Attachment 1
Exhibit A

Scope of Work for 2018 - 2019

Hydrogeologic Modeling Services in Support of the Monterey County Water Resources Agency's Nacimiento – San Antonio Interlake Tunnel and San Antonio Spillway Modification Project

Wood Environmental & Infrastructure, Inc. (Wood, formerly Amec Foster Wheeler Environmental & Infrastructure, Inc.) has assembled an expert and experienced team to assist the Monterey County Water Resources Agency (Agency) by providing the resources to perform hydrologic and hydrogeologic modeling necessary to develop and evaluate the operational components and potential environmental effects of the Agency's Nacimiento – San Antonio Interlake Tunnel and San Antonio Spillway Modification Project (Project). The anticipated seven-month schedule of modeling work is intended to continue support the ongoing engineering and environmental processes by providing model results along with summary discussions in technical memoranda (TMs).

The scope herein extends that in the recently expired agreement with the Agency. It is to continue with the modeling work identified in the original (2017) scope of work and is a result of delays in the development and verification of the operational version of the SVIHM by the U.S. Geological Survey.

Organization of the Contents

- Modeling Objectives
- Specific Engineering, Environmental and Water Resource Management objectives
- Model Specifics
- Scope of Work by Tasks
- Exhibit A: Scope of Work
- Exhibit B: Budget – Fee Schedule

Modeling Objectives Inclusive of the Engineering and Environmental Modeling Requirements

Project modeling will evaluate the impacts of construction of the Project on the groundwater-surface water system of the Salinas Valley Groundwater Basin (SVGB). The modeling will rely on a recently completed U.S. Geological Survey (USGS) modeling system that simulates the integrated groundwater/surface water system of the SVGB. This modeling system consists of an HSPF watershed and BCM climate model, the Salinas Valley Watershed Model (SVWM); a hydrogeologic framework model; and a land use model, all integrated into the USGS groundwater/surface water model referred to as the Salinas Valley Integrated Hydrologic Model (SVIHM), which uses the MODFLOW-OWHM code. The SVIHM numerically incorporates surface water systems and land-use based water demand.

Project modeling will simulate the impacts of the Project by incorporating physical and operational details of the Project into the modeling system. Wood will modify the USGS modeling system as appropriate to reflect the operational and design criteria of various potential configurations of the Project as well as select alternative projects. The results of these simulations will be reported in a series of TMs, hydrographs, or data spreadsheets.

Specific Engineering, Environmental and Water Resource Management Objectives

1. Analyze groundwater budget components (e.g., change in storage, groundwater contours, and seawater intrusion)
2. Analyze flood control releases (e.g., volume, area, depth, and duration of inundation)
3. Evaluate downstream flow regimes (e.g., flow prescriptions, conservation releases, lagoon operations, SRDF, and additional diversions)
4. Evaluate reservoir storage, including transfer through the Interlake Tunnel

5. Evaluate future seawater intrusion conditions with and without climate change effects
6. Identify via model results potential water rights issues that could trigger further analyses
7. Assist with development of the operational component of the Project description
8. Analyze operating rules to optimize performance of the Project, minimize environmental impacts, and optimize sustainable water supply
9. Provide modeling analysis of identified Project alternatives to be finalized with the Agency
10. Define changes in stream flows and flood releases because of reservoir operations scenarios and define baseline conditions for environmental impact analysis
11. Assist in the identification of downstream effects of the Project and comparison of effects to the No Project Alternative
12. Evaluate prescribed operating rules and run scenarios to confirm mitigation of unacceptable environmental impacts
13. Evaluate the effects of climate change and increased demands

Model Specifics

The USGS will transition a fully developed operational baseline model (SVIHM-2014Base) to Wood to investigate the effects of the construction and operation of the proposed Project. The SVIHM-2014Base was created and configured by the USGS from the development of a historical model calibrated through the hydrologic period 1967 to 2014 (SVIHM-2014). Utilizing the SVIHM-2014Base, a number of Project alternatives will be simulated. The results of these various alternatives will be used to investigate the optimum configuration of the Project. The model will also be used to investigate alternative projects, including a new upstream reservoir and modification of the Nacimiento Outlet Works.

