Water System Asset Management

TO: Doug Starr and Randall Heglin

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COPY: Nat Norton, David Pinsky

DATE: Original: November 12, 2013
Revised: February 4, 2014

The purpose of this memorandum is to summarize the water system asset management services conducted for the Town of Jaffrey. The scope of work included the following:

1. Expand the buried infrastructure inventory
2. Organize the water system geographic information system (GIS) data and the Town's existing GIS data into a web-based GIS
3. Update the distribution system computer model
4. Perform a water main improvement prioritization analysis
5. Develop a buried infrastructure capital spending plan

1 Buried Infrastructure Inventory

The Town started developing a GIS based asset inventory of the public water system in 2010. The asset inventory has been phased over three years and is focused on developing a field verified inventory of the Town's water system capturing system valves, hydrants, and water mains. Attribute information including pipe size, material, and date of installation has been captured where available from record plans and from the Town's water distribution system computer model. The GIS inventory is available to water department staff at the DPW through ESRI desktop GIS software installed on one computer. The GIS inventory will also be available from multiple computers through the private GIS website (see Section 1.2 below).

1.1 Buried Infrastructure Inventory Update

Tighe & Bond scanned and reviewed available record plans that were supplied by the Town. These record plans were used by Tighe & Bond to create new features and update attribute information on existing geocoded features as necessary. Information included date of installation, size, and materials of construction when available. Scanned images of these record plans were attached to the appropriate feature in the GIS database

1.2 Web-Based GIS

The Town of Jaffrey will be able to access the updated GIS database in both a mobile application and through Tighe & Bond's hosted private website. The private website will give the Town the ability to turn layers on and off, switch basemaps and access record plans. For mobile access, Tighe & Bond will load the GIS data into ArcGIS Online (AGOL) and provide basic configuration and training to the Town. Registered users, to be determined later by the Town, will have secure access to view and edit the data on iPads through ArcGIS for iOS.

2 Distribution System Model Update

The Town of Jaffrey has an existing hydraulic model in the Bentley WaterGEMS software format and in EPA Net format. The existing hydraulic model was calibrated in 2008 by Tighe & Bond using hydrant flow test data from 14 tests conducted on May 7, 2008. Tighe & Bond updated the existing hydraulic model using the GIS database developed for this study. The model database was revised to reflect new information regarding installation date, materials of construction, and recent improvements to the water system. The updated model was developed using MW Soft InfoWater Version 3.0 modeling software. Figures 2-1 and 2-2 present the updated model showing water main diameter and material, respectively. An updated EPA Net format model was also prepared.

The demand allocation from Jaffrey's existing hydraulic model was utilized for the updated model. Demands from the existing hydraulic model were assigned to the nearest updated model node. Diurnal patterns from the existing model were utilized in the updated model. Average and maximum day demands were determined from the *Water Supply and Demand Analysis* memorandum prepared by Tighe & Bond in 2008. Average and maximum day demands were 403,000 gallons per day (gpd) and 723,000 gpd, respectively. These demands are similar to current demands based on a review of recent production and billing data.

The best available elevation data for Jaffrey, NH is the 10 meter digital elevation model (DEM) from the NH GRANIT database. Tighe & Bond converted the DEM into feet for use in assigning node elevations. Node elevations from the existing model were utilized if the updated model node was within 10 meters of an existing model node. Updated model nodes that were greater than 10 meters from an existing model node were assigned an elevation based on the DEM.

Parameters from the existing model for the Bullet and Poole water storage tanks including tank minimum and maximum water levels, base elevation, and geometry were utilized in the updated model. Pump curves and control set points from the existing model for the Contoocook, Squantum, and Turnpike production wells, and the Prospect Street booster pump station were also utilized in the updated model. These parameters and set points are still valid because pertinent updates were made to the existing hydraulic model to reflect changes to the distribution system and controls as they were implemented.

2.1 Hydraulic Model Analyses

Pressure and available fire flow (AFF) analyses were conducted using the hydraulic model. The model results were used to prioritize water main improvements, as discussed in Section 3.

2.1.1 Pressure

An extended period model simulation was prepared to evaluate distribution system pressure under average demand conditions. Figure 2-3 presents the results of the pressure analysis. Pressure is represented by color-coded model junctions. The figure shows typical pressures throughout the distribution system at an average demand model time-step (7 pm). Excessively high pressures increase the probability of failure in aging water mains. Areas with high model predicted pressure (>120 psi) include portions of the high service area along and off of Route 124 in the vicinity of Gilmore Pond Road, Sawtelle Road, and Highland Avenue, and in the main service area near the intersection of Peterborough and Old Sharon Road. Low pressure areas in the distribution system are limited to areas near the Bullet and Poole water storage tanks, near Whitcomb Hill, and on Turnpike Road near the intersection of Witt Hill Road.

2.1.2 Available Fire Flow

An available fire flow (AFF) analysis was conducted using the updated hydraulic model. AFF is defined as the maximum flow that can be withdrawn while maintaining pressure at 20 psi or greater at all points in the system. It is typical for a limited number of nodes with pressures near 20 psi to constrain the entire AFF analysis. These nodes are usually not included as constraining nodes during the AFF analysis so that the AFF results for the rest of the distribution system are not skewed on the low side. Nodes that were not included as constraining nodes in the Jaffrey system include nodes near the water storage tanks, Whitcomb Hill, and Gilmore Court. The available fire flow analysis was conducted under maximum demand conditions at an average demand model time-step (7 pm). Figure 2-4 presents the results of the AFF analysis. Model predicted AFF was compared with the Insurance Service Office (ISO) needed fire flows for Jaffrey to determine areas of deficient AFF. Jaffrey was last evaluated by the ISO in 2005. Table 2-1 summarizes the 2005 ISO needed fire flows and model predicted AFF.

Table 2-1
ISO Needed Fire Flow and Model Predicted AFF

Test No.	Test Location	ISO Needed Fire Flow (gpm)	Existing Conditions Model Predicted AFF (gpm)	Model Predicted AFF with Improvements (gpm)
1	Squantum Rd & Prescott Rd	2,250	6,378	6,401
2	Turnpike Rd & Moore Pike Rd	2,250	1,910	2,629
3	Knight St & Webster St	7,500	2,089	2,944
4	Peterborough St & Sunset Ln	3,500	2,125	3,036
5	River St & Main St	3,500	2,157	3,048
6	Conant Way & Stratton Rd	3,000	2,140	3,026
7	Gilmore Pond Rd & Adams St	3,000	1,489	2,328
8	Main St & Bryant Rd	1,750	1,047	1,834
9	Michigan Rd South of Lakewood Dr	750	1,626	1,675
10	Fitzgerald Dr & Plantation Dr	4,500	2,135	3,004

Needed AFF for 1- and 2-family dwellings not exceeding 2 stories in height can be determined based on the distance between the dwellings. Needed AFF according to the distance between buildings is listed in Table 2-2 (*Guide for Determination of Needed Fire Flow*, Edition 05-2008, ISO Properties, Inc.). Needed fire flow may be higher for other types of buildings (e.g. industrial, commercial, multi-family, etc.).

Table 2-2
Available Fire Flow Needed for 1- and 2-Family Dwellings Not Exceeding 2 Stories in Height

Distance Between Buildings	Available Fire Flow Needed
More than 100 feet	500 gpm
31 – 100 feet	750 gpm
11-30 feet	1,000 gpm
10 feet or less	1,500 gpm

Water main improvements to improve areas with low AFF were evaluated using the hydraulic model. Water main improvements that significantly improve AFF include new 12-inch water mains on Squantum Road, Prescott Road, Mountain Road, and Main Street and a new 8-inch water main on Gilmore Pond Road, as shown on Figure 2-5. Figure 2-5 also presents model predicted AFF with the aforementioned water main improvements. Model predicted AFF at the ISO test locations with the improvements are summarized in Table 2-1.

A new 12-inch water main connecting the recently installed water main on Old Sharon Road to Route 124 via Witt Hill Road was evaluated using the hydraulic model. The location of the new water main is shown on Figure 2-6. This looping project provides increased redundancy. Figure 2-6 presents the model predicted AFF with the new water main. The model results do not show a significant improvement in AFF. Therefore, this alternative was not evaluated further.

3 Water Main Prioritization

Several potential problems are associated with aging water mains, including loss of hydraulic capacity, deterioration of water quality, and structural degradation. Prioritization of water main improvements is important to maximize the overall benefit from the investment made. An analysis was performed to identify and prioritize water main candidates for upgrade or replacement. This analysis included classifying pipes by material and hydraulic characteristics based on historical records and the results of model simulations.

Water main replacement projects were prioritized based on deficiency and water main criticality. Deficiency was quantified based on water main material and age, excessively high model predicted pressure, and low AFF. The majority of the water mains in the system are ductile iron (DI) or cast iron (CI). Model predicted pressure was modeled under average demand conditions. Available fire flow was modeled under maximum demand conditions. Water main criticality was quantified using hydraulic importance based on model predicted flow and proximity to critical facilities. Critical facilities provided in the Town of Jaffrey's Community Water System Emergency Response Plan were used in the prioritization analysis. Table 3-1 summarizes the critical facilities.

Table 3-1
Critical Facilities

Critical Facility	Address
Good Shepherd Nursing Home	20 Plantation Drive
Conant High School and Jaffrey-Rindge Middle School	1-3 Conant Way
Jaffrey Grade School	18 School Street
Millipore	Intersection of Prescott Road and Route 124
St. Patrick's School	70 Main Street

A prioritization matrix with water main material, age, pressure, AFF deficiency, flow, and proximity to critical facilities was prepared. Ranking points were assigned to each water main segment for these criteria. The distribution of deficiency ranking points is summarized in Table 3-2. The distribution of criticality ranking points is summarized in Table 3-3. Points were assigned to water mains for AFF deficiency if replacing the water mains either improves AFF at deficient ISO sites by at least 700 gpm or makes deficient ISO sites sufficient. Improvements to AFF were determined from the modeling analysis discussed in Section 2.1.2. Water mains that were assigned points for improving low AFF are shown on Figure 2-5. Ranking points were only assigned to water mains with high model predicted pressure if the material is cast iron. A total deficiency score was calculated by summing the

ranking points for water main material, age, pressure, and AFF deficiency. A total criticality score was calculated by summing the ranking points for hydraulic importance based on model predicted flow and proximity to critical facilities. A total benefit score was calculated by multiplying the deficiency and criticality scores.

Table 3-2
Distribution of Deficiency Points for Evaluation Criteria

Criteria	Ranking Points			Max Points
Pipe material	Ductile Iron (0 points)	PVC, Copper, Galvanized Iron (5 points)	Cast Iron (20 points)	20
Age	Post-1970 (0 points)	1950-1970 (10 points)	Pre-1950 (20 points)	20
Excessively High Pressure	<100 psi (0 points)	100-120 psi and CI (10 points)	>120 psi and CI (20 points)	20
AFF Deficiency	Pipe replacement does not improve low AFF (0 points)		Pipe replacement improves low AFF (40 points)	40

Table 3-3
Distribution of Criticality Points for Evaluation Criteria

Criteria	Ranking Points				Max Points
Hydraulically important based on flow	<10 gpm (1 point)	10-100 gpm (2 points)	100-500 gpm (3 points)	>500 gpm (5 points)	5
Proximity to critical facilities	Not close to critical facility (0 points)		Near critical facility (5 points)		5

A prioritized water main improvements project matrix was developed based on the total benefit score for each pipe segment. Projects were selected from individual pipe segments based on location and scoring. A weighted benefit score was calculated for each project based on the benefit score and length of the individual pipe segments included in the project (see Equation 1). Points were added to the total benefit score for special considerations such as coordination with other infrastructure projects. Table 3-4 lists the top scoring water main improvement projects, which are shown on Figure 3-1. Appendix A provides evaluation criteria for each pipe segment included in the selected projects and the weighted benefit score calculation.

$$\frac{\sum(Benefit\ Score\ x\ Pipe\ Segment\ Length)}{Total\ Project\ Length}$$ Equation 1

Table 3-4

Table Top Scoring Water Main Replacement and Upgrade Projects

	Project Name	Weighted Benefit Score	Total Length (ft)	Existing Diameter (in)	Proposed Diameter (in)	Remarks
1	Main St Section 2	580	3,568	8 and 12	12	CIP, Installed in 1918, Excessively High Pressure, High Flow, Coordination with Planned Project (replacement of culvert and sewer main)
2	Main St Section 1	563	1,524	8 and 10	12	CIP, Installed in 1899 to 1918, Improves Low AFF, Excessively High Pressure, High Flow, Complete in Conjunction with Main St Section 2
3	Prescott Rd*	560	1,415	12	12	CIP, Installed in 1920 to 1940, Improves Low AFF, Near Critical Customer
4	Mountain Rd	282	7,139	10	12	CIP, Installed in 1918, Improves Low AFF, Excessively High Pressure, High Flow
5	School St	280	860	6	8	CIP, Installed in 1899, Near Critical Customer
6	Squantum Rd Section 2	220	2,983	12	12	CIP, Installed in 1920, Improves Low AFF, High Flow
7	Squantum Rd Section 3	195	1,197	12	12	CIP, Installed in 1920, Improves Low AFF, High Flow
8	Stratton Rd	180	2,972	12	12	CIP, Installed in 1899 to 1920, Near Critical Customer, High Flow
9	Squantum Rd Section 1	120	3,824	12	12	CIP, Installed in 1920, High Flow
10	Sawtelle Rd	111	3,616	6	8	CIP, Installed in 1918, Excessively High Pressure
11	First Tavern Rd	100	1,231	6	8	CIP, Installed in 1918, Excessively High Pressure
12	Webster St	92	498	6 and 8	8	CIP, Installed 1920 to 1960, Excessively High Pressure

*Field test is recommended for Prescott Road; consider cleaning and lining.

