



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

RESOLUTION NO. 47-FY2017

RELATIVE TO APPROVAL OF CONTRACT FOR DESIGN SERVICES FOR THE UPGRADE OF THE NORTHERN DISTRICT WASTEWATER TREATMENT PLANT TO SECONDARY TREATMENT, GWA PROJECT NO. S17-003-OEA (OEA GRANT OCO N676-16-02)

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, the U.S. Department of Defense, Office of Economic Adjustment awarded to GWA a General Assistance Grant for community investment August 26, 2016 with subsequent additional grants forthcoming; and

WHEREAS, the General Assistance Grant is to be used for water and wastewater improvements in support of the relocation of U.S. Marines and their dependents to Guam; and

WHEREAS, the report “Final Guam Water and Wastewater Assessment Report in Support of the Economic Adjustment Committee Implementation Plan,” (NAVFAC, Department of the Navy, February 2015) has recommended the design and construction of NDWWTP treatment upgrades to comply with current National Pollutant Discharge Elimination System permit and mitigate impacts to wastewater utilities, nearshore waters, and marine biological resources; and

//

1 **WHEREAS**, GWA has advertised the Request-For-Proposals RFP-08-ENG-2017 dated
2 April 21, 2017, soliciting statement of qualifications from experienced and qualified engineering
3 firms to provide design engineering services for the UPGRADE OF THE NORTHERN
4 DISTRICT WASTEWATER TREATMENT PLANT TO SECONDARY TREATMENT; and

5
6 **WHEREAS**, RFP packages were downloaded by thirty-five (35) interested parties and of
7 those, five (5) firms picked up the appropriate documents on compact disk (CD), from which
8 GWA received proposal submittals from four (4) Design Engineering firms of the thirty-five (35)
9 interested parties before the RFP submittal deadline; and

10
11 **WHEREAS**, the GWA A-E Selection Committee reviewed and evaluated all four (4)
12 proposals (SEE EXHIBIT A-Evaluation Score) and generated a short list of the top three (3)
13 firms, and conducted interviews with the top three (3) Design Engineering firms; and

14
15 **WHEREAS**, subsequent to the interviews the GWA A-E Selection Committee updated
16 the ranking list of the most qualified firm (SEE EXHIBIT B – Evaluation Score) which indicated
17 the design team led by DUENAS CAMACHO & ASSOCIATES (“DCA”) as being the highest
18 ranked firm; and

19
20 **WHEREAS**, the GWA A-E Selection Committee submitted, through GWA’s
21 engineering division for the General Manager’s (GM) Determination of selection, the ranking of
22 the firms evaluated from which GWA can begin scope and fee negotiations with the selected
23 firm or any successor at interest thereto (SEE EXHIBIT C- GM Determination); and

24
25 **WHEREAS**, GWA’s Project Management/Construction Management (PM/CM) team
26 has negotiated the Scope of Work (SEE EXHIBIT D - Scope of Work) which includes
27 engineering design, permitting, and engineering services during construction, and which is being
28 used as a base for the fee negotiations for the design services plus a contingency which GWA
29 engineering estimates to be within the estimated range of Nine Million Dollars (\$9,000,000.00);
30 and

31 //

1 **WHEREAS**, The on-going procurement for design services is necessary and is also
2 predicated on an internal GWA milestone deadline to issue the Notice to Proceed to the design
3 firm by the end of July 2017 to meet timelines established in the Office of Economic Adjustment
4 grant requirements and coordinated with the Guam Water and Wastewater Intergovernmental
5 Support Team (GWWIST), and to do so GWA management seeks the support of the CCU to
6 approve the intent of the design project and the estimated high end of the design range cost plus
7 a contingency fee that will not exceed the amount of Nine Million Dollars (\$9,000,000.00).

8
9 **WHEREAS**, GWA management will provide an update via the GM's Report the results
10 of the procurement process relative to this resolution which will include the name of the design
11 firm selected and the negotiated design fees; and

12
13 **WHEREAS**, the source of funding for the engineering services will be from the OEA
14 General Assistance Grant OCO N676-16-02;

15
16 **NOW BE IT THEREFORE RESOLVED**, the Consolidated Commission on Utilities
17 does hereby approve the following:

- 18 1. The recitals set forth above hereby constitute the findings of the CCU.
- 19 2. The CCU finds that the terms of the Scope of Work as described in EXHIBIT
20 C are acceptable.
- 21 3. The CCU hereby approves the intent of the design project and authorizes the
22 management of GWA to enter into a contract for design services with the
23 most qualified design engineering firm for design services plus a contingency
24 which GWA engineering estimates to be within the estimated budget of Nine
25 Million Dollars (\$9,000,000.00) and subject only to final negotiations on
26 remaining terms and conditions not already agreed upon which are acceptable
27 to GWA.
- 28 4. The source of funding for the engineering services will be from the OEA
29 General Assistance Grant OCO N676-16-02.

30 //

31 //

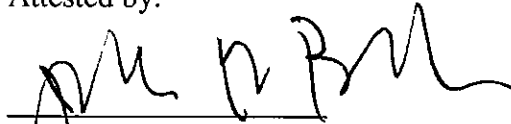
1 **RESOLVED**, that the Chairman certified and the Board Secretary attests to the adoption
2 of this Resolution.

3
4 **DULY AND REGULARLY ADOPTED**, this 25th day of July 2017.

5
6 Certified by:

Attested by:

7
8 

9 

10 **JOSEPH T. DUENAS**
Chairperson

J. GEORGE BAMBA
Secretary

11
12 I, J. George Bamba, Board Secretary of the Consolidated Commission on Utilities as
13 evidenced by my signature above do hereby certify as follows:

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

18	AYES:	<u> 5 </u>
19	NAYS:	<u> 0 </u>
20	ABSTENTIONS:	<u> 0 </u>
21	ABSENT:	<u> 0 </u>

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GUAM WATERWORKS AUTHORITY

Gloria B. Nelson Public Service Building • 688 Route 15 • Mangilao, Guam 96913

June 6, 2017

To: Thomas F. Cruz, P.E., Chief Engineer

From: Gloria P. Bensaon 
Chairperson, Consultant Selection Board

Project: RFP-08-ENG-2017
Design Services for the Upgrade of the Northern District Wastewater Treatment Plant (NDWWTP)
GWA Project No. S17-003-OEA

The following information is intended to document the evaluation process undertaken for the referenced solicitation. The top three (3) firms short listed by the committee for interviews are ranked 1-3 below.

EVALUATION COMMITTEE MEMBERS	
Name	Title
John Davis, P.E.	CIP Wastewater Engineer Supervisor
Evangeline Lujan	Senior Regulatory Analyst
Prudencio Aguon	Grants Administrator
David Fletcher	Operations and Maintenance Manager

Consultant	Evaluation Score				Total	Rank
1. EMPSCO Engineering Consultants	70	52	50	62	234	4
2. Duenas, Camacho and Associates	100	96	100	99	395	1
3. Kennedy/Jencks Consultants	90	82	93	96	361	3
4. AECOM	90	88	88	96	362	2

Scores were evaluated based on sum of the individual scores. The recommendation of the evaluation committee is shown in the ranking above.

Please review and approve at your earliest convenience so that we may proceed with the notification letters.

Exhibit B (1 of 1)



GUAM WATERWORKS AUTHORITY

Gloria B. Nelson Public Service Building • 688 Route 15 • Mangilao, Guam 96913

June 26, 2017

To: Thomas F. Cruz, P.E. Chief Engineer

From: Gloria P. Bensan 
Chairperson, Consultant Selection Board

Subject: RFP-08-ENG-2017
Design Services for the Upgrade of Northern District Wastewater Treatment Plant
GWA Project No. S17-003-OEA

The following information is intended to document the post evaluation scoring process undertaken for the referenced project.