Wood will also construct an additional baseline model, from the SVIHM-2014Base, to simulate future water demand and climatic conditions to approximately year 2045 (SVIHM-2045Base). The SVIHM-2045Base will provide future horizon conditions against which Project alternatives can be compared in order to evaluate the potential effects of the Project in relation to changes in water demand, climate change, and sea level rise. In addition, an existing two dimensional (2D) HEC-RAS model of the Salinas River will be used jointly with the SVIHM-2014Base and SVIHM-2045Base to provide a more detailed simulation of surface water conditions for a selection of inundation events.

Scope of Work by Task

Task 1: Project Management, Workplan, and USGS Coordination

Task 1.1 Project Management

This subtask is proposed to administer the project and coordinate management of the engineering and environmental support efforts by Wood for the duration of the seven-month continued modeling effort. Wood will manage efforts by the team, which includes subconsultant Flow West Inc. The project manager (PM) will participate in bi-monthly (two per month) project meetings with the Agency.

Deliverables: Monthly progress report, budget status, earned value report, and invoicing.

Task 1.2 Concise Modeling Workplan – HEC-RAS, SWO, SVIHM, HSPF

Wood will prepare a "Workplan" consistent with engineering and environmental requirements and concisely describe the modeling approach in coordination with the Agency. The approach is intended to support the required deliverables put forth by both the engineering and environmental consultants. The Workplan can be updated as the modeling project progresses to accommodate changes in specific study requirements.

Deliverables: Initial draft and one update of the Workplan.

Task 1.3 Modeling Coordination with USGS

Wood will receive the SVIHM-2014Base from the USGS in a ready-to-run state. Wood will run the model to confirm successful operation, and will become familiar with the inputs, outputs, structure, and parameters of the modeling system.

Deliverable: E-mail communications with the USGS and the Agency

Task 2: Team Kick-Off Meeting and External Coordination

Task 2 is proposed to coordinate management of the engineering and environmental support efforts by Wood for the duration of the seven-month modeling effort. The PM and specific modeling leads will participate in bi-monthly (two per month) project meetings with the Agency. Certain meetings could include the environmental consultant Horizon Water and Environment, the design/engineering consultant McMillen Jacobs Associates (MJA), and the Program Manager EPC.

Deliverable: Meeting agenda, handouts, minutes and action items for up to 14 meetings.

Task 3: Baseline Model (This task is 95% complete)

Wood will construct a baseline model (SVIHM-2045Base) to simulate hydrology under projected year 2045 water demand conditions, without Project implementation. Current operational configurations will be continued into the future, as will current land use and pumping configurations. Year 2045 water demands for the SVIHM-2045Base will be developed in coordination with the USGS, or will be a synthetic hydrology that is based on projected climate change conditions.

Deliverable: Hydrographs of SVIHM-2045Base are the results against which subsequent scenarios will be compared.

Task 4: HEC-RAS Model Incorporation and Implementation

Task 4.1 HEC-RAS Model Incorporation

Wood will receive the Salinas River 2D HEC-RAS model from the Agency in a ready-to- run state, including a complete set of input and output files for the calibrated historical simulation. Wood will run the model to confirm successful operation, and will become familiar with the inputs, outputs, structure, and parameters of the model. Wood will analyze the event- based results to become familiar with the area of inundation, depth of inundation, duration of inundation, and velocity vector maps of historical flood events.

Wood will build a tool to integrate the 2D HEC-RAS model into the SVIHM-2014Base. This tool will translate the model outputs from the SVIHM-2014Base into inputs for the 2D HEC-RAS model. This will allow for the detailed simulation by 2D HEC-RAS of the impacts of inundation events, including consideration of how the interaction between the groundwater and surface water systems affects the propagation of flood events.

