



CONSOLIDATED COMMISSION ON UTILITIES

Guam Power Authority | Guam Waterworks Authority
P.O. Box 2977 Hagatna, Guam 96932 | (671)649-3002 | guamccu.org

GWA RESOLUTION NO. 29-FY2024

**RELATIVE TO REQUESTING APPROVAL OF AN INDEFINITE
DELIVERY/INDEFINITE QUANTITY HYDRAULIC MODELING & GIS SUPPORT
SERVICES CONTRACT FOR THE WATER & WASTEWATER SYSTEMS**

WHEREAS, under 12 G.C.A. § 14105, the Consolidated Commission on Utilities (“CCU”) has plenary authority over financial, contractual, and policy matters relative to the Guam Waterworks Authority (“GWA”); and

WHEREAS, the Guam Waterworks Authority (“GWA”) is a Guam Public Corporation established and existing under the laws of Guam; and

WHEREAS, a Water Resources Master Plan (WRMP) was developed for GWA in 2006 as a requirement of the Stipulated Order entered as a result of a complaint filed by the United States Environmental Protection Agency (USEPA); and as part of the 2006 WRMP, the first significant effort to develop computer models of the GWA water and wastewater pipe networks were completed for planning and design purposes for hydraulic evaluation, assessment, and analysis of required capital improvement projects (CIP). The hydraulic models for water and waste water system utilizes the GIS to update; and

WHEREAS, GWA’s Geographic Information System (GIS) was developed in 2006 because of the EPA Stipulate Order issued on June 5, 2003. The GIS was to be developed first and used to create the hydraulic model. Due to lack of accurate as-builts of the water and wastewater systems, the GIS mapping currently has gaps. The GIS system is continuously being updated with new CIP projects but field verification of the existing water and wastewater lines are needed in order to produce a more accurate hydraulic model.

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1 **WHEREAS**, as part of the 2024 Partial Consent Decree requires an updated hydraulic
2 model for proper capacity evaluation and planning of the Wastewater Collection System with
3 corresponding GIS maps.

4
5 **WHEREAS**, the GWA water and wastewater system hydraulic models and GIS require
6 continuous updates with metering, field verification, calibration, maintenance, training and data
7 collection of rainfall flow, new CIPs, new developments; and

8
9 **WHEREAS**, GWA issued a solicitation of Request for Proposals (RFP-02-ENG-2023)
10 seeking experienced and qualified professionals to provide Indefinite Delivery – Indefinite
11 Quantity (IDIQ) Water and Wastewater Hydraulic Modeling / GIS Support services to sustain
12 efforts to plan, maintain and optimize GWA water and wastewater infrastructure; and

13
14 **WHEREAS**, GWA evaluated all proposals on November 15, 2022 and two firms
15 submitted proposals by the RFP deadline of December 6, 2022, selecting Brown & Caldwell
16 (B&C) as best qualified to provide the hydraulic modeling services of the water and wastewater
17 systems and entered into contract negotiations regarding scope and fee described in Attachment A
18 as well as selecting Duenas, Camacho, & Associates, Inc. (DCA) as best qualified to provide GIS
19 services to field verify the hydraulic modeling and aerial mapping by fill the existing gaps of the
20 existing water and wastewater infrastructure and enhance the accuracy of the GIS maps, and
21 entered into contract negotiations regarding scope and fee described in Attachment B; and

22
23 **WHEREAS**, GWA Management seeks CCU approval to enter into a contract with B&C
24 and DCA, for RFP-02-ENG-2023, in the amount of Two Million One Hundred Forty-Five
25 Thousand Five Hundred Fifty-Six Dollars (\$2,145,556.00) to Brown & Caldwell for a period of
26 up to five (5) years.

27
28 **WHEREAS**, GWA Management seeks CCU approval to enter into a contract with B&C
29 and DCA, for RFP-02-ENG-2023, in the amount of Eight Hundred Thirty-Five Thousand Seven
30 Hundred Seventy-Two Dollars (\$835,772.00) to Duenas, Camacho, & Associates, Inc. for over
31 period of five (5) years; and

1 **WHEREAS**, the total project cost is based on an estimated number of hours needed to
2 execute the general scope of work, of five (5) year period. Actual expenditures will be on a Time
3 and Material Basis as individual Task Orders are issued. GWA will seek CCU approval for
4 additional funding should project cost exceed the proposed budget; and

5
6 **WHEREAS**, funding is available through grants, internally funded capital improvement
7 program (IFCIP) funds, System Development Charge Funds, and bonds; and

8
9 **WHEREAS**, the Public Utilities Commission (PUC) contract review protocol requires
10 GWA to obtain approval for All professional service procurements in excess of One Million
11 Dollars (\$1,000,000.00) and the CCU must approve all petitions to the PUC.

12
13 **NOW BE IT THEREFORE RESOLVED**, the Consolidated Commission on Utilities
14 does hereby approve and authorize the following:

- 15 1. The recitals set forth above hereby constitute the findings of the CCU.
16 2. The CCU hereby approves the funding of \$2,145,556.00 to B&C to enable the
17 execution of the agreement and future task orders (Attachment A).
18 3. The CCU hereby approves the funding of \$835,772.00 to DCA to enable the
19 execution of the agreement and future task orders (Attachment B).
20 4. The CCU hereby further authorizes GWA management to petition the PUC for
21 approval of the funding for B&C and DCA.


22
23 **RESOLVED**, that the Chairman certified, and the Board Secretary attests to the adoption
24 of this Resolution.

25
26 **DULY AND REGULARLY ADOPTED**, this 23rd day of July 2024.

27
28 Certified by:

29
30 
31 **JOSEPH T. DUENAS**
32 Chairperson

Attested by:

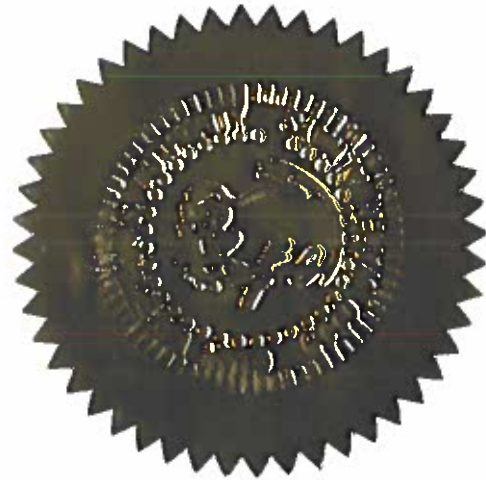
31 
32 **PEDRO ROY MARTINEZ**
Secretary

SECRETARY'S CERTIFICATE

I, Pedro Roy Martinez, Board Secretary of the Consolidated Commission on Utilities as evidenced by my signature above do hereby certify as follows:

The foregoing is a full, true and accurate copy of the resolution duly adopted at a regular meeting by the members of the Guam Consolidated Commission on Utilities, duly and legally held at a place properly noticed and advertised at which meeting a quorum was present and the members who were present voted as follows:

AYES:	<u>5</u>
NAYS:	<u>0</u>
ABSTAIN:	<u>0</u>
ABSENT:	<u>0</u>



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414 West Soledad Avenue, Suite 602
Hagatna, GU 96910

T: 671.300.4220

Attachment A



~~November 30, 2023~~ June 19, 2024

Gerald Gattoc, Senior Engineer
Guam Waterworks Authority
Gloria B. Nelson Public Service Building
Route 15
Mangilao, GU 96913

GWA Project No. W22-07-BND

Subject: Budget Proposal for the Indefinite Delivery/Indefinite Quantity (ID/IQ) for Water and Wastewater Hydraulic Modeling

Dear Mr. Gattoc:

Brown and Caldwell (BC) is pleased to submit this budget proposal for the Guam Waterwork Authority (GWA) ID/IQ for Water and Wastewater Hydraulic Modeling Services. BC developed the detailed scope of work in Attachment A based on the Request for Proposal (RFP) and discussion held with GWA staff regarding the RFP tasks.