EVALUATION COMMITTEE MEMBERS	
Name	Title
John Davis, P.E.	Engineer Supervisor – CIP Wastewater
Mauryn McDonald, P.E.	Engineer Supervisor – Permits and Inspection
Evangeline Lujan	Senior Regulatory Analyst
Prudencio Aguon	Grants Administrator
David Fletcher	Operations and Maintenance Manager

POST PRESENTATION GROSS SCORE SUMMARY(2 nd Evaluation)							
Consultant	Evaluation Score					Total	Rank
1. Duenas, Camacho & Associates	100	91	96	100	99	486	1
2. AECOM	95	85	88	90	98	456	3
3. Kennedy/Jenks Consultants	95	86	90	96	97	464	2


GUAM WATERWORKS AUTHORITY

"Better Water. Better Lives."

Gloria B. Nelson Public Service Building
688 Route 15, Mangilao, Guam 96913

MEMORANDUM

To: Miguel C. Bordallo, General Manager

From: Thomas F. Cruz, P.E., Chief Engineer 

Subject: RFP-08-ENG-2017
Design Services for the Upgrade of Northern District Wastewater Treatment Plant
GWA Project No. S17-003-OEA

Date: June 26, 2017

The Selection Committee has completed all necessary actions for selecting the most qualified consultant for the referenced solicitation. All proposals were reviewed and scored according to the conditions established in the solicitation. The evaluation summary sheet is attached for your information.

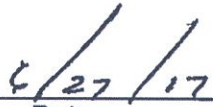
After the firm presentation and interview, the committee recommends the final ranking of three (3) shortlisted firms in order of preference for the project:

1. Duenas, Camacho & Associates
2. Kennedy/Jenks Consultants
3. AECOM

Concurred:



 VINCENT E. GUERRERO
 Supply Management Administrator



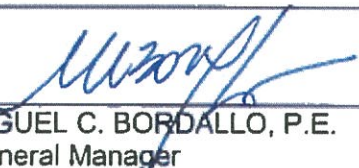
 Date

GENERAL MANAGER'S DETERMINATION

Consultant Firm Selected:

Duenas, Camacho & Assoc.

Remarks:



 MIGUEL C. BORDALLO, P.E.
 General Manager

6.28.17

 Date



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Website: www.dca Guam.com
Email: dca@dca Guam.com

July 14, 2017

Miguel C. Bordallo, P.E.
General Manager, Guam Waterworks Authority
Gloria B. Nelson Public Service Building
688 Route 15
Mangilao, Guam 96913

Via: **Mr. Thomas F. Cruz, P.E., Chief Engineer**

Subject: **GWA RFP-08-ENG-2017, Upgrade of the Northern District Wastewater Treatment Plant (NDWWTP), GWA Project No. S17-003OEA (OEA Grant OCON676-16-02)**

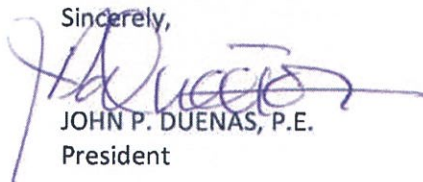
Re: Draft Scope of Work

Hafa Adai Mr. Bordallo:

Duenas, Camacho & Associates, Inc. (DCA) in association with Gresham, Smith & Partners (GS&P), CH2M, EMCe, TRMA and Geo-Engineering & Testing, Inc. is pleased to submit the enclosed Draft Scope of Work for engineering services on the subject project in .pdf and Word formats.

The Draft Scope incorporates the results of our scoping meeting held at GWA on July 12th as well as changes and additions provided by our Team and by the Program Manager to date. We look forward to incorporating any additional changes or additions GWA wishes to make to finalize the scope document.

Sincerely,



JOHN P. DUENAS, P.E.
President

Enclosures

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July 14, 2017

**GUAM WATERWORKS AUTHORITY
UPGRADE OF THE NORTHERN DISTRICT WASTEWATER TREATMENT PLANT
TO SECONDARY TREATMENT
GWA PROJECT S17-003-OEA (OEA GRANT OCON676-16-02)**

SCOPE OF WORK

1.0 BACKGROUND

The Northern District Wastewater Treatment Plant (NDWWTP) is located in Dededo on the northwestern coast of Guam, just inland of the Tranguisson beach area, and north of the Two Lovers Point landmark. The NDWWTP was built on a limestone plateau 300 feet above the Philippine Sea by the US Navy and was commissioned in 1979. The facility collects and treats wastewater from the regions of Dededo, Latte Heights, Perez Acres, Ypaopao, Marianas Terrace, the Yigo Collector System, and other unincorporated subdivisions throughout the Yigo and Dededo Municipalities. The service area includes U.S. military facilities, including Air Force and Navy facilities within the areas of Dededo, Harmon Annex, and Andersen Air Force Base. The NDWWTP currently provides chemically enhanced primary treatment (CEPT) for a population of approximately 76,000 people. The original design average flow rate of the primary treatment plant was 12.0 million gallons per day (MGD), representing 46 percent of the island's wastewater flow. However, a 2011 Court Order and current 2013 NPDES permit have established new effluent limits and discharge requirements. Current average daily flow to the plant is approximately 6 mgd.

Future flows are expected to increase primarily based on military buildup, however, the increase also includes tourism impacts and onsite wastewater system conversions. The relocation of the U.S. Marine Corps to Guam from Okinawa anticipates an increase in Guam's population to include an additional 5,000 Marines and 1,300 dependents. Guam's population is also expected to increase as a result of construction activity related to the military buildup and civilian jobs created by buildup activities. Table 1 shows the flow projection summary from the NDWWTP Facility plan as well as the target flows required for the design of the upgraded treatment Plant.

TABLE 1 – NDWWTP FLOW PROJECTIONS

Year	Average Flow (mgd)	Peak Month Flow (mgd)	Peak Day Flow (mgd)	Peak Hour Flow (mgd)
2016	6.0	6.5	16.6	20.2
2025	7.8	8.6	21.9	26.6
2035	8.1	8.9	22.7	27.5
2050	8.5	9.4	23.8	28.9
2065	9.0	9.8	25.1	30.4
Design Flows	9.0	Future Expansion = 12 mgd		

The plant design flows for current and future needs will be used as the basis of design. The design flow for the upgraded plant including secondary treatment facilities will be 9 mgd, with provisions to facilitate future expansion to 12 mgd. Supervisory control and data acquisition (SCADA) systems of the existing and the newly designed facilities will be integrated for efficient and reliable centralized operation. Process systems will share flow and effluent data for more cost-effective treatment.

The new plant will be referred to as the Northern District Wastewater Treatment Plant. Effluent concentration requirements will be as described in Table 2.

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TABLE 2 – NDWWTP EFFLUENT LIMITS

Parameter	Maximum Allowable Discharge Limits			
	Concentration and Loading			
	Average Monthly	Average Weekly	Maximum Daily	Units
Flow Rate	12	(a)	(a)	mgd
Biochemical Oxygen Demand (5-day)	30	45	-	mg/L
	3002	6760	-	lbs/day
	The average monthly percent removal shall not be less than 85 percent. ^(b)			%
Total Suspended Solids	30	45	-	mg/L
	3002	6760	-	lbs/day
	The average monthly percent removal shall not be less than 85 percent. ^(b)			%
pH (hydrogen ion)	Within 6.5 and 8.5 at all times			pH units
Settleable solids	1	-	2	mL/L
Oil and grease, total recoverable	10	-	15	mg/L
<i>Enterococcus</i> ^(c)	35 ^(c)	-	104	CFU/100mL
Chlorine, total residual (TRC)	1.5	-	2.46	mg/L
Temperature	(a)	-	(a)	°C
Ammonia	(a)	-	(a)	mg/L
Chronic toxicity	(a)	-	(a)	Pass/Fail
Priority pollutant scan	(a)	-	(a)	-

(a) No effluent limits are set at this time, but monitoring and reporting is required

(b) Both the influent and the effluent shall be monitored for Biochemical Oxygen Demand (BOD) and Total Suspended Solids. The arithmetic mean of the concentrations of effluent samples collected in a calendar month shall not exceed 15 percent of the arithmetic mean of the influent samples collected in the same calendar month (e.g. must achieve 85% removal rates).

