SEASIDE GROUNDWATER BASIN WATERMASTER

NOTICE
BUDGET AND FINANCE COMMITTEE
MEETING WEDNESDAY, JANUARY 17, 2018
11:00 A.M. - SEASIDE CITY HALL
ROOM TO BE DETERMINED

AGENDA

Committee Members

City of Seaside
Daphne Hodgson - Chair

California American Water
Eric Sabolsice

City of Sand City
Todd Bodem

Coastal Subarea Landowners
Paul Bruno

The public may comment on any item within the committee's jurisdiction. Please limit comments to three minutes in length.

Action Items:

1. Discuss/Consider Recommending Approval to the Watermaster Board of a Cost-Sharing Memorandum of Agreement for Seaside Basin Hydrogeologic Model Update

2. Discuss/Consider Recommending Approval to the Watermaster Board of a Cost-Sharing Memorandum of Agreement for Seaside Basin Geochemical Modeling

If requested, the agenda and documents in the agenda packet shall be made available in appropriate alternative formats to persons with a disability, as required by Section 202 of the Americans with Disabilities Act of 1990 (42 U.S.C. Sec. 12132), and the federal rules and regulations adopted in implementation thereof.

SEASIDE BASIN WATER MASTER
BUDGET AND FINANCE COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	January 17, 2018
AGENDA ITEM:	1
AGENDA TITLE:	Cost-Sharing Agreement for Seaside Basin Hydrogeologic Model Update
PREPARED BY:	Robert Jaques, Technical Program Manager

SUMMARY:

The Board directed that a cost-sharing agreement be developed between the Watermaster, MPWMD, and M1W (Monterey One Water) for updating and recalibrating the Seaside Basin Groundwater Model.

Attached is a draft agreement for this purpose. It has been reviewed with Dave Stoldt of MPWMD, and reflects his suggested edits. No suggested edits were submitted by M1W.

The Memorandum of Agreement presented was approved by the TAC at its January 10, 2018 meeting.

ATTACHMENTS:	Cost-Sharing Agreement for Seaside Basin Hydrogeologic Model Update
RECOMMENDED ACTION:	Recommend the Board approve the Cost-Sharing Memorandum of Agreement for Seaside Basin Hydrogeologic Model Update

MEMORANDUM OF AGREEMENT

Between the SEASIDE BASIN WATERMASTER, the MONTEREY PENINSULA WATER MANAGEMENT DISTRICT AND MONTEREY ONE WATER

TO SHARE IN THE COSTS OF UPDATING THE SEASIDE BASIN GROUNDWATER MODEL

THIS AGREEMENT is made and entered into this _____ day of _____, 2018, by and between the SEASIDE BASIN WATERMASTER, hereinafter referred to as the "WATERMASTER", and the MONTEREY PENINSULA WATER MANAGEMENT DISTRICT, hereinafter referred to as the "DISTRICT", and MONTEREY ONE WATER, hereinafter referred to as "M1W," as follows.

In this Agreement the terms "Party" and "Parties" refer to the WATERMASTER, the DISTRICT, and/or M1W, either individually or collectively.

RECITALS:

A. Under Case No. M66343, California Superior Court Monterey County, on March 27, 2006 by entry of Judgment ("Judgment") the WATERMASTER was created. The purpose of the WATERMASTER is to assist the Court in the administration and enforcement of the provisions of the Judgment.

B. As part of carrying out its duties and responsibilities under the Judgment, the WATERMASTER had a hydrogeologic model ("Model") of the Seaside Groundwater Basin ("Seaside Basin") prepared by its consultant, HydroMetrics WRI. Preparation of the Model was completed by HydroMetrics in November 2009.

C. Periodic recalibration and updating of the Model is necessary to ensure the Model simulates groundwater levels within an acceptable industry standard accuracy. The Model was last updated in 2014, and has not been recalibrated since it was originally prepared in 2009. Therefore, the WATERMASTER intends to recalibrate and update the Model in 2018.

D. M1W and the DISTRICT are together developing a project referred to as the Pure Water Monterey Project (PWM) that will store highly treated reclaimed wastewater in the Seaside Basin for subsequent recovery and reuse.

E. Because the Pure Water Monterey project will need to use the Model for further studies and reporting purposes, the Parties wish to enter into this Agreement to share in the cost of recalibrating and updating the Model.

