

**Barnet Fire District #2  
Background and Data**

**Barnet Village Water System**

The Barnet Village Water System was constructed in the 1970's by a private owner for village residents during construction of I-91 to St. Johnsbury. The construction of the highway caused several homes to be destroyed or moved to new locations. Additionally, several wells and springs were left contaminated, which is one of the reasons the water system was built. It now has 63 connections and serves a village of a few hundred people.

Over the next several decades, maintenance was a low priority for the private owners. It was during this period that a boil water notice was put into effect. Finally, the private owner was strongly encouraged to make capital improvements. In 2013, the owner filed a petition with the Vermont Public Service Board to increase customer rates by approximately 520% to address the system's deficiencies. Around this time, negotiations began with the Fire District, who voted to purchase the system in June of 2014 believing they would be more able to control rates than a for profit company. The boil water notice which had stayed in effect for a decade was lifted when source water improvements were made by the Fire District; at a cost of approximately \$680,000. While the terms of the loan through the State Revolving Fund were favorable, the improvements did not address the significant distribution system issues facing the community. The Fire District now faces a dilemma, not having the financial capacity to take out another significant loan through the typical funding sources but spending the equivalent of a bond payment on repairs.

Since purchasing the system, the Fire District has spent a significant amount of money repairing the failing distribution lines. In a system with an operating budget of about \$50-60,000 per year, \$32,359 on average in leak repairs per year is unsustainable. Below is a leak repair summary:

Leak Repair Summary	
2014	\$52,030
2015	\$36,386
2016	\$1,683
2017	\$26,944
2018	\$44,750
Total	\$161,793
*Average per year	\$32,359
*This average includes the 275-foot replacement from last summer.	

We do currently have a significant leak, based on our average daily usage per month. Note the usage last January, February, and March compared to January and the first part of February 2019. The other peak usages coincide with patches we made last summer.

Month	Daily Average
Jan 2018	13,930
Feb-18	11,588
Mar-18	12,915
Apr-18	24,409
May-18	20,823
Jun-18	27,131
Jul-18	22,400
Aug-18	28,811
Sep-18	14,013
Oct-18	17,145
Nov-18	20,216
Dec-18	14,035
Jan 2019	20,807
Feb-19	26,470

We are currently working with RCAP Solutions to conduct an Income Survey. The timeframe for our next repair is as soon as practically possible, and our funding needs are immediate.

Recognizing the immediate need for these projects, in January of 2019 the Fire District updated our rate schedule. Residential customers are now paying \$1000 per year.

**BFD#2 Current Rate Schedule:**

Type of Building	Rate Per Quarter
Cemetery	\$75
Church	\$150
Office Space	\$125
Single Family Home	\$250
Light Commercial	\$280
Bed and Breakfasts	\$280
Single Family Home and 1 Apartment	\$300
Single Family Home and 2 Apartments	\$350
Add \$50 for each Additional Apartment	
Apartment Building	\$650
Municipal (Library, Offices, Town Hall and Clerk's Office)	\$650
Curb Stop Fee	\$99

**Final Analysis**

Last summer we replaced 275 feet on Anderson Street, therefore this will reduce the total replacement cost. However, we still have another 475 – 575 feet on Anderson Street to replace. This distance depends on where we stop replacing the distribution line. We, also, need to install the new line leading to the bridge. It is approximately 300 feet from the four-inch line on Church Street across the bridge to the Distribution line on Anderson Street. (The engineering estimates can be found in Appendix A and further recommendations from last summer's leak survey can be found in Appendix B). The three scenarios found in Appendix A do not include replacing 325 feet on Mill Hill. This was previously designed by an engineer, although our experience with construction of this type cost approximately \$100 per foot, so, this project would be approximately \$32,500.

If we subtract \$27,500 (for the Anderson Street replacement) from the less expensive estimate of \$191,000 we will still need \$163,500 added to the \$32,500 for a total of \$196,000.