Small diameter water main improvement projects were evaluated. Small diameter water mains (i.e. ≤ 4 inches) did not receive high prioritization scores because these water mains serve a limited number of customers and therefore points assigned for hydraulic importance based on flow are low. However, replacing undersized water mains would be beneficial. We recommend an annual appropriation for a small diameter water main replacement program. Proposed small diameter water main improvement projects are shown on Figure 3-2 and summarized in Table 3-5. The proposed water main diameter for these projects is 8 inches. Two new water mains are recommended on Woodbound Road and Loop Road to connect the proposed 8-inch water mains to existing water mains that are 8-inch or larger.

Table 3-5
Small Diameter Water Main Projects

	Project Name	Total Length (ft)	Existing Diameter (in)	Proposed Diameter (in)	Benefit
13	Cheshire Rd Area	2,249	2	8	Replaces 2-inch diameter pipe
14	Loop Rd	1,965	N/A	8	New pipe connecting Cheshire Rd Area project to existing 8-inch pipe
15	Beach Ave Area	2,721	2	8	Replaces 2-inch diameter pipe
16	Woodbound Rd	5,642	N/A	8	New pipe connecting Beach Ave Area project to existing 12-inch pipe
17	Bryant Rd	1,037	4	8	Replaces 4-inch 1899 CI pipe
18	Harkness Rd	1,087	4	8	Replaces 4-inch 1899 CI pipe

4 Buried Infrastructure Capital Spending Plan

The purpose of the water main prioritization analysis was to evaluate the distribution system with respect to pipe age, material, pressure, available fire flow, and proximity to critical customers. Budgetary cost estimates for the proposed water main improvement projects were prepared. The budgetary cost estimates include construction costs with an allowance for engineering and contingencies. Budgetary cost estimates for top scoring water main improvement projects and small diameter water main improvement projects are summarized in Tables 4-1 and 4-2, respectively. Tables 4-1 and 4-2 include a brief description of the benefit of each project. More detailed budgetary estimates are provided in Appendix B.

Table 4-1
Budgetary Cost Estimates for Top Scoring Water Main Improvement Projects
January 2014

	Project Name	Project Length (ft)	Water Main Diameter (in)	Cost	Benefit
1	Main St, Section 2	3,568	12	$1,460,000	Replaces 1918 CI pipe that experiences high pressure; Coordination with planned project
2	Main St, Section 1	1,524	12	$790,000	Replaces 1899-1918 CI pipe that experiences high pressure; Improves AFF
3	Prescott Rd	1,415	12	$540,000	Replaces 1920-1940 CI pipe near a critical customer; Improves AFF
4	Mountain Rd	7,139	12	$2,640,000	Replaces 1918 CI pipe that experiences high pressure; Improves AFF
5	School St	860	8	$430,000	Replaces 1899 CI pipe near a critical customer
6	Squantum Rd, Section 2	2,983	12	$1,050,000	Replaces 1920 CI pipe; Improves AFF
7	Squantum Rd, Section 3	1,197	12	$520,000	Replaces 1920 CI pipe; Improves AFF
8	Stratton Rd	2,972	12	$1,550,000	Replaces 1899-1920 CI pipe near a critical customer
9	Squantum Rd, Section 1	3,824	12	$1,560,000	Replaces 1920 CI pipe
10	Sawtelle Rd	3,616	8	$1,130,000	Replaces 1918 CI pipe that experiences high pressure
11	First Tavern Rd	1,231	8	$410,000	Replaces 1918 CI pipe that experiences high pressure
12	Webster St	498	8	$200,000	Replaces 1920-1960 CI pipe that experiences high pressure
			Total	$12,280,000	

Table 4-2
Budgetary Cost Estimates for Small Diameter Water Main Projects
January 2014

	Project Name	Project Length (ft)	Water Main Diameter (in)	Cost	Benefit
13	Cheshire Rd Area	2,249	8	$460,000	Replaces 2-inch diameter pipe
14	Loop Rd	1,965	8	$540,000	New pipe connecting Cheshire Rd Area project to existing 8-inch pipe
15	Beach Ave Area	2,721	8	$600,000	Replaces 2-inch diameter pipe
16	Woodbound Rd	5,642	8	$1,470,000	New pipe connecting Beach Ave Area project to existing 12-inch pipe
17	Bryant Rd	1,037	8	$350,000	Replaces 4-inch 1899 CI pipe
18	Harkness Rd	1,087	8	$390,000	Replaces 4-inch 1899 CI pipe
			Total	$3,810,000	

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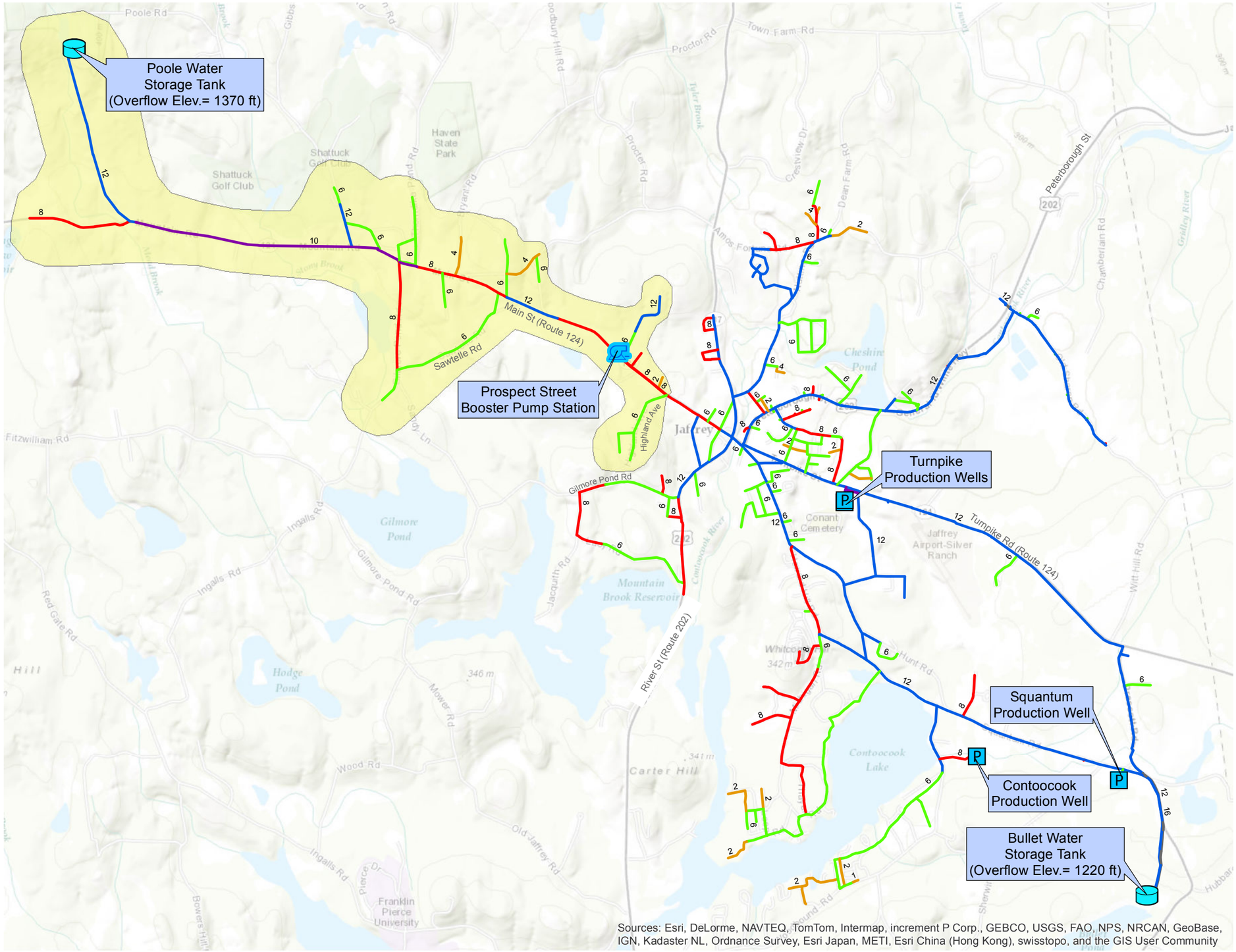
Figure 2-1
Updated Hydraulic Model
Water Main Diameter

Jaffrey, NH Water System



Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

Legend

- Water Storage Tank
- Production Well
- Booster Pump Station
- High Service Area
  Nominal HGL Elev.= 1370 ft

Water Main Diameter (in)

- 1 - 4
- 6
- 8
- 10
- 12
- 14 - 18

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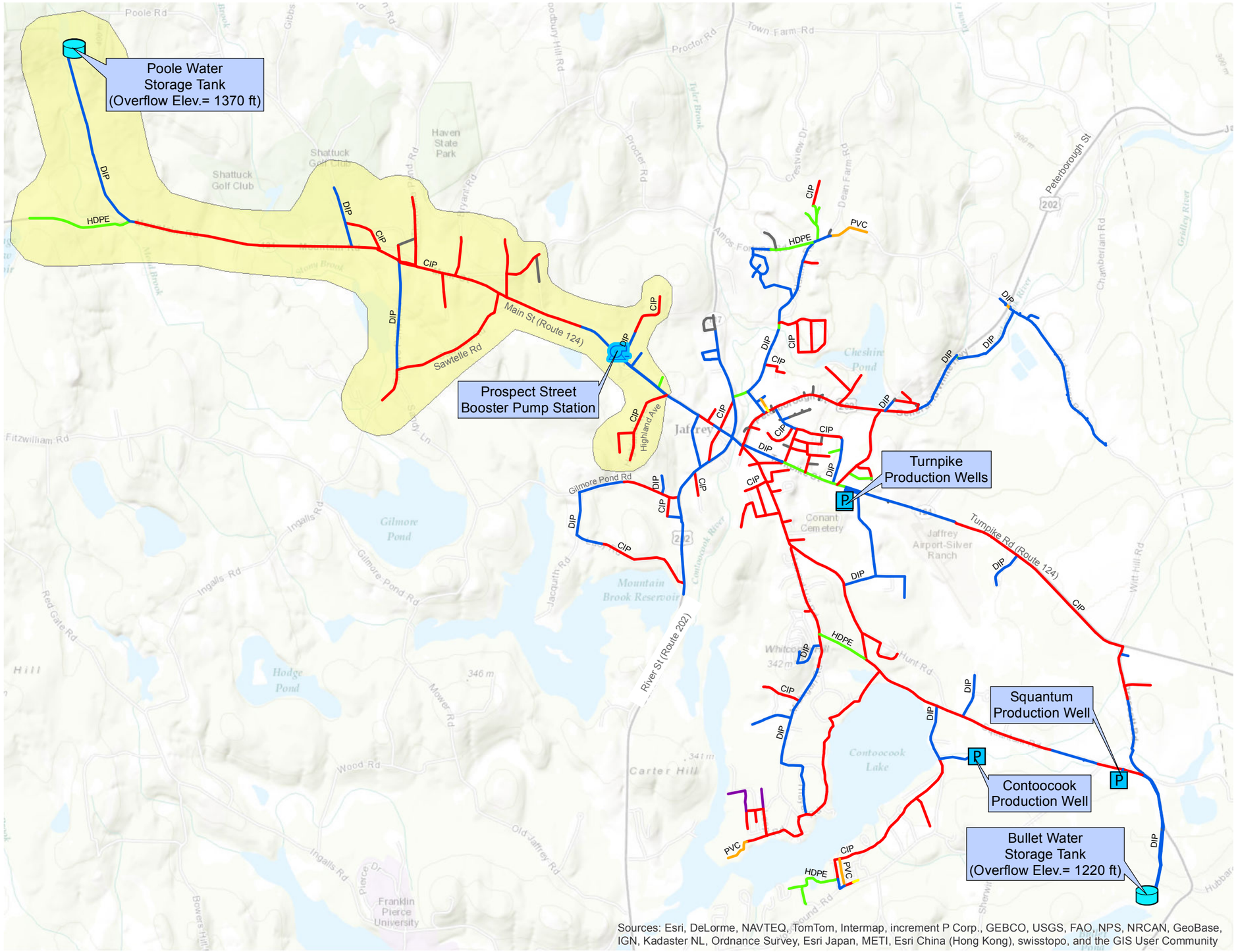
Figure 2-2
Updated Hydraulic Model
Water Main Material