TERMS AND CONDITIONS:

In consideration of the mutual promises contained herein, the WATERMASTER, the DISTRICT, and M1W hereby agree to the following terms and conditions:

A. Work to be performed. The WATERMASTER will have its consultant, HydroMetrics WRI, recalibrate and update the Model. The Scope of Work and the estimated costs to update and recalibrate the Model are described in Attachment 1 to this Agreement. The staff of each of the Parties to this Agreement will be invited to attend any key milestone meetings and conference calls that are held between the WATERMASTER and its consultant as the work is being performed, in order to enable each of the Parties to stay abreast of the work, raise pertinent questions in a timely manner, and provide input as appropriate.

The Parties hereto understand, as stated in Attachment 1, that it is difficult for HydroMetrics to accurately estimate the costs to perform the work to update and recalibrate the Model, and that the costs listed in Table 1 of Attachment 1 are HydroMetrics' best estimates. In the event it is determined, during the course of the work, that the cost to complete the work will be greater than the total cost listed in Table 1, the Parties agree to meet and confer to reach agreement on a revised cost that will be shared as described in paragraph B, so that the work can be completed. Agreement on said revised cost shall not be binding on any Party unless and until that Party formalizes its agreement to the revised cost in writing to each of the other Parties.

B. Costs to be shared. The costs to be shared are listed in Table 1 of Attachment 1. These costs will be shared in the following percentages:

Watermaster share = 50% ($27,185)
District and M1W combined share = 50% ($27,185).

(In the event a revised cost is agreed to, as described in paragraph A, these dollar figures will change).

C. Documents to be provided. After completion of Task 1 as described in Attachment 1, the WATERMASTER will provide the DISTRICT and M1W each with one copy of the Final Technical Memorandum documenting the model update and calibration results.

D. Payment of costs and reimbursement to the WATERMASTER. The WATERMASTER will make progress payments to HydroMetrics as it satisfactorily performs the work described in Attachment 1. After the satisfactory completion of the work, the WATERMASTER will provide to the DISTRICT and to M1W, copies of the payments it made to HydroMetrics. Within 30 days of receiving those documents, the DISTRICT and M1W will reimburse the WATERMASTER for 50% of those costs.

E. Term of Agreement. The term of this Agreement shall commence on the date of its execution, and shall continue in effect until the WATERMASTER has been reimbursed as described in paragraph D.

F. Hold Harmless. Under this Agreement the DISTRICT and M1W do hereby agree to indemnify, defend, and hold the WATERMASTER and its Board members, officers, employees, agents, and representatives harmless from and against any and all liability, claims, suits, actions, damages, and causes of action of any kind arising out of the DISTRICT'S and/or M1W's use of the Model in the planning, design, and construction of the PWM Project, and for the subsequent use of the Model in operating and maintaining the PWM Project.

G. Venue. In the event that suit shall be brought by any Party to this Agreement, the Parties agree that venue shall be exclusively vested in the state courts of the County of Monterey, or, if brought in federal court, in the United States District Court handling matters arising in Monterey County. Further, the prevailing Party shall be entitled to reasonable attorney fees and costs.

H. Notices. Written notice shall be deemed to have been duly served if delivered in person or by mail to the individuals and at the addresses listed below:

A. WATERMASTER:
Technical Program Manager
Seaside Basin Watermaster
P.O. Box 51502
Pacific Grove, CA 93950

B. DISTRICT:
General Manager
Monterey Peninsula Water Management District
5 Harris Court, Building G
Monterey, CA 93940

B. M1W:
General Manager
Monterey One Water
5 Harris Court, Building D
Monterey, CA 93940

IN WITNESS WHEREOF, the Parties hereto have executed this Agreement as of the dates shown below.

WATERMASTER

Date: _____ By: _____
Ralph Rubio, Chair, Board of Directors

DISTRICT

Date: _____ By: _____
David Stoldt, General Manager

M1W

Date: _____ By: _____
Paul Sciuto, General Manager

ATTACHMENT 1

Scope of Work and Cost
to
Update and Recalibrate the Model

(Excerpted from HydroMetrics WRI Proposal Letter Dated August 4, 2017)

Task 1: Update Seaside Basin Groundwater Flow Model.

Subtask 1.1. Update Model Input Data.
Groundwater production, groundwater levels, injected water, and precipitation data will be sourced and compiled for input into the groundwater model. In addition to precipitation, estimates of storm water percolation, septic tank leakage, and system losses are also needed as they all contribute to the recharge of the basin. Most data are already available from MPWMD or Watermaster, but some other pumpers such as Cal Water Service and Marina Coast Water District, which do not fall under the Watermaster will be contacted for their data.

