

**ENGINEERING SERVICES REQUEST  
AUTHORIZATION TO PROCEED**

To: Underwood Engineers, Inc. (**Engineer**)  
25 Vaughan Mall  
Portsmouth, New Hampshire 03801

ESR No.: #2  
File No.: 2718  
Date: April 1, 2022  
Description: **Source Evaluation &  
Preliminary Design**

From: County of Carroll (**Owner**)  
Office of the Commissioners  
95 Water Village Road  
Ossipee, NH 03864

Owner's Contact(s) (this project):  
Engineer's Contact(s) (this project):

Will DeWitte, Director of Public Works  
Lynnette Carney, P.E., Project Manager

Under agreement for Professional Services as Consulting **Engineer** for the **Owner** (General Services Agreement UE # N2911 dated August 12, 2021), **Engineer** is authorized to proceed with the following work:

**Description:**

The Carroll County Farm complex and approximately 40 homes in Ossipee Village are served by the Carroll County Water System. An evaluation of the system was performed by UE in 2021, which resulted in several recommendations for additional evaluation and improvements to various areas of the system.

The sources of supply for the system include two bedrock wells BW-1 and BW-2, and a system of three dug wells. Dug wells W-1 and W-2 flow by gravity into W-3 where water is pumped to the storage tank via the meter/chlorination building. BW-2 is the primary water supply, and on/off operation is controlled by water level in the storage tank. BW-1 and W-3 are secondary sources, are pumped together, but are only operated when the storage tank reaches a low water level. This occurs twice a year when the system is flushed. There is no water level monitoring in any of the wells, nor is the yield of the wells known. Various and differing estimates of yields and pump rates were found in historical data. Possible problems with BW-1 blowing air were reported by the operator.

Water supply capacity has been an issue in the past, but there have been no supply improvements for over 20 years. Demands have increased over this time due to the addition of new facilities at the County Complex (new jail in 2003 and a new nursing home in 2010). There is also potential for increased future water demand in the Village, and the potential for future expansion of existing facilities at the County Complex.

The 2021 System Evaluation notes several deficiencies in the system, and recommended several improvements, which were prioritized. Source evaluation and improvements were ranked as the most important improvements and include the following:



1. Inspect existing wells and verify capacity
  - Remove pumps & inspect, verify well depth and water level depth in each of the wells. (Open them up, see what is there and what is functioning).
  - Verify presence or absence of conduits between the wells and the control buildings (for level transducers).
  - Verify operation of Wells BW #1 & W-1, and pumping flowrate. This may be done by turning BW #2 off at the HOA switch and forcing BW#1 and W-1 to operate alone to fill the tank.
  - Verify the pumping rate of BW#2 throughout its pump cycle, drawdown, and long-term yield.
  - Verify drawdown in each of the wells.
  - Perform pumping tests on the wells to monitor drawdown over time, estimate the safe yield of each, determine if there is any interference between wells, and determine the Wellhead Protection Area (WHPA) for each source.
2. Install stilling tubes and level transducers in each well and connect to the SCADA system. Install safety interlocks to shut down the well pump if water level reaches a low level.
3. Clear brush from wellheads and upgrade the access road to allow easier maintenance.
4. Replace wooden electrical boards for disconnects at the wells (W-1 should be replaced; further assess condition at BW-1 and 2).
5. W-2 and W-3 - clean and assess the condition of concrete covers; patch/resurface the concrete, as necessary.
6. If W-1 and BW#1 are found to have adequate, reliable, long-term yields year-round, consideration should be given to altering the control system so that the wells are alternated each time the tank requires filling (perhaps BW#2 one cycle and W-1 and BW#1 together on the next cycle). This will allow resting of BW#2 and provide more even wear on equipment.

This proposal includes work to begin the recommended work associated with the source water evaluation, including an evaluation of source capacity. Also included is preliminary design for replacement of the system hydrants and Old Route 28 water main, and funding assistance. Finally, final design of the improvements at the source (meter/chlorination) building and storage tank are included in this scope.

Preliminary design for improvements at the source (meter/chlorination) building, the storage tank, County Complex meters, and residential/village meters was included in ESR #3, which will primarily be funded by the NHDES Planning Grant.

Subsequent work not included in this proposal may include evaluation and development of an additional groundwater source, if determined necessary. Additionally, future work will include:

- Final design and construction administration services for the County Complex meters, residential meters, and the new meter reading system.



- Construction administration services associated with replacement of the hydrants.
- Construction administration services associated with the meter/chlorination building upgrade and storage tank improvements.
- Final design and construction administration services for the Old Route 28 water main replacement.

Underwood Engineers proposes to conduct the following scope of work to begin the source work recommended in the system evaluation report.

### **Scope of Work:**

Note, Task 1 was the Water System Evaluation previously completed. This scope includes Tasks 2 through 7. The **Engineer** will provide the following engineering services as part of this agreement:

### **Task 2 – Hydrogeological Assessment – 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.

### **Task 3 – Evaluation of Existing Source Capacity**

This work would begin with a kickoff meeting to discuss the project scope of work and goals to ensure that all parties are on the same page, as well as to either collect, or identify information needed to complete the work.

Underwood's engineering work for this task will include the following:

- Coordination with EGGI
- Provide necessary background information to EGGI
- Assist the County in procuring a well contractor to remove and reinstall the well pumps.



- Coordinate with the County's SCADA provider to obtain operational information, and modifications to the operational system needed to execute the pump tests. We have included a \$6,000 allowance to retain EOS Research as a subconsultant to download data and modify controls as necessary during the pump tests.

At the completion of the work, we will conduct a meeting with the BOC to inform them of the results and discuss next steps.

