



OTTER CREEK  
ENGINEERING

**VILLAGE OF NORTH BENNINGTON**

**PRELIMINARY ENGINEERING REPORT**

**WATER DISTRIBUTION SYSTEM  
EXTENSIONS TO  
PFOA CONTAMINATED PROPERTIES**

**NORTH BENNINGTON, VERMONT**

**FINAL REPORT**

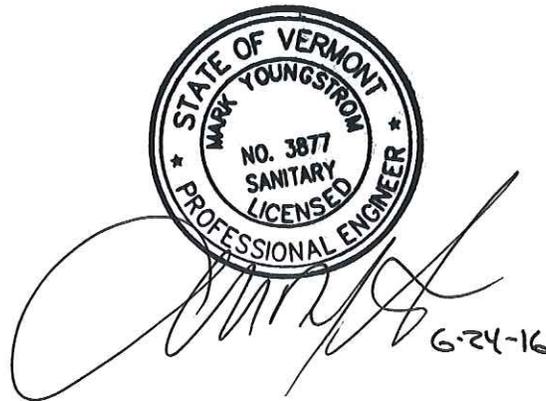
**JUNE, 2016**

# VILLAGE OF NORTH BENNINGTON

## PRELIMINARY ENGINEERING REPORT

### WATER DISTRIBUTION SYSTEM EXTENSIONS TO PFOA CONTAMINATED PROPERTIES

NORTH BENNINGTON, VERMONT



June, 2016

Otter Creek Engineering, Inc.  
110 Merchants Row  
4<sup>th</sup> Floor, Suite 15  
Rutland, Vermont 05701  
802-747-3080  
802-747-4820 - Fax  
[Info@OtterCrk.com](mailto:Info@OtterCrk.com)



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## 1.0 INTRODUCTION

During early 2016, the Vermont Department of Environmental Conservation (DEC) sampled groundwater wells near the closed ChemFab manufacturing building on Water Street in North Bennington. This effort was in response to perfluorooctanoic acid (PFOA) groundwater contamination, related to a similar facility owned by the same company, in nearby Hoosick Falls, NY.

The initial five private drinking wells tested in North Bennington, showed significant PFOA concentrations. The sampling area was quickly increased to greater than a 1½ mile radius around the former ChemFab facility and, to date, over 160 wells have been shown to have PFOA concentrations over the Vermont Department of Health's drinking water health advisory of 20 parts per trillion (ppt).



Saint-Gobain, the current owner of the ChemFab property, closed the North Bennington ChemFab plant in 2002.

Since the groundwater contamination was discovered, Saint-Gobain has arranged for point-of-entry treatment (POET) systems to be installed in all homes and buildings which have documented PFOA contaminated water. The POET systems are intended to be temporary, in place until municipal water service can be extended to these properties.

The Village of North Bennington's municipal source is Basin Brook in Shaftsbury, 5½ miles to the northeast of the ChemFab facility. No PFOA contamination was found either in the Village's water source, the filtered water exiting the Village's water filtration facility, or in the Village's water distribution system. Likewise, no PFOA contamination was found in the Town of Bennington's water system.

Following several meetings between DEC staff, representatives of Saint-Gobain, and Town of Bennington and Village of Bennington officials, it was decided that the only long-term, publicly acceptable solution to providing safe drinking water to the effected landowners would be the extension of municipal water service. A general plan was developed whereby the Village would allow extensions of water service outside the Village limits, to contaminated properties close to existing Village water mains. All other areas would be serviced by the Town of Bennington's municipal water system, where extensions from that system were viewed as practical and cost effective.

This Preliminary Engineering Report examines the physical configuration of the Village's potential water service extensions, the estimated cost of those extensions, the likely schedule and the permitting requirements necessary for implementation.