(c) Average monthly *Enterococcus* effluent monitoring shall be reported as a 30-day geometric mean. Maximum daily *Enterococcus* effluent monitoring shall be reported as the highest instantaneous maximum (the maximum of any single sample shall not exceed 104 CFU/100mL.)

GWA has retained a Program Manager, Brown and Caldwell, to assist with the administration of the GWA's Capital Improvement Program. The Engineer will work under the direction of the Program Manager.

The design and permitting portion of the contract shall be executed as a lump sum task with contract payments made according to a payment schedule approved by GWA. Post design services shall be executed as time and materials tasks with the payments not to exceed the negotiated amounts indicated in the contract.

2.0 Engineer Services

2.1 Treatment Plant Components

The components and processes for the new treatment plant include, but are not necessarily limited to the following:

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1. Upstream flow equalization and/or off-spec wastewater storage at or in close proximity of the new treatment plant site.
2. Interconnecting piping at the new treatment plant site with the existing Southern Link Pump station.
3. Preliminary treatment with mechanical screening, grit removal, flow measurement, odor control and sampling.
4. Primary treatment with clarifiers (chemical enhanced treatment may be considered). Primary clarifiers may be eliminated from the liquid stream treatment train after evaluation of the results of the wastewater characterization study. If the wastewater characterization study confirms that the influent wastewater is weak and less than approximately 200 mg/L TSS and BOD₅, then the influent wastewater would best be treated directly with bioreactors without primary clarifiers.
5. Primary sludge pumping (if needed)
6. Secondary treatment using the approved treatment system
7. Secondary clarification
8. Secondary sludge pumping, holding and dewatering
9. Disinfection with UV radiation
10. Effluent flow measurement and sampling
11. Water supply piping, booster pumping (if necessary) and controls to accommodate plant water and fire flow needs.
12. Yard piping, including liquid, sludge and drainage piping, and electrical distribution, and controls duct banks
13. Instrumentation, control, SCADA and network system to include panels for the automation devices and for redundant operation of the individual process systems. Centralized SCADA system to be located at the main operation building with optional remote (backup system) at locations selected by GWA.
14. Site work, including but not necessarily limited to drainage control, grading, roads, landscaping and fencing
15. Class "B" biosolids stabilization with aerobic or anaerobic digestion, or Class "A" biosolids stabilization with autothermal thermophilic aerobic digestion (ATAD)
16. Sludge thickening, dewatering and truck loading
17. Administration building with laboratory
18. Standby power
19. Plant system controls for individual treatment components or systems including standalone PLCs and a centralized SCADA system for overall monitoring and control.
20. New power services design will be provided for with provisions for upgrade.
21. Septage receiving and handling provisions
22. Re-purposing and re-use of existing facilities as practicable to create improved new plant operation and efficient and optimal influent and effluent.

2.2 Project Management Services

The Engineer shall provide project management and design services including design criteria confirmation, preliminary engineering, final design, and engineering services during bidding and construction. The Engineer shall provide services for civil, process, structural, architectural, electrical, instrumentation and mechanical engineering for wastewater treatment plant design as defined by the following tasks.

2.2.1 General Project Management

- a. *Quality Assurance and Quality Control (QA/QC) Plan.* The Engineer shall develop and implement a QA/QC Plan to check, as a minimum, planning methods, design methods, calculations, cost estimates, field investigations, measurements, drawings, specifications, bid documents and

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addenda, Operation and Maintenance Manuals and other technical issues associated with project planning and design.

- b. Project Milestones and Schedule.* The Engineer shall submit for approval a Primavera P6 Professional version R8.3.12 or equivalent schedule that meets required milestones. The schedule shall be consistent with the Program and construction schedules and shall include GWA's requirements and constraints, right of entry, land acquisition and permit approvals. The Engineer shall consider approaches to reduce the schedule for the design phase to provide additional float for the construction phase and develop more efficient design processes, such as smaller review packages and meetings to facilitate reviews, or more concurrent predesign and design activities. Unless changes are approved by GWA, the Engineer shall adhere to the approved project schedule. Changes that do not affect the milestones shall be updated on the schedule through all phases of the project, including monthly meetings, dates for completion of engineering design studies, and dates for review periods. A complete schedule shall be submitted to the Program Manager within 7 calendar days of any deviation from a prior approved schedule, unless otherwise agreed upon. Project milestones shall be recommended by the Engineer and subsequently approved and established by GWA. Engineer must adhere to approved milestones. The project milestones and schedule shall be submitted prior to the kick off meeting.
- c. Risk Evaluation.* The Engineer shall develop and maintain a Risk Register compatible with the Program Risk Register that identifies potential risks, issues and challenges for all aspects of the project (through design, construction, final completion and acceptance) including mitigation strategies. The register shall be updated on a regular basis, follow mitigation measures and augmented as necessary.
- d. Progress Reports.* The Engineer shall submit monthly progress/status reports to support monthly billings. Status reports shall include a project status narrative, updated project schedule, actual and projected spending curves, earned value reporting, details of issues, details of deviations and changes and projection milestone risks.
- e. Facility Design Communication and Documentation Through Technical Memoranda (TMs).* The Engineer shall during the design of project improvements communicate to the Program Manager and GWA facility design issues, approaches, directions, considerations and decisions etc. through Technical Memoranda (TMs). TMs are not intended to supplant or obviate the preparation and submittal of the Design Development Report and Design Calculations that are integral components of design submittal packages.
- f. Meetings and Coordination.* The Engineer shall arrange and conduct regularly scheduled meetings as well as meetings requested by the Program Manager and coordinate with entities within and, as appropriate, outside the NDWWTP Team. In addition, the Engineer shall identify and facilitate milestone meetings and workshops. Prepare meeting agendas and meeting minutes.
- g. Public Meetings.* The Engineer shall provide technical support in public outreach meetings if required, conducted by GWA, regarding the siting of the NDWWTP Upgrades. As part of the scope of work, the Engineer shall provide conceptual architectural renderings and site layout(s) in a format suitable for the public meetings.

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- h. Construction Cost Estimates:* The Engineer shall prepare an opinion of probable construction cost for the project including engineering, administration and construction management costs as an integral part of the 30%, 60% and 90% design submittals. Include contingencies as appropriate in accordance with guidance from the Association for the Advancement of Cost Engineering (ACE) criteria. The Engineer shall immediately notify GWA when design decision(s) causes a significant cost increase to the project.
- i. Deliverables.* Provide deliverables in accord with GWA guidelines and section 2.3 below.
- j. Document Management.* The Engineer shall utilize GWA's assigned web-based site [Bentley's ProjectWise Construction Management (EADOC) to maintain communication related to all submittals.

2.2.2 Project Management Plan

The Engineer will prepare a Project Management Plan in accordance with the GWA Program Management Manual. This plan will cover such items as:

- Project description
- Scope of Work
- Work Plan
- Project Milestones and Schedule
- Progress Reporting and Program Evaluation
- Quality Control Plan
- Communications Plan
- Documentation Plan
- File Storage and Access plan
- Scope Changes and Changes to Management Plan
- Sub-Engineers and Sub-Engineer Responsibilities
- Cost Estimates and Opinions of Probable Construction Costs
- Health and Safety Plan

The Engineer will submit a draft Program Management Plan for GWA review and prior to the Kick Off meeting. The Engineer shall update the plan as may be requested by the Program Manager.