Jaffrey, NH Water System



Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

Legend

- Water Storage Tank
- Production Well
- Booster Pump Station
- High Service Area
  Nominal HGL Elev.= 1370 ft

Water Main Material

- Ductile Iron (DIP)
- Cast Iron (CIP)
- Copper
- Galvanized iron
- HDPE
- PVC
- Unknown

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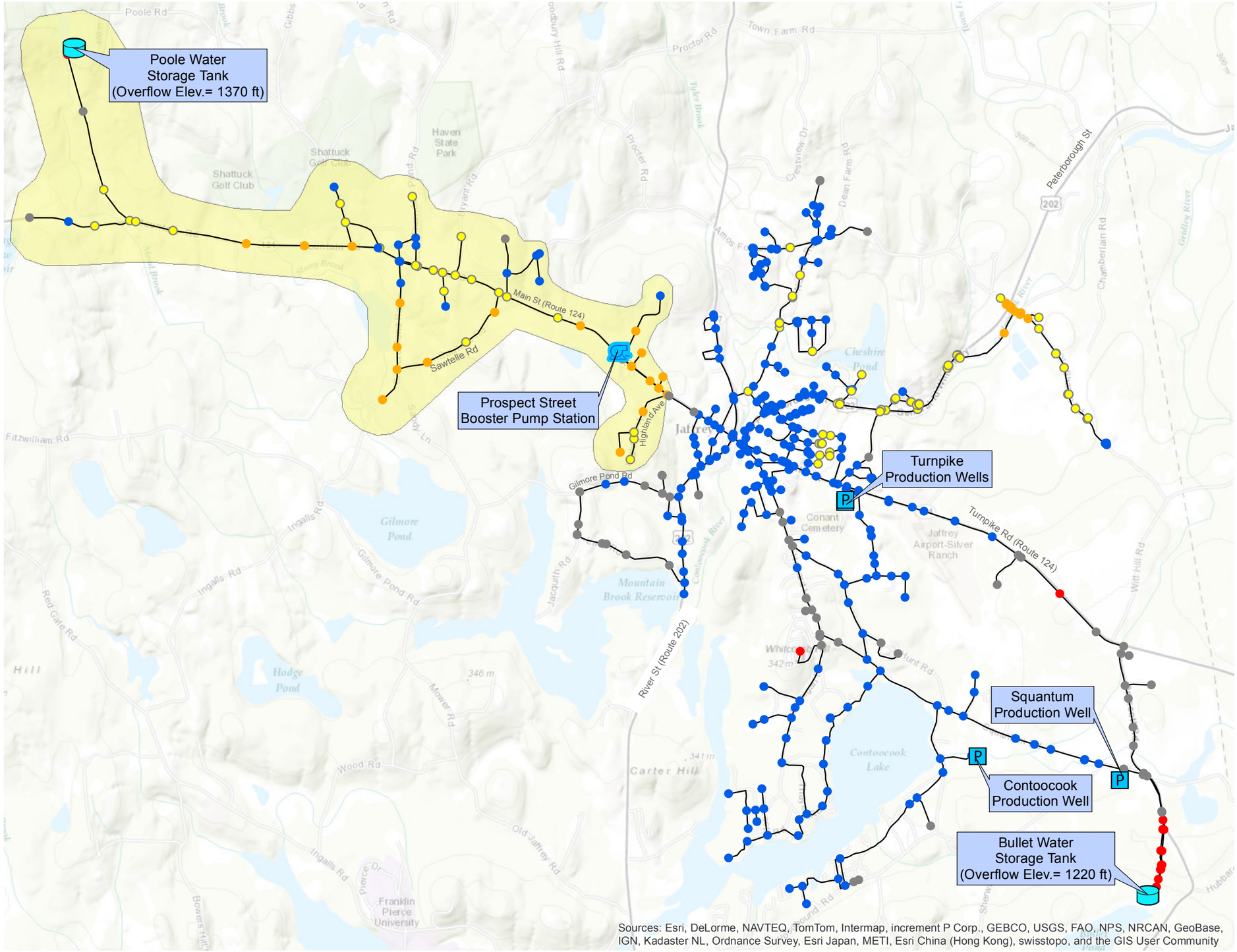

Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

Figure 2-3
Model Predicted Pressure
Average Day Demand

Jaffrey, NH Water System

Legend

- Water Storage Tank
- Production Well
- Booster Pump Station
- Existing Water Main
- High Service Area
  Nominal HGL Elev.= 1370 ft

Pressure (psi)

- <35
- 36 - 70
- 71 - 100
- 101 - 120
- >120

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Figure 2-4
Model Predicted Available Fire Flow Baseline Conditions

Jaffrey, NH Water System

Poole Water Storage Tank (Overflow Elev.= 1370 ft)

Prospect Street Booster Pump Station

Turnpike Production Wells

Squantum Production Well

Contoocook Production Well

Bullet Water Storage Tank (Overflow Elev.= 1220 ft)

Legend

- Water Storage Tank
- Production Well
- Booster Pump Station
- Existing Water Main
- High Service Area Nominal HGL Elev.= 1370 ft

Available Fire Flow (AFF) (gpm)

- <500
- 501 - 750
- 751 - 1000
- 1001 - 2500
- 2501 - 3500
- >3500

ISO Needed Fire Flow (NFF)

- Deficient (AFF < NFF)
- Sufficient (AFF > NFF)

Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

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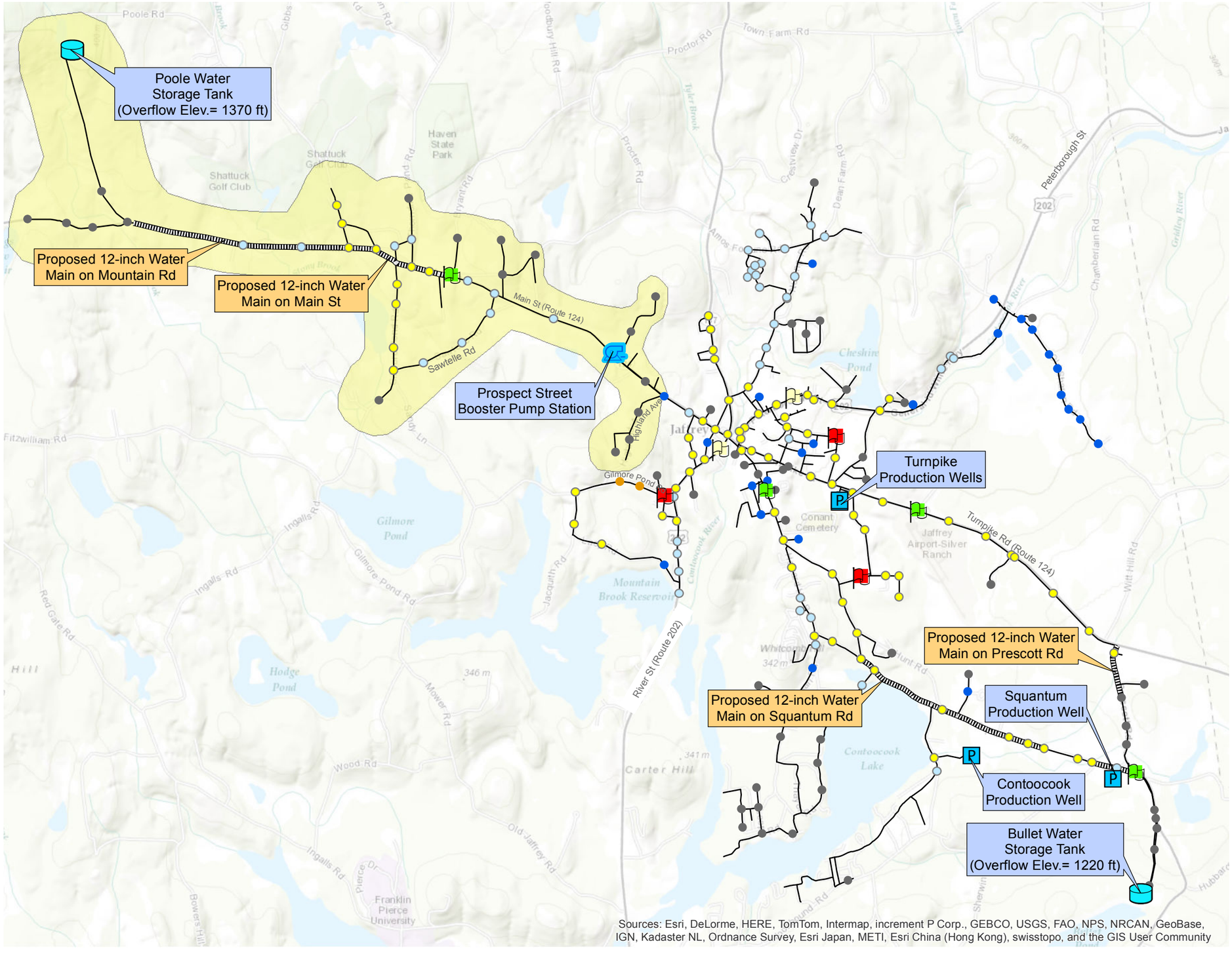

Sources: Esri, DeLorme, HERE, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

Figure 2-5
Model Predicted Available Fire Flow Improvements

Jaffrey, NH Water System

Legend

- Water Storage Tank
- Production Well
- Booster Pump Station
- Existing Water Main
- AFF Improvements
- High Service Area
  Nominal HGL Elev.= 1370 ft

Increase in AFF with Improvements (gpm)

- <50
- 51 - 100
- 101 - 500
- 501 - 1000
- >1000

ISO Needed Fire Flow (NFF)

- Deficient (AFF < NFF)
- Sufficient (AFF > NFF)
- Marginal (AFF within 15% of NFF)

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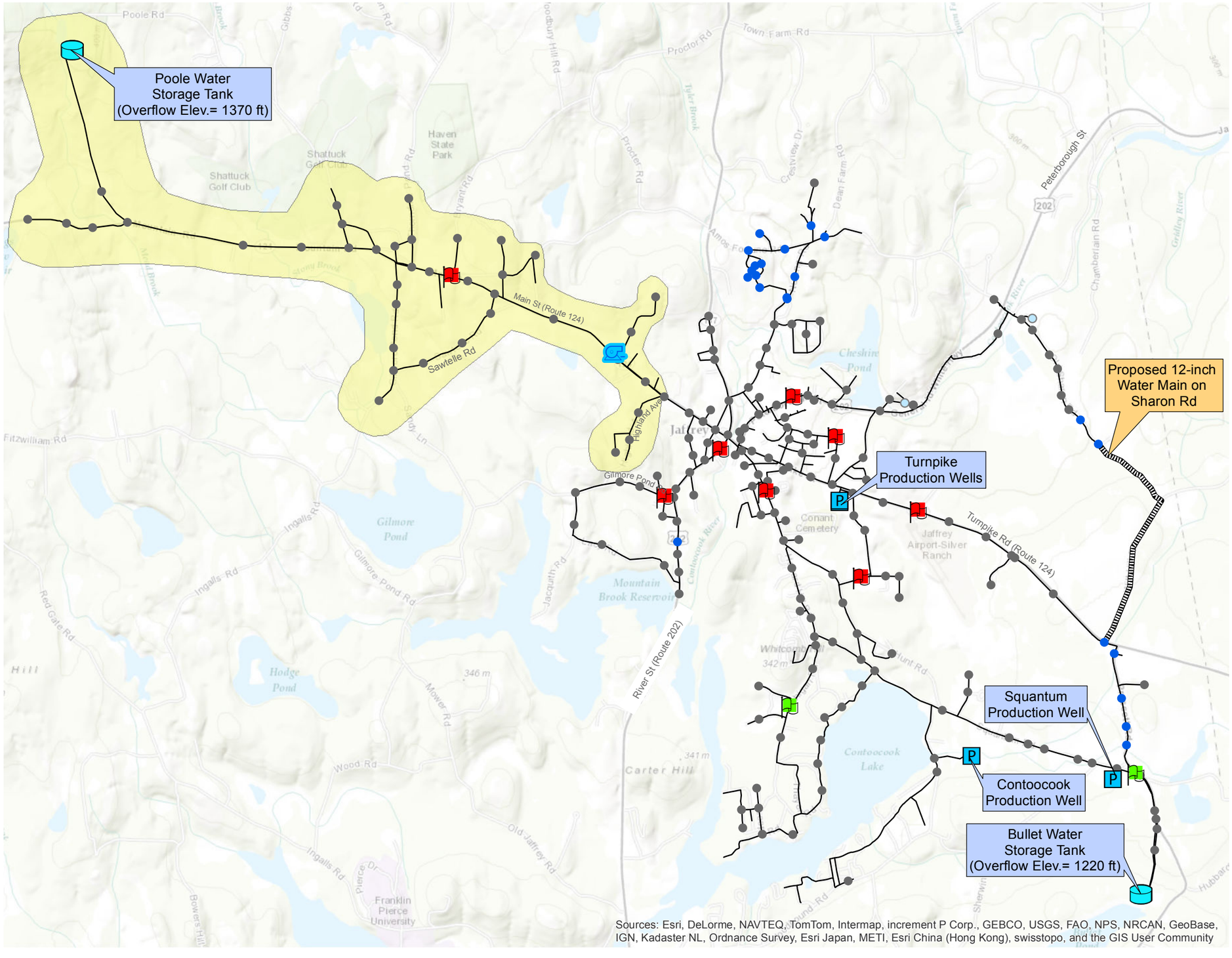