## 2.0 CONCLUSIONS AND RECOMMENDATIONS

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### Conclusions

1. The Village of North Bennington and Town of North Bennington have agreed to extend municipal water service, beyond their existing distribution service areas, to landowners with detected PFOA contamination above the State advisory limit of 20 ppt. Which municipality would serve which properties has been agreed upon between the Town of Bennington and the Village of North Bennington, based on location, serviceability and operation of the respective systems.
2. Water quality sampling by the DEC has proven the Village of North Bennington and Town of North Bennington municipal water systems are PFOA-free. Both systems are in compliance with State and Federal water quality regulations for drinking water.
3. The Village of North Bennington water system has the necessary uncommitted reserve capacity to supply water to the estimated 34 landowners with PFOA contaminated wells within the Village's proposed extension area.
4. Fire protection through hydrants is limited in the proposed extension area and use of hydrants in this area for flushing or fire protection will result in system residual pressures below 20 psi. Properties added to the system, at elevations higher than existing customers, will exacerbate this violation of the State's Water Supply Rule. Without corrective distribution system improvements, properties on Asa's Way, Susan Taylor Lane and Scarey Avenue will require a booster pump station for service.
5. The estimated cost of providing system improvements only to serve PFOA contaminated properties within the proposed Village extension area is \$5 million dollars.
6. The estimated cost of providing the service described above and improving the Village's fire flow capability in the south end of the system is \$6 million dollars.
7. The project has been determined to be exempt from Act 250 review and the only permits anticipated to be required are a Water Supply Permit to Construct (technical review) and a Construction General Permit (Erosion Control), both from the Department of Environmental Conservation. If a Booster Pump Station is designed, a permit from the Division of Fire Safety will be required.
8. Providing there is no delay in approving the project scope, or obtaining the source(s) of funding for design and construction, the project can be designed, bid and construction started by late fall of this year.
9. It is estimated that construction could be completed by the end of next summer (2017), allowing time for the POET systems to be removed before the end of 2017.
10. All proposed changes to the North Bennington water system are subject to the approval of the North Bennington Board of Water Commissioners.



## Recommendations

1. The Village of North Bennington Water Board, State Regulators and all other involved parties should read this report and address any questions, clarifications or requests for addenda to Otter Creek Engineering.
2. The source of funds for design of the selected improvements and the process of payment should be determined. The Village does not anticipate having to provide financing or bridge loans for PFOA remediation improvements. Likewise, the source of construction funding and the process for payment should be arranged such that construction bidding can follow closely behind completion of the design and permitting.
3. The Village should decide if it wishes to make improvements to its distribution system, as part of the PFOA remediation project. If so, the Village will need to schedule a bond vote for the Village's share of the project. Such a vote could take place during the design process.
4. Landowners within the proposed extension areas should be notified of the proposed project, the project schedule and the opportunity to connect to the Village distribution system at no cost. Landowners should also be notified they will become customers of the North Bennington water system and will be subject to the same water rates, bond payments and ordinance requirements as other Village water customers.
5. The Village should decide if the recommended improvements, not directly related to PFOA remediation, are to be constructed concurrently with the anticipated project. If so, a bond vote should be scheduled to obtain voter approval and the Water Board should review the Deed of Gift, as amended for construction of the water filtration facility.

### 3.0 EXISTING CONDITIONS

#### 3.1 Water Source / Treatment

The Village of North Bennington's primary water source is Basin Brook, flowing from a 1.14 square mile watershed on the western slope of the Green Mountains, near the border of Shaftsbury and Glastenbury. The brook has an estimated safe yield (1Q20) of 184,320 gallons per day (gpd). Except during very dry summer seasons, Basin Brook provides sufficient flow to serve the Village system.

The Village's secondary source of water are five shallow sand and gravel wells located below the Basin Brook intake near the intersection of East Road and Reservoir Road. The estimated safe yield of the well field is 504,000 gpd (assuming 24 hour per day withdrawal). Therefore, the water system's maximum day capacity is determined to be 688,320 gpd.

Raw water from both sources flows approximately 2½ miles, by pipeline, to the Village's water filtration facility off of Buck Hill Road. At that location, the combined source water is filtered, disinfected and stored in a one million gallon water storage tank, prior to distribution to the Town of Shaftsbury water distribution system and the Village of North Bennington's water distribution system. The filtration facility has two filter units, each with a rated capacity of 500,000 gpd.



#### 3.2 Service Area

The Village's existing water distribution system is illustrated on the exhibit included in Appendix A. Currently, all North Bennington customers reside within the Village limits, with the exception of the independent Shaftsbury water system, some customers in Paran Acres and a few customers on Murphy Road near the Henry Covered Bridge.

