PLAISTOW POTABLE WATER SUPPLY FEASIBILITY STUDY

PRESENTATION TO THE PLAISTOW BOARD OF SELECTMEN

JULY 6, 2015

NORMANDEAU
environmental consultants

Presentation Summary

- General Water Resources Review
- Overview of Fire Suppression System
- Review of Scope of Work
- General Summary of Completed Tasks
- Project Deliverables
- Next Steps

Plaistow's Limited Water Resources

- One of two communities in NH that does not have a pond or water body sufficient for a municipal reservoir - the Town faces significant water resource challenges.
- Plaistow has a significant "stratified-drift" aquifer; but most of the aquifer is low-volume.
- Water quality is impacted by Beede Waste Oil Superfund Site, Town landfill and salt shed, Former Lido Gasoline site, and various junk yards.
- Plaistow's aquifer is now protected by:
  - Source Water Protection Plan;
  - Aquifer District Overlay Zone
  - Best Management Practices Stormwater Management Ordinance
  - Active Board of Selectmen, Conservation Commission, and Planning Board.

Plaistow Water Resources – Public Water Systems

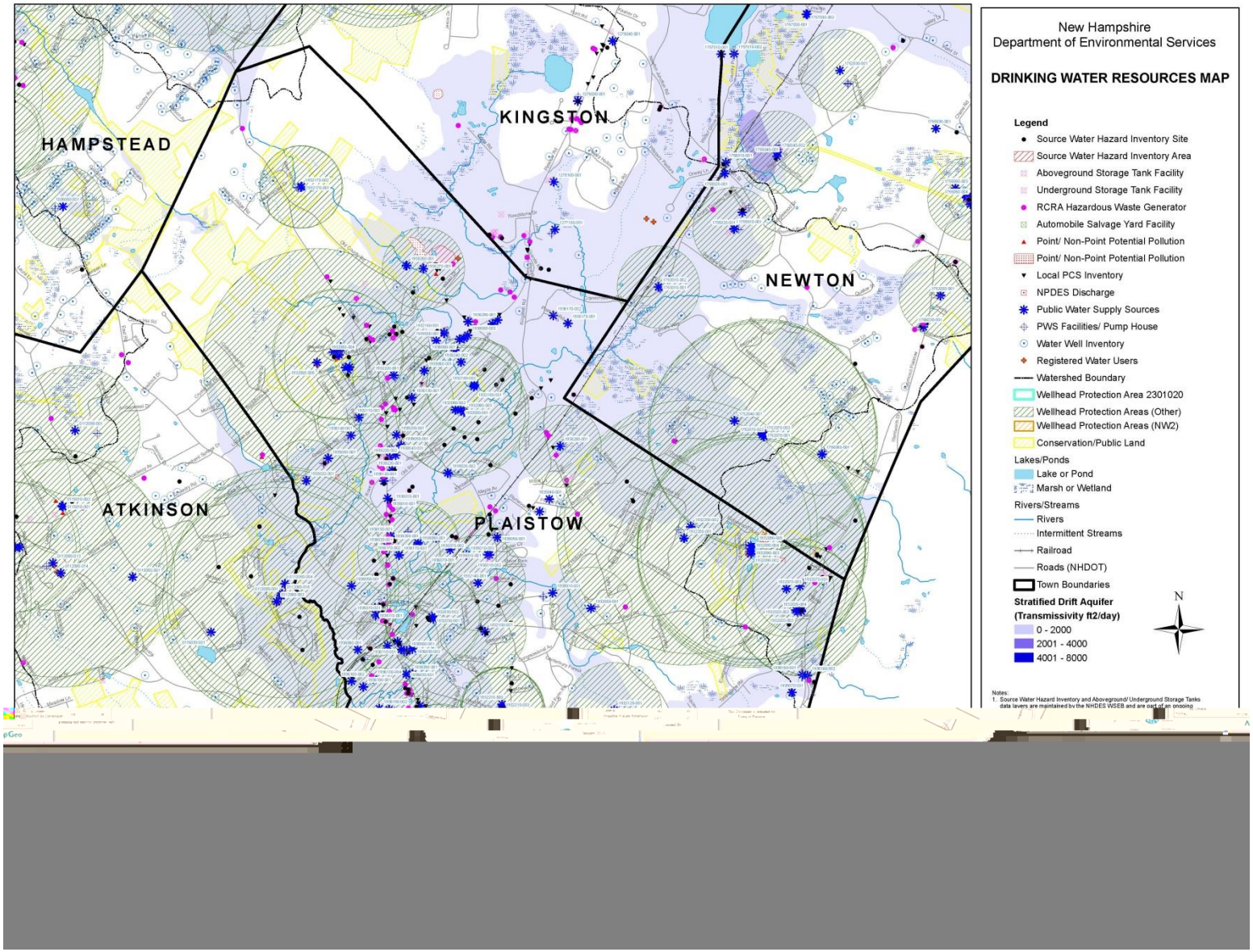
Public Water System: a system of piped water for human consumption that serves at least 15 service connections or 25 people at least 60 days a year.