Deliverable: TM#1 – Summary of integration approach, results, and benefits.

Assumption: The Team will respond to comments on two (2) drafts of the TM and prepare a final TM.

Task 4.2 2D HEC-RAS Model Runs – Baseline plus Two Alternatives

The integrated 2D HEC-RAS model will be used to simulate a set of flood events that appear in the results of the SVIHM-2014Base. Approximately 12 flood events will be simulated in the 2D HEC-RAS model; these events will be selected from the SVIHM-2014Base results in coordination with the Agency and the USGS. Results of the 2D HEC-RAS model simulations will be presented in terms of area of inundation, depth of inundation, duration of inundation and velocity vector maps.

Four alternative scenarios developed under Tasks 5 and 6 (two for the Tunnel-Only option and two from the Tunnel plus Spillway option) will include 2D HEC-RAS model runs to investigate the Project effect of the alternative scenarios on flood events. The alternative scenarios will be selected from the Tunnel-Only and Tunnel plus Spillway Modification alternatives in coordination with the Agency. The same set of flood events analyzed for the SVIHM-2014Base results will be analyzed using the results of the selected two alternative scenarios, and the model results of the selected alternatives will be compared against the same flood events in the SVIHM-2014Base results.

Deliverable: TM#1 Continuation – Summary discussion of SVIHM-2014Base and selected alternative scenarios. TM#2 will present the approach to incorporation of the 2D HEC-RAS model with the SVIHM-2014Base. Modifications made to the existing 2D HEC-RAS model will be reported. The process for choosing 12 flood events will be reported. TM#2 will present the results of the 2D HEC-RAS model run based on SVIHM-2014Base conditions.

Assumption: The Team will respond to comments on two (2) drafts of the TM and prepare a final TM.

Task 5: Tunnel-Only Model System

A set of up to 7 alternative scenarios will be developed incorporating construction of the Interlake Tunnel only, analyzing its effects compared to baseline conditions of the SVIHM-2014Base. Task 5.1 is devoted and budgeted for three tunnel design-related alternative model runs. Task 5.2 is intended for four tunnel operations-related alternatives model runs.

The model scenarios will be configured in coordination with the Agency to reflect variants of the design and operation of the engineered surface water system. The results of each alternative scenario will be compared against the SVIHM-2014Base. As noted in Task 4.2, two of the alternative scenarios will also be simulated using the 2D HEC-RAS model to investigate the effects of the alternative configuration
relative to flood or peak flow events. Changes to the model system will largely be limited to modification of the parameters of the Surface Water Operations (SWO) Package, reflecting alternative designs and operational rules.

Deliverable: TM#2 will present the results of the Tunnel-Only modeling scenarios. Results will be presented for each scenario, and will be compared against the SVIHM-2014Base results. As applicable, results for any HEC-RAS model runs (Task 4.2) will be presented.

Assumption: The Team will respond to comments on two (2) drafts of the TM and prepare a final TM.

Task 6: Tunnel Plus Spillway Modification Model System

A set of up to 9 alternative scenarios will be developed incorporating construction of the Interlake Tunnel Plus Spillway Modification, analyzing its effects compared to baseline conditions of the SVIHM-2014Base. Task 6.1 is devoted and budgeted for three tunnel/spillway design-related alternative model runs. Task 6.2 is intended for six tunnel/spillway operations-related alternative model runs.

The results of each alternative scenario will be compared against the SVIHM-2014Base. Two of the scenarios will also be simulated using the 2D HEC-RAS model (Task 4.2) to investigate the effects of the alternative configuration relative to flood or peak flow events. Changes to the model system will largely be limited to modification of the parameters of the SWO Package, reflecting alternative designs and operational rules.

Through the course of Tasks 5 and 6, a Preferred Alternative will be identified that demonstrates

maximum benefit. The results of this Preferred Alternative will be used during subsequent tasks for the purposes of comparison.

