipated in 2020.
I. 4. e. **Refine and/or Update the Seawater Intrusion Response Plan** **($0)**	At the beginning of 2009 it was thought that it might be beneficial or necessary to perform work to refine the SIRP and/or to update it based on new data or knowledge that was gained subsequent to the preparation of the SIRP. However, this did not prove to be necessary, and no further work of this type is anticipated in 2020.
I. 4. f. **If Seawater Intrusion is Determined to be Occurring, Implement Contingency Response Plan** **($0)**	The SIRP will be implemented if seawater intrusion, as defined in the Plan, is determined by the Watermaster to be occurring.

Attachment 2

BMAP Recommended Management Strategies

Many of the recommendations made in the 2009 BMAP have been implemented and have successfully contributed to producers adhering to triennial pumping reductions. Producers in the Basin have already demonstrated that they have the means to reduce pumping to close to 3,000 acre-feet per year. With the supplemental water supply projects currently under construction, basin producers are on track to achieving the Basin's Operating Yield at the Decision-Established Natural Safe Yield of 3,000 acre-feet per year by October 2020.
The modeling that developed the protective elevation groundwater surfaces for this report indicate that the MPWSP, in its current configuration, will not raise groundwater levels to protective groundwater elevations in all parts of the Basin. A further reduction of pumping in production wells screened in the deep aquifer of the Northern Coastal Subarea of approximately 1,800 acre-feet per year is needed for all protective groundwater elevations to be reached by the end of the predictive model period (2041). This will ensure that seawater intrusion will not impact the Basin and its production wells.

Recommendation 1: Encourage Implementation of Selected Management Actions
From the basin management actions outlined in Section 5, the following five are the most likely to be implemented cost-effectively and provide the greatest benefit to the Basin in the short-term. These recommended management strategies are focused on increasing recharge in the Basin and decreasing groundwater demand in the key areas of the Basin that are under stress: Northern Coastal and Laguna Seca Subareas. Any action that would assist in appropriate management of the Basin should be encouraged and supported by the Watermaster.

1. **Install New Southern Coastal Subarea Wells**
   This strategy further spreads pumping across the Basin. It could be implemented more quickly than the inland wells strategy if land is available to CAWC in the Southern Coastal Subarea. The Southern Coastal Subarea would be particularly advantageous, because it has more groundwater stored above sea level than the Northern Coastal Subarea. New well locations should be sited in coordination with the Watermaster to determine optimal locations that do not cause groundwater levels to fall below protective elevations.
2. **Recycled Water for Laguna Seca Golf Courses**
   The use of recycled water in the Laguna Seca Subarea for irrigation purposes should be encouraged by the Watermaster provided that no detrimental water quality impacts occur.
3. **Water Conservation**
   This is a management action without capital costs that results in a demand reduction. Water conservation should be given high priority with respect to the Watermaster's support of projects that reduce the amount of groundwater pumped from the Basin. Opportunities for additional water conservation, however, may be limited and therefore the benefit may be small.
4. **Coordination with the Salinas Valley Basin Groundwater Sustainability Agencies**
   Over the next few years, the Salinas Valley Basin and MCWD Groundwater Sustainability Agencies will be developing sections of their GSPs related to sustainable management criteria and the projects and management actions that will be implemented to achieve their sustainability goals for the Corral de Tierra and Ord subareas of the Monterey Subbasin by 2042. Their GSPs are required to be submitted by January 31, 2022. Since pumping in the Corral de Tierra subarea east of the Laguna Seca Subarea influences groundwater levels in Laguna Seca Subarea, and pumping in the Ord subarea can influence groundwater levels in the Seaside Basin's Northern Coastal Subarea, it is

vital that the Watermaster have technical representation at GSP coordination meetings required under SGMA with neighboring basins. Due to the extended timeline for GSP implementation, this management action is likely to have a longer-term impact on the Basin than the other recommendations.

5. **Enhanced Storm Water Recharge within the City of Seaside**
   Recharge project opportunities using storm water similar to the Del Monte Manor Park infiltration and the Drywell Aquifer Recharge Program should be supported by the Watermaster. The shallow aquifer will benefit from this type of recharge of stormwater that normally discharges to the ocean through outfalls to Monterey Bay.

