SEASIDE BASIN WATERMASTER
REQUEST FOR SERVICE

DATE: September 2, 2021

RFS NO. 2021-01 Amendment No. 2
(To be filled in by WATERMASTER)

TO: Hale Barter
Montgomery & Associates
PROFESSIONAL

FROM: Robert Jaques
WATERMASTER

Services Needed and Purpose: Perform additional hydrogeologic consulting services as described herein.

Completion Date: All work of this RFS shall be completed not later than December 31, 2021, and shall be performed in accordance with the Schedule described in Attachment 2.

Method of Compensation: Time and Materials (As defined in Section V of Agreement.)

Total Price The Total Price for RFS No. 2021-01 is increased by $37,510.00 by this Amendment No. 2, including Optional Task 1.3 pertaining to the incorporation of sea level rise, and the Total Price for RFS No. 2021-01 is therefore increased to $74,120.00.

Total Price may not be exceeded without prior written authorization by WATERMASTER in accordance with Section V. COMPENSATION.

Requested by: Robert Jaques Date: 9/2/21.
WATERMASTER Technical Program Manager

Agreed to by: Date: 9/3/21.
PROFESSIONAL

ATTACHMENT 1

SCOPE OF WORK

PROFESSIONAL was authorized by RFS No. 2021-01 to perform general on-call hydrogeologic consulting services. WATERMASTER wishes to also have PROFESSIONAL perform groundwater modeling to determine how much replenishment water will be needed to achieve protective groundwater elevations in the Basin. This Amendment No. 2 to RFS No. 2021-01 authorizes the performance of the work described in Attachment 2 hereto.

ATTACHMENT 2

MONTGOMERY & ASSOCIATES
Water Resource Consultants

Groundwater experts since 1984

July 30, 2021

Mr. Bob Jaques
Seaside Watermaster Technical Program Manager
83 Via Encanto
Monterey, CA 93940

SUBJECT: SCOPE AND COST TO UPDATE PREDICTIVE MODELING OF BASIN REPLENISHMENT OPTIONS TO ACHIEVE PROTECTIVE ELEVATIONS

Dear Mr. Jaques

Per your request, this letter contains a scope of work and estimated cost to update a previous replenishment study using the basin groundwater model to estimate how much replenishment injection would be needed to achieve protective elevations in Watermaster coastal protective elevation wells.

BACKGROUND

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

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

Scenario 1 did not achieve protective elevations as 700 AFY is too little to raise groundwater levels. This scenario will not be updated as part of the update.

Under Scenario 2, a pumping reduction by Standard and Alternative Producers of just over 2,000 AFY (including Cal Am's 700 AFY reduction) was needed to achieve protective water levels. Scenario 2 is not a practical solution as Standard and Alternative producers do not have access to supplemental sources of water. This scenario will not be updated as part of the update.

1970 Broadway, Suite 225, Oakland, CA 94612 • 510.903.0458 • elmontgomery.com

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

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

TASK 1. DEVELOP BASELINE SCENARIO

Subtask 1.1. Extend Historical Hydrology Baseline Scenario

Since 2009, all predictive simulations using the model have been based on repeating the historical hydrology from the 22-year model calibration period of 1987 – 2008. The previous predictive simulation runs from 2009 through 2042. While maintaining this approach allows for direct comparison between new simulations and previous simulations, it does not take advantage of the additional nine years of hydrologic and climatic data that have been incorporated into the historical model. The historical model was updated in 2014 and 2018, and now includes a continuous 31-year hydrologic record from 1987 through 2017. Significantly, this 31-year hydrologic record includes the recent 2012-2015 drought. We propose that this full 31-year historical hydrology and climate dataset be used as basis for all predictive modeling, as this incorporates a broader range of potential climate variability. The extended hydrology would repeat the 31-year hydrology from 1987 – 2017, so that the baseline scenario is extended out 31-years from 2018 to 2048.

The previous replenishment modeling effort assumed protective elevations must be reached in 25 years from the time supplemental water is available to offset pumping (assumed at that time to be in 2016) thereby resulting in protective elevations being reached in 2041. Per the TAC's direction, the update will determine how much replenishment water is needed to achieve protective coastal elevations in 20 years. Extending the hydrology to 2048 covers the 20-year target to be used for evaluating replenishment volumes that achieve protective elevations.

Subtask 1.2. Incorporate all Existing and Approved/Planned Projects into Baseline Model

The Baseline scenario will include the following:

1. PWM injection of 3,500 AFY based on hydrology and planned amount extracted each year
2. Carmel River ASR current planned operations based on hydrology

3. Cal-Am's 700 AFY reduction in pumping as part of its 25-year groundwater overpumping replenishment program, assumed to begin in 2024

Monthly PWM injection rates have some dependence on hydrology because injection is reduced during drought years to send some recycled water to CSIP in Salinas Valley, and they also have a drought reserve that needs to be managed. Similarly, Cal-Am extraction of ASR water also depends on hydrology. All these operating requirements need to be considered when developing the monthly injection and extraction rates to be simulated.

Additionally, it may be necessary to revise the assumptions on Cal-Am annual demand since the assumptions used in the 2013 replenishment modeling have changed. We may potentially update the new demand forecast spreadsheet model that MPWMD (Jon Lear) developed for PWM expansion modeling for the expanded hydrology. The demand forecast has a uniform increase in demand over time and is tied to the hydrology cycle and takes into account all the water rights and allocations and demand/supply sources which are then distributed to Cal-Am extraction wells.

