

**AMENDMENT TO OWNER-ENGINEER AGREEMENT**  
**Amendment No. 2**

1. *Background Data:*

- a. Effective Date of Owner-Engineer Agreement: January 16, 2018
- b. Owner: Brunswick County, North Carolina
- c. Engineer: CDM Smith Inc.
- d. Project: NORTHWEST WATER TREATMENT EVALUATION

2. *Description of Modifications:*

A. Engineer shall perform or furnish the following Additional Services:

The Engineer shall prepare both a Basis of Design Report (BODR) and an Engineering Report/ Environmental Information Document (ER/EID) for the advanced treatment upgrades and Phase III expansion of the Brunswick County Northwest WTP. The basis of the BODR and ER/EID are for the recommended alternative from the “Advanced Treatment Options for the Northwest Water Treatment Plant” draft report dated March 2018 and final report dated April 2018 prepared by the Engineer.

The ER/EID will be prepared as part of the State Revolving Funding application process.

Improvements for the Northwest WTP to be developed in the BODR and ER/EID include expansion of the existing conventional process treatment capacity. The PER will include processes to provide treatment capacity for a raw water flow of 45 mgd through rapid mixing, clarification, and filtration. The addition of low pressure reverse osmosis as an advanced treatment process will also be included in the PER. The Engineer will review the treatment capacity of the expanded processes to confirm a conventional capacity of 40 – 45 mgd and a reverse osmosis permeate flow of 36 - 40 mgd. Process considerations and anticipated space requirements for future expansions and upgrades will be presented in the PER.

The Engineer understands the Owner intends to permit the plant as a conventional water treatment plant without advanced treatment at a higher capacity. Advanced treatment will impact the finished water capacity of the facility, driving the pursuit of multiple plant ratings that are dependent on which processes are in service.

The BODR will include the following process areas:

- New raw water pipeline
- New rapid mixing basin
- Upgrading existing Pulsator® clarifiers to SuperPulsator® clarifiers
- New Suez/Degremont Technologies Greenleaf® filter module and upgrading existing modules
- Expansion and upgrades to chlorine gas disinfection system

- New reverse osmosis treatment membrane system with building
- New reverse osmosis feed pumps and cartridge filters
- New re-stabilization facilities (either chemicals or groundwater wells)
- Chemical system upgrades such as pumps to support increased treatment capacity
- New concentrate discharge pipeline to the confluence of Hood Creek and Cape Fear River and associated diffuser
- New solids gravity thickener
- Upgrades to existing equalization basin
- Electrical improvements to support expansion and upgrades
- Instrumentation & Controls improvements to support expansion and upgrades
- Architectural improvements to support expansion and upgrades
- Structural improvements to support expansion and upgrades
- HVAC and Plumbing improvements to support expansion and upgrades

This amendment includes the following major tasks:

- Task A2.100 Project and Quality Management
- Task A2.200 Basis of Design Report (BODR)
- Task A2.300 Engineering Report/Environmental Information Document (ER/EID) Reports for SRF Program
- Task A2.400 Unspecified Services Allowance
- Task A2.500 Development of Test Wells for Groundwater Blending

### ***A2.100 Project and Quality Management***

This task covers managing the project and coordinating the work, tracking work progress, invoicing and accounting, providing regular updates to the Owner, managing scope compliance, oversight of technical products, and quality assurance checks on work and deliverables. Accounting and administrative support to achieve the project tasks listed herein are also included in this task.

### ***A2.200 Basis of Design Report (BODR)***

#### **1.200.1 Project Meetings**

A kickoff workshop to be followed by one progress meeting where alternatives analyses will be presented for selection by the Owner and one draft report review meeting is included in this task. The meetings will be held at a location convenient to the Owner's offices, such as the Northwest WTP.

Engineer will conduct a project kickoff workshop for the preparation of the BODR summarizing the upgrades and expansion. Engineer will facilitate a discussion with water treatment plant operations staff, maintenance personnel, and utility managers regarding the improvements to the existing facilities to be addressed with the project BODR. Administrative elements of the project including scope and schedule review will also be included in the kick-off meeting agenda. Multiple disciplines from the Engineer's project team will be represented at the meeting to facilitate thorough collaboration. Meeting notes will be prepared by the Engineer.

### **1.200.2 Preliminary Site Investigations**

Engineer's process, structural, electrical, instrumentation, and HVAC design engineers will conduct a site inspection of the Northwest Water Treatment Plant. The site investigation will be completed on the same day as the project kick-off workshop. The purpose of the site visit is to identify the condition of existing facilities, review code compliance, and identify optional locations and orientation for the proposed facilities to be included in the BODR.