The system's current average day water demand has been approximately 330,000 gpd when Bennington College is in session. The Village adequately provides domestic water service to all its customers in accordance with the Vermont Water Supply Rule. Bennington College owns and operates its own consecutive public water system within the Village limits.

The Village distribution system is equipped with fire hydrants throughout the system. Regarding fire protection, a 2007 hydraulic modeling report of the Village's water distribution system, prepared by Otter Creek Engineering, indicated areas where adequate fire flows were not available. That report outlined specific improvements which would bring the system into compliance with both ISO fire flow recommendations and the

Vermont Water Supply Rule. The Village has begun some of those recommended improvements.

The Village system operates entirely from the pressure provided by the water storage tank at the water filtration facility (overflow elevation 881.0). A pressure reducing valve (PRV) in the Village center, at the north end of Water Street, reduces the system pressure serving Water Street from approximately 110 psi to 65 psi.

The Bennington College campus, located at a relatively high elevation, is served by a college-owned booster pump station. Bennington College has a "Permit to Operate" its consecutive water system, indicating a "recognized" water allocation of 48,000 gpd. The Town of Shaftsbury has a "Permit to Operate" its consecutive water system, indicating a "recognized" water allocation of 44,000 gpd.

North Bennington has construction standards for all materials connected to the system. In general, these include ductile iron pipe for water mains and copper tubing for water services. All water customers have meters.

### **3.3 Water Rates**

The Village currently charges its users a metered consumption fee of \$4.25/1,000 gallons and a Bond repayment fee of \$44/year.

For a residence using 200 gpd, this equates to a typical annual water bill of \$354.

### **3.4 Governance**

The North Bennington Water System was created and constructed through a Deed of Gift, dated March 3, 1924 from Laura H. Jennings, who gifted the entire system to the Village. The system still operates under the provisions of that Deed. The system is managed by a Board of Water Commissioners made up of five members. Vacancies are filled by the remaining Commissioners. The water system is physically maintained and operated by two, full-time Water Operators.



## **4.0 PROPOSED SERVICE AREA**

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### **4.1 Contaminated Distribution**

The exhibit in Appendix B, developed by DEC, illustrates the most current extent of the identified PFOA groundwater contamination, in relation to the Village boundaries and the Village Water Distribution System.

### **4.2 Proposed Service Area**

The exhibit in Appendix C illustrates the Village water main extensions required to provide service to the landowners with contaminated wells with PFOA concentrations greater than 20 ppt, as agreed between the Village and Town. All other contaminated properties, beyond these extensions, will be served by the Town of Bennington. The exhibit shows the minimum water mains and improvements necessary to provide water service to PFOA contaminated properties, without negatively impacting the system. The exhibit also shows distribution improvements which would provide additional hydraulic benefits to the water system in this area, i.e., improve fire flows and provide increased reliability.

### **4.3 Estimated Additional Water Demand**

The water main extensions illustrated in Appendix C will provide water service to approximately 41 contaminated properties, primarily all residential uses. The possibility exists of uncontaminated properties also requesting connection if the water main is constructed along the roadway. For water use estimating purposes 53 single-family residential properties is assumed. A random selection of 25 metered single-family water users on the North Bennington water system shows the average family water consumption is 121 gpd. Although this consumption is far below the State's unit figures for design, it is consistent with historical metered data from several similar communities. Using a per property water demand of 121 gpd, the total water additional consumption of is estimated to be 6,500 gpd for the proposed system expansion. The Village has this reserve capacity available to serve this expanded area.

A list of the highest daily flows, over the past year, through the North Bennington water filtration facility have been provided by the Water Operator, as listed on the following page:



**Table 1**  
**One Year Historical High Daily Flows through the**  
**North Bennington Water Filtration Facility**

<b>Date</b>	<b>Recorded Daily Filter Plant Flow (Gallons)</b>	<b>Reason For Adjustment</b>	<b>Adjusted 24 Hour Use</b>	<b>Adjusted Use Less Leakage Repaired on 5/9/16</b>
8/7/2015	456,000	31 hrs., (weekend)	364,800	321,600
8/22/2015	363,000	29 hrs. & 25 min., (weekend)	296,159	252,959
8/26/2015	354,000	Leak on West Street	354000	310,000
9/4/2015	461,000	Hydrant flushing	461000	417,800
9/21/2015	389,000	Leak on the Shaftsbury Water System	389000	<345,800
9/22/2015	400,000	Leak - Found Repaired on 9/30/2015	400,000	<356,800
9/23/2015	474,000	Leak	474000	<430,800
9/24/2015	361,000	Leak	361,000	<317,800
9/25/2015	406,000	Leak	406,000	<362,800
9/26/2015	432,000	Leak	432,000	<388,800
9/27/2015	402,000	Leak	402,000	<358,800
9/28/2015	447,000	Leak	447,000	<403,800
9/29/2015	386,000	Leak	386,000	<342,800
9/30/2015	353,000	Leak	353,000	<309,800
10/12/2015	356,000	College Flushing	356,000	312,800
10/16/2015	378,000	College Flushing	378,000	334,800
11/21/2015	357,000	26 hrs. & 50 min., (weekend)	319,304	276,104
12/6/2015	390,000	26 hrs. & 25 min., (weekend)	354,322	311,122
1/31/2016	368,000	25 hrs. & 10 min., (weekend)	350,940	307,740
2/25/2016	380,000	Incorrect total, actual was 353,000	353,000	309,800
3/6/2016	393,000	25 hrs. & 25 min., (weekend)	371,095	327,895
3/18/2016	409,000	27 hrs. & 30 min.	356,945	313,745
3/26/2016	391,000	26 hrs. & 50 min., (weekend)	349,714	306,514
4/2/2016	438,000	28 hrs. & 45 min., (weekend)	365,635	322,435
4/14/2016	449,000	Fire on Water Street and Bennington College flushing	449,000	405,800
4/30/2016	391,000	28 hrs. & 25 min., (weekend)	330,229	287,029

5/9/2016- Leak fixed by homeowner on 2" service line, approximately 30 gpm. Observed by Water Operator. Leak was in a field not visible from traveled area. Unknown how long it had been leaking.

Eliminating water use from corrected leaks, hydrant flushing, and fire demands, and correcting for 24 hour use, the maximum "normal" daily water use over the past year appears to be in the range of 300,000 – 350,000 gpd.

Assuming 350,000 gpd and estimating an additional 6,500 gpd for new PFOA affected customers (times a 1.3 peaking factor), yields an estimated maximum daily water use of 358,450 gpd, or 72% of the capacity of one of the two filter units. The Water Supply Rule requires that a filtration have redundant units such that a single unit can be out of service and the facility continue to function normally. Due to the Village's excellent source water quality, it is likely that the existing filters could be operated above their current rated capacity of 350 gpm, therefore having greater than a 500,000 gpd capacity. However, that determination would need to be made through trial and is not critical at this time.

Current Water Supply rule regulations require that when a water utility *"reaches 90% of the capacity of treatment or pumping systems capacity, it shall commence planning for the required additional capacity."* The term "capacity" is not defined here, and the maximum day demand may, or may not, be the appropriate trigger for this requirement. Regardless, the Village water sources or treatment facility are not expected to reach this threshold due to the anticipated additional customers.

## 5.0 PROPOSED PROJECT

As illustrated on Appendix C, the proposed minimum project will involve the following quantities:

**Table 2**  
**Proposed Minimum Water Main Extensions For PFOA Resolution**

Location	Length of Main	Pipe Size	Approximate # of Services
Matteson Road	1,500 feet	8-inch	5
Park Street	900 feet	8-inch	1
Harrington Road	4,200 feet	8-inch	6
McCullough Road	3,100 feet	4-inch	5
Scarey Lane	900 feet	2-inch	1
Asa's Way	1,500 feet	4-inch	7
Susan Taylor Lane	300 feet	2-inch	6
Murphy Road	2,000 feet	4-inch	5
Orebed Road	3,200 feet	4-inch	7
Orebed Road	3,600 feet	2-inch	5
Riverside Drive	1,100 feet	4-inch	1
Riverside Drive	5,400 feet	2-inch	4
<b>Total</b>	<b>27,700 Feet</b>		<b>53</b>

Under current conditions, all properties proposed to be served will have sufficient domestic service pressure with the exception of the higher homes on Asa's Way and Susan Taylor Lane. Water pressure on Water Street and its extensions to the south is currently reduced by a PRV at the north end of Water Street. This PRV has an incoming pressure of 110 psi and an outgoing pressure setting of 60 psi. With this current reduction, the highest house on Asa's Way would have a static pressure of only 29 psi and certainly the pressure would be zero during a period of high water demand such as use of a fire hydrant. To increase the service pressure, the PRV could be adjusted to provide 40 psi at the highest house by increasing the PRV output from 60 psi to 71 psi. This would change the static pressure at the lowest house service on the system (Murphy Road at Henry Bridge) from 95 psi to 106 psi. However, this would not address the significant hydraulic pressure losses during a fire event on Water Street.

