Public Works Committee Water Facility and Annual Report 2021

There has been progress this past year regarding our municipal water system and addressing the ongoing water quality situation. I am happy to provide this report which outlines progress to date and future direction. As the community is aware, in Spring 2020, the Rhode Island Department of Health (RIDOH) mandated a 4-log chemical disinfection for the fire district. We continue to engage with RIDOH on developing a treatment facility which will meet with their approval.

Summary of our Water System Source

Our water system utilizes 2 groundwater wells which are just under 30 feet deep. The unconfined groundwater essentially flows downhill, from the area above Route 1 to the ocean, in a southerly direction as a 20-25 foot thick stream. The upper boundary of this stream fluctuates, defined by the water table and an impenetrable bedrock, 30 feet down, forms the fixed deep boundary. Beneath the ground surface soil, and above the impermeable bedrock, is a bed of glacial moraine material (rocks, sand, and gravel) which is where the groundwater lives and flows.

This groundwater, an unconfined aquifer, is solely dependent upon rainwater for its source and recharge. Therefore, during periods of drought the water table drops and the groundwater flow to the ocean is less. During periods of high rainfall the water table rises, sometimes close to the ground surface, and the excess groundwater flows into the ocean.

Our two groundwater wells are susceptible to water quality issues due to the following factors:

1. Surface contaminants such as bacteria, nitrates, total organic compounds (TOC)
    a. A function of the varying water table depth, adjacent septic systems, and surface organic composition
2. Dissolved minerals (iron, nickel, manganese, etc)
    a. A function of glacial moraine material.

Since we began testing in the late 1980's our water samples have, on occasion, sampled positive for coliform bacteria typically winter and spring, or during periods of increased rainfall. This especially occurred during the wet summer of 2019 when the water table rose. The persistent positive coliform samples through winter into early 2020 prompted the RIDOH 4-log chemical disinfection mandate in Spring 2020.

Nitrate levels are seasonal and tend to peak in the fall. They are primarily due to surface lawn fertilizers and septic system sterile discharge. We have been testing our nitrates monthly since 2014 and we see a consistent downward trend for the past 6 years. We do not see this as a critical issue, however our monthly testing will allow us to continue to actively monitor the trends.

One of our wells, Well 2, has persistent elevated iron levels and both our wells have borderline elevated manganese as well as total organic compounds (TOC). Iron, manganese, and TOC interact negatively with 4-log chemical (chlorine) disinfectants to create significant water quality issues such as cloudy precipitates from the iron and manganese, and halogenated chlorine byproducts from the TOC.

Treatments to remove minerals and TOC typically require chemical precipitation and filtration with regular filter backwashing and regeneration. The water discharge volume can be significant and our well field is limited, based on location, geological structure, proximity to wetlands, regulatory restrictions as to how much, if any, water discharge can be accepted.

Update on Progress and Proposed Water Treatment Facility

The multiple elements that are currently found in our water system, as summarized above, make the process for delivering a reliable 4-log disinfection more complex than originally anticipated. As a result, we have engaged several engineers to propose and develop a water treatment facility which will not only assure our community will receive 4-log disinfected water, as required and mandated by RIDOH to prevent the intermittent coliform or more severe bacterial contamination, but will also address the negative water quality issues created by the 4-log chemical disinfection. The goal is to develop a state of the art water treatment facility which will provide long-term high quality potable water for our community.

At last year's annual meeting we asked for the community to approve ($) 900,000 toward the installation of a RIDOH compliant 4-log disinfection which would include technical modifications primarily to remove iron, manganese, and possibly TOC. A 4-log chemical disinfection design submitted to RIDOH in June 2020 has not, as of the date of this report, yet received final RIDOH approval but we have been responsive to the RIDOH to address their concerns and design modifications. Upon RIDOH final approval of the design specifications we will initiate the construction phase of this 4-log chemical disinfection is expected to cost $60,000 to install. It does not, however, address the elevated iron and manganese levels, as noted above. Therefore, while this initial chemical disinfection installation will meet the mandate of RIDOH, it will not deliver acceptable quality water to our community.

To develop the more comprehensive system, we directed C&E Engineering in the Fall of 2020 to look at various technologies which would remove from our water dissolved minerals negatively impacted by chemical disinfection. Given our lack of an accessible location to properly and safely discharge waste water generated during this removal, a critical system design requirement was a near zero waste water volume with scalable function across our 10-fold seasonal daily water usage spread; i.e 5,000 gallons per day in winter vs 55,000+ gallons per day in summer.