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

Subtask 1.2. Model Recalibration.
Model calibration is a process that involves varying relatively uncertain and sensitive parameters such as horizontal and vertical hydraulic conductivities, over a reasonable range of values. HydroMetrics will jointly calibrate recharge and aquifer parameters. This is a change from HydroMetrics' previous calibration approach of only calibrating aquifer parameters. Calibration will be completed when simulated results match the measured data within an acceptable measure of accuracy, and when successive calibration attempts do not notably improve the calibration statistics. Parameter Estimation (PEST) software will be used as a tool to improve calibration.

Estimating the effort involved in model calibration is difficult because there is no defined set of steps that can be followed. The costs provided with this scope reflect HydroMetrics' best estimate, but additional costs may be necessary to complete calibration successfully.

Subtask 1.3. Model Update Technical Memorandum.
A Draft Technical Memorandum will be prepared documenting the model update and calibration results. After presenting the Technical Memorandum to the Watermaster Technical Advisory Committee (TAC) and receiving comments, a Final Technical Memorandum will be prepared for submission to the Watermaster Board. For purposes of estimating costs, HydroMetrics WRI assumed it would present the findings to the TAC and to the Board. One presentation would be made to the TAC by telephone, and one presentation would be made to the Board in-person.

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

Schedule
It is expected to take two months to update and recalibrate the groundwater model.

Table 1: Cost Estimate to Update and Recalibrate the Model

Tasks	HydroMetrics WRI Labor			Labor Total		Other Direct Costs	TOTALS
	Derrik Williams	Georgina King	Hanieh Haeri				
	President	Principal Hydrogeologist	Hydrologist				
Rates	$220	$195	$130	**Hours**	**($)**	**($)**	**($)**
Task 1: Update Groundwater Model & Recalibrate							
Subtask 1.1. Update Model Input Data	8	24	40	72	$ 11,640	$ -	$ 11,640
Subtask 1.2. Model Recalibration	46	10	140	196	$ 30,270	$ -	$ 30,270
Subtask 1.3. Model Update and Recalibration Technical Memorandum	12	28	32	72	$ 12,260	$ 200	$ 12,460
Task 1 Totals	***66***	***62***	***212***	***340***	***$ 54,170***	***$ 200***	***$ 54,370***

Notes

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

SEASIDE BASIN WATER MASTER
BUDGET AND FINANCE COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	January 17, 2018
AGENDA ITEM:	2
AGENDA TITLE:	Cost-Sharing Agreement for Seaside Basin Geochemical Modeling
PREPARED BY:	Robert Jaques, Technical Program Manager

SUMMARY:

The Board directed that a cost-sharing agreement be developed between the Watermaster, MPWMD, M1W (Monterey One Water), and California American Water (CAW) for performing geochemical modeling in the Seaside Groundwater Basin to assess the geochemical interaction effects of introducing non-native water from the storage and recovery projects proposed by MPWMD (expanded ASR project), M1W (Pure Water Monterey Project), and CAW (desalination project) into the native water in the Basin.

Attached is a draft agreement for this purpose. It has been reviewed with Dave Stoldt of MPWMD, and reflects his suggested edits. He stated he would coordinate with M1W on this, and would provide me any edits they suggested as well. It was also sent to Eric Sabolsice of CAW for his review. No further edits from M1W or CAW were received.

The Memorandum of Agreement presented incorporates edits received from the TAC at its January 10, 2018 meeting where it was ultimately approved.

ATTACHMENTS:	Cost-Sharing Agreement for Seaside Basin Geochemical Modeling
RECOMMENDED ACTION:	Recommend approval of the Cost-Sharing Memorandum of Agreement for Seaside Basin Geochemical Modeling

MEMORANDUM OF AGREEMENT

BETWEEN THE SEASIDE BASIN WATERMASTER, THE MONTEREY PENINSULA WATER MANAGEMENT DISTRICT, CALIFORNIA AMERICAN WATER COMPANY, AND MONTEREY ONE WATER

TO SHARE IN THE COSTS OF PERFORMING GEOCHEMICAL MODELING OF THE SEASIDE BASIN GROUNDWATER BASIN

THIS AGREEMENT is made and entered into this _____ day of _____, 2018, by and between the SEASIDE BASIN WATERMASTER, hereinafter referred to as the "WATERMASTER", and the MONTEREY PENINSULA WATER MANAGEMENT DISTRICT, hereinafter referred to as the "DISTRICT", CALIFORNIA AMERICAN WATER COMPANY, hereinafter referred to as "CAWC," and MONTEREY ONE WATER, hereinafter referred to as "M1W," as follows.

In this Agreement the terms "Party" and "Parties" refer to the WATERMASTER, the DISTRICT, and/or M1W, either individually or collectively.

