

Emery & Garrett Groundwater Investigations, LLC

***56 Main Street • P.O. Box 1578
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June 17, 2015

Mr. Michael Unger
Underwood Engineers
25 Vaughan Mall #1
Portsmouth, NH 03801

Mr. Dean Peschel
City of Dover
288 Central Avenue
Dover, NH 03820-4169

Re: Dover City-wide Groundwater Monitoring Program – Letter/Proposal No. 1025

Dear Mike,

Please find herein our proposal that describes the recommended groundwater monitoring program that we believe should be initiated in Dover, New Hampshire. This groundwater monitoring proposal is intended to be used to better manage groundwater resources that are the foundation of Dover's public water supply. Understanding how climate change will affect groundwater levels, groundwater quality, and ultimately groundwater supplies is imperative. It is strongly recommended that this program be initiated as soon as possible. A brief description of the groundwater monitoring program is presented as follows:

I. PURPOSE OF GROUNDWATER MONITORING PROGRAM

In order to effectively manage and protect Dover's vital groundwater supplies, a groundwater monitoring program shall be designed, installed, and implemented. Effective groundwater monitoring programs serve to protect the quantity of groundwater resources to ensure that a sustainable supply can be maintained. A comprehensive groundwater monitoring program will also identify any groundwater quality problems that may exist and serve to ensure that groundwater resources remain of high quality ... sufficient to meet public "safe" drinking water requirements. The benefits for developing a groundwater monitoring program are many and varied. These benefits include, but are not be limited to, the following:

- Provides an assessment of the changes that occur in groundwater storage in all aquifers being utilized by the City today and those that will be utilized in the future.
- Provides an understanding of the impact that rainfall events have on groundwater levels.
- Allows for an evaluation of the impact that drought has on groundwater levels and groundwater resource availability.
- Provides an assessment of changes in groundwater quality associated with changes in land use.
- Provides an early warning system for the migration of groundwater contaminants toward public supply wells.
- Provides an estimate of the groundwater recharge rates during both significant rainfall periods and drought periods.

- Provides an assessment of whether long-term over drafting (mining) of groundwater resources is occurring as a result of extended groundwater withdrawals.
- Provides an important understanding as to how climate change may adversely impair groundwater supplies in the future.

II. SELECTION OF GROUNDWATER MONITORING LOCATIONS

The criteria for selecting groundwater monitoring locations will be based upon a variety of factors. These will include, but not be limited, to the following:

- Topography
- Geology (based upon aquifer thickness, aquifer type, and aquifer distribution)
- Watershed boundaries
- The presence of potential sources of contaminant threats to groundwater quality
- The presence of other domestic, community, irrigation, and/or municipal groundwater supply wells
- The boundaries of potential planning areas

III. SUMMARY

Groundwater monitoring is an active process that must begin with an overall design of the program followed by the installation of monitoring wells at strategic locations. Automated water level monitoring equipment will be installed in all of the selected monitoring locations. Both water level and water quality data will be collected in accordance with a predetermined time and schedule. Such monitoring data will be compiled by a professional hydrogeologist and a report will be prepared and submitted annually to the City regarding the status of groundwater resources within the selected “monitored Aquifer Areas.”

Based upon other New Hampshire groundwater monitoring programs, it is anticipated that it will take up to one year to fully initiate this program after a contract for the monitoring program is complete. The program should continue for the first three years before modifications to the sampling and data collection program are made, such that a level of consistency of data can be established.

The groundwater monitoring program will be carried out in the Areas that include the following:

1. Hoppers Aquifer
2. Barbados Aquifer
3. Williams Pond Aquifer
4. Pudding Hill Aquifer
5. Smith/Cummings Aquifer
6. Bedrock Aquifer/Day Property

The *design* of this groundwater monitoring program will take approximately 90-120 days to complete. The implementation of the monitoring program would take six months so that the long-term monitoring program will be able to collect data during the last 60 days of the first year.

I hope you find the information contained herein responsive to your needs. If you have any questions regarding this proposal, please do not hesitate to contact me.

Best regards,

A handwritten signature in black ink, appearing to read 'J. Emery', with a stylized flourish extending from the top right.

James M. Emery
President/CEO

Emery & Garrett Groundwater Investigations, LLC

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SERVICE CONTRACT

PROPOSED BUDGET

Dover City-wide Groundwater Monitoring Program – Letter/Proposal No. 1025

The estimated costs for the first year of the City-wide Groundwater Monitoring Program are anticipated to be as follows:

1. Design of monitoring network\$17,500
2. Drilling of monitoring wells\$35,000
3. Purchase and installation of automated monitoring equipment.....\$35,000
4. Water quality data collection\$13,500
5. Collecting, compiling, and plotting all water level data\$15,000
6. Preparation of annual report.....\$13,500

TOTAL ESTIMATED COST.....\$129,500

UEI and EGGI agree that this signature page constitutes a binding agreement between UEI and EGGI.

**APPROVED FOR
UNDERWOOD ENGINEERS**

**APPROVED FOR
EMERY & GARRETT GROUNDWATER
INVESTIGATIONS, LLC**



By: _____

By: _____

Name: _____

James M. Emery
President/CEO

Title: _____

Date:

Date: _____

6/17/15