### **1.200.3 Basis of Design**

Engineer will develop the basis of design for the Northwest Water Treatment Plant expansion and upgrades. Historical operating data for calendar years 2014 – 2017 provided by the Owner will be used to develop flow and mass balances for water and chemicals. The Engineer will consider water losses associated with solids removal, filter backwashing, and the reverse osmosis reject stream when establishing the basis of design for expanding the Northwest WTP to a filtered water capacity of 42 to 45 mgd (exact number to be determined) and finished water (reverse osmosis permeate) capacity of 36 mgd.

Design criteria tables for major process will be developed. These process areas include:

- Rapid mixing, Pulsator® conversion to SuperPulsators®
- Filtration and backwash pumping
- Reverse osmosis feed pumping and membrane skids
- Solids thickening
- Backwash equalization and treatment
- Chemicals including coagulant (PACL), oxidant (chlorine dioxide), pH/alkalinity adjustment (caustic), disinfection (chlorine and ammonia), fluoride, corrosion inhibitor, anti-scalant for membranes, and membrane cleaning chemicals (caustic and acid). Other chemicals required to re-stabilize/re-mineralize reverse osmosis permeate will also be identified and a basis of design established.
- Concentrate disposal pipeline and diffuser – hydraulic analysis

The Engineer will also complete a preliminary hydraulic analysis for the water treatment plant from the Rapid Mix basins through the clearwells. A hydraulic profile will be prepared and included in the BODR.

### **1.200.4 Re-stabilization Alternatives Evaluation**

Engineer will complete an evaluation of re-stabilization alternatives for the reverse osmosis permeate. The alternatives will include blending with groundwater and restabilization by chemical addition. Field investigation and test wells are included under a separate task. The evaluation will consider operational, technical, and economic criteria. The results of the evaluation will be presented at a progress meeting and will be included in the BODR.

### **1.200.5 Concentrate Pipeline Routing Analysis**

Engineer will complete an analysis of the alternative pipeline routes for conveying reverse osmosis concentrate to the diffuser. Up to two alternative pipeline routes will be developed. The desktop evaluation will review wetlands impacts, potential utility conflicts, DOT road crossings, and property easement requirements. The alternatives will be presented at the progress meeting where the Owner will select a preferred route. A summary of the alternatives evaluation and the selected route will be included in the BODR.

#### **1.200.6 Electrical System Evaluation**

The existing plant electrical system will be evaluated to determine if it can accommodate the improvements. It is expected additional service capacity will be required. Engineer will evaluate options for additional capacity that include adding a second service and expanding or upsizing the existing service. Additionally, options for providing standby power, including an emergency generator, will be considered in the electrical system evaluation.

Engineer will present the results of the evaluation and recommendations at a progress meeting. The results of the evaluation will be included in the BODR. A one-line diagram will be developed for the recommended option to show the integration of the upgraded service into the existing distribution system at the plant.

#### **1.200.7 Conceptual Drawings**

Conceptual level drawings will be prepared and included in the BODR. Drawings will be based on manufacturer's equipment drawings and access requirements for operations and maintenance. Drawings to be included are:

- Proposed site plan and yard piping over 20-inch in diameter (site plan will be developed based on existing CAD files provided by the Owner)
- Preliminary hydraulic profile
- Plan and section of the clarifier improvements
- Plan and section of the new filter modules
- Plan and section of reverse osmosis feed pumps
- Plan and section of the reverse osmosis facility
- Plan of chlorine area
- Plan of sludge thickener
- Plan and section of equalization basin
- GIS map(s) of the conceptual concentrate discharge pipe from the treatment plant to the Cape Fear River

Owner will provide existing facility drawings CAD format for use in developing figures for existing facilities. These include Puilsator® clarifier drawings as well as filter module and pipe gallery drawings.

#### **1.200.8 Instrumentation and Control**

The basis for instrumentation and control for the new and modified systems will be developed for the BODR. The Engineer will prepare a narrative of system controls and operation for the major processes, discuss incorporation of the improvements into the existing plant control network, and develop preliminary process flow diagrams.

The process flow diagrams will serve as the basis for development of Process and Instrumentation Diagrams (P&IDs) in the next phase of design.

#### **1.200.9 Engineer's Preliminary Opinion of Probable Construction Cost**

Engineer will prepare a preliminary opinion of probable construction cost. A breakdown of items by each unit operation, major structures and civil works will be provided. Engineer will provide two options for phasing of construction as defined by the Owner. These options may include phased implementation of reverse osmosis skids.

### **1.200.10 Basis of Design Report**

Upon completion of Tasks 1.200.1 through 1.200.9, the Engineer will prepare a draft BODR for the selected alternatives including design criteria and descriptions of facilities, site plans showing the areas of proposed modifications, key equipment sizing calculations, key equipment cut sheet information, preliminary plant control philosophy description, concepts and design criteria for the new process units and a preliminary opinion of probable construction costs for the recommended alternatives. A project implementation schedule, construction and operating cost information suitable for future planning will also be included.