Recommendation 2: Groundwater Modeling to Determine a Combination of Management Actions and Supplemental Supply Projects that Achieve Protective Groundwater Elevations

A calibrated groundwater flow model was developed for the Basin based on recommendations in the 2009 BMAP. The groundwater model has been used regularly to evaluate Basin conditions that result from various management actions and supplemental water supply projects. The model was updated in early 2018 prior to the preparation of this updated BMAP.

Although individual projects have been modeled and compared against protective groundwater elevations, the combination of basin management actions and supplemental water supply projects that are able to raise groundwater levels to protective elevations has not been studied. This is understandable, since the focus over the past nine years has been on meeting triennial pumping reductions. Since it is only two years until the last triennial reduction takes effect, the Watermaster should focus on establishing a path forward to meet coastal protective elevations.

Recommendation 3: Continue Ongoing Groundwater Monitoring

Groundwater level and groundwater quality monitoring is currently being conducted in accordance with the Seaside Basin M&MP and Seawater Intrusion Response Plan (SIRP). The M&MP is a key component of basin management that is already being implemented by the Watermaster. Continued monitoring in accordance with the M&MP and SIRP will provide data necessary for making future management decisions.

Water quality and groundwater level data from monitoring wells associated with new supplemental projects should be reported to the Watermaster.

Recommendation 4: Develop Long-Term Financing Plan for Replenishment Water

The Decision identifies three separate budgets that the Watermaster oversees: (1) the Monitoring and Management Plan budget, (2) an annual Administrative budget, and (3) a Replenishment budget. These budgets are set every year by the Watermaster.

The replenishment assessments are only intended to offset overproduction that has occurred after the Decision was issued. The current replenishment assessments are not sufficient to buy water that offsets over-pumping that occurred prior to the Decision. The over-pumping prior to the Decision added to the Basin's deficit. Offsetting only the over-production that occurred after the Decision may not be sufficient to raise groundwater levels in the Basin sufficiently to prevent seawater intrusion. The Watermaster should develop a plan to address this issue.

SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	July 10, 2019
AGENDA ITEM:	6
AGENDA TITLE:	Schedule
PREPARED BY:	Robert Jaques, Technical Program Manager