As shown in Appendix A, adequate fire flow is limited, or unavailable, on the south end of Water Street. Adding the homes on Asa's Way, Susan Taylor Lane and Scarey Lane to the distribution system will compound this problem since those homes would be the first to drop below the minimum 20 psi service pressure required in the Water Supply Rule under all water demand conditions (including fire flows). To mitigate this issue:

**Option 1** - A booster pump station could be constructed to provide domestic water service to those homes on Asa's Way, Susan Taylor Lane and Scarey Lane not currently on the Village system.

This option maintains the existing fire flow/Water Supply Rule deficiencies without making the existing deficient condition worse.



**Option 2** - A new 8-inch (minimum) water main could be constructed along the entire length of Park Street from West Street to River Road. There is one contaminated well in the unserved "gap" between the existing Village water mains. Construction of this main would require a PRV vault on Park Street to match the setting in the existing PRV vault, if the existing vault was retained and the Village desired to continue a reduced controlled pressure in this area.

This option above will correct the majority of fire flow and Water Supply Rule deficiencies in this section of the distribution system and eliminate the need for a Booster Pump Station (if the existing PRV valve is eliminated). The quantities of piping required for this alternative is listed on Table 4 in the next section.



## 6.0 ESTIMATED PROJECT COSTS

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### 6.1 Construction Cost Estimates

Preliminary opinions of construction costs have been prepared for the system expansion and improvements under consideration. These estimates are based on Otter Creek Engineering's experience with similar projects, recent construction bids and our knowledge of site conditions. At this phase of project estimating, some assumptions on general soil/groundwater conditions, depth to ledge, pavement disturbance, and other construction conditions must be made. Table 3 details the estimated total project costs for the minimum Village system expansion to provide municipal water service to PFOA affected property owners. Table 4 Incorporates additional improvements to improve system fire flow hydraulics in this southern portion of the water distribution system.

### 6.2 Other Project Costs

Beyond actual construction costs, project expenses also include engineering, permitting assistance, legal services, short term borrowing expenses, easement costs, and other project related costs.

- a. **Technical Services** - Over the years, the Agency of Natural Resources and Rural Development have developed a technical services "curve" for water supply projects used as a general guideline for evaluating fees as a function of construction cost. For this phase of engineering study, the estimated construction costs are used to estimate technical fees during design, bid and construction phases of the project. In our experience, subject to the nature of the project, we have found that this fee curve is a useful and a reasonable tool for estimating fees.
- b. **Legal/Fiscal/Administrative Expenses** - In addition to technical fees, projects of this nature typically incur costs for legal and accounting services, and often times fiscal expenses for short term financing to bridge between expenditures and funding availability. Due to the nature of this specific project's funding, these costs are expected to be minimal.
- c. **Contingency** - Given the early phase of this project it is prudent to include a contingency in the overall budget to account for variability on construction, material, and equipment pricing, and unanticipated design considerations. A contingency of 20% of estimated construction cost is included for this project due to the preliminary nature of the estimate. This percentage is often reduced after construction bids are received.
- d. **Land Acquisition** - It is assumed that all project sites and easements necessary for the project have been obtained or will be obtained at reasonable costs. It is anticipated that all water main construction, with the possible exception of the booster station, will be in the public highway right-of-way. Individual building services will obviously be on private property and will require temporary construction easements.