The total project cost, over a 5-year period, on a Time and Materials Basis is ~~\$3,799,352~~ \$2,145,556. Table 1 below shows the yearly costs for all Scope of Work Items.

Table 1: Yearly Project Cost for all Scopes of Work						
	BC Labor		Expenses		Tax (5.263%)	Total
Year 1	\$385,515	\$656,190	\$27,500	\$64,000	\$21,737	\$758,094
Year 2	\$384,147	\$638,219	\$19,250	\$58,500	\$21,230	\$733,387
Year 3	\$361,912	\$645,260	\$24,750	\$64,000	\$20,350	\$746,588
Year 4	\$407,746	\$677,476	\$19,250	\$58,500	\$22,473	\$774,710
Year 5	\$383,462	\$683,246	\$24,750	\$64,000	\$21,484	\$786,573
Total	\$1,922,782	\$3,300,390	\$115,500	\$309,000	\$107,274	\$3,799,352

Tables 2 to 5 on the following page provide the project cost breakdown by scope of work Nos. 1 through 4.

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Table 2. SOW 1: Water Model				
	BC Labor	Expenses	Tax (5.263%)	Total
Year 1	\$187,454	\$27,500	\$11,313	\$226,267
Year 2	\$152,077	\$19,250	\$9,017	\$180,344
Year 3	\$162,009	\$24,750	\$9,829	\$196,588
Year 4	\$161,432	\$19,250	\$9,509	\$190,191
Year 5	\$171,604	\$24,750	\$10,334	\$206,688
Project Total	\$834,576	\$115,500	\$50,002	\$1,000,078

Table 3. SOW 2: Wastewater Model				
	BC Labor	Expenses	Tax (5.263%)	Total
Year 1	\$118,350 \$126,202	\$0 \$16,500	\$6,229 \$7,510	\$124,579 \$150,212
Year 2	\$149,960 \$159,909	\$0 \$16,500	\$7,892 \$9,284	\$157,852 \$185,693
Year 3	\$115,316 \$122,966	\$0 \$16,500	\$6,069 \$7,340	\$121,385 \$146,806
Year 4	\$159,163 \$169,723	\$0 \$16,500	\$8,377 \$9,801	\$167,540 \$196,024
Year 5	\$122,212 \$130,320	\$0 \$16,500	\$6,432 \$7,727	\$128,644 \$154,547
Project Total	\$665,001 \$709,118	\$0 \$82,500	\$34,999 \$41,662	\$700,000 \$833,282

Table 4. SOW 3: Permits				
	BC Labor	Expenses	Tax (5.263%)	Total
Year 1	\$79,711	\$0	\$4,195	\$83,906
Year 2	\$82,110	\$0	\$4,321	\$86,431
Year 3	\$84,587	\$0	\$4,452	\$89,039
Year 4	\$87,151	\$0	\$4,587	\$91,738
Year 5	\$89,646	\$0	\$4,718	\$94,364
Project Total	\$423,205	\$ 0	\$22,273	\$445,478

The proposed budget is based on an estimated number of hours needed each year to execute the tasks in the attached scope of work. As task orders are issued under this ID/IQ, each task order will fully define and refine the scope of work to be done under each task order.

The following assumptions were used while developing the scope of work and budget:

- Annual labor costs will increase by 3 percent annually.
- There will be eight requests for analysis each year, for on-call modeling support for analyzing new developments. Each analysis—including analysis of the water/wastewater models, and documenting results—is assumed to take 24 hours.

- Water and wastewater model piping will be updated from the GIS biennially. The water model will also be updated and calibrated every other year. GWA approval will be required prior to updating from the GIS to coordinate and verify data shared between GWA and BC.
- Because sufficient wet weather events do not normally occur annually, it was assumed that sufficient flow metering data will be collected by GWA, biennially, under BC's direction. Following data collection, associated metered basins will be calibrated the subsequent year.
- Per GWA's direction, \$100,000 was allotted in the budget for equipment purchases at \$20,000 annually for five years. Each year, GWA will inform BC of the required equipment (e.g., pressure loggers, flow meters, etc.) and BC will purchase the equipment on behalf of GWA—invoicing GWA for actual costs (plus shipping and overhead).
- Major training sessions will be held at GWA's offices. Additional training may be held over web conferencing.
- Upon request by GWA, BC mainland staff will travel to Guam up to four times a year to perform training and field work.
- BC staff will perform GWA-assisted field work. GWA will have staff available to assist BC in field work where necessary, such as visiting facilities behind locked gates or assisting with traffic control when visiting a pressure reducing valve (PRV) vault. Since the amount of required field work is unknown at this time, field work was budgeted at \$100,000 for five years, or \$20,000 per year. Actual field work requirements will be defined by task orders and actual cost can be estimated. All field work will require pre-approval by GWA.
- An updated water model will be delivered with the northern zones updated and calibrated by the end of year 2, the central zones updated and calibrated by the end of year 4, and the southern zones updated and calibrated by the end of year 5.
- For the sewer models, model calibration will be performed with the goal of calibrating the northern and southern basins within the 5-year contract period. The timing for calibrating a basin model is a goal that is dependent on obtaining flow metering data during at least two basin-wide storm events close to 2-year events while flow meters are operational. Flow metering will need to continue in each basin until sufficient wet weather flow metering data is collected, so the timing for these goals may change. Goals for the timing of model calibration include:
 - Northern basin – flow meter in Year 1 and calibrate in Year 2
 - Southern basins – flow meter in Year 3 and calibrate in Year 4
 - Hagåtña/Central basin – this basin was calibrated in 2023 and will not be recalibrated under this contract.
- As part of GWA's Consent Decree with EPA, Capacity Assurance Projects have been identified, and continue to be developed, to prioritize sewer rehabilitation and replacement in areas with inadequate capacity issues. It is anticipated that design and hydraulic modeling work effort will be conducted in association with these projects outside of this contract. Therefore, that modeling work shall not be duplicated but rather incorporated into the update/calibration scope of this IDIQ contract. Projects already identified include a) Route 12 at Route 2, b) Barrigada Pump Station, c) Route 1 (Dededo), and d) Route 4 (between Pump Station 18 and Pump Station 14).

Attachment A provides the project scope of work, Attachment B provides a preliminary project schedule, and Attachment C provides the hourly breakdown by scope of work per year. The schedule is a preliminary schedule based on expected tasks, but the schedule will likely change as tasks are

Gerald Gattoc
Guam Waterworks Authority
November 30, 2023
Page 4

finished earlier than projected, tasks take longer than projected, and tasks are re-prioritized. The schedule lists which tasks (1, 2, 3, 4, or All) will take place in each month over the five years.