Subtask 1.3. Incorporate Sea Level Rise at Ocean Boundaries (Optional)

An optional item that incorporates sea level rise into the groundwater model is included in the cost estimate attached. We will incorporate estimates of projected sea level rise into the predictive model simulation by adjusting the head boundary conditions specified along the ocean boundary. Generally speaking, sea level rise is expected to increase seawater intrusion and/or the risk of sea water intrusion in coastal aquifers, though the magnitude of the effects due to sea level rise alone are highly dependent on local conditions. The sea level rise estimates will be based on the projected levels for Monterey Bay from the 2018 update of the State of California Sea-Level Rise Guidance document recently released by the California Ocean Protection Council (OPC, 2018). It should be noted that adjustments to the sea level elevations will also entail simple equivalent adjustments to the protective head elevations as they are tied to sea level.

TASK 2. DEVELOP ITERATIVE SCENARIO TO ACHIEVE PROTECTIVE ELEVATIONS IN 20 YEARS

An iterative model scenario to evaluate additional replenishment required to meet protective elevations is based on the Baseline scenario but with additional replenishment injection iteratively adjusted until coastal protective groundwater elevations are achieved within 20 years. As per direction from the TAC, injection will be simulated at PWM injection wells regardless of injection capacity. If existing injection capacity is insufficient to replenish the basin, additional infrastructure to increase injection capacity would be needed.

MONTGOMERY
& ASSOCIATES

TASK 3. REPORTING

Subtask 3.1. Prepare Technical Memorandum

A technical memorandum summarizing the assumptions made in developing the Baseline and iterative scenarios, the results of the iterative modeling of replenishment injection needed to achieve protective elevations within 20 years presented on tables and maps, and conclusions of the study will be prepared as a draft. Based on review by Mr. Jaques and the TAC, a final version will be provided as both a PDF and MS Word document.

Subtask 3.2. Presentation

A PowerPoint presentation summarizing the findings of the study will be prepared for presentation to the TAC. It assumed that a similar presentation will be made to the Board. Both presentations are assumed to be made via Zoom.

PROJECT COST ESTIMATE AND SCHEDULE

We anticipate that this work can be completed within a two-month period, though the timing may depend on the scheduling of TAC and Board meetings. We can begin work on this immediately following notice to proceed.

The total estimated cost for the above-described tasks is $37,510, including the optional task of incorporating sea level rise into the baseline scenario. Without the optional seal level rise task, the estimated cost is $32,230. The attached cost estimate provides a breakdown of costs by task and subtask.

The hourly rates contained in this proposal are valid through December 31, 2021. If the work will substantially be completed in 2022, the cost estimate will need to be updated with 2022 rates.

Please feel free to contact us with any questions about the proposed scope of work and budget.

Sincerely,

E.L. MONTGOMERY & ASSOCIATES

Georgina King, Senior Hydrogeologist

MONTGOMERY
& ASSOCIATES
Water Resource Consultants

Cost Estimate to Update Predictive Modeling of Basin Replenishment to Achieve Protective Elevations

		Montgomery & Associates Labor							Other Direct Costs	TOTALS
		Scientist VIII	Scientist VI	Scientist V	Scientist III	Technical Editor	Labor Total			
		D. Williams	G. King	P. Benito						
Task	Hourly Rates	$260	$215	$195	$150	$80	Hours	($)	($)	
1.0	**DEVELOP BASELINE SCENARIO**									
1.1	Extend Historical Hydrology Baseline Scenario	0	2	10	4	0	16	$2,980	$0	$2,980
1.2	Incorporate all Existing and Approved/Planned Projects and Cal-Am's 700 AFY Replenishment Repayment	2	2	30	16	0	50	$9,200	$0	$9,200
1.3	Incorporate Sea Level Rise at Ocean Boundaries (Optional)	2	4	20	0	0	26	$5,280	$0	$5,280
	Task 1 Subtotal	*4*	*8*	*60*	*20*	*0*	*92*	*$17,460*	*$0*	*$17,460*
2.0	**DEVELOP ITERATIVE SCENARIO TO ACHIEVE PROTECTIVE ELEVATIONS IN 20 YEARS**									
	Iterative Modeling to Determine How Much Water is Needed to Achieve Protective Elevations within 20 Years	0	4	30	8	0	42	$7,910	$0	$7,910
	Task 2 Subtotal	*0*	*4*	*30*	*8*	*0*	*42*	*$7,910*	*$0*	*$7,910*
3.0	**REPORTING**									
3.1	Prepare Technical Memorandum describing Scenarios, Findings, and Conclusions	2	16	24	8	4	54	$10,160	$0	$10,160
3.2	Prepare Presentation and Present Findings to TAC and Board via Zoom	0	6	2	2	0	10	$1,980	$0	$1,980
	Task 3 Subtotal	*2*	*22*	*26*	*10*	*4*	*64*	*$12,140*	*$0*	*$12,140*
	Total with Optional Task Incorporating Sea Level Rise	**6**	**34**	**116**	**38**	**4**	**198**	**$37,510**	**$0**	**$37,510**
	Total without Optional Task Incorporating Sea Level Rise	**4**	**30**	**96**	**38**	**4**	**172**	**$32,230**	**$0**	**$32,230**