Figure 2-6
Model Predicted Available Fire Flow
Sharon Road Alternative

Jaffrey, NH Water System

Legend

- Water Storage Tank
- Production Well
- Booster Pump Station
- Existing Water Main
- Sharon Road Improvement
- High Service Area
  Nominal HGL Elev.= 1370 ft

Increase in AFF with Improvement (gpm)

- <50
- 51 - 100
- 101 - 500
- 501 - 1000
- >1000

ISO Needed Fire Flow (NFF)

- Deficient (AFF < NFF)
- Sufficient (AFF > NFF)

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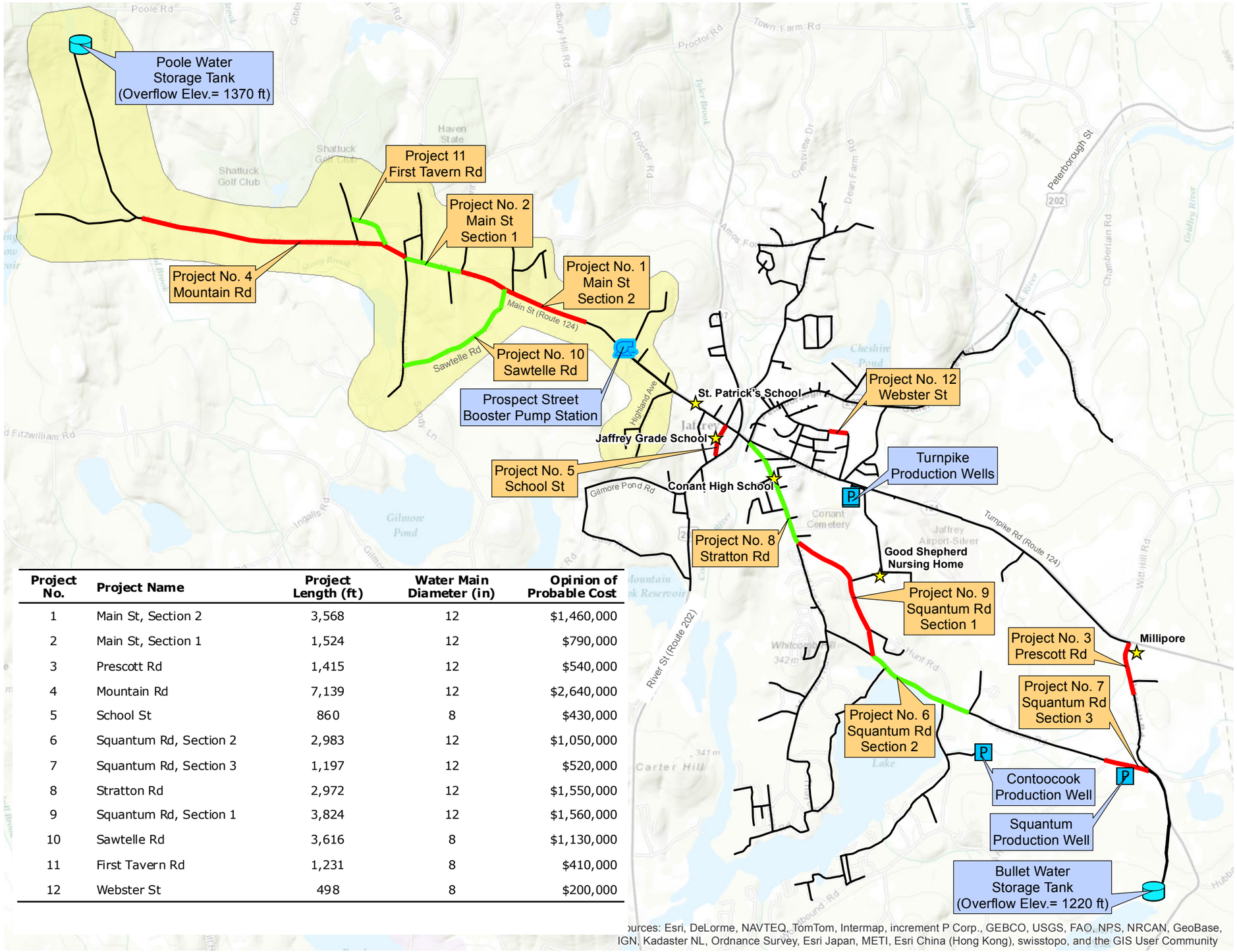
Figure 3-1
Water Main Improvement Projects

Jaffrey, NH Water System



Project No.	Project Name	Project Length (ft)	Water Main Diameter (in)	Opinion of Probable Cost
1	Main St, Section 2	3,568	12	$1,460,000
2	Main St, Section 1	1,524	12	$790,000
3	Prescott Rd	1,415	12	$540,000
4	Mountain Rd	7,139	12	$2,640,000
5	School St	860	8	$430,000
6	Squantum Rd, Section 2	2,983	12	$1,050,000
7	Squantum Rd, Section 3	1,197	12	$520,000
8	Stratton Rd	2,972	12	$1,550,000
9	Squantum Rd, Section 1	3,824	12	$1,560,000
10	Sawtelle Rd	3,616	8	$1,130,000
11	First Tavern Rd	1,231	8	$410,000
12	Webster St	498	8	$200,000

Legend

- Water Storage Tank
- Production Well
- Booster Pump Station
- Existing Water Main
- Critical Facility
- High Service Area Nominal HGL Elev.= 1370 ft
- Water Main Improvement

ources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

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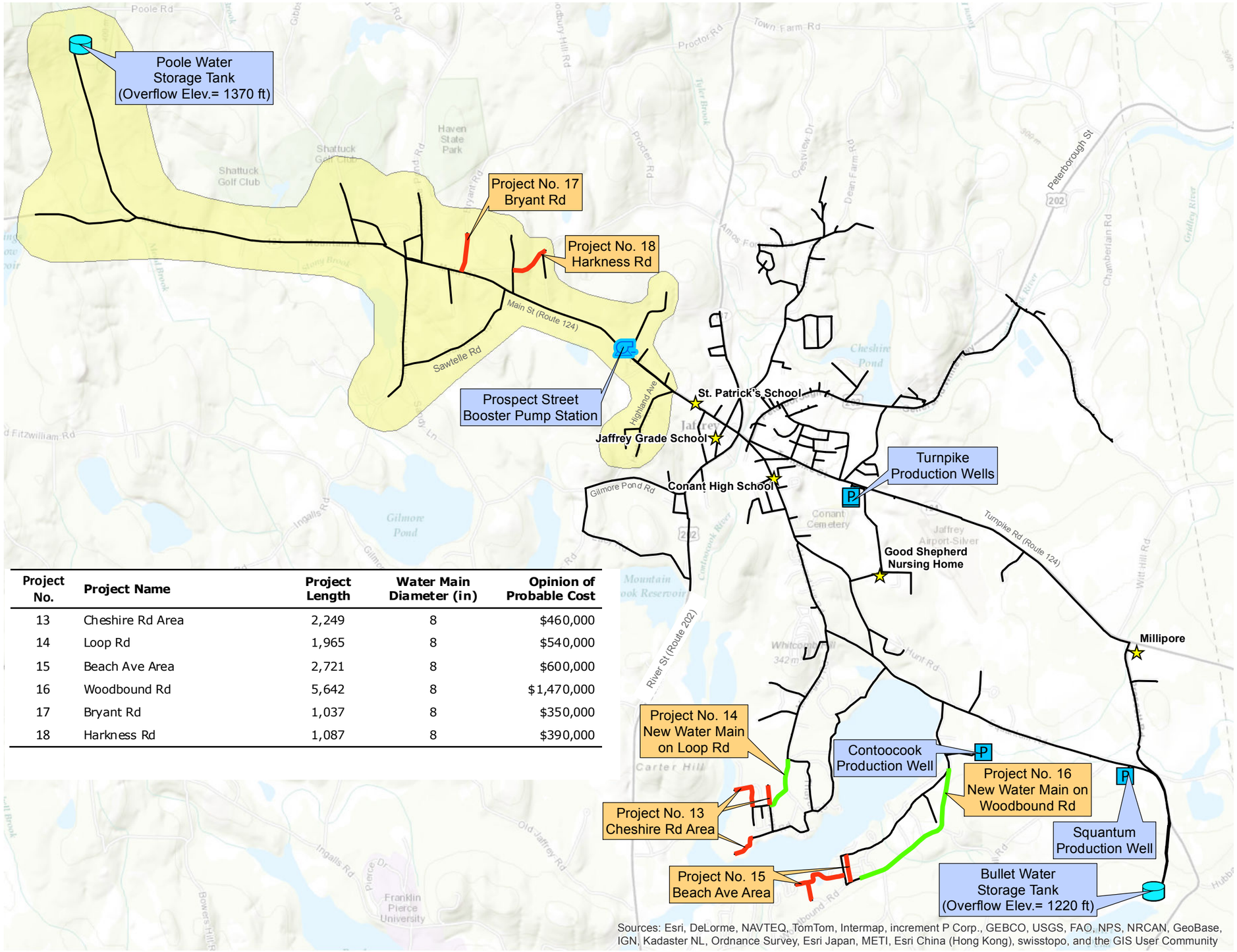
Figure 3-2
Small Diameter Water Main Improvement Projects

Jaffrey, NH Water System



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16	Woodbound Rd	5,642	8	$1,470,000
17	Bryant Rd	1,037	8	$350,000
18	Harkness Rd	1,087	8	$390,000

Legend

- Water Storage Tank
- Production Well
- Booster Pump Station
- Existing Water Main
- Critical Facility
- High Service Area Nominal HGL Elev.= 1370 ft
- Water Main Improvement
- New Water Main

Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

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Tighe&Bond

APPENDIX A

Pipe Label	Junction	Pressure (psi)	Year Installed	Flow (gpm)	Material	Length (ft)	Diameter (in)	Critical Customer	Improves AFF	Material Points	Age Points	Pressure Points	Improves AFF Points	Total Deficiency Points	Critical Customer Points	Flow Points	Total Criticality Points	Benefit Score	Score x Length
Main Street Section 2																			
P145	J446	123	1918	207	CIP	631	8	No	No	20	20	20	0	60	0	3	3	180	113,616
P285	J442	115	1918	196	CIP	243	8	No	No	20	20	10	0	50	0	3	3	150	36,431
P286	J428	105	1918	116	CIP	450	8	No	No	20	20	10	0	50	0	3	3	150	67,485
P287	J720	108	1918	116	CIP	793	8	No	No	20	20	10	0	50	0	3	3	150	118,887
P332	J448	117	1918	207	CIP	1,452	12	No	No	20	20	10	0	50	0	3	3	150	217,751
																	Sum (Benefit Score x Pipe Segment Length)		554,169
																		Total Project Length	3,568
																		Weighted Average	155
																		Special Consideration Points	425
																		Total Points	580
Main Street Section 1																			
P131	J402	93	1899	97	CIP	25	10	No	Yes	20	20	0	40	80	0	2	2	160	3,942
P138	J426	105	1918	112	CIP	342	8	No	Yes	20	20	10	40	90	0	3	3	270	92,372
P269	J426	105	1918	106	CIP	253	8	No	Yes	20	20	10	40	90	0	3	3	270	68,261
P270	J704	104	1918	106	CIP	433	8	No	Yes	20	20	10	40	90	0	3	3	270	116,795
P525	J420	104	1899	106	CIP	47	10	No	Yes	20	20	10	40	90	0	3	3	270	12,794
P527	J1026	93	1899	77	CIP	424	10	No	Yes	20	20	0	40	80	0	2	2	160	67,862
																	Sum (Benefit Score x Pipe Segment Length)		362,027
																		Total Project Length	1,524
																		Weighted Average	238
																		Special Consideration Points	325
																		Total Points	563
Prescott Road																			
P37	J122	46	1940	99	CIP	868	12	Yes	Yes	20	20	0	40	80	5	2	7	560	485,873
P443	J550	38	1920	100	CIP	346	12	Yes	Yes	20	20	0	40	80	5	2	7	560	193,964
P482	J1010	51	1920	96	CIP	201	12	Yes	Yes	20	20	0	40	80	5	2	7	560	112,784
																	Sum (Benefit Score x Pipe Segment Length)		792,621
																		Total Project Length	1,415
																		Weighted Average	560
																		Special Consideration Points	0
																		Total Points	560
Mountain Road																			
P130	J402	93	1918	167	CIP	684	10	No	Yes	20	20	0	40	80	0	3	3	240	164,068
P197	J558	115	1918	153	CIP	1,013	10	No	Yes	20	20	10	40	90	0	3	3	270	273,469
P198	J560	110	1918	153	CIP	1,958	10	No	Yes	20	20	10	40	90	0	3	3	270	528,727
P199	J564	124	1918	151	CIP	690	10	No	Yes	20	20	20	40	100	0	3	3	300	206,879
P515	J1028	132	1918	157	CIP	1,253	10	No	Yes	20	20	20	40	100	0	3	3	300	375,756
P516	J562	125	1918	155	CIP	1,542	10	No	Yes	20	20	20	40	100	0	3	3	300	462,679
																	Sum (Benefit Score x Pipe Segment Length)		2,011,578
																		Total Project Length	7,139
																		Weighted Average	282
																		Special Consideration Points	0
																		Total Points	282