RECITALS:

A. The WATERMASTER was established for the purposes of administering and enforcing the provisions of the Amended Decision filed February 9, 2007 in Case No. M66343, California Superior Court, Monterey County ("Amended Decision").

B. Section L.3.j.xxi of the Judgment states in part "The Watermaster will monitor and perform or obtain engineering, hydrogeologic, and scientific studies concerning all characteristics and workings of the Seaside Basin, and all natural and human-induced influences on the Seaside Basin, as they may affect the quantity and quality of Water available for Extraction, that are reasonably required for the purposes of achieving prudent management of the Seaside Basin in accord with the provisions of this Decision."

C. Section L.3.j.xxiii of the Judgment states in part "The Watermaster will take any action within the Seaside Basin, including, but not limited to, capital expenditures and legal actions, which in the discretion of Watermaster is necessary or desirable to accomplish any of the following:
   - Prevent contaminants from entering the Groundwater supplies of the Seaside Basin, which present a significant threat to the Groundwater quality of the Seaside Basin, whether or not the threat is immediate;
   - Remove contaminants from the Groundwater supplies of the Seaside Basin presenting a significant threat to the Groundwater quality of the Seaside Basin;

- Determine the existence, extend, and location of contaminants in, or which may enter, the Groundwater supplies of the Seaside Basin;
- Determine Persons responsible for those contaminants; and
- Perform or obtain engineering, hydrologic, and scientific studies as may be reasonably required for any of the foregoing purposes.

D. The DISTRICT, CAWC, and M1W intend to submit application(s) to the WATERMASTER for Storage of Non-Native Water in the Seaside Basin ("Application(s)") in accordance with Section III.L.3.j.xx of the Amended Decision, which states in part: "The Watermaster will review applications for Storage in the Seaside Basin, regulate the Storage of Non-Native Water in the Seaside Basin, and issue Storage and Recovery Agreements, all as provided below. All applications for Storage in the Seaside Basin shall be considered and voted on before a noticed meeting of the Watermaster. However, all such applications shall be approved absent the issuance of findings that a Material Injury to the Seaside Basin or Producers will or is likely to occur as a result of the proposed Storage program and no reasonable conditions could be imposed to eliminate such risk. If a Storage application is approved, the Watermaster shall issue a Storage and Recovery Agreement. The Storage and Recovery Agreement may include, among other possible elements and/or provisions, the following conditions to avoid Material Injury: … (4) the particular Water quality characteristics that are required pursuant to the Storage and Recovery Agreement… and any other terms and conditions deemed necessary to protect the Seaside Basin and those areas affected by the Seaside Basin."."

C. The DISTRICT, CAWC, and M1W propose to store Non-Native Water from the following sources: (1) water produced by the DISTRICT; (2) desalinated seawater produced by CAWC's Monterey Peninsula Water Supply Project ("Desal Water"), and water produced by M1W's Pure Water Monterey project ("PWM Water"). As part of carrying out its duties and responsibilities under the Amended Decision, the WATERMASTER has requested that the Application(s) include a geochemical interaction modeling assessment investigating the potential for adverse geochemical reactions resulting from the introduction of these waters into the Seaside Basin and, if applicable, identifying measures to avoid such adverse reactions.

Terms and Conditions

In consideration of the mutual promises contained herein, the WATERMASTER, the DISTRICT, CAW, and M1W hereby agree to the following terms and conditions:

A. Work to be performed. The DISTRICT will contract directly with its consultant, Pueblo Water Resources, Inc. ("Consultant"), to perform modeling of the proposed groundwater storage and recovery projects to assess the geochemical interaction effects of introducing the non-native water from these projects into the native water in the Basin ("Work"). The Scope of Work and the estimated costs to perform this work are described in Attachment 1 to this Agreement. The DISTRICT will invite the staff of each of the Parties to this Agreement to attend any key milestone meetings and conference calls that are held between the DISTRICT and its Consultant as the Work is being performed, in order to enable each of the Parties to stay abreast of the work, raise pertinent questions in a timely manner, and provide input as appropriate.

The Parties hereto understand, as stated in Attachment 1, that it is difficult for the Consultant to accurately estimate the costs to perform the Work, and that the costs listed in the Estimated Fee Summary of Attachment 1 are the Consultant's best estimates. In the event it is determined, during the course of the Work, that the cost to complete the Work will be greater than the total cost listed in the Estimated Fee Summary, the Parties agree to meet and confer to reach agreement on a revised cost that will be shared as described in paragraph B below, so that the Work can be completed. Agreement on said revised cost shall not be binding on any Party unless and until that Party formalizes its agreement to the revised cost in writing to each of the other Parties.

