ENGINEERING SERVICES REQUEST
AUTHORIZATION TO PROCEED

To: Underwood Engineers, Inc. **(UE)**
25 Vaughan Mall, Unit #1
Portsmouth, New Hampshire 03801

ESR No.: #2 – **Amendment 1**
File No.: 2718
Description: **Source Evaluation and Preliminary Design**

From: County of Carroll
Office of Commissioners
95 Water Village Road
Ossipee, New Hampshire 03864

Date: April 21, 2022

Carroll County Contact(s) (this project): Will DeWitte, Director of Public Works

Under agreement for Professional Services as Consulting Engineer for Carroll County, NH, (Underwood File #2717 dated 8/12/2021), you are authorized to proceed with the following work:

Description:
Task 1 (ESR #1) was an overall evaluation phase of the water system and was completed in January 2022. ESR #2 was executed in April 2022 and included the following tasks:

Task 2 - Hydrogeologic Evaluation of Existing Wells
Task 3 - Evaluation of Existing Source Capacity
Task 4 - Funding Assistance Allowance
Task 5 - Hydrant Replacement Evaluation and Design Allowance
Task 6 - Old Route 28 Water Main Preliminary Design
Task 7 - Meter/Chlorination Building Improvements –final design

The remaining tasks (Tasks 8-10) associated with the preliminary design were planned for ESR #3, which will be funded by the NHDES Planning Grant (up to $50,000). This was proposed to include Tasks 8-10, however, NHDES did not consider these tasks of high enough priority ranking for their funding, and requested that Task 2 be funded by the Planning Grant instead. This Amendment is to delete Task 2 from this (ESR #2) scope of work and add Tasks 8-10. Task 2 will be re-contracted via ESR #3 after execution of the NHDES Planning Grant Agreement.

Scope of Work:

Deleted: Task 2 - Hydrogeologic Evaluation of Existing Wells

This task includes work performed by subconsultant Emery & Garret Groundwater Investigations (EGGI), who specialize in hydrogeologic services. A copy of their proposed scope of work is attached to this ESR, and includes the following:

- *Review of background data*
- *Site visit*
- *Inspect Wells after pump removal*

- *Monitor water production and water levels for 2 weeks*
- *Design of a pumping test*
- *48-hour pumping test on Well #1 (BW-1)*
- *48-hour Pumping test on Well #2 (BW-2)*
- *48-hour pumping test on dug wells (W-1)*
- *Collect water quality data during pump tests*
- *Compile and analyze data and prepare final report describing findings as related to sustainable yield for each water source.*

Added:

Task 8 – Source Building & Storage Evaluation/Preliminary Design

This task will include a kickoff meeting with the County Board of Commissioners, Department of Public Works, NHDES and UE to discuss goals, expectations, and requirements for this phase of the work.

During the system evaluation conducted in 2021, several deficiencies were noted at the source (meter/chlorination) building that require upgrade. This building houses the electrical panels for the well pumps, the PLC that monitors and controls the system operation, meters (both source and distribution) and chemical feed for chlorination. Some specific deficiencies that require attention included the following:

- The source meters are currently read & recorded manually, and the distribution meter is currently not functioning properly (not reporting to the PLC). Additionally, the meters are 20 years old and at the end of their useful life. These meters provide monitoring of the flow/volume sent to the system and are critical for groundwater withdrawal reporting to NHDES and for comparing withdrawals to well yield. They also provide the ability to evaluate water usage and assess the possibility of leakage by enabling a water balance/water audit to be performed.
- The current PLC receives tank level, distribution flow data, and alarms and emails or texts the information to the operator daily. The operator does not currently have the capability to retrieve and save historical data from the PLC, nor to modify the control system.
- The current cellular modem associated with the SCADA system is 3G and requires replacement, as 3G service is being phased out by the carriers.
- There are currently no well level transducers, which does not allow monitoring of the sources, and does not allow fail-safe interlocks to turn the pumps off in the event of excessive drawdown.
- Additional deficiencies exist with the deterioration of building components that require repair or replacement to ensure that the facility can continue reliable operation.

The evaluation/preliminary design work associated with the Source Building will generate preliminary drawings and a basis of design to include the following:

- Replacement of 4 flowmeters (source & distribution) with addition of signal converters connected to SCADA panel.
- Repair/replacement of select areas of wall plywood, as necessary, including insulation, to replace water/moisture damaged sections. Evaluate installation of FRP panels over all walls and ceiling vs re-painting
- Replace propane heater

- Prep & paint existing piping
- Upgrade to SCADA system including new 5G cellular modem, additional flowmeter signals, well level signals, chlorine analyzer signal, and new software to access data & change setpoints from the office.
- Trim trees/branches from incoming electrical line.
- Assess condition of ventilation fan and louvers and replace if necessary.
- Evaluate new residual chlorine analyzer and discharge for chlorine alarms.
- Electrical work will be performed by a subcontracted electrical engineer, Lee Carroll, P.E.
- Three site visits have been included.

Based on existing water quality data, we have assumed that no new treatment, other than the existing disinfection, is necessary. More recent compliance sampling from 2021, and a recent sanitary survey are now available and will be reviewed. Additional water quality sampling of each individual well is proposed during of the source capacity evaluation (being performed as part of ESR #3), to provide additional and more source specific water quality information.