Furthermore, our current liabilities as of March 1, 2019 are as follows:

Long Term Liabilities	Total Borrowed	Interest rate / Term	Total Owed	Yearly Payment
Bond	\$680,000.00	-3.0% / 30 years	\$371,381.00	\$12,806.45
Bank Loan 1	\$70,000.00	2.6% / 15 years	\$52,443.21	\$4,660.00
Bank Loan 2	\$16,600.00	3.9% / 5 years	\$16,600.00	\$3,718.34
Congregational Church	\$50,000.00	2.0% / 5 years	\$48,413.00	\$10,512.00
<b>Total</b>	<b>\$833,900.00</b>		<b>\$488,837.21</b>	<b>\$31,696.79</b>
<b>Short Term Liabilities</b>				Monthly Payment
Greater than 30 days				
Contractor			\$6,753.18	\$2,000.00

## Appendix A

Engineering Estimates  
July 2018

Scenario 1:

1. Abandon the River Crossing and Reconstruct Over Bridge 11.
  - This requires the reconstruction and upgrade of Anderson St. to 4-inch.
  - Estimated Cost \$191k.

### River Crossing Replacement - Option 1

#### Preliminary Construction Estimate

Description	Unit	Unit Price	Quantity	Total Estimated Cost
<b>CONSTRUCTION</b>				
Site Mobilization/Demob	LS	5%	1	\$5,947
4" PE Water (Bore)*	LF	\$70	470	\$32,900
4" PVC Water (Open Cut)*	LF	\$50	420	\$21,000
4" PVC Bridge Crossing (all incl.)	LF	\$250	100	\$25,000
2" Polyurethane Insulation				
Alum 20ga. Jacket				
Hanger System				
Abutment Core				
4-inch Gate Valve	EA	\$1,200	4	\$4,800
2-inch Interconnection	EA	\$500	1	\$500
3/4" Water Service	EA	\$500	11	\$5,500
Temporary Water	LS	\$5,000	1	\$5,000
Interconnects/Abandonments	EA	\$3,000	2	\$6,000
Flushing and Disinfection	LS	\$2,000	1	\$2,000
Trench Pavement (3")	SY	\$35	327	\$11,433
Loam, Seed and Restoration	SY	\$8	600	\$4,800
Erosion and Sediment Control	LS	\$2,000	1	\$2,000
Traffic Control	LS	\$16,000	1	\$16,000
		<b>Subtotal Construction</b>		<b>\$142,880</b>
<b>Preliminary Non-Construction Costs</b>				
15% Contingency				\$21,432
Preliminary Engineering				\$800
Design Engineering				\$8,573
Construction Engineering				\$11,430
Ledge Probes				\$1,000
Permit Fees				1000
Legal and easements				2000
Town Access Permit				0
Short Term Borrowing				2000
		<b>Subtotal Non-Construction</b>		<b>\$48,235</b>
		<b>Total Project Cost</b>		<b>\$191,115</b>

\*Contingent on Ledge Probes

Scenario 2:

Reconstruct the River Crossing adjacent to the existing water main with additional depth protection and using a jointless pipe system that would be less susceptible to failures.

- Estimated Cost \$105k.
- Additionally, Anderson St. needs to be replaced. This estimate is included with Option #1
- Total \$205k.

River Crossing Replacement - Option 2

<b>Preliminary Construction Estimate</b>				
<b>Description</b>	<b>Unit</b>	<b>Unit Price</b>	<b>Quantity</b>	<b>Total Estimated Cost</b>
<b>CONSTRUCTION</b>				
Site Mobilization/Demob	LS	5%	1	\$3,548
4" PE Water River Crossing*	LF	\$100	250	\$25,000
4" PVC Water (Open Cut)	LF	\$50	475	\$23,750
4" D.I. Gate Valve	EA	\$1,200	2	\$2,400
River Crossing Manhole	EA	\$8,000	1	\$8,000
Interconnects/Abandonments	EA	\$3,000	2	\$6,000
Flushing and Disinfection	LS	\$1,000	1	\$1,000
Loam, Seed and Restoration	SY	\$8	600	\$4,800
Erosion and Sediment Control	LS	\$2,000	1	\$2,000
			<b>Subtotal Construction</b>	<b>\$76,498</b>
<b>Preliminary Non-Construction Costs</b>				
				15% Contingency
				\$11,475
				Preliminary Engineering
				\$400
				Design Engineering
				\$6,120
				Construction Engineering
				\$6,120
				Ledge Probes
				\$1,000
				Permit Fees
				1000
				Legal and easements
				1000
				Town Access Permit
				0
				Short Term Borrowing
				1000
			<b>Subtotal Non-Construction</b>	<b>\$28,114</b>
			<b>Total Project Cost</b>	<b>\$104,612</b>