A regulatory assessment will be conducted and summarized in the BODR to describe anticipated permits required to construct and operate the proposed facilities. Applying for permitting or completing specialized studies required for permits are not included in this scope of work.

Engineer will submit a draft BODR to the Owner for review. Following a review meeting to receive and discuss the comments from the Owner; the BODR report will be finalized. Engineer will deliver hardcopies and an electronic copy in PDF format of the final BODR.

### ***A2.300 Engineering Report/ Environmental Information Document (ER/EID) Reports for SRF Program***

The Owner is submitting two applications to the North Carolina Department of Environmental Quality Division of Water Infrastructure (DWI) State Revolving Fund (SRF) program for the planned Northwest Water Treatment Plant Expansion and Improvements Project. One application is to be submitted to the Drinking Water SRF program for the Water Treatment Plan expansion and treatment improvements portion of the project. A second application is to be submitted to the Clean Water SRF program for the anticipated wastewater discharge pipeline associated with the reverse osmosis treatment facility. The applications are being prepared by Engineer under a separate Amendment.

It is anticipated that DWI will inform the Owner of intent to fund in late Summer 2018 with a Letter of Intent to Fund (LIF). Upon notification of Owner's receipt of LIF and authorization by the Owner, Engineer will begin work on the ER/EID.

The SRF Funding Program follows a prescribed schedule, where the LIF starts the reporting phase of the process. The Engineer will assist the Owner by preparing the ER/EID for each of the two applications submitted to and funded by DWI. It is assumed that the projects will be above the minor construction activities threshold, and therefore, a Major ER/EID will be required and prepared for both applications.

The required content, format, and schedule for the ER/EID for wastewater and drinking water projects is defined in DWI's guidance documents. The Engineer will prepare the ER/EID documents in accordance with the guidance provided on DWI. A BODR is being prepared by Engineer under Task A2.200 of this amendment. The BODR for the Northwest Water Treatment Evaluation project will be utilized in preparing the engineering content for the ER.

Nineteen copies of each draft report will be submitted to DWI by the required due date, as outlined in the LIF. The Engineer will respond to comments from DWI within the prescribed timeframe and, if required, issue a revised report. This scope does not include any amendments to the ER/EID. If ER/EID amendments are required, this scope of work will be amended.

#### ***A2.400 Unspecified Services Allowance***

An allowance for unspecified services not assigned in this amendment, but determined by the Owner to be necessary, may be included with this task. Work under this task will not proceed without written authorization from the Owner, defining the scope, fee, and schedule for tasks. Potential services under this allowance are not limited to those listed below, but may include:

- Additional assistance with project funding applications (WIFIA, etc.)
- Geotechnical services, if required prior to final design (No subsurface investigation or geotechnical evaluation is currently included)
- Surveying services (no surveying is currently included)
- Extra meetings to assist in educating about the project (eg: Public Information Meetings, Presentations to the County Commissioners, etc.)

#### ***A2.500 Development of Test Wells for Groundwater Blending***

An alternative to chemical re-stabilization of the reverse osmosis permeate is blending with groundwater that has sufficient alkalinity and mineral concentrations. A desktop evaluation comparing this alternative to chemical use for re-stabilization is included in Task A2.200 of this amendment. To field verify the data utilized in this evaluation, the Engineer will develop test wells to collect additional information on the available quality and quantity of the groundwater supply at the Northwest WTP site. Under this task, the Engineer will:

- Install one pilot well and three test wells (4" or 6" depending on conditions encountered) with installation by drilling subcontractor and oversight by Engineer
- Complete geophysical logging during well installation
- Provide completed well reports and a summary of finding for water quality and well yield

It is assumed the test wells will be installed on the Owner's property at the Northwest Water Treatment Plant. Engineer will obtain authorization prior to proceeding with this task and will prepare a well installation and test plan for review by Owner once authorized but prior to beginning the well installation.

#### **ASSUMPTIONS AND EXCLUSIONS:**

*The following summarizes assumptions and exclusions with respect to the scope of work, as well as the Owners Responsibilities as it relates to the Engineer's performance of the Project.*

##### **ASSUMPTIONS FOR BASIC SERVICES**

1. CAD files for the existing facilities at the Northwest WTP will be made available to the Engineer for use.
2. Past survey and geotechnical information are available from the Owner for the Northwest WTP site.
3. All tasks that are compensated as Cost Plus Fee have been assigned an Upper Limit. The scope and costs of the work in these tasks have not been fully defined (eg: subcontracted well drilling costs) and therefore it is unknown if the set Upper Limit is sufficient to fund the completion of the work described in these tasks. The Engineer will not work beyond the Upper Limit of the task and does not guarantee completion of the work described in the task.