2.2.3 Kick Off Meeting

A project kick off meeting shall be conducted by the Engineer within three weeks after NTP. This kick off meeting shall be arranged to include attendance by the Program Manager and appropriate GWA personnel. This meeting will take place on Guam and will cover items such as:

- Communication Logistics
- Project Management Plan
- Quality Assurance and Quality Control Plan
- Project Schedule and Milestones
- Deliverables
- Project Hardships, Risks, Issues and Concerns
- Geotechnical and Survey Needs
- SCADA Systems Integration Needs

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- Future Meeting Logistics

2.3 Permitting

The Engineer shall identify all permit requirements from local authorities, the Department of Public Works and Utility Agencies, including but not limited to the following:

2.3.1 Permit Review

Upon contract execution, the Engineer shall conduct a local and federal permit review for the project that shall include coordination and meetings as necessary with local and federal regulators such as:

- Guam EPA
- USEPA Region 9
- US Army Corps of Engineers (USACOE)
- Local and Federal Fish and Wildlife Agencies
- Department of Public Works, Government of Guam
- Guam State Historic Preservation Office (SHPO)

Identification of required permits shall be submitted with the Draft Design Development Report, at minimum.

2.3.2 Environmental Information Document (EID)

Environmental Site Assessment for the proposed treatment plant upgrades and expansion is currently underway by another agency/firm. The Engineer shall provide basic project information including a detailed description of the proposed project for use by others in the preparation of the Environmental Information Document (EID). The Engineer will submit project information needed for preparation of the EID to the Program Manager who will be the interface for coordination of project information.

2.3.3 Area of Potential Effect (APE)

Establishing the Area of Potential Effect will be the responsibility of the agency/firm providing the environmental services described above. The Engineer will shall provide the necessary site information necessary for the environmental agency/firm to establish the APE. The Program Manager will relate to the Engineer in a timely manner environmental impact mitigation measures that must be incorporated into the project construction documents.

2.3.4 Cultural Resources and Historical Designation Applicability

Cultural, archaeological and historical resources surveys and investigations will be the responsibility of others. The Program Manager will relate to the Engineer in a timely manner cultural, archaeological and/or historical resources impact mitigation measures that must be incorporated into the project construction documents.

2.3.5 Department of Public Works (DPW) Permits

The Engineer shall prepare and complete a draft Building Permit Application for each design package during the pre-final design phase of the work and submit to GWA for review. Upon addressing GWA's comments, include the draft application in the Pre-Final Design Submittal package. The building permit shall be completed and available to the Contractors from DPW at the time of construction bidding. The Engineer shall submit the permit application to DPW and address resulting technical questions through building permit approval. Final fees to retrieve the DPW permits are to be paid by the Construction Contractor.

2.3.6 Clearing and Grading Permit

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The Engineer shall prepare a draft Clearing and Grading Permit application for the site preparation design package, including the Storm Water Pollution Prevention Plan and NPDES Notice of Intent. Permit application shall be submitted to GWA for review and comment. Upon addressing comments, the permit application shall be completed and available to the Contractors at the time of construction bidding. Final Fees to retrieve the Clearing and Grading Permits shall be paid by the Construction Contractor. The Engineer shall submit the permit application to DPW and address resulting technical questions through permit approval. Note the potential existence of unexploded ordnance, references the Final Remedial Investigation for Harmon Annex Operable Unit, Andersen Air Force Base Guam, January 2000 provided in Exhibit K identified in Section 5.0 Policy Guide and Reference Materials.

2.4 Pre-Design

2.4.1 Design Documentation: The Engineer shall complete Technical Memoranda (TMs) to precede and include in the Design Development Report (DDR). The TMs shall include, but not be limited to the following:

- Provide a summary of Northern District System history, status, issues and needs based on available reports, analyses and interviews.
- Provide a thorough identification and evaluation of all existing infrastructure including conveyance, liquid stream treatment, sludge stabilization, dewatering and handling appurtenances and reuse/disposal.
- Consider modification, reuse and repurposing of existing facilities.
- Expansion considerations in all aspects of design including but not limited to hydraulic profile, dynamic process model, site layout, electrical and SCADA expansion, and future effluent limits and flows.
- Process Alternative Analysis
- Site Plan and Layout

The Engineer shall document findings and recommendations in separate technical memoranda to be submitted as completed, unless otherwise agreed upon with the Program Manager. Final TMs, as completed, shall be incorporated into each submission of the Design Development Report (DDR).

2.4.2 Document Review

Immediately after NTP, the Engineer will make a formal data request to GWA for any and all documentation relating to the existing NDWWTP, past and current studies of the service areas and future service areas, and permit documents/requirements. Concurrently with the data request, the Engineer shall conduct a series of site visits to the existing NDWWTP and properties identified by GWA for treatment plant expansion. Initial interviews with plant operators, engineering and Program Manager will be conducted as part of this task. Current SCADA system architecture, process controllers, and network devices will be assessed during this phase to make sure that the existing and newly designed systems integrate seamlessly and securely.

2.4.3 Topographic and Property Surveying and Mapping

The Engineer is performing boundary and topographic surveying and mapping of the existing treatment plant site and other properties identified by GWA as part of the treatment plant upgrades and expansion of improvements under a separate contract. The Engineer shall provide under this contract surveying and mapping of the Southern Link Pump Station area and easement corridor(s) to support the design of pump station and transmission line improvements interconnecting the pump station with treatment plant improvements.

2.4.4 Site Investigation.

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The Engineer shall conduct detailed engineering investigations of the existing site and facilities as well as other properties/areas identified for treatment plant upgrades, expansion and supporting facilities. To this extent, facilities identified for re-use or to be re-purposed must be cleared and/or impediments removed and/or demolished such as to allow proper investigation of the facilities to support design of improvements. The Engineer shall provide design services necessary for demolition and removal of existing digester roofing and sludge removal. The Engineer will prepare a bid and construction package for early procurement to address this impediment clearing/demolition/removal work for early procurement.

2.4.5 Process Alternative Analysis

The NDWWTP Facility Plan incorporated under this scope as an essential reference document, identifies several potential liquid stream treatment processes as well as a recommended treatment process. The Engineer shall perform a detailed evaluation of the leading two (2) candidate liquid stream treatment processes from the Facility Plan, in addition to at least one other potential alternative of their choice for a minimum of three (3). The Study should establish and evaluate complete process trains (liquid and sludge) that will achieve the treatment requirements.

To perform this task, available wastewater data will be provided; however, there is insufficient wastewater characterization data to adequately develop the process model and solids balance. The Engineer shall plan, perform and evaluate additional wastewater characterization as noted in below to support the dynamic process modeling effort. The Engineer will conduct progress meetings to update GWA and the Program Manager of findings during this effort. A draft TM shall be developed and submitted for review prior to a final meeting for the review of findings and presentation of recommendations to GWA. A final TM, including GWA's decision on the selection of the liquid and sludge stream treatment processes from these efforts shall be provided for review, as well as incorporated into the Design Development Report.