In a report dated May 2021 C&E was able to identify four vendors (of the original 14 vendors presented with the RFP) who offered systems (products) which would meet the design requirements. In order to determine which product would work best for our water treatment needs, C&E recommended a pilot test be performed to evaluate the various vendor technologies “head to head”. Due to waste-related concerns with one of the vendor’s proposed products, C&E proposed we proceed and pilot test three vendor proposals. (see Table 1)

The pilot test would be a turn key operation – installed and managed by a contractor familiar and experienced with managing pilot installations and would run all three proposed products.The pilot install would run parallel to and not impact daily water delivery, and would be completed within about 3 months. Pilot testing plans will be drawn up and submitted to RIDOH. The proposal including engineering oversight and extensive water analysisis, see table 4 below, was for $153,560.

The Public Works committee studied the report and proposal and agreed that a pilot test be undertaken on the recommended 3 vendor products This would confirm functionality and effectiveness for our particular water source, assure the finished water product would meet or exceed design specifications, and allow for a performance guarantee of the newly installed water treatment facility. These vendors use different technologies some of which have other potential benefits, i.e. non chemical 4-log disinfection capabilities (not yet RIDOH approved). A recommendation was made to the Board of Governors to proceed with a Pilot Test, at a cost of up to $175,000, to compare these three vendors.

Breakdown of Costs Associated with the New Water Facility

The subsequent tables provide an overview of the projected costs of a completed water treatment facility associated with the three vendor products the Committee is currently reviewing. As the information below outlines, the proposed cost of this facility is approximately seven hundred thousand dollars more than what we originally requested for funding last year. This increase in cost is due to the need for the community to develop a new site for a larger pump house to house the new facility and provide space for future potential upgrades and other treatment contingencies.

The funding is broken down as follows:

- **Table 1** summarizes the cost, by vendor, of their proposed product;
- **Table 2** summarizes the infrastructure cost a new water treatment facility (including new pumphouse, design, project management, etc) to support the chosen vendor product;
- **Table 3** provides a contingency budget for unexpected costs
    - COVID labor and supply related risks;
- **Table 4** summarizes the cost of the pilot testing phase;
- **Table 5** summarizes the total cost for each of the three proposed vendor products under consideration, pilot testing, infrastructure costs, and the 4-log Chemical disinfection presently under ongoing RIDOH review.

Table 1: Summary of Cost for Vendor Technology

Vendor	Technology	Cost
Suez Water Treatment Technologies	Ultra-Filtration	$572,000
Pure Aqua Inc.	Green Sand Filter	$240,000
Filtronics Specialized Media	Specialized Media Filter	$440,000

Table 2: Summary of Projected Additional Infrastructure Water Facility costs

System Equipment	$52,000
New Pumphouse	$140,000
Mechanical, Electrical Installation	$137,500
Engineering, Permitting, and Construction Management	$135,000
Infrastructure Facility Costs	**$329,500**

Table 3: Summary of 25% contingency

Vendor	Technology Cost	WTS Cost	Subtotal Cost	25% Contingency
Suez Water Treatment Technologies	$572,000	$329,500	$1,036,500	$1,300,000
Pure Aqua Inc.	$240,000	$329,500	$889,500	$968,000
Filtronics Specialized Media	$440,000	$329,500	$704,500	$1,168,000

Table 4: Pilot testing Cost breakdown

Engineering Services	$26,000
Pilot Testing Operation	$106,360
Analytical Testing	$21,200
Total	**$153,560**

Table 5: Total Facility Cost per each vendor with a 25% Contingency, Pilot Testing, and 4 Log Chemical Disinfection

Vendor	25% Contingency	Pilot Test	4 Log Disinfection	Total
Suez Water Treatment Technologies	$1,300,000	$175,000	$60,000	**$1,535,000**
Pure Aqua Inc.	$968,000	$175,000	$60,000	**$1,203,000**
Filtronics Specialized Media	$1,168,000	$175,000	$60,000	**$1,403,000**

Concluding Remarks and Request for Community Approval

With this new information, and depending upon which technology product is chosen, the total cost of the project could be as high as $1,535,000. We appreciate that C&E is very generous in their cost estimates even before the 25% contingency addition so we expect that costs may be well less than these numbers.