Deliverable: TM#3 will present the results of the Tunnel Plus Spillway Modification modeling scenarios. Results will be presented for each scenario, and will also be compared against the SVIHM-2014Base. As applicable, results for any 2D HEC-RAS model runs will be presented.

Assumption: The Team will respond to comments on two (2) drafts of the TM and prepare a final TM.

Task 7: Alternative Project Scenario: New Upstream Reservoir

An Alternative Project Scenario will be configured to simulate operation of the proposed Jerrett Reservoir in lieu of the Interlake Tunnel Project. The Jerrett Reservoir site is located upstream of Nacimiento Reservoir along the Nacimiento River, approximately at its confluence with El Piojo Creek (Boyle, 1991). Its designed storage capacity is 145,000 acre-feet, with a usable storage volume of 135,000 acre-feet. The Jerrett Reservoir will be incorporated into the SVIHM-2014Base by the USGS. Operational rules will be developed in coordination with the Agency. The results of the Upstream Reservoir Alternative Project Scenario will be compared to the SVIHM-2014Base scenario to demonstrate the effects of the Alternative Project, and will also be compared to the Preferred Alternative scenario to provide a comparison of benefits of the projects. Additionally, downstream effects will be analyzed with the HEC-RAS model.

Deliverable: TM#4 will present the results of the Alternative Project Scenarios. Results will be presented for each Alternative Project Scenario, and will be compared to the results of the Preferred Alternative scenario and the SVIHM-2014Base scenario to quantify any potential benefits of the Alternative Project Scenarios. TM#4 will present results of alternative project scenarios for both Tasks 7 and 8.

Assumption: The Team will respond to comments on two (2) drafts of the TM and prepare a final TM.

Task 8: Alternative Project Scenario: Modification to Nacimiento Outlet Works

An Alternative Project with a separate project description will be configured to simulate modifications to the Nacimiento Outlet Works in lieu of the Project. This modification would allow for increased conservation releases from the Nacimiento Reservoir. This Alternative Project will be incorporated through modification of the operational rules to be developed within the SWO Package. The results of the Nacimiento Outlet Works Modification Alternative Project Scenario will be compared to the SVIHM-2014Base to demonstrate the effects of the Alternative Project, and will also be compared to the Preferred Alternative scenario to provide a comparison of potential benefits of the project. Additionally, downstream effects will be analyzed with the HEC-RAS model.

Deliverable: TM#4 will present the results of the Alternative Project Scenarios. Results will be presented for each Alternative Project Scenario, and will be compared to the results of the Preferred Alternative scenario and the SVIHM-2014Base scenario to quantify any potential benefits of the Alternative Project Scenarios. TM#4 will present results of alternative project scenarios for both Tasks 7 and 8.

Assumption: The Team will respond to comments on two (2) drafts of the TM and prepare a final TM.

Task 9: Build-Out Scenarios: Sea Level Rise, and Climate Change Scenarios

Four model scenarios will be developed to investigate the effects of year 2045 water demand, sea

level rise, and climate change on the groundwater-surface water system. The four scenarios will be developed in coordination with the Agency and the USGS. Development of these scenarios will include a number of considerations that include the following:

- Changes to water demand over the model period, including changes to municipal, industrial, and agricultural demand based on: existing projections of population change; anticipated changes to agricultural demand due to increased temperature under a changing climate; and initial estimates of future agricultural demand scaled from current demand.
- Rising sea levels due to climate change, which will be incorporated into the SVIHM-2045Base through modification of the model boundary condition at Monterey Bay.
- Changes in climate, mostly manifested through changes to precipitation, temperature, and potential evapotranspiration. A modified hydrology will be developed for each of the four scenarios by running the SVWM under a modified set of climate inputs, and the SVWM results will be used to construct boundary conditions for the SVIHM-2045Base (streamflow and recharge at the edges of the model).
- The Pure Water Monterey Project will be incorporated into the Build-Out Scenarios through modification of the SWO Package in the SVIHM.