**Table 3 - Estimated Project Cost**  
**Proposed Village of North Bennington Water Distribution System**  
**Option 1 - PFOA Remediation Only**  
**(Reference: Appendix C)**

	<b>Description</b>	<b>Total Qty.</b>	<b>Unit Cost</b>	<b>Total Cost</b>
1.0	Matteson Road - 8" water main	1,500 lf.	\$125 /lf.	\$187,500
2.0	Park Street - 8" water main	900 lf.	\$125 /lf.	\$112,500
3.0	Harrington Road - 8" water main	4,200 lf.	\$125 /lf.	\$525,000
4.0	Scarey Lane - 2" water main	900 lf.	\$70 /lf.	\$63,000
5.0	Asa's Way - 4" water main	1,500 lf.	\$110 /lf.	\$165,000
6.0	Susan Taylor Lane - 2" water main	300 lf.	\$70 /lf.	\$21,000
7.0	Murphy Road - 4" water main	2,000 lf.	\$110 /lf.	\$220,000
8.0	McCullough Road - 4" water main	3,100 lf.	\$110 /lf.	\$341,000
9.0	Orebed Road - 4" water main	3,200 lf.	\$110 /lf.	\$352,000
10.0	Water Services	53	\$7,500 /ea.	\$397,500
11.0	Fire / Flushing Hydrants	16	\$5,500 /ea.	\$88,000
12.0	Gate Valves	12	\$1,500 /ea.	\$18,000
13.0	Ledge (Estimate)	1,000	\$150 /c.y.	\$150,000
14.0	Booster Pump Station	1	\$200,000 /ls.	\$200,000
15.0	Orebed Road - 2" water main	3,600 lf.	\$70 /lf.	\$252,000
16.0	Riverside Drive - 4" water main	1,100 lf.	\$110 /lf.	\$121,000
17.0	Riverside Drive - 2" water main	5,400 lf.	\$70 /lf.	\$378,000
<b>Subtotal</b>				<b>\$3,591,500</b>
	Contingency, 20%			\$718,300
<b>Estimated Construction Cost</b>				<b>\$4,309,800</b>
<b>Technical Services</b>				
	Preliminary Engineering			\$10,000
	Survey / Aerial Photography and Ground Control Survey			\$4,500
	Final Design / Permitting /Additional Survey / Borings			\$215,000
	Bid Phase Services/Construction Phase Services			\$400,000
	Legal and Fiscal			\$10,000
	Administrative			\$5,000
	Land Acquisition / Easements			\$10,000
<b>ESTIMATED TOTAL PROJECT COST</b>				<b>\$4,964,300</b>

Assumptions:

1. Improvements are to provide for PFOA remediation only.
2. Improvements shall not increase system deficiencies.
3. New water mains shall be 8-inch where future Village improvements will allow adequate fire protection flows.
4. New water mains will be 4-inch or less where future fire protection is unlikely.
5. Water main unit prices include trenching, pipe, fittings, pavement, and other surface restoration.
6. Water services include corporation, curb stop, water service from main to building, interconnection with interior plumbing, meter, and abandonment of existing well connection.
7. Estimated engineering fees from FED/RD fee formula for State eligibility.
8. 4" and 8" water main shall be ductile iron. 2" water main assumed to be HDPE.

**Table 4 - Estimated Project Cost**  
**Proposed Village of North Bennington Water Distribution System**  
**Option 2 - PFOA Remediation and Improvements to Village Distribution System**  
**(Reference: Appendix C)**