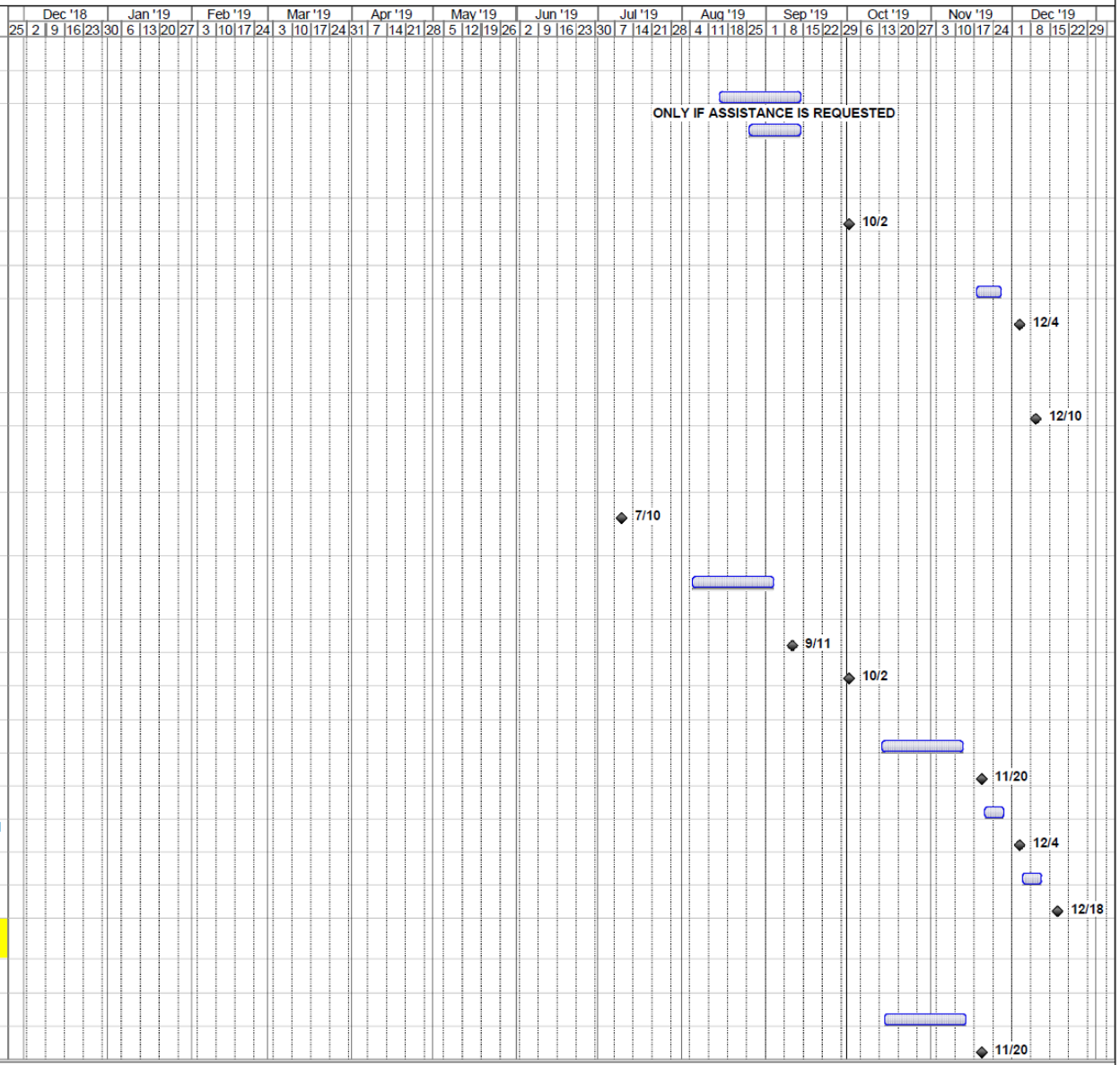
SUMMARY:

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 are performing certain portions of the work.

Attached is the proposed Work Schedule for FY 2019. It reflects discontinuing the posting of Q1/Q2 water quality and water level data on the Watermaster's website, as discussed in Agenda Item No. 2.C.