Climate change will be incorporated into the SVIHM-2014-Base using input and output data from the USGS Basin Characterization Model (BCM), which simulates hydrologic conditions throughout California using a set of climate projections downscaled to a 270-meter resolution. A selection of climate futures will be chosen from those simulated by the BCM, with the scenarios selected to define an envelope of potential climate futures, from warm to hot and from dry to wet. The results will give a range of groundwater-surface water system conditions that can be expected under future climate and water demand conditions.

The Build-Out Scenarios will utilize the Preferred Alternative identified under Tasks 5 and 6. Results of the Build-Out Scenarios will be compared to the Baseline Model results and to the Preferred Alternative results. The Build-Out Scenarios will not be simulated in the 2D HEC-RAS model.

Deliverable: TM#5 will present the details of all parts of the Build-Out Scenarios, including the setup and results of each of the four scenarios. The details of model setup will be listed, including the projected changes in water demand, the development of sea level rise time series, the development of the climate futures, and the parameters of the Pure Water Monterey Project. Model scenario results will be compared to the SVIHM-2014Base to demonstrate changes over time.

Assumption: The Team will respond to comments on two (2) drafts of the TM and prepare a final TM.

Task 10: Configuration of New Downstream Diversion

Wood will incorporate a potential new downstream diversion into the SVIHM-2014Base. This scenario would be based on the Preferred Alternative scenario, with the addition of the potential downstream diversion. The downstream diversion will be incorporated into the SVIHM-2014Base through modification of the SWO Package as well as the Surface Water Routing (SWR) and Streamflow Routing (SFR) Packages and Farm Process, as necessary. Results of this scenario will be compared to results of the SVIHM-2014Base and the Preferred Alternative scenario.

Deliverable: TM#6 will present the results of the New Downstream Diversion scenario. Information will be presented on the configuration of the downstream diversion and changes to operational rules. The results will compared to quantify potential effects on water supply.

Assumption: The Team will respond to comments on two (2) Drafts and prepare a final TM.

Attachment 1
Exhibit A

Proposed Work Schedule

Task #	Task Names	Costs	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Deliverables
1	Project Management; Workplan, and USGS Coordination	$39,263	$5,609	$5,609	$5,609	$5,609	$5,609	$5,609	$5,609	*Modeling Workplan; Monthly Project Reports; invoices*
2	Team Kick-Off meeting and Coordination External Meetings	$30,904	$4,415	$4,415	$4,415	$4,415	$4,415	$4,415	$4,415	*Meeting Minutes*
3	Baseline Model (completed)	$177	$177							
4	HEC-RAS Model Incorporation and Implementation (3 runs)	$44,002			$22,001	$22,001				TM#1
5	Tunnel Only Model System (7 runs)	$85,750	$21,437	$21,437	$21,437	$21,437				TM#2
6	Tunnel + Spillway Modification Model System (9 runs)	$122,228			$30,557	$30,557	$30,557	$30,557		TM#3
7	Alternative Project Scenario: New Upstream Reservoir - Jerrett Reservoir (1 run)	$11,267			$5,633	$5,633				TM#4
8	Alternative Project Scenario: Modification to Nacimiento Outlet Works (1 run)	$14,321			$7,160	$7,160				TM#4
9	Buildout Scenarios: Climate Change / Sea Level Rise / Monterey Pure (4 runs)	$46,727		$11,682	$11,682	$11,682	$11,682			TM#5
10	Configuration of New Downstream Diversion (1 run)	$29,711						$14,855	$14,855	*TM#6*
	Total Charge	$424,349								
	Projected Monthly Charges		$31,638	$43,143	$108,495	$108,495	$52,263	$55,436	$24,879	
	Cumulative Total Charges		$31,638	$74,781	$183,276	$291,771	$344,033	$399,470	$424,349	