B. Costs to be shared. The $68,679 cost to be shared is contained in the Estimated Fee Summary of Attachment 1. This cost will be shared in the following percentages:
Watermaster share = 0% ($0)
District share = 33 and 1/3% ($22,893)
CAWC share = 33 and 1/3% ($22,893)
M1W share = 33 and 1/3% ($22,893)

(In the event a revised cost is agreed to, as described in paragraph A above, these dollar figures will change).

As noted under the heading "Services Not Included" in Attachment 1, certain items are not included in the Consultant's scope of work or estimated costs. These items include:

- Laboratory fees
- Construction of site facilities
- Permit fees
- Cost of water, electricity, or other utilities, and
- Any other items not specifically included in the Consultant's scope of services.

The parties agree that the DISTRICT, CAWC, and M1W will each undertake and pay for these activities for their individual projects.

C. Documents to be provided. The DISTRICT will ensure that: (1) After completion of Tasks 1, 2, 3, 4, and 5, as described in Attachment 1, a Technical Memorandum or summary report will be prepared by the Consultant and provided by the DISTRICT to each of the other Parties, and (2) After completion of Task 6 an overall summary report will be prepared by the Consultant and provided by the DISTRICT to each of the other Parties.

D. Payment of costs and reimbursement to the DISTRICT. The DISTRICT will make progress payments to the Consultant as it satisfactorily performs the Work. After the satisfactory completion of the work, the DISTRICT will provide to CAWC and M1W copies of the invoices received from and payments made to the Consultant. Within 45 days of receiving those documents, CAWC and M1W will reimburse the DISTRICT for their respective shares of those costs.

E. Term of Agreement. The term of this Agreement shall commence on the date of its execution by all Parties, and shall continue in effect until the DISTRICT has been reimbursed as described in paragraph D above.

F. Hold Harmless. Under this Agreement the Parties do hereby agree to indemnify, defend, and hold the other Parties, their respective Board members, officers, employees, agents, and representatives harmless from and against any and all liability, claims, suits, actions, damages, and causes of action of any kind arising out of the indemnifying Party's use of the Work in the planning, design, and construction, operation, and maintenance of the indemnifying Party's projects.

G. Venue. This Agreement shall be governed by the laws of the state of California. The Parties agree that venue for any litigation arising out of this Agreement shall be exclusively vested in the state courts of the County of Monterey, or the United States District Court for the Northern District of California. Further, the prevailing Party shall be entitled to reasonable attorney fees and costs.

H. Miscellaneous. This Agreement may be executed in two or more counterparts, each of which shall be deemed an original, but all of which shall be deemed to constitute one and the same instrument. Paragraph headings are for convenience only and shall not be used in interpreting this Agreement. All Attachments to this Agreement are incorporated herein. This Agreement constitutes the entire agreement between the Parties with respect to the subject matter herein and may only be modified in a writing executed by all Parties. Each Party acknowledges that it participated in the drafting of this Agreement and agrees that any ambiguity herein shall not be construed against any Party as the drafter of the Agreement.

I. Notices. Written notice shall be deemed to have been duly served if delivered in person or by mail to the individuals and at the addresses listed below:

A. WATERMASTER:
Technical Program Manager
Seaside Basin Watermaster
P.O. Box 51502
Pacific Grove, CA 93950

B. DISTRICT:
General Manager
Monterey Peninsula Water Management District
5 Harris Court, Building G
Monterey, CA 93940

C. CAWC: Operations Manager, Central Division
California American Water
511 Forest Lodge Road, Suite 100
Pacific Grove, CA 93950

D. M1W: General Manager
Monterey One Water
5 Harris Court, Building D
Monterey, CA 93940

IN WITNESS WHEREOF, the Parties hereto have executed this Agreement as of the dates shown below.

WATERMASTER

Date: _____ By: _____
Ralph Rubio, Chair, Board of Directors

DISTRICT

Date: _____ By: _____
David Stoldt, General Manager

CAW

Date: _____ By: _____
Eric Sabolsice, Director of Operations

M1W

Date: _____ By: _____
Paul Sciuto, General Manager

ATTACHMENT 1

Scope of Work and Cost

to

Perform Modeling of Proposed Groundwater Recharge Projects to Assess the Geochemical Interaction Effects of Introducing Non-native Water from Those Projects into the Native Water in the Basin

November 17, 2017
Project No. 12-0048

Monterey Peninsula Water Management District
5 Harris Court, Building G
Monterey, California 93942

Attention: Mr. Jonathan Lear, Senior Hydrogeologist

Subject: Proposal for Seaside Groundwater Basin Geochemical Interaction Evaluation

Dear Mr. Lear:

In accordance with your request, Pueblo Water Resources, Inc. (PWR) is pleased to submit this proposal to provide a geochemical interaction evaluation of various managed aquifer recharge (MAR) projects currently planned to be implemented in the Seaside Groundwater Basin (SGB). Presented in this proposal is a detailed scope of work, estimated costs, and schedule to provide the requested services.