Please let us know if you would like to further discuss the scope of work or proposed fee.

Very truly yours,

Brown and Caldwell

John Riegel
Director Local Leader
Guam Office

Attachments (3)

- Attachment A: Project Scope of Work
- Attachment B: Project Schedule
- Attachment C: Detailed Fee Breakdown

Attachment A: Project Scope of Work

SCOPE OF WORK 1 – Water Hydraulic Model

Task 1: Task Management

The Engineer will manage the scope, schedule, and budget associated with the work described in the issued Task Orders to ensure that the work is managed in a manner that meets contract requirements. This includes, but is not limited to, subcontractor management, management of documents, changes and risks, and quality assurance and control. This task will include progress conference calls or status updates as needed by the Engineer or GWA, plus meetings, consultations, and discussions between Engineer and GWA personnel to review project progress, issues to be resolved, specific modeling use and scenario analysis, etc. This task covers efforts associated with the internal quality control and technical review process, administering the contract, requests for payment, and financial monitoring. Internal checking or peer review of all deliverables will also be performed. The Engineer will manage the scope, schedule, and budget and coordinate communication with GWA.

GWA will coordinate task order activities with the Engineer, process payment invoices and change order requests, and define specific support needed from the hydraulic models and work with the Engineer to complete the assistance requested.

Task 2: Software Support

The Engineer will help GWA move their current water model from InfoWater to a GWA-approved software. The Engineer owns all the major software packages and will help GWA select a new software package.

The Engineer will continue to help GWA with modeling software issues and questions throughout this contract. The Engineer will provide electronic versions of the updated models after model calibration is completed, as requested by GWA, and at the end of this contract. The Engineer will help GWA transition to new software and with any software issues.

GWA will purchase new software licenses and pay annual maintenance on the software.

Deliverables: Latest model files and converted model files from old software to new software.

Task 3: Gather, Review, and Field Verify Existing Data

This task will include reviewing and identifying data that needs to be updated in the water model. This will include model facilities as described below. The data to be updated will be identified and updated in the model during the Model Calibration and Model Maintenance tasks.

Model facilities. The Engineer will research, identify, gather, field investigate, verify, compile, and review existing water system and infrastructure data to update the model. Data will also be collected from the District Metering Area (DMA) program and through interviews with GWA engineering and operations staff to identify new facilities or locations that need updating in the models, such as water pressure zone boundaries, water PRV settings and status (active or bypassed), water tank dimensions, water wells and the WTP, and water pump attributes. The Engineer will discuss with GWA Operations staff how facilities are currently operated (as relate to system hydraulics). The collected data will be reviewed to identify updates needed in the model. The engineer will collect, review, and field verify data and data gaps to

develop a list of facilities that need to be updated in the model.

GWA will provide current water system and infrastructure data.

Deliverables: List of facilities to be updated in the model.

Task 4: Model Calibration

The Engineer will recalibrate GWA's water model. Model calibration will be performed so the entire model is calibrated within the 5-year contract period. Calibration will focus on the northern zones first, followed by the central zones, and then the southern zones. The goal will be to calibrate the northern zones by the end of year 2, the central zones by the end of year 4, and the southern zones by the end of year 5.

Water model calibration will include:

- The Engineer will work with GWA to develop a field-testing plan for collecting field data to calibrate the water model. The plan will include placing loggers throughout the water system and performing hydrant flow tests (in areas that have well defined pressure zones boundaries). The plan will also take into account the availability of flow and pressure data available from the new meters being placed at tanks, flow meters, and wells.
- The Engineer will work with GWA operations staff to perform the field testing detailed in the field-testing plan.
- After sufficient data is collected, and before the model is calibrated, the Engineer will coordinate with GWA to ensure that the Engineer has all the data needed as GWA may have additional information that was not yet shared with the Engineer.
- The model will be calibrated using two methods, operational calibration, and hydraulic calibration. Operational calibration includes modifying settings and operations of facilities such as pumps, valves, and tanks so they operate as they do in the field. Hydraulic calibration includes replicating hydrant tests and ensuring that model pressures match system pressures during the tests. Results of the model calibration will be compared to calibration goals listed in AWWA M32 (Computer Modeling of Water Distribution Systems). Areas that cannot be calibrated to match those goals will be documented so that additional field testing and calibration can be done in the future. For example, some areas may not be calibrated due to unknown closed or choked valves.

The models to be calibrated will have the latest customer demands/flows, piping, and facilities updated in Task 5. The engineer will develop a field-testing plan, perform field testing, and calibrate the water model.

GWA will assist in the water system field testing.

Deliverables: Field-testing plan, calibrated water model delivered with the northern zones updated and calibrated by the end of year 2, the central zones updated and calibrated by the end of year 4, and the southern zones updated and calibrated by the end of year 5.

Task 5: Update and Maintain Models

The Engineer will update and maintain GWA's water model. This will include:

- Update model flows and demands from billing data
- Update water model diurnal patterns from SCADA or field data
- Update model facilities using data collected in the data review task

The Engineer will update the water model and maintain a model change log. The model will be updated every other year throughout this contract. A spreadsheet will be used to track changes as new versions of the model are saved.

GWA will provide data needed for the water model updates.

Deliverables: Updated water model.

Task 6: Model Scenario Analysis

The Engineer will analyze specific scenarios requested by GWA using the water model. This task will be an on-call task to respond to requests from GWA as needed. Scenarios to be analyzed may include new CIP developments or areas of concern. The analysis may include the following:

- Water system - Analyze average and maximum flows, emergency and outage flows, fire flows, line sizing/capacity, system pressures, and any other required parameters.

Analyses will be performed using the latest Water Resource Master Plan (WRMP) criteria. The Engineer will analyze the water model and provide a summary of the analysis and the impacts to the GWA system, in an email, in a technical memo, or in a meeting, depending on the deliverable required by GWA.

GWA will provide required data for the analyses.

Deliverables: Provide and communicate model analysis and scenario results.

Task 7: Water Valve Inventory

The Engineer will develop an inventory of all main line valves in GWA's water system. The inventory will be developed by reviewing GIS data, the model, as-built drawings, through interviews and discussions with GWA engineering and operations staff, and through field verification. The inventory will be added to a database in software like Microsoft Excel or in a GIS database. The database will include the following: (1) unique valve identifier, (2) location, (3) date installed, (4) valve size, (5) number of turns, (6) type of valve, and (7) status (normally open, closed, or throttled), and any other valve information that should be recorded. The Engineer will develop the valve inventory database.

The reasons that valves are throttled will be discussed and a decision will be made if the throttled valves can be opened at that time or after the zone realignment is completed in the area. Options for GWA operations staff to collect valve information in the field, such as through mobile apps, will be discussed.

GWA will provide information about the water system valves.

Deliverables: Valve inventory.

Task 8: Water Model Training

The Engineer will conduct training workshops for GWA's staff. Training will be done according to the staff's experience with the modeling software. Training for staff with extensive experience with the modeling software will primarily include on-call assistance. Training for staff with little or no experience will include a preliminary training course followed by on-call assistance as they start using the software.