\*Contingent on Ledge Probes

\*\*VT Wetlands Permitting, River Crossing Permits may effect timelines

Scenario 3:

An estimate of just the bridge requires us to upgrade Anderson Street and the Church Street connections to 4" line prior to bridge construction.

Barnet Fire District #1  
River Crossing Replacement - Option 1 (Crossing Only)

**Preliminary Construction Estimate**

Description	Unit	Unit Price	Quantity	Total Estimated Cost
<b>CONSTRUCTION</b>				
Site Mobilization/Demob	LS	5%	1	\$2,574
4" PVC Water (Open Cut)*	LF	\$70	150	\$10,500
4" PVC Bridge Crossing (all incl.)	LF	\$250	100	\$25,000
2" Polyurethane Insulation				
Alum 20ga. Jacket				
Hanger System				
Abutment Core				
4-inch Gate Valve	EA	\$1,200	2	\$2,400
2-inch Interconnection	EA	\$500	1	\$500
3/4" Water Service	EA	\$500	2	\$1,000
Interconnects/Abandonments	EA	\$3,000	2	\$6,000
Flushing and Disinfection	LS	\$2,000	1	\$2,000
Trench Pavement (3")	SY	\$35	117	\$4,083
Traffic Control	LS	\$4,000	1	\$4,000
		<b>Subtotal Construction</b>		<b>\$58,058</b>
<b>Preliminary Non-Construction Costs</b>				
15% Contingency				\$8,709
Preliminary Engineering				\$800
Design Engineering				\$4,645
Construction Engineering				\$4,645
Ledge Probes				\$1,000
Permit Fees				1000
Legal and easements				500
Town Access Permit				0
Short Term Borrowing				1000
		<b>Subtotal Non-Construction</b>		<b>\$22,298</b>
		<b>Total Project Cost</b>		<b>\$80,355</b>

\*Contingent on Ledge Probes



## CONCLUSIONS/RECOMMENDATIONS

The 2018 (VDEC) Barnet VT LDS Project included 3 days of contracted leak detection services within the distribution system. The survey emphasized focus on the entire system.

The current NRW loss figures are estimated to be ~15000 Gallons Per Day (or 10.5 gpm). Throughout the survey, a total of 3 miles of main was inspected.

During the inspection, a total of 3 distribution leaks were identified. The loss from the findings is estimated to be 5,781,600 gallons per year.

It is recommended that the loss figures continue to be monitored post repairs/upgrades. Warmer months could also potentially contribute to excessive water usage.

Please see below for any additional Project specifics and preventative NRW recommendations:

- It is suggested that line replacement / upgrades be performed on all lines that have a history of failing and/or habitually fail after previous repairs are made. Copper pipe can be susceptible to electrolysis, pitting, etc. and should be replaced once signs of failure begin to occur.
- It is suggested that all distribution line easements be freed of vegetation / overgrowth on a routine basis. This would allow surfacing leakage to be identified quickly and potential leaks to be pin-pointed in a timely fashion.
- Relocation of lines should be considered in areas where current conditions could cause detrimental damage to existing water lines (tree roots, river erosion, etc.).
- Internal residential leakage issues could also potentially contribute to excessive loss (running toilet, leaky faucet, etc.). Continuous feedback from residents is important in identifying possible problems that could result in waste.
- GIS mapping can be beneficial when attempting to locate valves, lines, etc. for future purposes. It is recommended that GIS mapping be conducted on all system assets to ensure location accuracy and identification.