If additional funding is required, the Engineer will provide the Owner with a proposal for Amendment to complete the work.

#### EXCLUSIONS FOR BASIC SERVICES

1. Any work that is not explicitly described as included in the Engineers scope of work is excluded from the lump sum tasks. However, additional work may be included in Task 400, pending available funds.
2. Final design of facilities resulting in construction drawings and specifications.
3. Additional site surveying, subsurface exploration and utility locating, and geotechnical investigations. This includes the corridor for the concentrate disposal pipeline.
4. This scope of work does not include any permitting or environmental related studies including wetland delineation, endangered/protected species surveys, etc.
5. This scope of work does not include any Clean Water Act Section 404/401 or Rivers and Harbors Act stream and wetland permitting activities, other than coordination with agencies during the initial interagency meeting.

#### OWNERS RESPONSIBILITIES

1. Provide Engineer with timely response to requests for information, data, or decisions
2. Participation of decision-makers in meetings and workshops to facilitate project progression
3. Provide Engineer with access to the Northwest WTP as needed to complete the work

B. *The Scope of Services currently authorized to be performed by Engineer in accordance with the Agreement and previous amendments, if any, is modified as follows:*

None.

C. *The responsibilities of Owner are modified as follows:*

None.

D. *For the Additional Services or the modifications to services set forth above, Owner shall pay Engineer the following additional or modified compensation:*

##### Lump Sum Compensated Tasks

- Task A2.100: Project and Quality Management, Lump Sum Amount of \$43,500
- Task A2.200: Basis of Design Report, Lump Sum Amount of \$353,800
- Task A2.300: ER/EID Reports for SRF Program, Lump Sum Amount of \$80,600
- *Total Lump Sum Tasks Amount of \$477,900*

##### Cost Plus Fee Compensated Tasks

- Task A2.400: Unspecified Services Allowance, Upper Limit of \$80,000
- Task A2.500: Groundwater Supply Planning for Re-Stabilization Blending, Upper Limit of \$221,000
- *Total Cost Plus Fee Tasks Amount of \$301,000 (Upper Limit)*

Total of Amendment (Lump Sum + Cost Plus Fee) = \$778,900.00

- 1) The Lump Sum includes compensation for Engineer's services and services of Engineer's Consultants, if any. Appropriate amounts have been incorporated in the Lump Sum to account for labor, overhead, profit, and reimbursable expenses.
- 2) The portion of the Lump Sum amount billed monthly for Engineer's services will be based upon Engineer's estimate of the percentage of the services completed during the billing period.
- 3) Task A2.400 and A2.500 will be invoiced as a Cost-Plus Fee payment for work performed. Refer to Section 8.01 of the original contract for Basis of Payment for Cost Plus Fee payment items.
  - a. The schedule for rendering services is modified as follows:
    - A draft BODR will be submitted 15 weeks following notice to proceed on this Amendment No. 2. A final BODR will be submitted 4 weeks following receipt of owner's written comments.
    - The ER/EID will be submitted 10 months from Letter of Intent to Fund from DWI.
    - The schedule for any tasks authorized under Tasks A2.400 shall be determined at the time of authorization.
    - The schedule for Task A2.500 will be 20 weeks following notice to proceed.

3. *Agreement Summary (Reference only)*

a. Original Agreement amount:	<u>\$599,600</u>
b. Net change for prior amendments:	<u>\$12,600</u>
c. This amendment amount:	<u>\$778,900</u>
d. Adjusted Agreement amount:	<u>\$1,391,100</u>

The foregoing Agreement Summary is for reference only and does not alter the terms of the Agreement, including those set forth in Exhibit B.



Owner and Engineer hereby agree to modify the above-referenced Agreement as set forth in this Amendment. All provisions of the Agreement not modified by this or previous Amendments remain in effect. The Effective Date of this Amendment is \_\_\_\_\_.

OWNER:

ENGINEER:

\_\_\_\_\_  
Brunswick County

\_\_\_\_\_  
CDM Smith Inc

By: \_\_\_\_\_

By: \_\_\_\_\_

Title: \_\_\_\_\_  
Chairman  
Board of Commissioners

Title: \_\_\_\_\_

Date  
Signed: \_\_\_\_\_

Date Signed: \_\_\_\_\_

Clerk to the Board

\_\_\_\_\_  
“This instrument has been pre-audited in the manner required by the Local Government Budget and Fiscal Control Act.”

\_\_\_\_\_  
Finance Director – Brunswick County