**Note – This work requires the assistance of a licensed well contractor to remove and reinstall the pumps. We have assumed that this contractor would be hired directly by the County under a separate contract.**

**Additionally, repairs to the existing SCADA system may be necessary to enable flow data collection during the pump tests. These repairs are not included in this work.**

#### **Task 4– Funding Assistance Allowance**

We will provide funding assistance to aid in obtaining project funding, grant administration and assistance with disbursements. This will include applications for the NHDES planning grant, NHDES asset management plan grant, DWSRF pre-application, project information needed for disbursement of ARPA funds, and information requested by NHDES relative to grants. Depending on the final funding mechanisms for the project, additional funds may be needed for this task, which could be added by amendment.

#### **Task 5 – Hydrant Replacement Evaluation and Design Allowance**

There are twelve hydrants in the system that require replacement due to their age, disrepair, and difficulty in obtaining parts. 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:

Evaluation of the locations of the hydrants and developing a conceptual plan to sequence this construction to minimize downtime of the system. This plan would be combined with a technical specification for the hydrants to form a bid package the County can use in soliciting quotes from Contractors for this work. Hydrant locations will be reviewed by the County DPW, but will in general, be in the same location as the existing hydrants.

#### **Task 6 – Old Route 28 Water Main Preliminary Design**

The existing water main on Old Route 28 is the only water main not replaced in the 2000 system upgrade. It is a 4-inch main (unknown material), with insufficient capacity to support the fire hydrants present and should be replaced. Although this task was the lowest ranked project recommended in the 2021 System Evaluation, the current state of the design and construction industry is such that there are long lead times for services such as survey, as well as materials for construction. Therefore, we recommend proceeding with the preliminary design phase for the



water main so that the project can remain on a timeline that would allow construction to be possible within the timeframe of the County ARPA funds.

This task will include the following preliminary design tasks:

- Using GIS/Lidar (publicly available) data to develop a preliminary plan and route for the new water main, taking into consideration the approximate location of the existing main, water service provisions during construction.
- Conduct a detailed topographic survey of the water main route to be used in final design.
- Conduct ledge probes (up to 10) and borings (up to 3) if necessary.
- Identify permits required for the main replacement work.

The final product for this task will be conceptual design plans.

#### **Task 7 – Meter/Chlorination Building & Storage Final design**

Note, the evaluation/preliminary design phase for this work, was included in ESR #3, because it fit the eligibility criteria for the NHDES Planning Grant. This task picks up where Task 8 from ESR #3 leaves off, taking the basis of design, and implementing it into design documents that are ready for bid.

Using the Basis of Design for the improvements developed in the preliminary design phase under ESR #3, Final design sketches and specifications will be developed to permit bidding and construction of the work. The final design documents will be suitable for requesting quotes or proposals for the construction work. This design work includes specifying the following:

- Replacement of four 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.
- 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
- Replace ventilation fan and louvers and replace, if necessary.
- Install new residual chlorine analyzer and discharge for chlorine alarms, if feasible.
- 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.



We have assumed that the “bid documents/RFP” for the work at the meter/chlorination building would not include full-size construction drawings, but rather include limited sketches, details, and schematics to depict the work, combined with an abbreviated set of contract documents. This would include a simplified NHDES contract, combined with abbreviated technical specifications.

We have assumed that the existing 2001 Provan & Lorber Plan (Sheet 2) would be used for the conduit work to each of the three wells (i.e., no additional field survey is planned). This drawing will be supplemented by field observations and measurements.

The bid documents/RFP would be submitted to NHDES for approval and would be provided to the County in pdf format, ready for bids/quotes.

This proposal does not include infrastructure design for a new groundwater source if that is deemed necessary. The building improvements should not be completed until we know the status of a new groundwater source, as this would affect some of the planned improvements (control system upgrade, meters, etc.).

### **Owner Responsibility**

Owner shall make available to the Engineer the following:

- Existing operational data and water quality data
- Access to all water system facilities
- Coordination with team for execution of pumping tests

### **Work Not Included**

The following is not included in the Scope of Work:

- New source evaluations or well siting
- Design of treatment systems
- Bidding or construction services

### **Budget Costs:**

The work under this contract is intended to be funded from the County ARPA funds.

Task 2 - Hydrogeologic Evaluation of Existing Wells	\$ 60,000
Task 3 - Evaluation of Existing Source Capacity	\$ 23,100
Task 4 - Funding Assistance Allowance	\$ 11,900
Task 5 - Hydrant Replacement Evaluation and Design Allowance	\$ 10,300
Task 6 - Old Route 28 Water Main Preliminary Design	\$ 32,200
Task 7 - Meter/Chlorination Building Improvements –final design	<u>\$ 9,200</u>
<b>TOTAL</b>	<b>\$146,700</b>



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.

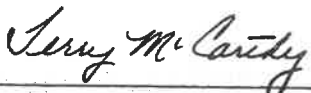
**Schedule:**


Underwood Engineers, Inc. proposes the following Schedule for the project. This schedule may change based on the findings of Tasks 2 & 3.

<b>Award Engineering Contract</b>	April 2022
<b>Source Evaluation</b>	April - October 2022
<b>Pumping Tests</b>	June - August 2022
<b>Hydrants Preliminary Design</b>	October - December 2022
<b>Old Route 28 Preliminary Design</b>	September 2022 - February 2023
<b>Metering/Chemical Building &amp; Storage Final Design</b>	November 2022 - April 2023

**Approval:**

Approval and authorization to proceed with the work:

  
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County of Carroll Commissioners      Date  
Terry McCarthy, Chairman

  
\_\_\_\_\_  
Keith A. Pratt, P.E., President      Date  
Underwood Engineers, Inc.      4/7/22