Several potential sludge stabilization, dewatering, and handling facilities alternatives sized for current and future estimated sludge production shall be evaluated. The Engineer shall evaluate reuse of the existing anaerobic digestion tanks, the associated anaerobic digestion pump station, primary clarifiers and other existing facilities for the implementation of the stabilization facilities. The following sludge handling alternatives will be evaluated by the Engineer:

- Stabilization (maximum of four options)
 - Aerobic sludge storage (non-Class B stabilization) for landfill disposal
 - Aerobic digestion (Class B stabilization) for landfill disposal
 - Anaerobic Digestion (Class B stabilization) for landfill disposal (only applicable if primary clarifiers are retained for use in liquid stream treatment)
 - Autothermal Thermophilic Aerobic Digestion (Class A stabilization) for reuse on parks, golf courses and for landscaping
- Thickening (maximum of four options)
 - Mechanical Thickening
 - Gravity Belt Thickeners
 - Rotary Drum Thickeners
 - Centrifuges
 - Decanting
- Dewatering (maximum of three options)
 - Centrifuges
 - Use of existing units with addition of new units
 - Moving existing units to the Agat Santa Rita WWTP and purchase and installation of new centrifuges at the NDWWTP

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- Screw presses
- Thickening and dewatering building with truck loading facilities (maximize of two options)
 - Use existing dewatering building (expansion may be required) with new thickening building
 - Provide new combined thickening and dewatering building
- 1. Alternative technologies shall evaluate wastewater and sludge treatment, including sludge digestion. The Engineer shall provide a description of each alternative technology identifying all applicable treatment components.
- 2. Prepare conceptual plant configurations that evaluate hydraulics and civil engineering issues. Using existing survey data and known elevations for structural components, prepare a plan view of process configurations on the site. The Engineer shall provide rendering level drawings of the configuration of the selected alternative.
- 3. The TM shall include a description of alternatives presented, an analysis of the advantages and disadvantages of each treatment option, including a narrative assessment of steps to be taken for implementation, operational complexity and reliability, environmental, construction and equipment constraints, and a breakdown of the estimated costs, including but not limited to:
 - Capital Costs
 - Equipment and structures
 - Design and engineering
 - Overall Construction
 - Operations and Maintenance Costs
 - Personnel (including operator grade levels required)
 - Chemicals
 - Energy
 - Maintenance
 - Sludge hauling and reuse/disposal
 - Monitoring
 - Laboratory Needs
 - Life Cycle Costs, including comparison of the cost of replacing components now, versus the cost of replacing after the remaining life is expended.
 - For those alternatives that consider the continued utilization of the facility's existing structures, compute a probable cost for replacement or rehabilitation of those mechanical components at or near the end of their life cycle. These components shall be determined in agreement with the Program Manager after recommendations based upon the on-site evaluation.
- 4. Provide references for unit cost estimates and plant service life for major equipment for each process. Wherever process, provide actual bid cost current costing data.
- 5. Wastewater characterization study as described below.
- 6. Dynamic modeling as discussed below.
- 7. Discuss any specialized training, chemical amendments or equipment, including all proprietary issues that will be required by any of the evaluated equipment or processes.
- 8. Discuss potential risk of contamination or collateral non-compliance attributable to use of existing or new equipment or processes as it applies to groundwater, soils, and air quality and nuisance generation.
- 9. Conduct a fatal flaw analysis for each process treatment technology.

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10. Assess permit attainment goals.

2.4.5.1 Wastewater Characterization Study: The Engineer shall collect and analyze plant-operating data. A comprehensive wastewater-sampling program shall be undertaken in which necessary constituents including, but not limited to COD, TKN and total phosphorus (TP) portioning, are examined for influent and effluent streams.

1. The Engineer shall review and consolidate existing wastewater characterization data, and shall obtain any additional data as necessary for evaluation and completion of the wastewater characterization study. The Engineer shall submit a plan for conducting the waste characterization study as a TM for review by GWA and the Program Manager. The study, including results and recommendations, shall subsequently be presented in a TM.
2. The TM shall clearly quantify all variables, including the process, hydraulic and wastewater characteristic parameters and all external conditions that will be used in subsequent modeling tasks. Process parameters to be considered include but are not limited to: aeration, internal recycle/returns and mixing. Wastewater characteristic parameters shall include but are not limited to: soluble and total BOD₅; total, soluble, flocculated filtered, unbiodegradable, and particulate biodegradable COD fractions; ammonia; total Kjeldahl nitrogen (TKN); total phosphorus; orthophosphate; chlorides; suspended solids; grit and flows. External conditions include: temperature (water and air), barometric pressures, wind and solar radiation. The Engineer shall quantify the expected range of variation for all parameters and conditions.
3. The Facility Plan identifies potential liquid and sludge stream treatment processes, in addition to providing recommendations and potential site layouts for these facilities. As described in the Facility Plan, the current NPDES permit does not include effluent limits for nutrients, only monitoring of nutrients in the effluent. However, the design shall include provisions for future nutrient reduction processes and facilities. The NPDES permit will be renegotiated in early 2018. The process design to be developed for treatment alternative comparison shall include potential effluent nutrient levels, assuming additional facilities for maximum nutrient reduction are added under a future construction budget.

Present results with treatment attainment, sensitivities through the expected range of parameters and conditions, limitations, capital costs and operations and maintenance costs for each alternative considered inclusive of the Process Alternatives Analysis TM.

2.4.5.2 Dynamic Modeling: Apply dynamic process simulation modeling to evaluate alternatives for technical feasibility, sensitivity and cost effectiveness.

1. Apply dynamic process simulation modeling to candidate treatment alternatives. Simulation runs for each candidate technology shall use data obtained from the Wastewater Characterization Study and baseline data. Critical model inputs shall be varied and sensitivities to the changes shall be tabulated. Sensitivity analyses for process parameters, wastewater characteristics and external conditions shall be performed for each candidate technology and will encompass the range of parameters and conditions identified.
2. The Engineer shall describe the findings of the treatment alternatives analyses, calibrated model and results, summarizing the results. Additionally, the Engineer shall modify the alternatives to provide additional nutrient removals for potential future nutrient limits. Optimization of the facilities evaluated with suggested process adjustments to improve plant efficiency and effluent quality should be presented.
3. As part of the modeling effort, the Engineer shall evaluate the system hydraulics, including but not limited to the following:

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- In-plant hydraulics
- Outfall connection hydraulics
- Upstream influent sewer hydraulics
- Compute all treatment design and cost calculations at design capacities of 9 and 12 mgd average daily flow, with adjustments for peak hourly and sustained maximum daily flows for each unit process alternative.
- Evaluate meeting treatment goals, including future modifications for nutrient removal under minimal and peak conditions of both influent quantity and quality.

A written description of the process, data and results shall be submitted with the Process Alternatives Analysis TM.

2.4.6 Site Layout

The Engineer shall prepare conceptual plant configuration or layouts that evaluate hydraulics and civil engineering issues, including liquid and sludge treatment and disposal. The Engineer shall provide a site layout showing all major treatment processes, access ways and facilities including preliminary site grading, stormwater improvements, utility corridors, security and site appearance, and process systems communication routes (duct banks, radio devices locations, etc.). The NDWWTP secondary treatment facilities shall be design for 9 mgd with provisions to facilitate future expansion to 12 mgd if average flows should increase. The provisions shall include potential future layouts for the expanded facilities as well as consideration of design features to facilitate this expansion. Provisions should also include space needed for future tertiary treatment and cooling water transmission for Guam Power Authority's proposed facility. In addition, plant modifications to achieve nutrient removal at both 9 mgd and 12 mgd conditions shall be provided.

2.5 Design Development Report

The Engineer shall complete a Design Development Report (DDR) on the approved wastewater treatment system capable of treating to secondary standards and meeting all applicable standards and limits as noted by the Facility Plan. The DDR shall recommend a preferred design direction and design criteria to address the upgrade and shall include, but not be limited to the following:

- Final TMs from Task 2 – Pre-Design
- Equipment list and preliminary specification on major equipment
- Specification List
- Operation and Control Strategies
- Key Engineering and Design Requirements
- Calculations including sizing and removal percentages in accordance with effluent limits
- Codes and standards
- Constructability issues
- Safety requirements
- Permits identification
- Environmental clearances
- Regulatory compliance
- Energy efficiency analysis
- Potential for providing energy source for GPA use
- Unit Processes
- Operations and Maintenance requirement and other operability considerations

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As part of the Draft Design Development Report, the Engineer and GWA shall develop a maximum construction bid target price for the Engineer to use as the basis for the design. The actual construction bid price for the facility construction projects(s) must fall within this amount or the Engineer is required to modify the design, with no additional compensation, until the construction cost is both within the budgeted cost and the project achieves the NPDES permit requirements without unreasonable O&M requirements. The Engineer shall provide a base design required to meet objectives, as well as additional additive bid items for consideration.