Larger training workshops will be held at GWA's office. Shorter training sessions may be held virtually. The training workshops will provide detailed directions and procedures for updating, maintaining, and running the model, which will include the following:

- Adding and updating model facilities, including water treatment plants, reservoirs, PRV stations, closed valves, boundary conditions, booster pump stations, etc.
- Updating model input flows
- Fire flow analysis
- Analyzing system capacity and model calibration
- Developing improvements
- Pressure zone boundary scenarios and modifications
- Analysis of development-initiated system changes
- Modifying model scenarios
- Managing model versions
- Best practices for documenting model results
- Other modeling tasks
- Training workshops with Operations (SCC) personnel to simulate real time issues such as impacts on reservoir levels due to downed wells and/or adjustment of operational settings; to include lessons in engineering hydraulic principles. Real-time modeling will only take place if sufficient SCADA data is available and only for areas that are well-calibrated or realigned.

The Engineer will provide written standard operating procedures (SOPs) for common modeling tasks, prepare for and hold training sessions, and provide training materials.

GWA will provide a conference room and computers for training sessions.

Deliverables: Training sessions, training materials, SOPs.

Task 9: Provide Equipment

The Engineer will purchase and provide GWA with equipment as necessary to efficiently maintain the water model. The equipment to be purchased by the Engineer will be as directed by GWA and as determined by GWA with input from the Engineer. For example, the equipment may include computer laptops, portable flow meters, pressure loggers, and line locators. Software will not be purchased by the Engineer for GWA to avoid issues with software licensing. All equipment will be owned by GWA. The cost of the equipment will not exceed the amount listed in the budget for each year for this task.

GWA will provide a list of equipment authorized to be purchased.

Deliverables: Equipment.

SCOPE OF WORK 2 – Wastewater Hydraulic Model

The following table summarizes the history of the GWA sewer basin models. As shown in the table, the Hagåtña model was updated in 2023 and the other basin models were updated at least 8 years ago using flow metering data ranging from 9 to 19 years old.

<u>Region</u>	<u>Basin</u>	<u>Year Model Updated</u>	<u>Years/Source of Flow Metering Data Used to Develop Model</u>
<u>North</u>	<u>Northern District</u>	<u>2016</u>	<u>2013-2015 by GWA</u>
<u>North</u>	<u>Tumon</u>	<u>2015</u>	<u>2014-2015 by EA Engineering, Science, and Technology, Inc. and Stanley Consultants</u>
<u>Central</u>	<u>Hagåtña</u>	<u>2023</u>	<u>2021 by GWA</u>
<u>South</u>	<u>Agat-Santa Rita</u>	<u>2016</u>	<u>2012 by ADS Environmental Services</u>
<u>South</u>	<u>Baza Gardens</u>	<u>2016</u>	<u>2012 by ADS Environmental Services</u>
<u>South</u>	<u>Inarajan</u>	<u>2016</u>	<u>2005 by GWA</u>
<u>South</u>	<u>Umatac-Merizo</u>	<u>2016</u>	<u>2012 by ADS Environmental Services</u>

Task 1: Task Management

The Engineer will manage the scope, schedule, and budget associated with the work described in the issued Task Orders to ensure that the work is managed in a manner that meets contract requirements. This includes, but is not limited to, subcontractor management, management of documents, changes and risks, and quality assurance and control. This task will include progress conference calls or status updates as needed by the Engineer or GWA, plus meetings, consultations, and discussions between Engineer and GWA personnel to review project progress, issues to be resolved, specific modeling use and scenario analysis, etc. This task covers efforts associated with the internal quality control and technical review process, administering the contract, requests for payment, and financial monitoring. Internal checking or peer review of all deliverables will also be performed. The Engineer will manage the scope, schedule, and budget and coordinate communication with GWA.

GWA will coordinate task order activities with the Engineer, process payment invoices and change order requests, and define specific support needed from the hydraulic models and work with the Engineer to complete the assistance requested.

Task 2: Software Support

The Engineer will help GWA transition from its current wastewater modeling software, InfoSWMM, to a new GWA-approved sewer modeling software. This will include presenting a list of options and costs for new software, contacting prospective software vendor reps (2 to 3 options) for conducting presentation of products, converting model files from the old software to the new software, verifying that model results from the new software match results from the old software, helping GWA with installation of the new software, and training GWA on using the new software. BC owns all the major sewer modeling software.

The Engineer will continue to help GWA with modeling software issues and questions throughout this

contract. The Engineer will provide electronic versions of the updated models after model calibration is completed, as requested by GWA, and at the end of this contract. The Engineer will help GWA transition to new software and with any software issues.

GWA will purchase new software licenses and pay annual maintenance on the software.

Deliverables: Latest model files and converted model files from old software to new software.

Task 3: Gather, Review, and Field Verify Existing Data

This task will include reviewing and identifying data that needs to be updated in the wastewater model. This will include model facilities as described below. The data to be updated will be identified and updated in the model during the Model Calibration and Model Maintenance tasks.

Model facilities. The Engineer will research, identify, gather, field investigate, verify, compile, and review existing relevant system and infrastructure data relating to updating the model. Data will also be collected through interviews with GWA engineering and operations staff to identify new facilities or locations that need updated in the models, such as WWTPs and wastewater pump attributes. The Engineer will discuss with GWA Operations staff how facilities are currently operated (as they relate to system hydraulics). The collected data will be reviewed to identify updates needed in the model. The engineer will collect, review, and field verify data and data gaps to develop a list of facilities that need to be updated in the model.

GWA will provide current wastewater system and infrastructure data.

Deliverables: List of facilities to be updated in the model.

Task 4: Model Calibration

The Engineer will recalibrate GWA's wastewater models. Model calibration will be performed with the goal of calibrating the northern and southern basins within the 5-year contract period. The timing for calibrating a basin model is a goal that is dependent on obtaining flow metering data during at least two basin-wide storm events close to 2-year events while flow meters are operational. Flow metering will need to continue in each basin until sufficient wet weather flow metering data is collected, so the timing for these goals may change. Goals for the timing of model calibration include:

- Northern basin – flow meter in Year 1 and calibrate in Year 2
- Southern basins – flow meter in Year 3 and calibrate in Year 4

Wastewater model calibration will include:

- The Engineer will work with GWA to develop a plan for flow metering in the collection system. The plan will include metering all basins in the GWA system. The plan will take into account the availability of flow metering equipment and GWA staff to place and maintain the meters. The plan will detail the number and locations of flow meters and rain gauges that will be placed by GWA.
- The Engineer will review flow metering and rainfall data as it is collected to ensure the flow meters are operating. The Engineer will also compare rainfall data to NOAA data to decide when sufficient wet weather data has been collected.
- After sufficient data is collected, and before the model is calibrated, the Engineer will coordinate

with GWA to ensure that the Engineer has all the data needed as GWA may have additional information that was not yet shared with the Engineer.

- Basins will be calibrated after sufficient dry and wet weather flow metering data is collected.
- The timing of calibrating each basin will be dependent on when sufficient wet weather flow metering data is collected, which is dependent on having sufficient large storms.
- Each basin will be calibrated for dry weather conditions. Dry weather calibration will include calibrating model flows to match dry weather flow meter data. Wet weather calibration will be done if sufficient wet weather flow metering data can be collected. Wet weather calibration will include adjusting model parameters to match flow meter wet weather peak flows from inflow and infiltration.
- The calibrated models will be analyzed to identify capacity deficiencies using the WRMP capacity criteria. Piping and pump capacity recommendations will be developed to address the deficiencies.