PURPOSE AND SCOPE

The purpose of the proposed work is to perform an initial geochemical interaction modeling assessment of various active and proposed MAR projects in the SGB. The only currently active MAR project is the Monterey Peninsula ASR Project, which injects treated excess Carmel River System water into 4 existing ASR wells (ASR-1 through ASR-4). Proposed MAR projects include the Pure Water Monterey and Monterey Peninsula Water Supply Project (MPWSP), which would inject advanced treated recycled water and desalinated seawater, respectively, into future injection wells in the SGB. The proposed activities and programs related to MAR in the SGB will ultimately result in the mixing and interaction of the following 4 waters:

- Santa Margarita Sandstone aquifer native groundwater
- Treated and disinfected Carmel River System water
- Treated water from the Pure Water Monterey project
- Desalinated seawater from the MPWSP

All of these waters will mix together in various proportions at various times within the geologic matrix of the Santa Margarita Sandstone aquifer (Tsm) within the SGB. The intermixing of these 4 waters and their individual and combined reactions with the minerals in the Tsm formation will result in a variety of geochemical reactions – these reactions may be beneficial (e.g., stabilization of water quality and reduction in corrosivity) or potentially problematic (e.g., precipitation of cementitous scales or evolution of gasses) – and would alter the quality of the

water recovered from the ASR wells and California American Water's (CAW) other municipal production wells in the SGB.

It is therefore prudent to investigate these geochemical reactions and to identify the potential for adverse reactions; and if present, to identify measures to avoid such adverse conditions. The investigation proposed herein will address these issues through a stepwise approach as discussed below.

Scope of Services

The above scenarios can be analyzed through utilization of geochemical simulations from various interaction models and chemical equilibrium databases. A geochemical interaction model has been developed by PWR in recent years to address the interaction of the Tsm mineralogy with Carmel River System waters and Native Tsm groundwater to address these same issues, and will be expanded to cover the more complex interactions of the 4 proposed project waters. PWR's existing geochemical model is based on the USGS geochemical interaction software PHREEQC-2, version 2.15.2697 combined with the robust Lawrence Livermore National Laboratory (LLNL) geochemical equilibrium database.

Implementation of the investigation will include the following tasks, which are structured to allow assessment of results at each step and provide the opportunity to modify the investigation or drop specific lines of analysis due to either fatal flaws or findings of no potential significance. A brief overview of the proposed scope or work by task is presented below:

Task 1 – Water Chemistry Data Compilation

Characterize the complete composition and character of the 4 water sources via laboratory and field analyses, or in the case of waters that do not currently exist (ie MPWSP desal plant water and Pure Water Monterey project effluent), quantitative process modeling estimations of water quality parameters (note that these process modeling estimations are not part of our services and would be provided by the project proponent's engineers). The initial step in this effort will be the preparation of a list of water chemistry parameters necessary for geochemical interaction modeling and a request for data for the injection source waters from the Pure Water Monterey and MPWSP project sponsors (MRWPCA and CAW, respectively). Data gaps will be identified and a Sampling and Analysis Plan (SAP) will be developed to fill any data gaps.

Task Deliverable: A Technical Memorandum (TM) summarizing the available water quality data for each of the project sources, and a SAP to fill-in missing data. *Note that no costs for collection of field or laboratory data are budgeted in this task. If additional sampling is necessary, such costs are assumed to be the responsibility of the respective source water generators or project proponents.*

Task Duration: 4 weeks

Task 2 – Aquifer Mineralogy Data Compilation

Characterize the mineral composition of the Tsm aquifer via empirical laboratory analysis of well cuttings and/or core samples. These data already exist for two of the ASR project wells (ASR-2 and ASR-3) that characterize the Tsm aquifer mineralogy at the two ASR facilities (Santa Margarita and Seaside Middle School, respectively); however, similar data will be needed for the Pure Water Monterey and MPWSP well facilities, and will need to be coordinated with the construction of the new wells for these projects. In addition, the older/existing mineralogical data may be incomplete for purposes of this new modeling effort. To maximize the quality and quantity of data available for this work, detailed protocols for sample collection and analytical testing will be provided.