The Engineer shall document findings and recommendations in separate TMs to be submitted as completed, unless otherwise agreed upon with the Program Manager. The DDR shall include all technical memoranda compiled and submitted. A draft shall be submitted per the approved schedule. The pre-final DDR shall be submitted after a review and comment period with stakeholders along with the 60% Design submittal package, and the final DDR shall incorporate all changes, modifications and revisions and be submitted with the 90% Design submittal package.

2.5.1 Design Criteria Confirmation

The Engineer shall perform the following tasks to confirm understanding of the design criteria:

- Visit the project site, review data and reference material, conduct interviews with GWA Program Management and Operations personnel.
- Identify all permit requirements from local authorities and utility agencies per Section 2.3.
- Arrange and conduct a Design Criteria Confirmation Workshop and prepare a summary report.

2.5.2 Geotechnical Investigation Report

A geotechnical survey shall be conducted for the site based on the approved site layout to guide the design of the new treatment plant. This investigation shall include test pits and samples sufficient in quantity and extent to provide appropriate information for design of all the components of the new treatment plant sitework and structures. The geotechnical report shall be submitted as part of the Pre-final DDR submittal and will make recommendations pertaining to the site and the design of the treatment plant upgrades and expansion. This report shall include a summary of the results of past geotechnical reports of the project site and a discussion of past geotechnical information which remain valid for use in the design of the new treatment plant.

2.5.3 DDR Submittals

2.5.3.1 Draft Design Development Report: At minimum, the Draft DDR shall include draft information required to develop the design, including but not limited to the following components:

1. Site Layouts
2. Capacity, Hydraulic and Process Requirements
 - a. Process Alternative Analysis TM
 - b. Confirm population and flow projections for the next 50 years with consideration of I&I mitigation.
 - c. Process modeling, design criteria, basin design data and site plan.
 - d. Hydraulic Profiles, using average daily flow and peak flow data
 - e. Future Expansion, including provisions for potential nutrient reduction.
 - f. Flood plain elevations (if appropriate).
3. Areas and Equipment
 - a. Ingress/Egress requirements
 - b. Headworks/Preliminary Treatment, including existing or new facilities
 - c. Primary Treatment, including existing or new facilities (if needed)
 - d. Aeration Reactors

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- e. Secondary Clarification
 - f. Disinfection including existing or new facilities
 - g. Utilities including process drains, non-potable water, potable water and plumbing.
 - h. Chemical Feed Systems and chemical handling
 - i. Odor control
 - j. Sludge pumping, thickening, stabilization, dewatering and handling
 - k. Internal Water Re-use and utility water modifications
 - l. New Electrical and/or Blower buildings and facilities
 - m. Major piping, channels and conduit corridors including emergency generator
 - n. Septage receiving modifications
 - o. General Security
 - p. Areas for future expansion, tertiary treatment and process water piping for GPA facilities
4. Design Disciplines
- a. Preliminary process and instrumentation diagrams (P&IDs), equipment list and control strategies. The control system will be designed to incorporate PLCs for included treatment and process systems. This is in addition to the individual treatment plant components being interfaced with a central SCADA system to monitor and control treatment operations. The design will be accomplished to accommodate redundancy for the individual systems to operate and be controlled separately.
 - b. Electrical
 - c. Instrumentation and Control
 - d. Mechanical HVAC
 - e. Process Mechanical
 - f. Structural and Architectural
 - g. Civil
 - h. Geotechnical
5. General requirements and Permitting
- a. Relevant Permits per Section 2.3
 - b. Stormwater Management
 - c. Encroachment Agreement
 - d. Noise, Odor and Vibration Concerns
6. Construction Related Items
- a. Long Lead Items, for example, MCCs, equipment, etc.
 - b. Construction Cost Estimate: Prepare an opinion of probable construction cost for a Class 3 estimate in accordance with the Advancement of Cost Engineering International (AACE) classification system for the project including consideration of engineering, administration and construction management for the 30% design submittal. Provide a basis of how the cost estimate was prepared, including a description of how Guam-specific costs were developed. Include contingencies as appropriate in accordance with guidance from AACE International criteria. Include a monthly cash flow schedule to determine time frame for expected project expenditures. The Engineer shall immediately notify the Program Manager when any design decision causes any cost increase to the project. This notification should not be delayed until the construction schedule is submitted.
 - c. Preliminary Construction Schedules: Prepare an opinion of probable construction schedule for the project including consideration of engineering, administration and construction management for the 30% design submittal. Identify the construction critical path. The Engineer shall immediately notify the Program Manager when any design decision causes a time increase to the project. This notification should not be delayed until the construction schedule is submitted.

The Engineer shall include all TMs and decision correspondence from previous tasks. The Engineer shall submit the Draft DDR with the 30% complete design package in accordance with the approved project schedule, following a review conference to be held with GWA and the Program Manager, at minimum.

2.5.3.2 Pre-Final Design Development Report: At minimum, the Pre-Final DDR shall include all pertinent information used to develop the 60% complete drawings and specifications, as well as information required in the Draft DDR. The Engineer shall include all TMs and decision correspondence from previous tasks. Any change to the cost estimate and construction schedule from the Draft DDR shall be requested through the Program Manager, and approved by GWA. The cost estimate and construction schedule shall only be revised per comments and review from GWA.

The Pre-Final DDR shall incorporate GWA and the Program Manager's comments and input resulting from the review of the Draft DDR. The Engineer shall submit the Pre-Final DDR with the 60% complete design package in accordance with the approved project schedule, following a review conference to be held with GWA.

2.5.3.3 Final Design Development Report

The Final DDR shall include any changes and revisions made to the Pre-Final DDR through the pre-final design submittal. The Engineer shall include all TMs and decision correspondence from previous tasks. Any change to the cost estimate and construction schedule from the Pre-Final DDR shall be requested through GWA. The cost estimate and construction schedule shall only be revised per comments and review from GWA.

Review comments from GWA, Program Manager, stakeholders, public meetings, regulatory agencies, manufacturer changes, etc. shall be incorporated. The Final DDR shall be submitted with the Pre-Final 90% Design submittal package unless otherwise agreed upon.

2.6 Design

2.6.1 Preliminary Engineering (30% Design).

The Engineer shall proceed with preliminary engineering design and deliver the following applicable items at minimum:

1. A site development plan with identification of environmental mitigation measures (if required).
2. A site demolition plan with potential staging areas, haul routes and measures addressing mitigation of impacts to surrounding areas.
3. Select final location of process units and associated buildings on the plant site.
4. Identify major underground utility corridors, coordinate subsurface utility engineering (SUE) with the project surveyor, and coordinate with utility companies and private entities.
5. Generate process design including mass balance, process block flow diagram, and list of major equipment.
6. Establish building layouts and equipment accessibility needs and prepare preliminary process unit and building design drawings.
7. Design efforts to provide power and controls to all process units and buildings
8. Coordination with project surveyor and geotechnical engineer, and determination and commissioning of additional needs.
9. General Discipline Preliminary Design including but not limited to:
 - a. Civil
 - b. Mechanical, Process and building

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- c. Structural
- d. Electrical
- e. Architectural

The preliminary design shall be submitted with the draft compiled DDR for concurrent review. Following the submission, a review conference shall be held with GWA and the Program Manager.

2.6.2 Site Preparation Bid Packages

To accelerate the construction schedule, separate site preparation bid packages must be released prior to the bulk of the design. Separate site preparation design packages shall be prepared for, but not be limited to the following:

1. Demolition and removal of existing digester roofing and sludge removal
2. Clearing & Grading (including storm drainage and erosion control)

Related specifications shall also be provided per the format described in Section 3.

2.6.3 60% Design

The Engineer shall develop the design of the project to 60% completion. The following tasks include, but not be limited to:

1. Prepare 60% complete drawings, specifications and cost estimate.
2. Incorporate all comments and input resulting from the review of the 30% design submittal.
3. Submission of the Pre-Final DDR with supporting design calculations.