The models to be calibrated will have the latest customer demands/flows, piping, and facilities updated in Task 5. The Engineer will develop a flow metering plan, review flow metering and rainfall data, and calibrate the wastewater model.

GWA will perform wastewater collection system flow metering (including placing, maintaining, and downloading flow meters and rain gauges).

Deliverables: Flow metering plan, calibrated wastewater model. The goal will be to deliver the updated and calibrated northern basin model by the end of year 2 and to deliver the updated and calibrated southern basins model by the end of year 4.

Task 5: Update and Maintain Wastewater Model

The Engineer will update and maintain GWA's wastewater model. This will include:

- Update model flows and demands from billing data
- Update model facilities using data collected in the data review task

The Engineer will update the wastewater model and maintain a model change log. The models will be updated every other year throughout this contract. A spreadsheet will be used to track changes as new versions of the models are saved.

GWA will provide data needed for the wastewater model updates.

Deliverables: Updated wastewater model.

Task 6: Model Scenario Analysis

The Engineer will analyze specific scenarios requested by GWA using the wastewater model. This task will be an on-call task to respond to requests from GWA as needed. Scenarios to be analyzed may include new CIP developments or areas of concern. The analysis may include the following:

- Wastewater system - Analyze dry and wet weather peak flows, pipe capacity, lift station capacity, and any other required parameters.

Analyses will be performed using the latest Water Resource Master Plan (WRMP) criteria. The Engineer will analyze the wastewater model and provide a summary of the analysis and the impacts to the GWA system, in an email, in a technical memo, or in a meeting, depending on the deliverable required by GWA.

GWA will provide required data for the analyses.

Deliverables: Provide and communicate model analysis and scenario results.

Task 7: Water Valve Inventory – Not Applicable

Task 8: Wastewater Model Training

The Engineer will conduct training workshops for GWA's staff. Training will be done according to the staff's experience with the modeling software. Training for staff with extensive experience with the modeling software will primarily include on-call assistance. Training for staff with little or no experience will include a preliminary training course followed by on-call assistance as they start using the software.

Larger training workshops will be held at GWA's office. Shorter training sessions may be held virtually. The training workshops will provide detailed directions and procedures for updating, maintaining, and running the model, which will include the following:

- Adding and updating model facilities, including wastewater treatment plants, lift stations, etc.
- Updating model input flows
- Analyzing system capacity and model calibration
- Developing improvements
- Analysis of development-initiated system changes
- Modifying model scenarios
- Managing model versions
- Best practices for documenting model results
- Other modeling tasks
- Lessons in engineering hydraulic principles

The Engineer will provide written standard operating procedures (SOPs) for common modeling tasks, prepare for and hold training sessions, and provide training materials.

GWA will provide a conference room and computers for training sessions.

Deliverables: Training sessions, training materials, SOPs.

Task 9: Provide Equipment

The Engineer will purchase and provide GWA with equipment as necessary to efficiently maintain the wastewater model. The equipment to be purchased by the Engineer will be as directed by GWA and as determined by GWA with input from the Engineer. For example, the equipment may include computer laptops, portable flow meters, pressure loggers, and line locators. Software will not be purchased by the Engineer for GWA to avoid issues with software licensing. All equipment will be owned by GWA. The cost of the equipment will not exceed the amount listed in the budget for each year for this task.

Additional equipment for wastewater models may include:

- Smoke testing equipment
- Gas detectors

GWA will provide a list of equipment authorized to be purchased.

Deliverables: Equipment.

SCOPE OF WORK 3 – New Area Development and Permits

Task 1: Task Management

The Engineer will manage the scope, schedule, and budget associated with the work described in the issued Task Orders to ensure that the work is managed in a manner that meets contract requirements. This includes, but is not limited to, subcontractor management, management of documents, changes and risks, and quality assurance and control. This task will include progress conference calls or status updates as needed by the Engineer or GWA, plus meetings, consultations, and discussions between Engineer and GWA personnel to review project progress, issues to be resolved, specific modeling use and scenario analysis, etc. This task covers efforts associated with the internal quality control and technical review process, administering the contract, requests for payment, and financial monitoring. Internal checking or peer review of all deliverables will also be performed. The Engineer will manage the scope, schedule, and budget and coordinate communication with GWA.

GWA will coordinate task order activities with the Engineer, process payment invoices and change order requests, and define specific support needed from the hydraulic models and work with the Engineer to complete the assistance requested.

Task 2: Software Support – Per Scope of Work 1 & 2

Task 3: Gather, Review, and Field Verify Existing Data – Per Scope of Work 1 & 2

Task 4: Model Calibration – Per Scope of Work 1 & 2

Task 5: Update and Maintain Models

The Engineer will update and maintain GWA's water and wastewater models. This will include:

- Update model flows and demands from New Area Development

Task 6: Model Scenario Analysis

The Engineer will analyze specific scenarios requested by GWA using the water and wastewater models. This task will be an on-call task to respond to requests from GWA as needed. Scenarios to be analyzed may include New Area Developments or areas of concern. The analysis may include the following:

- Water system - Analyze average and maximum flows, emergency and outage flows, fire flows, line sizing/capacity, system pressures, and any other required parameters.
- Wastewater system - Analyze dry and wet weather peak flows, pipe capacity, lift station capacity, and any other required parameters.

Analyses will be performed using the latest Water Resource Master Plan (WRMP) criteria. The Engineer will analyze the water and wastewater models and provide a summary of the analysis and the impacts to the GWA system, in an email, in a technical memo, or in a meeting, depending on the deliverable required by GWA.

GWA will provide required data for the analyses including information on the new developments or areas to be analyzed, average and peak demands/inflow to the system, connection points, project timing, etc.

Deliverables: Provide and communicate model analysis and scenario results.

Task 7: Water Valve Inventory – Not Applicable

Task 8: Model Training – Per Scope of Work 1 & 2

Task 9: Provide Equipment – Per Scope of Work 1 & 2

Attachment B

SCOPE OF WORK 1 – Water Hydraulic Model

Task 1: Task Management

The Engineer will manage the scope, schedule, and budget associated with the work described in the issued Task Orders to ensure that the work is managed in a manner that meets contract requirements. This includes, but is not limited to, subcontractor management, management of documents, changes and risks, and quality assurance and control. This task will include progress conference calls or status updates as needed by the Engineer or GWA, or meetings, consultations, and discussions between Engineer and GWA personnel to review project progress, issues to be resolved, specific modeling use and scenario analysis, etc. This task covers effort associated with the internal quality control and technical review process, administering the contract, requests for payment, and financial monitoring. Internal checking or peer review of all deliverables will also be performed. The Engineer will manage the scope, schedule, and budget and coordinate communication with GWA.

DCA will coordinate with GWA and others to maintain data flow from the field to GWA. This includes 1-2 meeting(s) per month (or as needed) ~~to assure continuous model update, calibration, and scenario runs.~~

GWA will coordinate task order activities with the Engineer, process payment invoices and change order requests, and define specific support needed from the water hydraulic models and work with the Engineer to complete the assistance requested.

Task 2: Software Support

The Engineer will help GWA move their current water model from InfoWater, to InfoWater Pro.