	Description	Total Qty.	Unit Cost	Total Cost
1.0	Matteson Road - 8" water main	1,500 lf.	\$125 / lf.	\$187,500
2.0	Park Street - 8" water main	900 lf.	\$125 / lf.	\$112,500
3.0	Harrington Road - 8" water main	4,200 lf.	\$125 / lf.	\$525,000
4.0	Scarey Lane - 2" water main	900 lf.	\$70 / lf.	\$63,000
5.0	Asa's Way - 4" water main	1,500 lf.	\$110 / lf.	\$165,000
6.0	Susan Taylor Lane - 2" water main	300 lf.	\$70 / lf.	\$21,000
7.0	Murphy Road - 4" water main	2,000 lf.	\$110 / lf.	\$220,000
8.0	McCullough Road - 4" water main	3,100 lf.	\$110 / lf.	\$341,000
9.0	Orebed Road - 4" water main	3,200 lf.	\$110 / lf.	\$352,000
10.0	Park Street - 8" water main	5,400 lf.	\$125 / lf.	\$675,000
11.0	Hillside/Water Street - 8" water main	1,300 lf.	\$125 / lf.	\$162,500
12.0	Water Services	55	\$7,500 / ea.	\$412,500
13.0	Fire / Flushing Hydrants	22	\$5,500 / ea.	\$121,000
14.0	Gate Valves	16	\$1,500 / ea.	\$24,000
15.0	Ledge (Estimate)	1,500	\$150 / c.y.	\$225,000
16.0	Pressure Reducing Vault	1	\$35,000 / ls.	\$35,000
17.0	Orebed Road - 2" water main	3,600 lf.	\$70 / lf.	\$252,000
18.0	Riverside Drive - 4" water main	1,100 lf.	\$110 / lf.	\$121,000
19.0	Riverside Drive - 2" water main	5,400 lf.	\$70 / lf.	\$378,000
	Subtotal			<b>\$4,393,000</b>
	Contingency, 20%			<b>\$878,600</b>
	<b>Estimated Construction Cost</b>			<b>\$5,271,600</b>
	<b>Technical Services</b>			
	Preliminary Engineering			\$10,000
	Survey/Aerial Photography and Ground Control Survey			\$4,500
	Final Design/Permitting			\$260,000
	Bid Phase Services/Construction Phase Services			\$480,000
	Legal and Fiscal			\$10,000
	Administrative			\$5,000
	Land Acquisition / Easements			\$10,000
	<b>ESTIMATED TOTAL PROJECT COST</b>			<b>\$6,051,100</b>

Assumptions:

- Improvements are primarily for PFOA remediation with additional noted improvements to improve distribution system hydraulics and compliance with Vermont Water Supply Rule.
- New water mains shall be 8" where future Village improvements will allow adequate fire protection flows.
- New water mains shall be 8-inch where future Village improvements will allow adequate fire protection flows.
- New water mains will be 4-inch or less where future fire protection is unlikely.
- Water main unit prices include trenching, pipe, fittings, pavement, and other surface restoration.
- Water services include corporation, curb stop, water service from main to building, interconnection with interior plumbing, meter, and abandonment of existing well connection.
- Estimated engineering fees from FED/RD fee formula for State eligibility.
- 4" and 8" water main shall be ductile iron. 2" water main assumed to be HDPE.

## 7.0 ESTIMATED PROJECT SCHEDULE

Table 5 below, outlines how we foresee this project proceeding from this preliminary phase through construction. Assumptions out of the Engineer's control regarding permitting and financing have been made based on the best information currently available.

**Table 5**  
**Project Priority Task List**

<b>Task</b>	<b>Description</b>	<b>Target Date</b>
a.	Approval of Preliminary Engineering Report	July 1, 2016
b.	Decision on Design Funding	August 1, 2016
c.	Begin Final Design	August 1, 2016
d.	Receive Construction Funding Commitment	September 1, 2016
e.	Bond Vote (Option 2)	November 1, 2016
f.	Complete Final Design, Contract Document	November 1, 2016
g.	Receive all Permits	December 1, 2016
h.	Advertise for Construction Bids	December 15, 2016
i.	Receive Construction Bids	January 15, 2017
j.	Award Construction Contract	February 1, 2017
k.	Begin Construction / Order Materials	April 15, 2017
l.	Complete Construction	October 15, 2017
m.	Remove POET Systems	December 15, 2017

No construction during 2016 should be expected given the required steps listed above, most importantly the commitment of funds for design and construction. The Village Water Board has specifically stated that, despite the necessity and highly publicized nature of this project, the Village does not want the project design or construction rushed such that there is any potential compromise with the end product. The recommended improvements will be owned and maintained by the Village for a century to come, and the Village has always placed quality first, as evidenced by its water filtration facility and its management of the award-winning water filtration facility.

## 8.0 PERMITS

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It has been determined that the combined water distribution main extensions by the Town and Village will be exempt from Act 250 review.

The only permits anticipated for the Village's proposed water main extensions are a Permit to Construct from the Drinking Water and Groundwater Protection Division of DEC and a Construction General Permit (Erosion Control) from DEC. No wetlands, stream or alteration or other environmental permits are anticipated with the Village's proposed extensions.

A local permit for construction in Town and Village streets may be required of the General Contractor.

If a booster pump station is included in the project a permit from the Department of Fire Safety will be required and the Contractor will need State electrical and plumbing permits.





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**APPENDIX C - PROPOSED WATER DISTRIBUTION SYSTEM IMPROVEMENTS**