We have assumed that the existing 2001 Provan & Lorber Plan (Sheet 2) pdf would be used as a site plan for the well level transducer work to each of the three wells (i.e., no additional field survey is planned).

UE will evaluate the improvements needed in more detail in order to prepare a basis of design for the work associated with the source building improvements and adjust the current cost opinion, as necessary.

The existing 200,000 gallon concrete potable water storage tank, which is located adjacent to the Source Building, was cleaned, and inspected in 2018. At that time, several minor deficiencies were identified that require repair, including deteriorating concrete and a gap between the walls and roof. These repairs are needed to sustain the long-term integrity of the structure as well as protect water quality in the tank. This is the only potable water storage in the system. UE will review the repairs recommended in the report with the tank inspector and a structural engineer to develop a basis of design for the materials and methods for the necessary repairs and evaluate the best procurement methods for the work.

Task 9 –County Complex Meter Evaluation & Preliminary Design

The buildings at the County Complex are currently unmetered. Although the residential users downstream are metered, having no meters on in the County facility makes it difficult (if not impossible) to perform a water audit or assess possible leaks. By metering each building, the County will be able to better assess if the water use by that building is commensurate with the building use (number of fixtures, beds, etc.), as well gain an overall assessment of the system by comparing source water produced to metered water use.

An evaluation of each service entrance will be conducted to evaluate necessary meter sizes, piping modifications needed, etc. UE will make a site visit to evaluate the existing service entrance into each building and take measurements. We will request building use information (number of fixtures, employees, beds, etc.) from the County to estimate water usage and properly size the meter for each application.

We will provide sketches of the proposed modifications at each location, technical specifications for the meters, piping and valves and a bid package which can be used in obtaining bids/quotes for the work.

Task 10 – Residential Meter Evaluation & Preliminary Design Allowance

The existing residential meters in the village are about 20 years old and are manually read. This causes issues when residents block access to meter reading. As discussed in previous tasks, accurate metering, and accounting of water in the system is necessary for responsible management and financing of the system. The typical life of a meter with proper accuracy is about 20 years, therefore, the meters are due to be replaced. The implementation of a radio read system will allow faster and more accurate meter reading, thereby providing better data for system monitoring.

The exact scope for this task has not been determined. Work associated with this task will be conducted as requested (in writing, via email) by the Director of Public Works. The following work may be included:

Meeting with the meter vendor to review the requirements for adding the new radios to the existing residential devices and the equipment needed for the radio reading system. Evaluating the requirements to interface the new meter reading system to the existing billing system. Working with the County to determine the best method for procurement and construction. Updating the cost opinion for the work. Documenting the work performed by writing a brief technical memorandum outlining the proposed equipment, work required to implement the new meter reading system, proposed method of procurement/installation for the meters and radios, and an updated construction cost opinion.

Owner's Responsibilities:

Owner shall make available to the Engineer the following:

- Existing operational data and water quality data
- Access to all water system facilities
- Provide water use information for County facilities – number of fixtures in each building, number of beds, number of employees, etc.

Work Not Included:

The following is not included in the Scope of Work:

- New source siting
- Bidding or construction services.

Budget Costs:

Task	Previous ESR #2 Total	Change in Fee	New ESR#2 Total
Task 2 - Hydrogeologic Evaluation of Existing Wells	$60,000	**($60,000)**	**$0**
Task 3 - Evaluation of Existing Source Capacity	$23,100	$0	$23,100
Task 4 - Funding Assistance Allowance	$11,900	$0	$11,900
Task 5 - Hydrant Replacement Evaluation and Design Allowance	$10,300	$0	$10,300
Task 6 - Old Route 28 Water Main Preliminary Design	$32,200	$0	$32,200
Task 7 - Meter/Chlorination Building Improvements –final design	$9,200	$0	$9,200
Task 8 - Source Building & Storage Evaluation/Preliminary Design	$0	**$37,600**	**$37,600**
Task 9 - County Complex Meter Evaluation & Preliminary Design	$0	**$13,700**	**$13,700**
Task 10 - Residential Meter Evaluation & Preliminary Design Allowance	$0	**$4,100**	**$4,100**
TOTAL	$146,700	**($4,600)**	**$142,100**

Fees for engineering services will be on an hourly basis for the personnel involved. Such hourly fees will be based on the Engineer's technical payroll plus an allowance to cover overhead and profit. Fees also include reimbursement for transportation expenses (per mile), out-of-pocket travel expenses (tolls), prints, telephone calls and miscellaneous materials that may be required to complete the work.

Suggested budgets, as used herein, are best estimates by Underwood Engineers. The budgets are based on available information and prior to detailed research on the Project. Budgets are not intended to be fixed prices but are reasonable estimates of average costs to complete projects of similar size. Budget will not be exceeded without written authorization.

Schedule:

Award Engineering Contract	May 2022
Source building & Storage Evaluation	May - November 2022
County Meter Evaluation & Prelim Design	June - September 2022
Residential Meter/Radio System Evaluation & Preliminary Design	June - September 2022

Approval:

Approval and authorization to proceed with the work:

Terry McCarthy, Chairman Date
County of Carroll Commissioners

4/26/22
Keith A. Pratt, P.E Date
President, Underwood Engineers, Inc.