~~The Engineer will continue to help GWA with modeling software issues and questions throughout this contract. The Engineer will provide electronic versions of the updated models after model calibration is completed, as requested by GWA, and at the end of this contract. The Engineer will help GWA transition to new software and with any software issues.~~

~~GWA will purchase new software licenses and pay annual maintenance on the software. DCA shall maintain an annual license for this task.~~

~~DCA shall have access to the model updated by others. There will be limited software support other than providing recommendations and scenario runs with either demand or loading changes done by DCA. No network or pump related changes will be made by DCA.~~

Deliverables: Latest model files and converted model files from old software to new software.

Task 3: Gather, review, and field verify existing data

This task will include reviewing and identifying data that needs to be updated in the water model. This will include model facilities as described below. The data to be updated will be identified and updated in

the model during the Model Calibration and Model Maintenance tasks.

Model facilities. The Engineer will research, identify, gather, field investigate, verify, compile, and review existing water system and infrastructure data to update the model. Data will also be collected from the District Metering Area (DMA) program and through interviews with GWA engineering and operations staff to identify new facilities or locations that need updating in the models, such as water pressure zone boundaries, water PRV settings and status (active or bypassed), water tank dimensions, water wells and the WTP, and water pump attributes. The Engineer will discuss with GWA Operations staff how facilities are currently operated (as relate to system hydraulics). The collected data will be reviewed to identify updates needed in the model. The engineer will collect, review and field verify data and data gaps to develop a list of facilities that need to be updated in the model.

GWA will provide current water system and infrastructure data.

It is anticipated that either GWA or its consultant will provide suggested locations for data collection and/or field verification(s) to DCA. In addition to these locations, DCA will develop a systematic approach to data collection for GWA review and concurrence. Once approved DCA will begin data collection in either the DCA identified or GWA location(s).

Deliverables: List of facilities to be updated in the model.

Task 4: Model Calibration

The Engineer will recalibrate GWA's water model.

Water model calibration will include:

- The DCA will work with GWA to develop a field testing plan for collecting field data to calibrate the water model. The DCA will prepare a plan will include for the placing loggers throughout the water system and performing hydrant flow tests (in areas that have well defined pressure zones boundaries). The plan will also take into account the availability of flow and pressure data available from the new meters being placed at tanks, flow meters, and wells.
- The DCA will work with GWA operations staff to perform the field testing detailed in the field-testing plan.
- After sufficient field data is collected by DCA, the model will be calibrated using two methods, operational calibration and hydraulic calibration. Operational calibration includes modifying settings and operations of facilities such as pumps, valves, and tanks so they operate as they do in the field. Hydraulic calibration includes replicating hydrant tests and ensuring that model pressures match system pressures during the tests. Results of the model calibration will be compared to calibration goals listed in AWWA M32 (Computer Modeling of Water Distribution Systems). Areas that cannot be calibrated to match those goals will be documented so that additional field testing and calibration can be done in the future. For example, some areas may not be calibrated due to unknown closed or choked valves. Model calibration will be done by others. DCA may calibrate model only at the specific request of GWA. Intent is for GWA to maintain one consultant to run model calibration.

The models to be calibrated will have the latest customer demands/flows, piping, and facilities updated in Task 5. The engineer will develop a field testing plan, perform field testing, and calibrate the water model.

GWA will assist in the water system field testing.

~~DCA shall have access to the model updated by others. There will be limited calibration support other than providing recommendations. No network or pump-related changes will be made by DCA unless instructed by GWA.~~

Deliverables: Field testing plan and updates when required.

Task 5: Update and Maintain Models

The Engineer will update and maintain GWA's water model. This will include:

- Update model flows and demands from billing data
- Update water model diurnal patterns from SCADA or field data
- Update model facilities using data collected in the data review task

~~DCA will upgrade demand/loading and diurnal patterns based on data collected by DCA.~~

The Engineer will update the water model and maintain a model change log. The models will be updated every other year throughout this contract. A spreadsheet will be used to track changes as new versions of the model are saved.

GWA will provide data needed for the water model updates.

~~DCA shall have access to the model updated by others. Update and model maintenance will include providing recommendations and performing internal modeling runs to conform field observations. No permanent network or pump-related changes will be made by DCA unless instructed by GWA.~~

~~DCA will provide analysis using updated field data and existing model runs. This data will be provided to GWA to update model~~

Deliverables: Updated water model.

Task 6: Model Scenario Analysis

The Engineer will analyze specific scenarios requested by GWA using the water model. This task will be an on-call task to respond to requests from GWA as needed. Scenarios to be analyzed may include new CIP developments or areas of concern. The analysis may include the following:

- Water system - Analyze average and maximum flows, emergency and outage flows, fire flows, line sizing/capacity, system pressures, and any other required parameters.

Analyses will be performed using the latest Water Resource Master Plan (WRMP) criteria. The Engineer will analyze the water models and provide a summary of the analysis and the impacts to the GWA system, in an email, in a technical memo, or in a meeting, depending on the deliverable required by GWA.

GWA will provide required data for the analyses.

~~Model runs will be reviewed by DCA to determine where update and field data collection may be needed. DCA will also coordinate with GWA to confirm these location(s).~~

Deliverables: Provide and communicate model analysis and scenario results.

Task 7: Water Valve Inventory

DCA will develop an inventory of all main line valves in GWA's water system. The inventory will be developed by reviewing GIS data, the model, as-built drawings, and through interviews and discussions with GWA engineering and operations staff, and field verification. The inventory will be added to a database in software like Microsoft Excel or in a GIS database. The database will include the following: (1) unique valve identifier, (2) location, (3) date installed, (4) valve size, (5) number of turns, (6) type of valve, and (7) status (normally open, closed, or throttled), and any other valve information that should be recorded. The Engineer will develop the valve inventory database.

The reasons that valves are throttled will be discussed and a decision will be made if the throttled valves can be opened at that time or after the zone realignment is completed in the area. Options for GWA operations staff to collect valve information in the field, such as through mobile apps, will be discussed.

GWA will provide information about the water system valves.

Deliverables: Valve inventory.

Task 8: Water Model Training

The Engineer will conduct training workshops for GWA's staff. Larger training workshops will be held at GWA office. Shorter training sessions may be held virtually. The training workshops will provide detailed directions and procedures for updating, maintaining, and running the model, which will include the following:

- Adding and updating model facilities, including water treatment plants, reservoirs, PRV stations, closed valves, boundary conditions, booster pump stations, etc.
- Updating model input flows
- Fire flow analysis
- Analyzing system capacity
- Developing improvements
- Pressure zone boundary scenarios and modifications
- Analysis of development-initiated system changes
- Modifying model scenarios
- Managing model versions

- Best practices for documenting model results
- Other modeling tasks
- Training workshops with Operations (SCC) personnel to simulate real time issues such as impacts on reservoir levels due to downed wells and/or adjustment of operational settings; to include lessons in engineering hydraulic principles

DCA will set up and lead classes focused on basic and intermediate hydraulics. These classes will be focused on operations and junior engineers. At least 1 class will be provided per year.

The Engineer will provide written standard operating procedures (SOPs) for common modeling tasks, prepare for and hold training sessions, and provide training materials.

GWA will provide conference room and computers for training sessions.