The Engineer shall submit a 60% complete design package in accordance with the approved project schedule. A review conference shall be held with GWA and the Program Manager following the submission of the design package.

2.6.4 Pre-Final 90% Design

The Engineer shall prepare and submit 90% complete detailed design drawings, specifications, and draft bid and contract documents. The submittal shall provide sufficient information for securing all permits for the project including all construction permits. The Engineer shall assist GWA in applying for the construction permit using this submittal. The following tasks shall include, but not be limited to:

1. Preparation and submission of Pre-Final 90% complete drawings to include P&IDs, SCADA system architecture, specifications and cost estimate.
2. Incorporate all comments and input resulting from the review of the 60% design submittal.
3. Submission of the Final Design Development Report with supporting design calculations.
4. Preparation and submission of an opinion of probable construction cost for a Class 1 estimate in accordance with the AACE International classification system for the project.
5. Preparation and submission of the draft construction permit application.

A review conference shall be held with GWA and the Program Manager following the submission of the design package.

2.6.5 Final Design

A final design review conference shall be held between the Engineer, GWA and the Program Manager and the resulting comments and corrections shall be incorporated in the final submittal. Guam EPA will be invited to attend the final review conference. The Engineer shall submit the final design/construction documents in hard copy originals, the desired number of print copies as well as native electronic files as provided in Section 3.

2.7 Post Design Services

2.7.1 Project Bidding Support

The Engineer shall assist in meetings during the bidding phase of the project. The Engineer shall provide comment and input as related to the design of the project and coordinate directly with the Program Manager. The Engineer's tasks shall include, but not be limited to:

- Providing responses to requests for information
- Providing input and preparing addenda as needed.
- Provide conformed construction documents.
- Attendance at the pre-bid meeting and bid evaluation conference.
- Providing responses to substitution requests.
- Review, evaluate and certify bid tabulations.
- Providing recommendation for construction contract award.

2.7.2 Project Construction Support

The Engineer shall assist in pre-construction, kick-off and periodic meetings as required by the Program Manager during the construction phase of the project. The Engineer shall review and comment on the contractor's schedule of values and shop drawings, project submittals, RFI's, change orders and contractor's construction schedule as requested by the Program Manager. Submittals that request for modifications to the design shall be reviewed and approved by the Engineer.

- Prepare final (100%) "Issued for Construction" conformed plans and specifications incorporating addenda, change orders and changes during the bid phase.
- Assist in preconstruction and partnering conferences.
- Attend weekly progress meetings.
- Provide field assistance as required.
- Visit site monthly during construction to determine general conformance.
- Review Change Orders and Contractor's Schedule and provide comments as appropriate.
- Review schedule of values.
- Coordinate process control programming with construction contractor and controls vendor.
- Provide treatment process training to GWA operators during construction in advance of completion.
- Provide support for start-up and commissioning.
- Approve punch list items completed.
- Review and respond electronically to technical submittals, shop drawings, samples, tests results and other data that the Contractor is required to submit in accordance with the contract documents. The review will be for conformance with the design concept of the project and compliance with the information given in the construction documents. Such review or other action shall not extend to means, methods, techniques or procedures of construction selected by the Contractor, or to safety precautions and programs also required of the Contractor.
- Review and respond electronically To RFIs by the Contractor. Provide assistance, guidance and recommendations in the interpretation of the drawings and specifications especially for resolution on any issues between the Contractor and the Program/Construction Manager to minimize cost and schedule impacts.

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- Provide witnessed factory test observation and reporting for specified equipment requiring a representative as required. Review delivery acceptance test and inspection reports as required in individual equipment specifications such as large pumps, fans, blowers, and FRP products.
- Witness and observe field installation and performance testing, as required. Provide observation reports as required in individual equipment specifications.
- Facilitate technical coordination between parties during testing and outages. Provide technical assistance as needed.
- Perform constructed plant electrical system analysis, arc-flash and labeling.

2.7.3 Process Startup and Optimization

Provide facility startup support and optimization recommendations as needed. Attend weekly startup meetings with Contractor, CM and GWA representatives starting approximately one month prior to the start of the component test phase, with meetings to continue through the commissioning period. Witness system test phases for each system and make recommendations regarding approvals. Witness operational test and commissioning phases for the complete facility, and make recommendations regarding approval. Verify coordination of communication and monitoring systems during system and operational testing periods. Verify control Actions and control system responses are per contract documents.

2.7.4 Operations and Maintenance Manual

Upon substantial completion of the project, GWA shall provide the Engineer with vendor O&M Manuals. The Engineer shall provide a consolidated Operations and Maintenance (O&M) Manual per example standards to be requested from the Program Manager and at a minimum shall contain:

- Introductory material
- Permit requirements
- Wastewater Treatment
- Sludge Treatment (pumping, thickening, stabilization, dewatering, handling and reuse/disposal)
- Plant description
- Treatment process descriptions and controls
- Plant Management procedures
- Plant operation procedures (including troubleshooting)
- SCADA system, I&C devices, and communication systems
- Parameters specific to NDWWTP
- Asset List and Preventative Maintenance Schedule

The Engineer will package the O&M Manuals in a three-ring binder, tabbed format, outlined by process. A table of contents, introductory language and descriptions of the items listed shall be prepared and included prior to the packaged vendor O&M Manuals. A total of five (5) O&M hard copies and one electronic copy shall be delivered to GWA.

Once the Draft O&M Manual is complete and reviewed by GWA and the Construction Manager, the Engineer shall conduct start-up training for GWA operations. Final O&M Manuals shall include all comments and revisions for submission.

2.7.5 Operator Training

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The Engineer shall conduct a series of workshops for GWA operators prior to plant start up. A minimum of six (6) workshops will be held on Guam. Each of these workshops will focus on the process operations of the new plant such as:

- Pretreatment
- Primary Treatment
- Secondary Treatment
- Sludge Handling and Stabilization
- System Controls – SCADA
- Laboratory and Safety Procedures
- Troubleshooting

The start-up training shall cover all major components of the facility as well as start-up, shut down, emergency operation and compliance monitoring.

2.7.6 As-Built (Record) Drawings

After completion of the construction punch-list items, GWA will provide the “red-line” mark ups prepared by the Construction Contractor to the Engineer. The “red-line” mark ups shall be prepared by the Contractor and concurred by Construction Manager prior to transmission to the Engineer. The Engineer shall use the redline mark ups to generate the project record drawings in AutoCAD format and per Section 3.

2.8 GWA Optional Task Assignments

The following services may be added to the scope of the Engineer’s work at GWA’s option. If exercised, the scope of and the fee for these optional services shall be engaged as amendments to the Contract.

2.8.1 Value Engineering Support.

Support 30% Value Engineering (VE) Workshop and provide written response/clarifications resulting from 30% VE Workshop. Incorporation of the agreed upon recommendations into the design will be the Engineer’s responsibility.

2.8.2 SCADA – Advanced System Options

The Engineer shall prepare and facilitate a SCADA workshop to demonstrate the enhanced abilities of the WWTP SCADA system such as data historian, distributed alarms, asset management, trending, scheduling, energy monitoring, and mobile operation to provide superior systems. process analysis, and cost savings.

3.0 PROJECT DELIVERABLES AND SUBMITTAL STANDARDS

Due to agreements between Guam Waterworks Authority (GWA), Guam Environmental Protection Agency (GEPA), U.S. Naval Facilities Command, Pacific (NAVFAC PAC), and Department of Defense Office of Economic Adjustment (OEA), secondary treatment upgrades must obtain final acceptance by December 31, 2021. It is anticipated that GWA will procure a separate site preparation construction bid package and a separate multi-step bid vertical construction package. The site preparation package construction documents shall be available such that the formal bidding process shall be not later than October 22, 2018. All other construction documents shall be available such that the formal bidding process for the multi-step bid vertical construction package shall be no later than March 18, 2019, unless otherwise agreed upon.