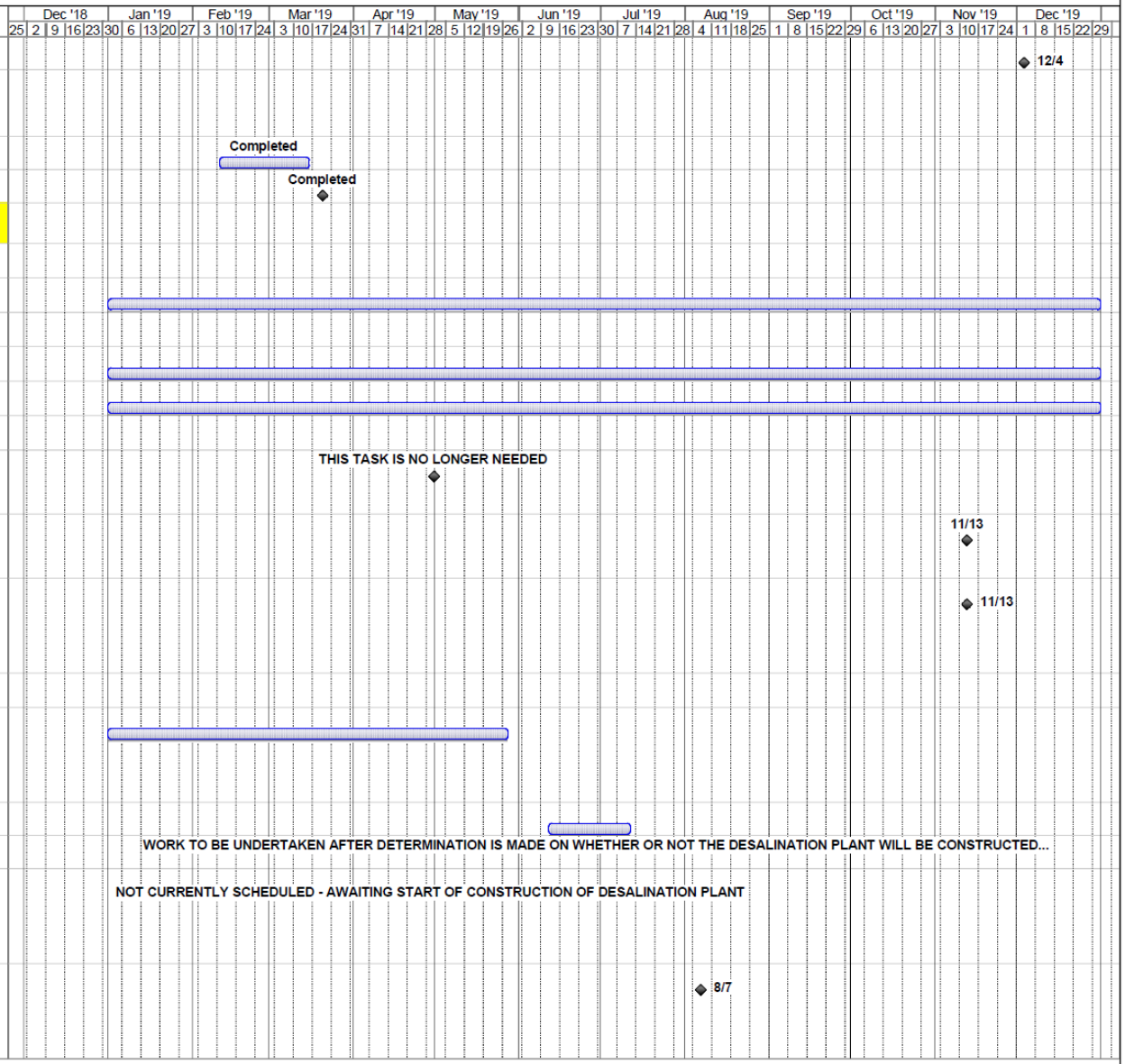
ATTACHMENTS:	Schedule of Work Activities for FY 2019
RECOMMENDED ACTION:	Provide Input to Technical Program Manager Regarding Any Corrections or Additions to the Schedule