Deliverables: Training sessions, training materials, SOPs.

Task 9: Provide Equipment

The Engineer will purchase and provide GWA with equipment as necessary to efficiently maintain the water model. The equipment to be purchased by the Engineer will be as directed by GWA and as determined by GWA with input from the Engineer. For example, the equipment may include computer laptops, portable flow meters, pressure loggers, and line locaters. Software will not be purchased by the Engineer for GWA to avoid issues with software licensing. All equipment will be owned by GWA. The cost of the equipment will not exceed the amount listed in the budget for each year for this task.

GWA will provide list of equipment authorized to be purchased.

Deliverables: Equipment.

SCOPE OF WORK 2 – Wastewater Hydraulic Model

Task 1: Task Management

The Engineer will manage the scope, schedule, and budget associated with the work described in this Task Order to ensure that this work is managed in a manner that meets contract requirements. This includes, but is not limited to, subcontractor management, management of documents, changes and risks, and quality assurance and control. This task will include progress conference calls or status updates as needed by the Engineer or GWA, or meetings, consultations, and discussions between Engineer and GWA personnel to review project progress, issues to be resolved, specific modeling use and scenario analysis, etc. This task covers effort associated with the internal quality control and technical review process, administering the contract, requests for payment, and financial monitoring. Internal checking or peer review of all deliverables will also be performed. The Engineer will manage the scope, schedule, and budget and coordinate communication with GWA.

GWA will coordinate task order activities with the Engineer, process payment invoices and change order requests, and define specific support needed from the water and sewer hydraulic models and work with the Engineer to complete the assistance requested.

Task 2: Software Support

The Engineer will help GWA transition from its current wastewater modeling software, InfoSWMM, to a new sewer modeling software. This will include presenting a list of options and costs for new software, contacting prospective software vendor reps (2 to 3 options) for conducting presentation of products, converting model files from the old software to the new software, verifying that model results from the new software match results from the old software, helping GWA within installation of the new software, and training GWA on using the new software.

The Engineer will continue to help GWA with modeling software issues and questions throughout this contract. The Engineer will provide electronic versions of the updated models after model calibration is completed, as requested by GWA, and at the end of this contract. The Engineer will help GWA transition to new software and with any software issues.

GWA will purchase new software licenses and pay annual maintenance on the software. ~~DCA shall maintain an annual license for this task.~~

~~DCA shall have access to the model updated by others. There will be limited software support other than providing recommendations and scenario runs with either demand or loading changes done by DCA. No network or pump related changes will be made by DCA.~~

Deliverables: Latest model files and converted model files from old software to new software.

Task 3: Gather, review and field verify existing data

This task will include reviewing and identifying data that needs to be updated in the Wastewater model. This will include model facilities, as described below. The data to be updated will be identified and updated in the model during the Model Calibration and Model Maintenance tasks.

Model facilities. The Engineer will research, identify, gather, field investigate, verify, compile, and review existing relevant system and infrastructure data relating to updating the model. Data will also be collected through interviews with GWA engineering and operations staff to identify new facilities or locations that need updated in the models, such as WWTPS and wastewater pump attributes. The Engineer will discuss with GWA Operations staff how facilities are currently operated (as relate to system hydraulics). The collected data will be reviewed to identify updates needed in the model. The engineer will collect, review and field verify data and data gaps to develop a list of facilities that need to be updated in the model.

GWA will provide current wastewater system and infrastructure data.

Deliverables: List of facilities to be updated in the model.

Task 4: Model Calibration

The Engineer will recalibrate GWA's wastewater models.

Wastewater model calibration will include:

- The Engineer will work with GWA to develop a plan for flow metering in the collection system. The plan will include metering all the basins in the GWA system. The plan will take into account the availability of flow metering equipment and GWA staff to place and maintain the meters. The plan will detail the number and locations of flow meters and rain gauges that will be placed by GWA.
- The Engineer will review flow metering and rainfall data as it is collected to ensure the flow meters are operating. The Engineer will also compare rainfall data to NOAA data to decide when sufficient wet weather data has been collected.
- Basins will be calibrated after sufficient dry and wet weather flow metering data is collected.
- The timing of calibrating each basin will be dependent on when sufficient wet weather flow metering data is collected, which is dependent on having sufficient large storms.
- Each basin will be calibrated for dry weather conditions. Dry weather calibration will include calibrating model flows to match dry weather flow meter data. Wet weather calibration will be done if sufficient wet weather flow metering data can be collected. Wet weather calibration will include adjusting model parameters to match flow meter wet weather peak flows from inflow and infiltration.

The models to be calibrated will have the latest customer demands/flows, piping, and facilities updated in Task 5. The Engineer will develop a flow metering plan, review flow metering and rainfall data, and calibrate the wastewater model.

GWA **DCA** will perform wastewater collection system flow metering (including placing, maintaining, and downloading flow meters and rain gauges).

~~DCA shall have access to the model updated by others. There will be limited calibration support other than providing recommendations and scenario runs with either demand or loading changes done by DCA. No network or pump related changes will be made by DCA.~~

Deliverables: Flow metering plan, calibrated wastewater model.

Task 5: Update and Maintain Wastewater Model

The Engineer will update and maintain GWA's wastewater model. This will include:

- Update model flows and demands from billing data
- Update model facilities using data collected in the data review task

The Engineer will update the wastewater model and maintain model change log. The models will be updated every other year throughout this contract. A spreadsheet will be used to track changes as new versions of the models are saved.

GWA will provide data needed for the wastewater model updates.

Deliverables: Updated wastewater model.

Task 6: Model Scenario Analysis

The Engineer will analyze specific scenarios requested by GWA using the wastewater model. This task will be an on-call task to respond to requests from GWA as needed. Scenarios to be analyzed may include new CIP developments or areas of concern. The analysis may include the following:

- Wastewater system - Analyze dry and wet weather peak flows, pipe capacity, lift station capacity, and any other required parameters.

Analyses will be performed using the latest Water Resource Master Plan (WRMP) criteria. The Engineer will analyze the wastewater model and provide a summary of the analysis and the impacts to the GWA system, in an email, in a technical memo, or in a meeting, depending on the deliverable required by GWA.

GWA will provide required data for the analyses.

Deliverables: Provide and communicate model analysis and scenario results.

Task 7: Water Valve Inventory - Not Applicable

Task 8: Wastewater Model Training

The Engineer will conduct training workshops for GWA's staff. Larger training workshops will be held at GWA office. Shorter training sessions may be held virtually. The training workshops will provide detailed directions and procedures for updating, maintaining, and running the model, which will include the following:

- Adding and updating model facilities, including wastewater treatment plants, lift stations, etc.
- Updating model input flows
- Analyzing system capacity
- Developing improvements
- Analysis of development-initiated system changes
- Modifying model scenarios
- Managing model versions
- Best practices for documenting model results
- Other modeling tasks
- Lessons in engineering hydraulic principles

The Engineer will provide written standard operating procedures (SOPs) for common modeling tasks, prepare for and hold training sessions, and provide training materials.

DCA will set up and lead classes focused on basic and intermediate hydraulics. These classes will be focused on operations and junior engineers. At least 1 class will be provided per year.

GWA will provide conference room and computers for training sessions.

Deliverables: Training sessions, training materials, SOPs.