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Each submittal shall be reviewed by stakeholders and as distributed by the Program Manager. All submittals shall be provided in the number of hard copies indicated, as well as 1 electronic copy for each.

Each deliverable shall be submitted per the schedule in calendar days as stated below. All deliverables and work tasks noted as "Per Approved Schedule" shall be provided per the approved project schedule to be developed as described in previous sections. As a guide, GWA/Program Manager has provided the Program Master Schedule. The Engineer is encouraged to develop an accelerated schedule.

3.1 Project Management, Project Initiation and Concept Design.

The Engineer shall provide the following deliverables. All submittals shall be provided in the number of copies indicated.

Deliverable/Work Task	Copies	Schedule
1. Project Management Plan		
• Quality Assurance/Quality Control Plan	5	Within 30 calendar days after NTP
• Risk Evaluation		
2. Project Milestones/Schedule	5	Within 30 calendar days after NTP
3. Project Kick-Off Meeting & Exhibits	-	Within 40 calendar days after NTP

3.2 Permitting

Deliverable/Work Task	Copies	Schedule
1. Identification of Required Permits	5	Per approved schedule
2. Environmental Info Document (EID)	5	Per approved schedule
3. Area of Potential Effect (APE)	1	Per approved schedule
4. Cultural Resources and Historical Designation Applicability	1	Per approved schedule 2.3.4
5. Preliminary Engineering (30%) Design Phase Building Permit (DPW)	1	With Pre-Final Design Submittal Package
6. Permits	1	Complete with Site Preparation Design Packages

2.3 Pre-Design

Deliverable/Work Task	Copies	Schedule
1. Document Review Request	-	Per approved schedule
2. Process Alternatives Analysis	5	Per approved schedule
• Wastewater Characterization Study		
• Dynamic Modeling		
3. Site Layout	5	Per approved schedule

3.4 Design Development Report (DDR)

Deliverable/Work Task	Copies	Schedule
1. Design Criteria Confirmation Meeting and Summary	5	Per approved schedule

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2.	Geotechnical Investigation Report	5	Per approved schedule
3.	Draft Design Development Report	5	With Preliminary 30% Design Package
4.	Pre-final Design Development Report	5	With 60% Design Package
5.	Final Design Development Report	5	With Pre-final 90% Design Package

3.5 Design Development

	Deliverable/Work Task	Copies	Schedule
1.	Preliminary 30% Plans, Specs, Cost Opinion	5	Per approved schedule
2.	Site Preparation Design Package	5	Per approved schedule
3.	60% Design Plans, Specs, estimate and Preliminary Construction Schedule	5	Per approved schedule
4.	Pre-final 90% Plans, Specs, Estimate and Preliminary Construction Schedule	5	Per approved schedule
5.	Final Original Drawings, Specs & Estimate	1 (set)	Per approved schedule
6.	Final Prints of Construction Bid Package and Construction Schedule	5	Per approved schedule

3.6 Post Design Services

	Deliverable/Work Task	Copies	Schedule
1.	Project Bidding Support	-	N/A
2.	Project Construction Support including "as constructed" electrical system analysis	-	N/A
3.	Process Start-Up and Optimization	-	Per approved schedule
4.	Operations and Maintenance Manual	5	Per approved schedule
5.	Operator Training	5	Per approved schedule
6.	As-Built Drawings	5	Per approved schedule

3.7 GWA Optional Task

	Deliverable/Work Task	Copies	Schedule
1.	Value Engineering Support	-	Per approved schedule
2.	SCADA – Advanced System Options	-	Per approved schedule

3.8 Submittal Standards

- A. Drawings: Drawings shall conform to GWA Standards and Contract Design Drawings shall be completed in REVIT, AutoCAD 3D MEP, AutoCAD Civil 3D, or other BIM software as approved by GWA and as appropriate. 3D drawings created during design using the approved BIM software shall be included in all deliverables. Plant buildings, yard piping and appurtenances shall also be translated into ESRI GIS mapping. Five (5) sets of submittals shall be submitted for all deliverables.
- B. Specifications: CSI Format.
- C. Project Schedule: Construction Schedule shall be CPM-based and be in Primavera P6.

4.0 GWA RESPONSIBILITIES

GWA be responsible for providing the following:

- A. Right-of-Entry permits for areas/properties that the Engineer must investigate and/or survey for performance of his work.

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- B. Property maps, past studies and other relevant documents in its possession (If available) that the Engineer will need to properly perform his work including the Phase 1 ESA Report.
- C. Wastewater loading projections and criteria for use in the Engineer's work.
- D. Timely reviews of and responses to the Engineer's submittals and inquiries.
- E. Arrange for meetings between the Engineer and appropriate Department of Defense officials to discuss to discuss wastewater flow requirements for the project.
- F. Timely initiation and issuance of optional tasks and appropriate contract amendments.
- G. Depict and mark clearly all connections and demarcation points to include, but not limited to, process, electrical, SCADA and communication.

5.0 POLICY GUIDE AND REFERENCE MATERIALS: The design shall conform to current industry standards and the following policy guide and reference materials:

5.1 Standards

- GWA Design and Construction Standards
- 2009 International Building Code (version adopted by the Government of Guam)
- Wastewater-Related Industry Standards adopted by GWA
- American National Standards Institute (ANSI)
- National Electrical Manufacturer's Association (NEMA)
- American Water Works Association (AWWA)
- National Fire Protection Association (NFPA)
- Federal Court Order relevant to this project.

5.2 Reference Exhibits

- Exhibit A U.S. Department of Defense Office of Economic Adjustment General Assistance Agreement Terms and Conditions, April 2016
- Exhibit B - National Policy Requirements, October 2015
- Exhibit C U.S. Department of Defense Office of Economic Adjustment Grant Program -Specific Terms and Conditions, April 2016
- Exhibit D Model Form of Agreement Between Owner and Engineer for Professional Services
- Exhibit E - Facility Plan: Northern District Wastewater Treatment Plant, April 2017
- Exhibit F - Guam Water and Wastewater Infrastructure Improvements Draft Master Program Schedule March 2017
- Exhibit G - USEPA Authorization to Discharge Under the National Pollutant Discharge Elimination System, NPDES Permit No. GU0020141, June 2002
- Exhibit H - Veolia Northern District Wastewater Treatment Plan (NDWWTP) Interim Improvements, Preliminary Design Study Report V0.1, April 2016
- Exhibit I - NAVFAC, Guam Water and Wastewater Assessment Report in Support of the Economic Adjustment Committee Implementation Plan, February 2015
- Exhibit J - Pacific Soils Engineering & Testing, Limited Soils Investigation,

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- Proposed NDWWTP Sludge Tank and Drainage Project, January 2012
- Exhibit K- Final Remedial Investigation for Harmon Annex Operable Unit, Andersen Air Force Base Guam, January 2000
- Exhibit L – Construction Drawings and Miscellaneous Information
 1. Administration & Laboratory Rooms, A/C & Duct As-Builts, Waterline Layout
 2. Clarifier MCC Wiring
 3. Desludge Scum Pump Control Panel – Seepex
 4. Electrical As-Builts, DCK
 5. Equipment and Instruments Schedule, Interim Improvements Project
 6. Fixed Asset Inventory
 7. Interim Improvements, NDWWTP, Kennedy/Jenks
 8. Interim Improvements, Septage Handling Facility, Kennedy/Jenks
 9. Northern District Sewerage System, 1975 As-Builts, ASA
 10. PAC Dilution System, Shop Drawings, DCK
 11. Process and Instrumentation Diagram, Cross Panel Wiring
 12. Power and Control Schematic Diagram

6.0 PROJECT DESIGN SCHEDULE

The Engineer shall prepare a Project Design Schedule and submit a draft schedule to GWA and the Program Manager for review and approval. The approved schedule shall become an integral part of this Scope of Work.