Nonetheless we would like to ensure that the facility we install includes the best technology available to address our needs today, but also be flexible enough to address potential future water related issues.

At last year's annual meeting, we projected a total cost of $900,000 for 4-log disinfection and associated technology upgrades. As this new information demonstrates, however, while we may be able to deliver a facility close to this cost projection (assuming no contingencies) we believe that *without expanding our budget to a larger value of $1,600,000* we will be limiting our choice of technology and thus the durability and effectiveness of our water system enhancements.

This value of $1,600,000 will also include the $65,000 of remaining debt from the prior water system upgrade in 2008-9.

Next Steps

We expect to initiate pilot testing this fall and have appropriate information for a final vendor product decision within 4 months. Based upon the vendor chosen the final water treatment facility design will be completed and submitted to RIDOH and appropriate other regulatory agencies for approval.

There is a good probability that the present 4-log disinfection design in front of RIDOH will be approved and require installation prior to completion of the water treatment facility. This installation will then be adapted and included into the final water treatment facility.

The community needs to be aware that water quality, upon installation of 4-log chemical disinfection, may be impacted for a period of several months, or longer, until residual chlorine levels in the distribution system can be stabilized. The final water treatment facility will certainly improve that situation.

Throughout this period we continue to test our wells and distribution system water monthly and we will comply with RIDOH directives and regulations to assure the water coming to your home is safe to consume.

PW Committee Annual Meeting Report 2021

My five year term as Public Works Chairperson has come to an end. It has been a very eventful term with much happening on our water front! I am honored to have served as chair alongside my committee members and the Board of Governors on behalf of the community. QCBFD is truly a special community. I thank the entire community for this opportunity.

I must acknowledge the members of the PW Committee, all of whom serve as volunteers, for their assistance, input, and true love of the Quonnie Community. Vincent Bailey, Dick Campbell, James Finn, Bob Frazier, Tom Frost, Jim Montstream, Fred “Fig” Newton, Steve Peet, George Prior, Greg Reppucci, and Tiffany Van Eislander.

A **special thank you to:** James Finn for maintaining our water usage logs, Bob Frazier for painting the speed bumps and traffic markings, George Prior for doing “everything”, and Tom Frost for keeping me focused and on track.

Please remember that **all Committee members are volunteers** and they do their best to accommodate our QCBFD residents. We appreciate your consideration of this.

The Public Works Committee wishes to share the following:

1. Lawn sprinkler systems and pool maintenance water systems **must not be cross connected** to the Municipal water system.
    a. PW committee has the authority, by RIDOH statute, to be allowed access to properties to confirm there are no cross connections to the potable Municipal water system. If reasonable access is denied by the homeowner, QCBFD has the right to isolate the property from the Municipal water supply.
2. **It is strongly recommended, since most properties in QCBFD are not primary residences, that water be turned off when you leave.** Any licensed plumber can assist with manual or remote shutoff valves.
    a. Please arrange for your home’s plumbing to be winterized! Every winter someone’s outdoor shower, faucet, or internal plumbing pipe bursts with the arrival of sub freezing temperatures. A burst internal pipe will ruin your home within a few minutes.
    b. The best prevention is to drain the pipes and shut off the water. If your home is heated be aware that heating systems can go down, due to power

outages and extreme weather, often for several hours or days, in severe winter freezing conditions.

3. Public works will continue to offer, for now, curbstop winter shutoff and turn-on as a courtesy. It is recommended that this **NOT** be done in place of an internal water shutoff valve as mentioned above. Further it is requested that someone be available to confirm water flow shutoff and turn-on within the residence. Please be considerate with turn-on and shutoff requests.
4. Vegetation growth and encroachment onto the roadways, which are privately owned by the QCBFD at a 40 foot width, **is a safety issue as it impedes sight lines at corners and interferes with traffic flow and emergency vehicles** by narrowing the passable roadway. Homeowners are responsible, at their expense, to maintain any vegetation on the QCBFD right of way. The Fire District will alert homeowners of vegetation which needs to be trimmed and, if necessary, trim or remove offending vegetation overgrowth and bill the homeowner.
5. Kenyon, Bayview, and Lucas were chip sealed this year. They were excluded at the first go around 2 years ago.
6. Speed bumps have started to be repainted and should be completed by the fall.

Respectfully submitted,

Vincent Reppucci
Chair QCBFD Public Works Committee