Task 9: Provide Equipment

The Engineer will purchase and provide GWA with equipment as necessary to efficiently maintain the wastewater model. The equipment to be purchased by the Engineer will be as directed by GWA and as determined by GWA with input from the Engineer. For example, the equipment may include computer laptops, portable flow meters, pressure loggers, and line locaters. Software will not be purchased by the Engineer for GWA to avoid issues with software licensing. All equipment will be owned by GWA. The cost of the equipment will not exceed the amount listed in the budget for each year for this task.

Additional equipment for wastewater model may include:

- Smoke testing equipment
- Gas detectors

GWA will provide list of equipment authorized to be purchased.

Deliverables: Equipment.

SCOPE OF WORK 3 – Permits

Task 1: Task Management

The Engineer will manage the scope, schedule, and budget associated with the work described in the issued Task Orders to ensure that the work is managed in a manner that meets contract requirements. This includes, but is not limited to, subcontractor management, management of documents, changes and risks, and quality assurance and control. This task will include progress conference calls or status updates as needed by the Engineer or GWA, or meetings, consultations, and discussions between Engineer and GWA personnel to review project progress, issues to be resolved, specific modeling use and scenario analysis, etc. This task covers effort associated with the internal quality control and technical review process, administering the contract, requests for payment, and financial monitoring. Internal checking or peer review of all deliverables will also be performed. The Engineer will manage the scope, schedule, and budget and coordinate communication with GWA.

GWA will coordinate task order activities with the Engineer, process payment invoices and change order requests, and define specific support needed from the wastewater hydraulic models and work with the Engineer to complete the assistance requested.

Task 2: Software Support – Per Scope of Work 1 & 2

Task 3: Gather, review and field verify existing data - Per Scope of Work 1 & 2

Task 4: Model Calibration - Per Scope of Work 1 & 2

Task 5: Update and Maintain Models

The Engineer will update and maintain GWA's water and wastewater models. This will include:

- Update model flows and demands from New Area Development

Task 6: Model Scenario Analysis

The Engineer will analyze specific scenarios requested by GWA using the water and wastewater models. This task will be an on-call task to respond to requests from GWA as needed. Scenarios to be analyzed may include New Area Developments or areas of concern. The analysis may include the following:

- Water system - Analyze average and maximum flows, emergency and outage flows, fire flows, line sizing/capacity, system pressures, and any other required parameters.
- Wastewater system - Analyze dry and wet weather peak flows, pipe capacity, lift station capacity, and any other required parameters.

Analyses will be performed using the latest Water Resource Master Plan (WRMP) criteria. The Engineer will analyze the water and wastewater models and provide a summary of the analysis and the impacts to the GWA system, in an email, in a technical memo, or in a meeting, depending on the deliverable required by GWA.

GWA will provide required data for the analyses including information on the new developments or areas to be analyzed, including average and peak demands/inflow to the system, connection points, project timing, etc.

Deliverables: Provide and communicate model analysis and scenario results.

Task 7: Water Valve Inventory - Not Applicable

Task 8: Model Training - Per Scope of Work 1 & 2

Task 9: Provide Equipment - Per Scope of Work 1 & 2

SCOPE OF WORK 4 – GIS

Task 1. Task Management

The GIS Specialist will manage the scope, schedule, and budget associated with the work described in this Task Order to ensure that this work is managed in a manner that meets contract requirements. This includes, but is not limited to, subcontractor management (if needed), management of documents, changes and risks, and quality assurance and control. This task will include progress conference calls or status updates as needed by the GIS Specialist and GWA, or meetings, consultations, and discussions between GIS Specialist and GWA personnel to review project progress, issues to be resolved, specific modeling use and scenario analysis, etc. This task covers effort associated with the internal quality control and technical review process, administering the contract, requests for payment, and financial monitoring. Internal checking or peer review of all deliverables will also be performed. The GIS Specialist will manage the scope, schedule, and budget and coordinate communication with GWA.

GWA will coordinate task order activities with the GIS Specialist, process payment invoices and change order requests, and define specific support needed from the water and sewer hydraulic models and work with the Engineer to complete the assistance requested.

Task 2: Software Support

Along with the Model software, the GIS Specialist will use ArcMap Pro v3.04 (from ESRI, the level of the software must be of the *Advanced* level.) which is compatible with the modelling software.

GWA will provide the Water and Wastewater geodatabases. All updates to GWA's geodatabases will be performed in GWA's Engineering Division.

Task 3: Gather, review and field verify existing data

This task will include reviewing and identifying data that needs to be updated in the water and wastewater models. This will include GIS data as described below. The data to be updated will be identified and updated in the model during the model calibration and model maintenance tasks.

GIS Model. The GIS Specialist will review GWA's water and wastewater GIS piping and identify data gaps. The review will include discussions with GWA engineering and operations staff to discuss existing pipes and piping projects that are not in the GIS (including old and new projects). Piping projects that have been added to the model that are not in the GIS will also be identified. Data gaps will be identified such as missing pipe diameters, materials, inverts, installation dates, etc. All map names will be inserted in the a "MERGE_SRC" column. The GIS Specialist will help GWA GIS staff in updating the GIS using data collected from the reviews, record drawings and field verification. The Engineer will also assist GWA GIS staff in identifying and cleaning up GIS issues that affect its use for updating the model such as snapping pipes (fixing gaps between the ends of pipes). The Engineer will then compare the GIS piping to the water and wastewater models to identify piping that needs to be updated in the models. Because piping projects continuously need to be added to the GIS, the GIS Specialist's will be limited to the budgeted effort (hours).

GIS Specialist responsibilities consist of collecting, reviewing and field verifying data and identify data gaps. If no map exist a crew must go out and survey the gap area. All GWA utilities must be located, I.E.

hydrants, water and sewer manholes, valves, etc. All GWA utilities must be located within a one-foot accuracy. All coordinate data will be in the Guam Geodetic Network of 1993 (GGN1993) in feet.

GWA will provide piping and facility information.

Deliverables: Updated GIS and list of facilities to be updated in the model.

- a. A digital copy of the GIS with the gaps filled in.
 - i. On a thumb drive.
- b. A Word document detailing what maps were inserted.
- c. The complete digital inventory of all maps used
- d. Ensure the meta data information is imbedded into the features.

Task 4: Model Calibration - Not Applicable

Task 5: Update and Maintain Models – Not Applicable

~~The GIS Specialist will update and maintain GWA's water and wastewater models. This will include:~~

- ~~• Update model piping from GIS data updated in the data review task~~

~~GIS Specialist will update models and maintain model change log. The models will be updated every other year throughout this contract. A spreadsheet will be used to track changes as new versions of the models are saved.~~

~~GWA will provide data needed for the model updates.~~

Deliverables: ~~Updated GIS models, to include and be consistent with tasks 2 and 3 above.~~

Task 6: Model Scenario Analysis – Not Applicable

Task 7: Water Valve Inventory – ~~The GIS Specialist will incorporate the water valve inventory in the latest water hydraulic model described in scope of work Task 7.~~

Task 8: Model Training - Not Applicable

Task 9: Provide GIS Specialist: GIS Specialist to perform all GIS Modeling in full at the GWA office. A desk, dedicated computer, and the software ArcMap Pro will be available.

DCA will allow 24 hours a month for this task.

For a period of 5 years