Pipe Label	Junction	Pressure (psi)	Year Installed	Flow (gpm)	Material	Length (ft)	Diameter (in)	Critical Customer	Improves AFF	Material Points	Age Points	Pressure Points	Improves AFF Points	Total Deficiency Points	Critical Customer Points	Flow Points	Total Criticality Points	Benefit Score	Score x Length
School Street																			
P257	J108	84	1899	16	CIP	461	6	Yes	No	20	20	0	0	40	5	2	7	280	128,960
P258	J686	81	1899	16	CIP	399	6	Yes	No	20	20	0	0	40	5	2	7	280	111,767
																	Sum (Benefit Score x Pipe Segment Length)		240,728
																	Total Project Length		860
																	Weighted Average		280
																	Special Consideration Points		0
																	Total Points		280
Squantum Road Section 2																			
P57	J186	88	1920	249	CIP	1,775	12	No	Yes	20	20	0	40	80	0	3	3	240	425,937
P191	J188	81	1920	231	CIP	467	12	No	Yes	20	20	0	40	80	0	3	3	240	112,050
P193	J80	83	1920	11	CIP	415	12	No	Yes	20	20	0	40	80	0	2	2	160	66,468
P488	J546	84	1920	11	CIP	326	12	No	Yes	20	20	0	40	80	0	2	2	160	52,153
																	Sum (Benefit Score x Pipe Segment Length)		656,608
																	Total Project Length		2,983
																	Weighted Average		220
																	Special Consideration Points		0
																	Total Points		220
Squantum Road Section 3																			
P519	J1012	55	1920	13	CIP	673	12	No	Yes	20	20	0	40	80	0	2	2	160	107,702
P484	J50	47	1920	317	CIP	524	12	No	Yes	20	20	0	40	80	0	3	3	240	125,650
																	Sum (Benefit Score x Pipe Segment Length)		233,353
																	Total Project Length		1,197
																	Weighted Average		195
																	Special Consideration Points		0
																	Total Points		195
Stratton Road																			
P16	J52	65	1920	175	CIP	501	12	No	No	20	20	0	0	40	0	3	3	120	60,143
P22	J72	78	1899	146	CIP	27	12	Yes	No	20	20	0	0	40	5	3	8	320	8,776
P27	J90	89	1920	190	CIP	146	12	No	No	20	20	0	0	40	0	3	3	120	17,547
P68	J216	68	1920	178	CIP	185	12	No	No	20	20	0	0	40	0	3	3	120	22,166
P189	J540	75	1899	148	CIP	142	12	Yes	No	20	20	0	0	40	5	3	8	320	45,486
P250	J670	75	1920	150	CIP	134	12	Yes	No	20	20	0	0	40	5	3	8	320	42,921
P252	J670	75	1920	150	CIP	586	12	Yes	No	20	20	0	0	40	5	3	8	320	187,562
P310	J74	78	1920	151	CIP	200	12	No	No	20	20	0	0	40	0	3	3	120	23,942
P311	J764	80	1920	151	CIP	324	12	No	No	20	20	0	0	40	0	3	3	120	38,854
P335	J92	88	1920	190	CIP	54	12	No	No	20	20	0	0	40	0	3	3	120	6,469
P336	J812	87	1920	190	CIP	401	12	No	No	20	20	0	0	40	0	3	3	120	48,163
P341	J542	68	1920	169	CIP	271	12	No	No	20	20	0	0	40	0	3	3	120	32,538
																	Sum (Benefit Score x Pipe Segment Length)		534,567
																	Total Project Length		2,972
																	Weighted Average		180
																	Special Consideration Points		0
																	Total Points		180

Pipe Label	Junction	Pressure (psi)	Year Installed	Flow (gpm)	Material	Length (ft)	Diameter (in)	Critical Customer	Improves AFF	Material Points	Age Points	Pressure Points	Improves AFF Points	Total Deficiency Points	Critical Customer Points	Flow Points	Total Criticality Points	Benefit Score	Score x Length
Squantum Road Section 1																			
P52	J172	72	1920	139	CIP	692	12	No	No	20	20	0	0	40	0	3	3	120	83,081
P67	J212	78	1920	127	CIP	976	12	No	No	20	20	0	0	40	0	3	3	120	117,107
P306	J172	72	1920	132	CIP	899	12	No	No	20	20	0	0	40	0	3	3	120	107,832
P471	J158	80	1920	127	CIP	332	12	No	No	20	20	0	0	40	0	3	3	120	39,871
P472	J214	78	1920	127	CIP	439	12	No	No	20	20	0	0	40	0	3	3	120	52,671
P473	J756	74	1920	132	CIP	486	12	No	No	20	20	0	0	40	0	3	3	120	58,342
																	Sum (Benefit Score x Pipe Segment Length)		458,904
																		Total Project Length	3,824
																		Weighted Average	120
																	Special Consideration Points		0
																		Total Points	120
Sawtelle Road																			
P140	J432	109	1918	81	CIP	530	6	No	No	20	20	10	0	50	0	2	2	100	52,979
P303	J434	127	1918	79	CIP	1,111	6	No	No	20	20	20	0	60	0	2	2	120	133,299
P304	J754	140	1918	79	CIP	817	6	No	No	20	20	20	0	60	0	2	2	120	98,089
P305	J752	111	1918	79	CIP	1,157	6	No	No	20	20	10	0	50	0	2	2	100	115,748
																	Sum (Benefit Score x Pipe Segment Length)		400,116
																		Total Project Length	3,616
																		Weighted Average	111
																	Special Consideration Points		0
																		Total Points	111
First Tavern Road																			
P129	J400	115	1918	14	CIP	1231	6	No	No	20	20	10	0	50	0	2	2	100	123,057
																	Sum (Benefit Score x Pipe Segment Length)		123,057
																		Total Project Length	1,231
																		Weighted Average	100
																	Special Consideration Points		0
																		Total Points	100
Webster Street																			
P118	J370	102	1920	34	CIP	301	6	No	No	20	20	10	0	50	0	2	2	100	30,056
P430	J792	101	1960	34	CIP	197	8	No	No	20	10	10	0	40	0	2	2	80	15,756
																	Sum (Benefit Score x Pipe Segment Length)		45,812
																		Total Project Length	498
																		Weighted Average	92
																	Special Consideration Points		0
																		Total Points	92

Tighe&Bond

APPENDIX B

Methodology for Opinions of Probable Construction Costs

Tighe & Bond prepares Opinions of Probable Costs (OPC) at various stages of project planning and design. The accuracy of an OPC at each stage of a project is directly proportional to the level of engineering effort and the details that are available at the time the OPC is prepared.

Accuracy - The Association for the Advancement of Cost Estimating (AACE) categorizes classes of cost estimates into five "estimate classes" which relate to the level of project definition. These classes, along with Tighe & Bond's anticipated project phase and accuracy range are tabulated below. For the purposes of this Water System Asset Management Study, our OPCs have been prepared as Class 4 estimates (highlighted below).

Estimate Class	Level of Project Definition (% of Project Completion)	Tighe & Bond Project Phase	Anticipated Accuracy Range
Class 5	0% to 2%	Screening or Feasibility	+50% to -30%
Class 4	**1% to 15%**	**Concept Study**	**+40% to -25%**
Class 3	10% to 40%	Planning Project/Preliminary Design Report	+30% to -20%
Class 2	30% to 70%	50% to 75% Design Completion	+20% to -10%
Class 1	50% to 100%	Final Design	+15% to -5%

The accuracy of the estimate should increase as the project moves from planning through final design. Conceptual estimates can be expected to have a wide accuracy range relative to the construction contract amount because not all of the design features and details are known at the planning stage of the project. The final estimate should be more accurate due to the additional level of detail that is known when the design is completed.

ENR Index - For projects included in this Water System Asset Management Study, we have indexed our estimates to September 2013 (ENR CCI = 9545.33). The overall estimated cost should be adjusted to reflect anticipated increases in construction costs. Historical ENR indexes should be compared and a projected increase in the overall construction cost to the mid-point of construction should be added to the project.

General Conditions and Engineering & Contingencies - The total project cost includes such items as engineering fees, contingency for scope items that may not have been fully developed at the particular phase of the project, and General Conditions (to cover contractor costs such as mobilization, demobilization, bonds, insurance, etc.). See the table below for recommended percentages to include in an estimate. Contractor overhead and profit (OH&P) of 15% and engineering & contingencies (E&C) of 40% were included for the projects (highlighted below).

Type of Estimate	General Conditions	Engineering & Contingencies	Contingency (no Engineering)
Conceptual/Schematic Design	**15%**	**40%**	
Preliminary Design	15%		20%
Detailed Design	15%		10%
After Bidding	15%		5%

Traffic Maintenance & Protection - Traffic Maintenance & Protection is calculated as a percentage of construction (1 to 4% of Construction Cost less Alternates and General Conditions) using 1% for "Low", 2% for "Medium" and 4% for "High".

Police Details - Cost for Police/Flaggers is determined by dividing the total length of water main replacement or improvement divided by the average pipe installation per day and adding days for paving, testing etc. to determine an active construction period. Then, depending on the traffic intensity, we determined a required number of officers (typically 1 or 2) multiplied by a typical work day (using 8 hours) and an hourly rate of $60/hour for uniformed police officers and $30/day for standard flaggers.

New 12" DI WM on Main St, Section 2

ESTIMATE OF PROBABLE CONSTRUCTION COST

Jaffrey, NH Water System

September 2013

ENR CCI - 9545.33

ITEM	DESCRIPTION	UNITS	QTY	UNIT PRICE	SUB TOTAL	TOTAL
1	**Pipeline**					**$432,200**
	12" DI Pipe and Fittings	LF	3,568	$100	$356,800	$356,800
	12" Gate Valves	EA	0	$4,100	$0	$0
	Hydrant Assemblies	EA	8	$5,100	$40,800	$40,800
	Special Connections					
	Main St & Sawtelle Rd	LS	1	$17,300	$17,300	$17,300
	Main St & Matchpoint Rd	LS	1	$17,300	$17,300	$17,300
2	**Water Services**					**$25,410**
	Replace/Reconnect Water Main	EA	14	$1,000	$14,000	$14,000
	Corporation	EA	14	$305	$4,270	$4,270
	Curb Stop, Box and Coupling	EA	14	$510	$7,140	$7,140
3	**Traffic Control**					**$79,000**
	Maintenance and Protection of Traffic	LS	1	$35,000	$35,000	$35,000
	Uniformed Police/Flaggers for Traffic Control	LS	1	$44,000	$44,000	$44,000
4	**Restoration**					**$222,300**
	Temporary Bituminous Concrete Repair	SY	1,400	$45	$63,000	$63,000
	Permanent Bituminous Concrete Repair	SY	2,200	$55	$121,000	$121,000
	Bituminous Concrete Sidewalk & Driveway Repair	SY	400	$60	$24,000	$24,000
	Pavement Markings	LS	1	$14,300	$14,300	$14,300
5	**Excavation**					**$10,000**
	Test Pits	LS	1	$5,000	$5,000	$5,000
	Gravel Borrow	LS	1	$5,000	$5,000	$5,000
6	**Other**					**$140,000**
	Rock Excavation	CY	400	$100	$40,000	$40,000
	Culvert Crossing	LS	1	$100,000	$100,000	$100,000
					SUBTOTAL	**$908,910**
7	**General Conditions - 15%**					**$136,400**
					CONSTRUCTION - SUBTOTAL	**$1,045,310**
8	**Engineering and Contingency - 40%**					**$418,200**
					TOTAL	**$1,463,510**
					SAY	**$1,460,000**

Notes:

1 Costs for permitting and easements are not included.

2 Connection at Bryant Rd included in Main St Sec 1 cost estimate.

New 12" DI WM on Main St, Section 1

ESTIMATE OF PROBABLE CONSTRUCTION COST

Jaffrey, NH Water System

September 2013

ENR CCI - 9545.33

ITEM	DESCRIPTION	UNITS	QTY	UNIT PRICE	SUB TOTAL	TOTAL
1	**Pipeline**					**$258,400**
	12" DI Pipe and Fittings	LF	1,524	$100	$152,400	$152,400
	12" Gate Valves	EA	2	$4,100	$8,200	$8,200
	Hydrant Assemblies	EA	4	$5,100	$20,400	$20,400
	Special Connections					
	Main St & Bryant Rd	LS	1	$17,300	$17,300	$17,300
	Main St & Parsons Ln	LS	1	$17,300	$17,300	$17,300
	Main St,Thorndike Pond Rd & Meeting House Rd	LS	1	$21,400	$21,400	$21,400
	Main St, Laban-Ainsworth Way & Gilmore Pond Rd	LS	1	$21,400	$21,400	$21,400
2	**Water Services**					**$19,965**
	Replace/Reconnect Water Main	EA	11	$1,000	$11,000	$11,000
	Corporation	EA	11	$305	$3,355	$3,355
	Curb Stop, Box and Coupling	EA	11	$510	$5,610	$5,610
3	**Traffic Control**					**$43,000**
	Maintenance and Protection of Traffic	LS	1	$19,000	$19,000	$19,000
	Uniformed Police/Flaggers for Traffic Control	LS	1	$24,000	$24,000	$24,000
4	**Restoration**					**$142,100**
	Temporary Bituminous Concrete Repair	SY	600	$45	$27,000	$27,000
	Permanent Bituminous Concrete Repair	SY	1,000	$55	$55,000	$55,000
	Bituminous Concrete Sidewalk & Driveway Repair	SY	900	$60	$54,000	$54,000
	Pavement Markings	LS	1	$6,100	$6,100	$6,100
5	**Excavation**					**$10,000**
	Test Pits	LS	1	$5,000	$5,000	$5,000
	Gravel Borrow	LS	1	$5,000	$5,000	$5,000
6	**Other**					**$20,000**
	Rock Excavation	CY	200	$100	$20,000	$20,000
					SUBTOTAL	**$493,465**
7	**General Conditions - 15%**					**$74,100**
					CONSTRUCTION - SUBTOTAL	**$567,565**
8	**Engineering and Contingency - 40%**					**$227,100**
					TOTAL	**$794,665**
					SAY	**$790,000**

Notes:

1 Costs for permitting and easements are not included.

New 12" DI WM on Prescott Rd

ESTIMATE OF PROBABLE CONSTRUCTION COST

Jaffrey, NH Water System

September 2013 **ENR CCI - 9545.33**

ITEM	DESCRIPTION	UNITS	QTY	UNIT PRICE	SUB TOTAL	TOTAL
1	**Pipeline**					**$213,000**
	12" DI Pipe and Fittings	LF	1,415	$100	$141,500	$141,500
	12" Gate Valves	EA	5	$4,100	$20,500	$20,500
	Hydrant Assemblies	EA	4	$5,100	$20,400	$20,400
	Special Connections					
	Prescott Rd & Turnpike Rd	LS	1	$15,300	$15,300	$15,300
	Prescott Rd & Eastwood Dr	LS	1	$15,300	$15,300	$15,300
2	**Water Services**					**$7,260**
	Replace/Reconnect Water Main	EA	4	$1,000	$4,000	$4,000
	Corporation	EA	4	$305	$1,220	$1,220
	Curb Stop, Box and Coupling	EA	4	$510	$2,040	$2,040
3	**Traffic Control**					**$19,000**
	Maintenance and Protection of Traffic	LS	1	$7,000	$7,000	$7,000
	Uniformed Police/Flaggers for Traffic Control	LS	1	$12,000	$12,000	$12,000
4	**Restoration**					**$88,200**
	Temporary Bituminous Concrete Repair	SY	600	$45	$27,000	$27,000
	Permanent Bituminous Concrete Repair	SY	900	$55	$49,500	$49,500
	Bituminous Concrete Sidewalk & Driveway Repair	SY	100	$60	$6,000	$6,000
	Pavement Markings	LS	1	$5,700	$5,700	$5,700
5	**Excavation**					**$10,000**
	Test Pits	LS	1	$5,000	$5,000	$5,000
	Gravel Borrow	LS	1	$5,000	$5,000	$5,000
					SUBTOTAL	**$337,460**
6	**General Conditions - 15%**					**$50,700**
				CONSTRUCTION - SUBTOTAL		**$388,160**
7	**Engineering and Contingency - 40%**					**$155,300**
					TOTAL	**$543,460**
					SAY	**$540,000**

Notes:

1 Costs for permitting and easements are not included.

New 12" DI WM on Mountain Rd

ESTIMATE OF PROBABLE CONSTRUCTION COST

Jaffrey, NH Water System

September 2013 **ENR CCI - 9545.33**

ITEM	DESCRIPTION	UNITS	QTY	UNIT PRICE	SUB TOTAL	TOTAL
1	**Pipeline**					**$846,400**
	12" DI Pipe and Fittings	LF	7,139	$100	$713,900	$713,900
	12" Gate Valves	EA	1	$4,100	$4,100	$4,100
	Hydrant Assemblies	EA	15	$5,100	$76,500	$76,500
	Special Connections					
	Mountain Rd & First Tavern Rd	LS	1	$17,300	$17,300	$17,300
	Mountain Rd & Dublin Rd	LS	1	$17,300	$17,300	$17,300
	TM to Poole Tank	LS	1	$17,300	$17,300	$17,300
2	**Water Services**					**$54,450**
	Replace/Reconnect Water Main	EA	30	$1,000	$30,000	$30,000
	Corporation	EA	30	$305	$9,150	$9,150
	Curb Stop, Box and Coupling	EA	30	$510	$15,300	$15,300
3	**Traffic Control**					**$142,000**
	Maintenance and Protection of Traffic	LS	1	$64,000	$64,000	$64,000
	Uniformed Police/Flaggers for Traffic Control	LS	1	$78,000	$78,000	$78,000
4	**Restoration**					**$444,600**
	Temporary Bituminous Concrete Repair	SY	2,800	$45	$126,000	$126,000
	Permanent Bituminous Concrete Repair	SY	4,400	$55	$242,000	$242,000
	Bituminous Concrete Sidewalk & Driveway Repair	SY	800	$60	$48,000	$48,000
	Pavement Markings	LS	1	$28,600	$28,600	$28,600
5	**Excavation**					**$10,000**
	Test Pits	LS	1	$5,000	$5,000	$5,000
	Gravel Borrow	LS	1	$5,000	$5,000	$5,000
6	**Other**					**$143,688**
	Rock Excavation	CY	937	$100	$93,688	$93,688
	Stream Crossing	LS	1	$50,000	$50,000	$50,000
					SUBTOTAL	**$1,641,138**
7	**General Conditions - 15%**					**$246,200**
					CONSTRUCTION - SUBTOTAL	**$1,887,338**
8	**Engineering and Contingency - 40%**					**$755,000**
					TOTAL	**$2,642,338**
					SAY	**$2,640,000**

Notes:

1 Costs for permitting and easements are not included.

2 Connection at Gilmore Pond Rd included in cost estimate for Main St Section 1

New 8" DI WM on School St

ESTIMATE OF PROBABLE CONSTRUCTION COST

Jaffrey, NH Water System

September 2013 **ENR CCI - 9545.33**

ITEM	DESCRIPTION	UNITS	QTY	UNIT PRICE	SUB TOTAL	TOTAL
1	**Pipeline**					**$98,400**
	8" DI Pipe and Fittings	LF	860	$70	$60,200	$60,200
	8" Gate Valves	EA	2	$2,000	$4,000	$4,000
	Hydrant Assemblies	EA	2	$5,100	$10,200	$10,200
	Special Connections					
	School St & Main St	LS	1	$13,000	$13,000	$13,000
	School St & River St	LS	1	$11,000	$11,000	$11,000
2	**Water Services**					**$36,300**
	Replace/Reconnect Water Main	EA	20	$1,000	$20,000	$20,000
	Corporation	EA	20	$305	$6,100	$6,100
	Curb Stop, Box and Coupling	EA	20	$510	$10,200	$10,200
3	**Traffic Control**					**$19,000**
	Maintenance and Protection of Traffic	LS	1	$10,000	$10,000	$10,000
	Uniformed Police/Flaggers for Traffic Control	LS	1	$9,000	$9,000	$9,000
4	**Restoration**					**$102,500**
	Temporary Bituminous Concrete Repair	SY	400	$45	$18,000	$18,000
	Permanent Bituminous Concrete Repair	SY	600	$55	$33,000	$33,000
	Bituminous Concrete Sidewalk & Driveway Repair	SY	800	$60	$48,000	$48,000
	Pavement Markings	LS	1	$3,500	$3,500	$3,500
5	**Excavation**					**$10,000**
	Test Pits	LS	1	$5,000	$5,000	$5,000
	Gravel Borrow	LS	1	$5,000	$5,000	$5,000
					SUBTOTAL	**$266,200**
6	**General Conditions - 15%**					**$40,000**
				CONSTRUCTION - SUBTOTAL		**$306,200**
7	**Engineering and Contingency - 40%**					**$122,500**
					TOTAL	**$428,700**
					SAY	**$430,000**

Notes:

1 Costs for permitting and easements are not included.

New 12" DI WM on Squantum Rd, Section 2

ESTIMATE OF PROBABLE CONSTRUCTION COST

Jaffrey, NH Water System

September 2013

ENR CCI - 9545.33

ITEM	DESCRIPTION	UNITS	QTY	UNIT PRICE	SUB TOTAL	TOTAL
1	**Pipeline**					**$395,200**
	12" DI Pipe and Fittings	LF	2,983	$100	$298,300	$298,300
	12" Gate Valves	EA	0	$4,100	$0	$0
	Hydrant Assemblies	EA	7	$5,100	$35,700	$35,700
	Special Connections					
	Squantum Rd & Howard Hill Rd	LS	1	$15,300	$15,300	$15,300
	Squantum Rd & Rue Deschenes	LS	1	$15,300	$15,300	$15,300
	Squantum Rd & Woodbound Rd	LS	1	$15,300	$15,300	$15,300
	Squantum Rd & Darcie Dr	LS	1	$15,300	$15,300	$15,300
2	**Water Services**					**$21,780**
	Replace/Reconnect Water Main	EA	12	$1,000	$12,000	$12,000
	Corporation	EA	12	$305	$3,660	$3,660
	Curb Stop, Box and Coupling	EA	12	$510	$6,120	$6,120
3	**Traffic Control**					**$32,000**
	Maintenance and Protection of Traffic	LS	1	$13,000	$13,000	$13,000
	Uniformed Police/Flaggers for Traffic Control	LS	1	$19,000	$19,000	$19,000
4	**Restoration**					**$188,500**
	Temporary Bituminous Concrete Repair	SY	1,200	$45	$54,000	$54,000
	Permanent Bituminous Concrete Repair	SY	1,900	$55	$104,500	$104,500
	Bituminous Concrete Sidewalk & Driveway Repair	SY	300	$60	$18,000	$18,000
	Pavement Markings	LS	1	$12,000	$12,000	$12,000
5	**Excavation**					**$10,000**
	Test Pits	LS	1	$5,000	$5,000	$5,000
	Gravel Borrow	LS	1	$5,000	$5,000	$5,000
6	**Other**					**$7,200**
	Wetlands/Dewatering	LF	1,800	$4	$7,200	$7,200
					SUBTOTAL	**$654,680**
7	**General Conditions - 15%**					**$98,300**
					CONSTRUCTION - SUBTOTAL	**$752,980**
8	**Engineering and Contingency - 40%**					**$301,200**
					TOTAL	**$1,054,180**
					SAY	**$1,050,000**

Notes:

1 Costs for permitting and easements are not included.

New 12" DI WM on Squantum Rd, Section 3

ESTIMATE OF PROBABLE CONSTRUCTION COST

Jaffrey, NH Water System

September 2013

ENR CCI - 9545.33

ITEM	DESCRIPTION	UNITS	QTY	UNIT PRICE	SUB TOTAL	TOTAL
1	**Pipeline**					**$181,900**
	12" DI Pipe and Fittings	LF	1,197	$100	$119,700	$119,700
	12" Gate Valves	EA	3	$4,100	$12,300	$12,300
	Hydrant Assemblies	EA	3	$5,100	$15,300	$15,300
	Special Connections					
	Squantum Rd & Prescott Rd	LS	1	$17,300	$17,300	$17,300
	To Squantum Production Well	LS	1	$17,300	$17,300	$17,300
2	**Water Services**					**$18,150**
	Replace/Reconnect Water Main	EA	10	$1,000	$10,000	$10,000
	Corporation	EA	10	$305	$3,050	$3,050
	Curb Stop, Box and Coupling	EA	10	$510	$5,100	$5,100
3	**Traffic Control**					**$17,000**
	Maintenance and Protection of Traffic	LS	1	$6,000	$6,000	$6,000
	Uniformed Police/Flaggers for Traffic Control	LS	1	$11,000	$11,000	$11,000
4	**Restoration**					**$95,300**
	Temporary Bituminous Concrete Repair	SY	500	$45	$22,500	$22,500
	Permanent Bituminous Concrete Repair	SY	800	$55	$44,000	$44,000
	Bituminous Concrete Sidewalk & Driveway Repair	SY	400	$60	$24,000	$24,000
	Pavement Markings	LS	1	$4,800	$4,800	$4,800
5	**Excavation**					**$10,000**
	Test Pits	LS	1	$5,000	$5,000	$5,000
	Gravel Borrow	LS	1	$5,000	$5,000	$5,000
					SUBTOTAL	**$322,350**
6	**General Conditions - 15%**					**$48,400**
				CONSTRUCTION - SUBTOTAL		**$370,750**
7	**Engineering and Contingency - 40%**					**$148,300**
					TOTAL	**$519,050**
					SAY	**$520,000**