Task Deliverable: A TM summarizing the mineral characterization of the Tsm, and protocol for the sample collection and analysis of upcoming Tsm mineralogy samples. *Note that no costs for field or laboratory analyses are budgeted for this task; but are reportedly included in the current budgets for the construction of the monitoring well for the Pure Water Monterey project in May 2018.*

Task Duration: 2 weeks

Task 3 – Geochemical Model Development

Develop a geochemical interaction model based on the data derived from Tasks 1 and 2 above, combined with the geochemical equilibrium databases discussed previously.

To complete this work, the existing model will be upgraded and expanded, including the addition of the most recent French Geological Survey (BRGM) Thermoddem V1.1 database and the Swiss (ETH Zurich) CHEMDATA17 database. The upgrades will allow further analysis of water quality stabilization, more accurate identification of sulfate/carbonate/siliceous scaling, and assessment of corrosivity issues in recovered waters.

Task Deliverable: A summary of model base and primary settings will be provided if requested.

Task Duration: 3 weeks

Task 4 – Model Mixing Ratios

Upon completion of Task 3, PWR will model a number of mixing ratios of the four water types. For the purpose of planning, there will be 21 mixtures of various percentage mixtures of the four water types; **Table 1** outlines the mixing ratios that will initially be modeled. The matrix of water mixtures presented in **Table 1** were chosen through discussions with MPWMD staff to bracket the potential extreme case mixing scenarios that might occur during program operations; this methodology should identify potential problem areas to avoid early in the investigation, which will allow additional efforts to analyze these scenarios if warranted.

PWR will analyze the geochemical stability of each of the individual waters, and perform the modeling of the proposed intermixing scenarios described above. The results of the

modeling will be analyzed and interpreted with specific attention to potentially adverse geochemical interactions such as mineral scale formation, gas evolution, and leaching/mobilization of deleterious compounds within the Tsm formation.

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Task Deliverable: A TM summarizing the results of the geochemical interaction modeling, and recommendations for additional model scenarios based on the initial output runs.

Task Duration: 6 weeks

Table 1. Summary of Mix Ratios for Geochemical Modeling

Mix No.	% Native Tsm Water	% Treated Carmel River Water	% Reclaimed PWM Water	% Desal Water
1	100	0	0	0
2	0	100	0	0
3	0	0	100	0
4	0	0	0	100
5	66	33	0	0
6	66	0	33	0
7	66	0	0	33
8	33	66	0	0
9	0	66	33	0
10	0	66	0	33
11	33	0	66	0
12	0	33	66	0
13	0	0	66	33
14	33	0	0	66
15	0	33	0	66
16	0	0	33	66
17	55	15	15	15
18	15	55	15	15
19	15	15	55	15
20	15	15	15	55
21	25	25	25	25

Task 5 – (Optional Task) Additional Focused Analysis

Based on the results of Task 4 above, PWR will identify those mixture simulations that show undesirable geochemical reactions (ie mineral precipitation or gas evolution) and will re-run those model simulations under various modifications of mix ratios and/or aquifer conditions

to identify methods of mitigating the observed adverse reactions and to identify potential operational scenarios which would prevent such adverse geochemical reactions from occurring.

Task Deliverable: A TM summarizing the results of the supplemental modeling and recommendations for project design and/or operational changes associated with enhancing recovered water quality or avoiding adverse geochemical reactions.

Task Duration: 4-6 weeks

Task 6 – Reporting

Upon the conclusion of tasks 1-5, PWR will develop an overall summary report and recommendations for process and/or operational changes for each project to reduce or avoid adverse geochemical reactions. PWR will also participate in two technical workshops with project stakeholders to discuss the impacts to the various regional projects, and participate in one presentation to the Watermaster Board to address questions and present findings.

Task Duration: 4 weeks

Task 7 – Project Management and Meetings

Provide routine project management, including invoicing, schedule management, project coordination and communication. This will include one intermediate and one final presentation of the evaluation findings and recommendations to the SGB Water Master Technical Advisory Committee (TAC).

Task Duration: Ongoing

Services Not Included

It should be noted that completion of this project will require services which are not included in our proposal; the costs for these items are presumed to be paid for by the project proponents under the provisions of the Storage Agreement. These items include (but are not limited to) the following:

- Laboratory fees;
- Construction of site facilities;
- Permit fees;
- Cost of water, electricity, or other utilities;
- Any other items not specifically included in PWR's scope of services.