Seaside Basin Watermaster
2019 Monitoring and Management Program
Work Schedule

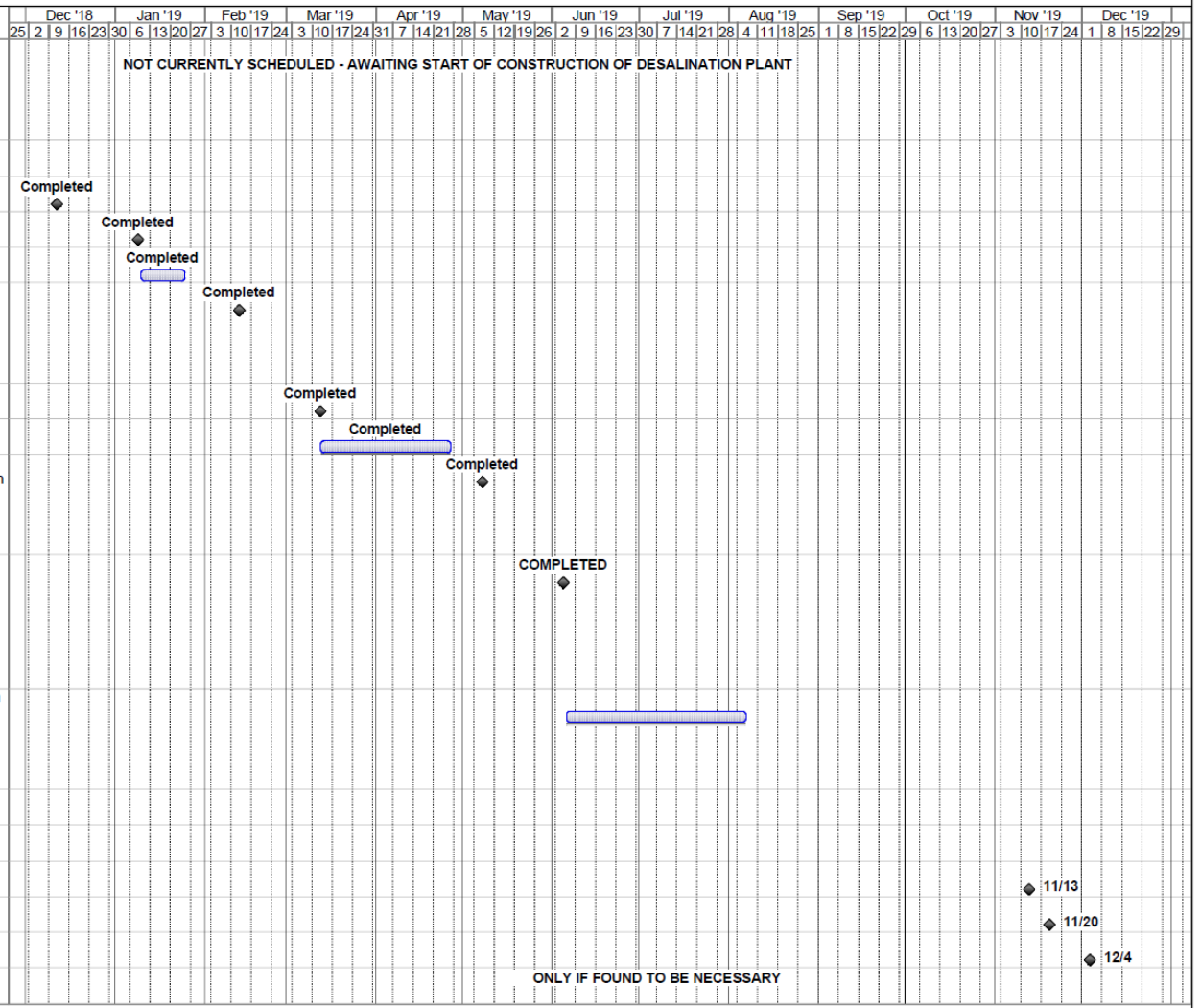


ID	Task Name
1	**Replenishment Assessment Unit Costs for Water Year 2020**
2	B&F Committee Develops Replenishment Assessment Unit Cost for 2020 Water Year
3	If Requested, TAC Provides Assistance to B&F Committee in Development of 2020 Water Year Replenishment Assessment Unit Cost
4	Board Adopts and Declares 2020 Water Year Replenishment Assessment Unit Cost
5	**Replenishment Assessments for Water Year 2019**
6	Watermaster Prepares Replenishment Assessments for Water Year 2019
7	Watermaster Board Approves Replenishment Assessments for Water Year 2019 (At December Meeting)
8	Watermaster Levies Replenishment Assessment for 2019
9	**Monitoring & Management Program (M&MP) Budgets for 2020 and 2021**
10	Preliminary Discussion of Potential Scope of Work for 2020 M&MP
11	Prepare Draft 2020 M&MP Work Plan and 2020 and 2021 O&M and Capital Budgets
12	TAC approves Draft 2020 M&MP Work Plan and 2020 and 2021 O&M and Capital Budgets
13	Board approves 2020 M&MP O&M and Capital Budgets
14	**2019 Annual Report**
15	Prepare Preliminary Draft 2019 Annual Report
16	TAC Provides Input on Preliminary Draft 2019 Annual Report
17	Prepare Draft 2019 Annual Report (Incorporating TAC Input)
18	Board Provides Input on Draft 2019 Annual Report (At December Board Meeting)
19	Prepare Final 2019 Annual Report (Incorporating Board Input)
20	Watermaster Submits Final 2019 Annual Report to Judge
21	***MANAGEMENT***
22	**M.1 PROGRAM ADMINISTRATION**
23	Prepare Initial Consultant Contracts for 2020
24	TAC Approval of Initial Consultant Contracts for 2020

Seaside Basin Watermaster
2019 Monitoring and Management Program
Work Schedule



Seaside Basin Watermaster
2019 Monitoring and Management Program
Work Schedule



SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	July 10, 2019
AGENDA ITEM:	6
AGENDA TITLE:	Other Business
PREPARED BY:	Robert Jaques, Technical Program Manager

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

ATTACHMENTS:	None
RECOMMENDED ACTION:	None required – information only