Notes:

1 Costs for permitting and easements are not included.

New 12" DI WM on Stratton Rd

ESTIMATE OF PROBABLE CONSTRUCTION COST

Jaffrey, NH Water System

September 2013 **ENR CCI - 9545.33**

ITEM	DESCRIPTION	UNITS	QTY	UNIT PRICE	SUB TOTAL	TOTAL
1	**Pipeline**					**$484,700**
	12" DI Pipe and Fittings	LF	2,972	$100	$297,200	$297,200
	12" Gate Valves	EA	3	$4,100	$12,300	$12,300
	Hydrant Assemblies	EA	7	$5,100	$35,700	$35,700
	Special Connections					
	Stratton Rd & Forcier Way	LS	1	$17,300	$17,300	$17,300
	Stratton Rd & Hamilton Ct	LS	1	$17,300	$17,300	$17,300
	Stratton Rd & Lawrence St	LS	1	$17,300	$17,300	$17,300
	Stratton Rd & Conant Way	LS	1	$17,300	$17,300	$17,300
	Stratton Rd, Aetna St, and Unnamed St	LS	1	$21,400	$21,400	$21,400
	Stratton Rd, Union St, and Ellison St	LS	1	$21,400	$21,400	$21,400
	Stratton Rd, Blake St, Peterborough St, River St	LS	1	$27,500	$27,500	$27,500
2	**Water Services**					**$81,675**
	Replace/Reconnect Water Main	EA	45	$1,000	$45,000	$45,000
	Corporation	EA	45	$305	$13,725	$13,725
	Curb Stop, Box and Coupling	EA	45	$510	$22,950	$22,950
3	**Traffic Control**					**$75,000**
	Maintenance and Protection of Traffic	LS	1	$37,000	$37,000	$37,000
	Uniformed Police/Flaggers for Traffic Control	LS	1	$38,000	$38,000	$38,000
4	**Restoration**					**$308,400**
	Temporary Bituminous Concrete Repair	SY	1,200	$45	$54,000	$54,000
	Permanent Bituminous Concrete Repair	SY	1,900	$55	$104,500	$104,500
	Bituminous Concrete Sidewalk & Driveway Repair	SY	2,300	$60	$138,000	$138,000
	Pavement Markings	LS	1	$11,900	$11,900	$11,900
5	**Excavation**					**$10,000**
	Test Pits	LS	1	$5,000	$5,000	$5,000
	Gravel Borrow	LS	1	$5,000	$5,000	$5,000
					SUBTOTAL	**$959,775**
6	**General Conditions - 15%**					**$144,000**
					CONSTRUCTION - SUBTOTAL	**$1,103,775**
7	**Engineering and Contingency - 40%**					**$441,600**
					TOTAL	**$1,545,375**
					SAY	**$1,550,000**

Notes:

1 Costs for permitting and easements are not included.

2 Connection at Squantum Rd included in Squantum Rd Sec 1 cost estimate.

Tighe&Bond

New 12" DI WM on Squantum Rd, Section 1

ESTIMATE OF PROBABLE CONSTRUCTION COST

Jaffrey, NH Water System

September 2013

ENR CCI - 9545.33

ITEM	DESCRIPTION	UNITS	QTY	UNIT PRICE	SUB TOTAL	TOTAL
1	**Pipeline**					**$486,500**
	12" DI Pipe and Fittings	LF	3,824	$100	$382,400	$382,400
	12" Gate Valves	EA	3	$4,100	$12,300	$12,300
	Hydrant Assemblies	EA	9	$5,100	$45,900	$45,900
	Special Connections					
	Squantum Rd & Stratton Rd	LS	1	$15,300	$15,300	$15,300
	Squantum Rd & Plantation Dr	LS	1	$15,300	$15,300	$15,300
	Squantum Rd & Hunt Rd	LS	1	$15,300	$15,300	$15,300
2	**Water Services**					**$54,450**
	Replace/Reconnect Water Main	EA	30	$1,000	$30,000	$30,000
	Corporation	EA	30	$305	$9,150	$9,150
	Curb Stop, Box and Coupling	EA	30	$510	$15,300	$15,300
3	**Traffic Control**					**$42,000**
	Maintenance and Protection of Traffic	LS	1	$19,000	$19,000	$19,000
	Uniformed Police/Flaggers for Traffic Control	LS	1	$23,000	$23,000	$23,000
4	**Restoration**					**$376,800**
	Temporary Bituminous Concrete Repair	SY	1,500	$45	$67,500	$67,500
	Permanent Bituminous Concrete Repair	SY	2,400	$55	$132,000	$132,000
	Bituminous Concrete Sidewalk & Driveway Repair	SY	2,700	$60	$162,000	$162,000
	Pavement Markings	LS	1	$15,300	$15,300	$15,300
5	**Excavation**					**$10,000**
	Test Pits	LS	1	$5,000	$5,000	$5,000
	Gravel Borrow	LS	1	$5,000	$5,000	$5,000
					SUBTOTAL	**$969,750**
6	**General Conditions - 15%**					**$145,500**
					CONSTRUCTION - SUBTOTAL	**$1,115,250**
7	**Engineering and Contingency - 40%**					**$446,100**
					TOTAL	**$1,561,350**
					SAY	**$1,560,000**

Notes:

1 Costs for permitting and easements are not included.

2 Connection at Howard Hill Rd included in Squantum Rd Sec 2 cost estimate.

Tighe&Bond

New 8" DI WM on Sawtelle Rd

ESTIMATE OF PROBABLE CONSTRUCTION COST

Jaffrey, NH Water System

September 2013 **ENR CCI - 9545.33**

ITEM	DESCRIPTION	UNITS	QTY	UNIT PRICE	SUB TOTAL	TOTAL
1	**Pipeline**					**$306,920**
	8" DI Pipe and Fittings	LF	3,616	$70	$253,120	$253,120
	8" Gate Valves	EA	2	$2,000	$4,000	$4,000
	Hydrant Assemblies	EA	8	$5,100	$40,800	$40,800
	Special Connections					
	Sawtelle Rd & Gilmore Pond Rd	LS	1	$9,000	$9,000	$9,000
2	**Water Services**					**$29,040**
	Replace/Reconnect Water Main	EA	16	$1,000	$16,000	$16,000
	Corporation	EA	16	$305	$4,880	$4,880
	Curb Stop, Box and Coupling	EA	16	$510	$8,160	$8,160
3	**Traffic Control**					**$36,000**
	Maintenance and Protection of Traffic	LS	1	$14,000	$14,000	$14,000
	Uniformed Police/Flaggers for Traffic Control	LS	1	$22,000	$22,000	$22,000
4	**Restoration**					**$232,500**
	Temporary Bituminous Concrete Repair	SY	1,500	$45	$67,500	$67,500
	Permanent Bituminous Concrete Repair	SY	2,300	$55	$126,500	$126,500
	Bituminous Concrete Sidewalk & Driveway Repair	SY	400	$60	$24,000	$24,000
	Pavement Markings	LS	1	$14,500	$14,500	$14,500
5	**Excavation**					**$10,000**
	Test Pits	LS	1	$5,000	$5,000	$5,000
	Gravel Borrow	LS	1	$5,000	$5,000	$5,000
6	**Other**					**$90,000**
	Rock Excavation	CY	400	$100	$40,000	$40,000
	Stream Crossing	LS	1	$50,000	$50,000	$50,000
					SUBTOTAL	**$704,460**
7	**General Conditions - 15%**					**$105,700**
				CONSTRUCTION - SUBTOTAL		**$810,160**
8	**Engineering and Contingency - 40%**					**$324,100**
					TOTAL	**$1,134,260**
					SAY	**$1,130,000**

Notes:

1 Costs for permitting and easements are not included.

2 Connection at Main St included in Main St Sec 2 cost estimate.

New 8" DI WM on First Tavern Rd

ESTIMATE OF PROBABLE CONSTRUCTION COST

Jaffrey, NH Water System

September 2013

ENR CCI - 9545.33

ITEM	DESCRIPTION	UNITS	QTY	UNIT PRICE	SUB TOTAL	TOTAL
1	**Pipeline**					**$110,470**
	8" DI Pipe and Fittings	LF	1,231	$70	$86,170	$86,170
	8" Gate Valves	EA	0	$2,000	$0	$0
	Hydrant Assemblies	EA	3	$5,100	$15,300	$15,300
	Special Connections					
	First Tavern Rd & Dublin Rd	LS	1	$9,000	$9,000	$9,000
2	**Water Services**					**$16,335**
	Replace/Reconnect Water Main	EA	9	$1,000	$9,000	$9,000
	Corporation	EA	9	$305	$2,745	$2,745
	Curb Stop, Box and Coupling	EA	9	$510	$4,590	$4,590
3	**Traffic Control**					**$16,000**
	Maintenance and Protection of Traffic	LS	1	$5,000	$5,000	$5,000
	Uniformed Police/Flaggers for Traffic Control	LS	1	$11,000	$11,000	$11,000
4	**Restoration**					**$83,500**
	Temporary Bituminous Concrete Repair	SY	500	$45	$22,500	$22,500
	Permanent Bituminous Concrete Repair	SY	800	$55	$44,000	$44,000
	Bituminous Concrete Sidewalk & Driveway Repair	SY	200	$60	$12,000	$12,000
	Pavement Markings	LS	1	$5,000	$5,000	$5,000
5	**Excavation**					**$10,000**
	Test Pits	LS	1	$5,000	$5,000	$5,000
	Gravel Borrow	LS	1	$5,000	$5,000	$5,000
6	**Other**					**$20,000**
	Rock Excavation	CY	200	$100	$20,000	$20,000
					SUBTOTAL	**$256,305**
7	**General Conditions - 15%**					**$38,500**
					CONSTRUCTION - SUBTOTAL	**$294,805**
8	**Engineering and Contingency - 40%**					**$118,000**
					TOTAL	**$412,805**
					SAY	**$410,000**

Notes:

1 Costs for permitting and easements are not included.

2 Connection at Mountain Rd included in Mountain Rd cost estimate.

New 8" DI WM on Webster St

ESTIMATE OF PROBABLE CONSTRUCTION COST

Jaffrey, NH Water System

September 2013 **ENR CCI - 9545.33**

ITEM	DESCRIPTION	UNITS	QTY	UNIT PRICE	SUB TOTAL	TOTAL
1	**Pipeline**					**$56,060**
	8" DI Pipe and Fittings	LF	498	$70	$34,860	$34,860
	8" Gate Valves	EA	1	$2,000	$2,000	$2,000
	Hydrant Assemblies	EA	2	$5,100	$10,200	$10,200
	Special Connections					
	Webster St & Pine St	LS	1	$9,000	$9,000	$9,000
2	**Water Services**					**$7,260**
	Replace/Reconnect Water Main	EA	4	$1,000	$4,000	$4,000
	Corporation	EA	4	$305	$1,220	$1,220
	Curb Stop, Box and Coupling	EA	4	$510	$2,040	$2,040
3	**Traffic Control**					**$7,000**
	Maintenance and Protection of Traffic	LS	1	$2,000	$2,000	$2,000
	Uniformed Police/Flaggers for Traffic Control	LS	1	$5,000	$5,000	$5,000
4	**Restoration**					**$45,000**
	Temporary Bituminous Concrete Repair	SY	200	$45	$9,000	$9,000
	Permanent Bituminous Concrete Repair	SY	400	$55	$22,000	$22,000
	Bituminous Concrete Sidewalk & Driveway Repair	SY	200	$60	$12,000	$12,000
	Pavement Markings	LS	1	$2,000	$2,000	$2,000
5	**Excavation**					**$10,000**
	Test Pits	LS	1	$5,000	$5,000	$5,000
	Gravel Borrow	LS	1	$5,000	$5,000	$5,000
					SUBTOTAL	**$125,320**
6	**General Conditions - 15%**					**$18,800**
				CONSTRUCTION - SUBTOTAL		**$144,120**
7	**Engineering and Contingency - 40%**					**$57,700**
					TOTAL	**$201,820**
					SAY	**$200,000**

Notes:

1 Costs for permitting and easements are not included.

Tighe&Bond

New 8" DI WM in Cheshire Rd Area

ESTIMATE OF PROBABLE CONSTRUCTION COST

Jaffrey, NH Water System

September 2013

ENR CCI - 9545.33

ITEM	DESCRIPTION	UNITS	QTY	UNIT PRICE	SUB TOTAL	TOTAL
1	**Pipeline**					**$213,003**
	8" DI Pipe and Fittings	LF	2,249	$70	$157,403	$157,403
	8" Gate Valves	EA	0	$2,000	$0	$0
	Hydrant Assemblies	EA	6	$5,100	$30,600	$30,600
	Special Connections					
	Deschenes Rd	LS	1	$9,000	$9,000	$9,000
	Loop Pl	LS	1	$11,000	$11,000	$11,000
	Lake Dr	LS	1	$5,000	$5,000	$5,000
2	**Water Services**					**$18,150**
	Replace/Reconnect Water Main	EA	10	$1,000	$10,000	$10,000
	Corporation	EA	10	$305	$3,050	$3,050
	Curb Stop, Box and Coupling	EA	10	$510	$5,100	$5,100
3	**Traffic Control**					**$19,000**
	Maintenance and Protection of Traffic	LS	1	$3,000	$3,000	$3,000
	Uniformed Police/Flaggers for Traffic Control	LS	1	$16,000	$16,000	$16,000
4	**Restoration**					**$18,000**
	Grade and Resurface Gravel Road	SY	900	$20	$18,000	$18,000
5	**Excavation**					**$10,000**
	Test Pits	LS	1	$5,000	$5,000	$5,000
	Gravel Borrow	LS	1	$5,000	$5,000	$5,000
6	**Other**					**$8,994**
	Wetlands/Dewatering	LF	2,249	$4	$8,994	$8,994
					SUBTOTAL	**$287,147**
7	**General Conditions - 15%**					**$43,100**
					CONSTRUCTION - SUBTOTAL	**$330,247**
8	**Engineering and Contingency - 40%**					**$132,100**
					TOTAL	**$462,347**
					SAY	**$460,000**

Notes:

1 Costs for permitting and easements are not included.

Tighe&Bond

New 8" DI WM in Loop Rd

ESTIMATE OF PROBABLE CONSTRUCTION COST

Jaffrey, NH Water System

September 2013

ENR CCI - 9545.33

ITEM	DESCRIPTION	UNITS	QTY	UNIT PRICE	SUB TOTAL	TOTAL
1	**Pipeline**					**$174,050**
	8" DI Pipe and Fittings	LF	1,965	$70	$137,550	$137,550
	8" Gate Valves	EA	0	$2,000	$0	$0
	Hydrant Assemblies	EA	5	$5,100	$25,500	$25,500
	Special Connections					
	Thayer Rd	LS	1	$11,000	$11,000	$11,000
2	**Water Services**					**$5,445**
	Replace/Reconnect Water Main	EA	3	$1,000	$3,000	$3,000
	Corporation	EA	3	$305	$915	$915
	Curb Stop, Box and Coupling	EA	3	$510	$1,530	$1,530
3	**Traffic Control**					**$17,000**
	Maintenance and Protection of Traffic	LS	1	$3,000	$3,000	$3,000
	Uniformed Police/Flaggers for Traffic Control	LS	1	$14,000	$14,000	$14,000
4	**Restoration**					**$121,400**
	Temporary Bituminous Concrete Repair	SY	800	$45	$36,000	$36,000
	Permanent Bituminous Concrete Repair	SY	1,300	$55	$71,500	$71,500
	Bituminous Concrete Sidewalk & Driveway Repair	SY	100	$60	$6,000	$6,000
	Pavement Markings	LS	1	$7,900	$7,900	$7,900
5	**Excavation**					**$10,000**
	Test Pits	LS	1	$5,000	$5,000	$5,000
	Gravel Borrow	LS	1	$5,000	$5,000	$5,000
6	**Other**					**$8,994**
	Wetlands/Dewatering	LF	2,249	$4	$8,994	$8,994
					SUBTOTAL	**$336,889**
7	**General Conditions - 15%**					**$50,600**
					CONSTRUCTION - SUBTOTAL	**$387,489**
8	**Engineering and Contingency - 40%**					**$155,000**
					TOTAL	**$542,489**
					SAY	**$540,000**

Notes:

1 Costs for permitting and easements are not included.

2 Connection at Sharon Pl included in Cheshire Rd Area cost estimate.

Tighe&Bond

New 8" DI WM in Beach Ave Area

ESTIMATE OF PROBABLE CONSTRUCTION COST

Jaffrey, NH Water System

September 2013

ENR CCI - 9545.33

ITEM	DESCRIPTION	UNITS	QTY	UNIT PRICE	SUB TOTAL	TOTAL
1	**Pipeline**					**$269,270**
	8" DI Pipe and Fittings	LF	2,721	$70	$190,470	$190,470
	8" Gate Valves	EA	1	$2,000	$2,000	$2,000
	Hydrant Assemblies	EA	8	$5,100	$40,800	$40,800
	Special Connections					
	Florence Ave	LS	1	$9,000	$9,000	$9,000
	Woodbound Rd	LS	1	$9,000	$9,000	$9,000
	Spruce Ave	LS	1	$9,000	$9,000	$9,000
	Chestnut Rd	LS	1	$9,000	$9,000	$9,000
2	**Water Services**					**$36,300**
	Replace/Reconnect Water Main	EA	20	$1,000	$20,000	$20,000
	Corporation	EA	20	$305	$6,100	$6,100
	Curb Stop, Box and Coupling	EA	20	$510	$10,200	$10,200
3	**Traffic Control**					**$22,000**
	Maintenance and Protection of Traffic	LS	1	$4,000	$4,000	$4,000
	Uniformed Police/Flaggers for Traffic Control	LS	1	$18,000	$18,000	$18,000
4	**Restoration**					**$22,000**
	Grade and Resurface Gravel Road	SY	1,100	$20	$22,000	$22,000
5	**Excavation**					**$10,000**
	Test Pits	LS	1	$5,000	$5,000	$5,000
	Gravel Borrow	LS	1	$5,000	$5,000	$5,000
6	**Other**					**$10,884**
	Wetlands/Dewatering	LF	2,721	$4	$10,884	$10,884
					SUBTOTAL	**$370,454**
7	**General Conditions - 15%**					**$55,600**
				CONSTRUCTION - SUBTOTAL		**$426,054**
8	**Engineering and Contingency - 40%**					**$170,500**
					TOTAL	**$596,554**
					SAY	**$600,000**

Notes:

1 Costs for permitting and easements are not included.

Tighe&Bond

New 8" DI WM in Woodbound Rd

ESTIMATE OF PROBABLE CONSTRUCTION COST

Jaffrey, NH Water System

September 2013

ENR CCI - 9545.33

ITEM	DESCRIPTION	UNITS	QTY	UNIT PRICE	SUB TOTAL	TOTAL
1	**Pipeline**					**$470,140**
	8" DI Pipe and Fittings	LF	5,642	$70	$394,940	$394,940
	8" Gate Valves	EA	0	$2,000	$0	$0
	Hydrant Assemblies	EA	12	$5,100	$61,200	$61,200
	Special Connections					
	Woodbound Rd (Northeast side)	LS	1	$9,000	$9,000	$9,000
	Woodbound Rd (Southwest side)	LS	1	$5,000	$5,000	$5,000
2	**Water Services**					**$36,300**
	Replace/Reconnect Water Main	EA	20	$1,000	$20,000	$20,000
	Corporation	EA	20	$305	$6,100	$6,100
	Curb Stop, Box and Coupling	EA	20	$510	$10,200	$10,200
3	**Traffic Control**					**$41,000**
	Maintenance and Protection of Traffic	LS	1	$9,000	$9,000	$9,000
	Uniformed Police/Flaggers for Traffic Control	LS	1	$32,000	$32,000	$32,000
4	**Restoration**					**$344,100**
	Temporary Bituminous Concrete Repair	SY	2,200	$45	$99,000	$99,000
	Permanent Bituminous Concrete Repair	SY	3,500	$55	$192,500	$192,500
	Bituminous Concrete Sidewalk & Driveway Repair	SY	500	$60	$30,000	$30,000
	Pavement Markings	LS	1	$22,600	$22,600	$22,600
5	**Excavation**					**$10,000**
	Test Pits	LS	1	$5,000	$5,000	$5,000
	Gravel Borrow	LS	1	$5,000	$5,000	$5,000
6	**Other**					**$8,994**
	Wetlands/Dewatering	LF	2,249	$4	$8,994	$8,994
					SUBTOTAL	**$910,534**
7	**General Conditions - 15%**					**$136,600**
					CONSTRUCTION - SUBTOTAL	**$1,047,134**
8	**Engineering and Contingency - 40%**					**$418,900**
					TOTAL	**$1,466,034**
					SAY	**$1,470,000**

Notes:

1 Costs for permitting and easements are not included.

New 8" DI WM on Bryant Rd

ESTIMATE OF PROBABLE CONSTRUCTION COST

Jaffrey, NH Water System

September 2013 **ENR CCI - 9545.33**

ITEM	DESCRIPTION	UNITS	QTY	UNIT PRICE	SUB TOTAL	TOTAL
1	**Pipeline**					**$87,890**
	8" DI Pipe and Fittings	LF	1,037	$70	$72,590	$72,590
	8" Gate Valves	EA	0	$2,000	$0	$0
	Hydrant Assemblies	EA	3	$5,100	$15,300	$15,300
2	**Water Services**					**$10,890**
	Replace/Reconnect Water Main	EA	6	$1,000	$6,000	$6,000
	Corporation	EA	6	$305	$1,830	$1,830
	Curb Stop, Box and Coupling	EA	6	$510	$3,060	$3,060
3	**Traffic Control**					**$14,000**
	Maintenance and Protection of Traffic	LS	1	$4,000	$4,000	$4,000
	Uniformed Police/Flaggers for Traffic Control	LS	1	$10,000	$10,000	$10,000
4	**Restoration**					**$77,200**
	Temporary Bituminous Concrete Repair	SY	500	$45	$22,500	$22,500
	Permanent Bituminous Concrete Repair	SY	700	$55	$38,500	$38,500
	Bituminous Concrete Sidewalk & Driveway Repair	SY	200	$60	$12,000	$12,000
	Pavement Markings	LS	1	$4,200	$4,200	$4,200
5	**Excavation**					**$10,000**
	Test Pits	LS	1	$5,000	$5,000	$5,000
	Gravel Borrow	LS	1	$5,000	$5,000	$5,000
6	**Other**					**$20,000**
	Rock Excavation	CY	200	$100	$20,000	$20,000
					SUBTOTAL	**$219,980**
7	**General Conditions - 15%**					**$33,000**
					CONSTRUCTION - SUBTOTAL	**$252,980**
8	**Engineering and Contingency - 40%**					**$101,200**
					TOTAL	**$354,180**
					SAY	**$350,000**

Notes:

1 Costs for permitting and easements are not included.

2 Connection at Main St included in Main St, Section 1 cost estimate.

New 8" DI WM on Harkness Rd

ESTIMATE OF PROBABLE CONSTRUCTION COST

Jaffrey, NH Water System

September 2013 **ENR CCI - 9545.33**

ITEM	DESCRIPTION	UNITS	QTY	UNIT PRICE	SUB TOTAL	TOTAL
1	**Pipeline**					**$109,390**
	8" DI Pipe and Fittings	LF	1,087	$70	$76,090	$76,090
	8" Gate Valves	EA	0	$2,000	$0	$0
	Hydrant Assemblies	EA	3	$5,100	$15,300	$15,300
	Special Connections					
	Harkness Rd & Cutter Hill Rd	LS	1	$9,000	$9,000	$9,000
	Harkness Rd & Matchpoint Rd	LS	1	$9,000	$9,000	$9,000
2	**Water Services**					**$10,890**
	Replace/Reconnect Water Main	EA	6	$1,000	$6,000	$6,000
	Corporation	EA	6	$305	$1,830	$1,830
	Curb Stop, Box and Coupling	EA	6	$510	$3,060	$3,060
3	**Traffic Control**					**$15,000**
	Maintenance and Protection of Traffic	LS	1	$5,000	$5,000	$5,000
	Uniformed Police/Flaggers for Traffic Control	LS	1	$10,000	$10,000	$10,000
4	**Restoration**					**$77,400**
	Temporary Bituminous Concrete Repair	SY	500	$45	$22,500	$22,500
	Permanent Bituminous Concrete Repair	SY	700	$55	$38,500	$38,500
	Bituminous Concrete Sidewalk & Driveway Repair	SY	200	$60	$12,000	$12,000
	Pavement Markings	LS	1	$4,400	$4,400	$4,400
5	**Excavation**					**$10,000**
	Test Pits	LS	1	$5,000	$5,000	$5,000
	Gravel Borrow	LS	1	$5,000	$5,000	$5,000
6	**Other**					**$20,000**
	Rock Excavation	CY	200	$100	$20,000	$20,000
					SUBTOTAL	**$242,680**
7	**General Conditions - 15%**					**$36,500**
					CONSTRUCTION - SUBTOTAL	**$279,180**
8	**Engineering and Contingency - 40%**					**$111,700**
					TOTAL	**$390,880**
					SAY	**$390,000**

Notes:

1 Costs for permitting and easements are not included.