ESTIMATED FEES AND SCHEDULE

Based on the scope of services presented herein, we estimate the fees for our services will be approximately *$51,365*, which will be billed on a time-plus-expenses basis in accordance with our current Fee Schedule (attached). An estimated fee summary worksheet is attached summarizing the estimated man-hours and costs per task/work item. The spreadsheet also identifies the cost total including Optional Task 5, as well as a 10 percent contingency which has been noted in the attached budget summary in the event that unforeseen project complications or constraints arise (total with optional task and 10% contingency is *$68,679*). We recommend the contingency be held for authorization by District staff upon written justification by PWR.

We understand that in order to authorize this work, your Board must first approve a formal contract amendment. Based on our current workload, we believe that we can commence work within two weeks of your authorization and that the work will be completed within approximately 4 months.

We appreciate the opportunity to provide ongoing assistance to the District on this important community water-supply project. If you require additional information regarding this or other matters, please contact me.

Sincerely,

PUEBLO WATER RESOURCES, INC.

Stephen P. Tanner, P.E.
Principal Engineer

SPT.rcm

Attachments: Cost Estimation Spreadsheet
2018 Fee Schedule

MONTEREY PENINSULA WATER MANAGEMENT DISTRICT

Professional Services for SGB Geochemical Interaction Evaluation

PUEBLO water resources

PWR Project No.: 12-0048

ESTIMATED FEE SUMMARY

LABOR		Principal Professional	Senior Professional	Drafting	WP	Hours by Task	Estimated Task Cost
	Hourly Fee	$205	$185	$115	$95		
Task No.	Task Description						
1	Water Chemistry Data Compilation	22	-	-	12	34	$5,650
2	Aquifer Mineralogy Compilation	38	-	-	-	38	$7,790
3	Geochemical Model Development	48	-	-	-	48	$9,840
4	Model Mixing Ratios	67	-	-	-	67	$13,735
5	Additional Focused Analysis (OPTIONAL)	54	-	-	-	54	$11,070
6	Reporting	48	-	-	-	48	$9,840
7	PM and Meetings	22	-	-	-	22	$4,510
		-	-	-	-	0	$0
		-	-	-	-	0	$0
		-	-	-	-	0	$0
	Hours by Labor Category:	299	0	0	12		
	Costs by Labor Category:	$61,295	$0	$0	$1,140		
					Total Labor Hours (not inc. Optional Task):		257
					Total Labor Costs (not inc. Optional Task):		$51,365
					Total Labor Hours (inc. Optional Task):		311
					Total Labor Costs (inc. Optional Task):		$62,435

OTHER DIRECT COSTS (ODC's) Item	Units	Unit Price	No. of Units	Fee
Vehicle	Daily	$75		$0
Travel Per Diem	Daily	$150		$0
				$0
				$0
				$0
			Subtotal ODCs:	$0

OUTSIDE SERVICES Task No.	Item	Units	Unit Price	No. of Units	Fee
					$0
					$0
					$0
					$0
					$0
Subtotal Outside Services:					$0
Subtotal Outside Services w/ Markup (15%):					$0

COST SUMMARY	
Labor (not inc. Optional Task)	$51,365
Other Direct Costs	$0
Outside Services	$0
Subtotal (not inc. Optional Task):	$51,365
10 % Contingency (not inc. Optional Task)	$5,137
TOTAL ESTIMATED PROJECT COST (not inc. Optional Task):	$56,502
Task 5 (Optional)	$11,070
Subtotal (inc. Optional Task):	$62,435
10 % Contingency (inc. Optional Task)	$6,244
TOTAL ESTIMATED PROJECT COST (inc. Optional Task):	$68,679

PUEBLO WATER RESOURCES, INC
2018 FEE SCHEDULE

Professional Services

Principal Professional	$205/hr
Senior Professional	$190/hr
Project Professional	$175/hr
Staff Professional	$145/hr
Technician	$135/hr
Illustrator	$120/hr
Word Processing	$100/hr

Other Direct Charges

Subcontracted Services	Cost Plus 15%
Outside Reproduction	Cost Plus 15%
Travel Expenses	Cost Plus 15%
Per Diem*	$150/day
Vehicle	$75/day

Equipment Charges

Drilling Fluid Test Kit	$100/day, $400/week
Field Water Quality Meter (Hach DR890)	$75/day, $275/week
Orion ORP/pH/Temp Probe	$75/day, $275/week
Water Level Probes (In-Situ Mini-Troll/Level Troll)	$100/day, $300/week
Fuji Ultrasonic Flowmeter	$200/day, $750/week

*Regionally and seasonally specific to project.

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