Plaistow has approximately 55 active PWSs.

Three Categories:

- **Community Water System (CWS)**: serves at least 15 service connections or 25 residents which use the system year round.
  - *20 active CWS in Plaistow – ex. Twin Ridge, Golden Hill, Rainbow Ridge*
- **Non-transient, Non-community Water System (NTNC)**: not a CWS but serves **the same** 25 or more people at least 60 days a year
  - *16 active NTNC in Plaistow – ex. Pollard School, Timberlane, Market Basket*
- **Transient, Non-community Water System (TNC)**: not a CWS but serves at least **25 people in a transitory setting** for at least 60 days a year.
  - *19 active TNC in Plaistow – Dunkin Donuts Plaza, Plaistow F&G Club*

Public Water Systems and Aquifer Protection Areas



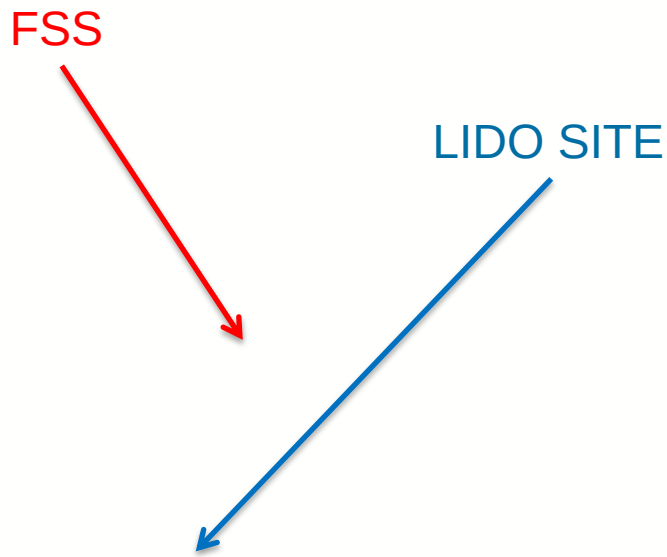
Potable (Drinking) Water Supply Feasibility Study

- Study funded through New Hampshire Department of Environmental Services (NHDES) Gasoline Remediation and Elimination of Ethers (GREE) Funds.
- GREE projects are typically associated with releases at underground storage tank (UST) sites where methyl tertiary butyl ether (MtBE) is present.
- Objective is to determine the feasibility of developing a public drinking water supply system for the groundwater impacted area in the vicinity of the former Lido gasoline station and other gasoline release sites by utilizing the existing fire suppression system (FSS) as a water distribution system.
- The system will need to serve as both drinking water system and fire suppression system.

Objective of GREE Feasibility Study

Provide drinking water to three MtBE-contaminated areas associated with the Lido site:

- MtBE-contaminated **properties related to the Lido site and MtBE-contaminated properties** immediately abutting the water supply route connecting the contaminated properties to an upgraded FSS;
- MtBE-contaminated properties **immediately abutting the existing water supply route** of an upgraded FSS; and
- MtBE-contaminated properties immediately **abutting the water supply route connecting an upgraded FSS to an assumed water supply source** (and/ or an assumed interconnection source).

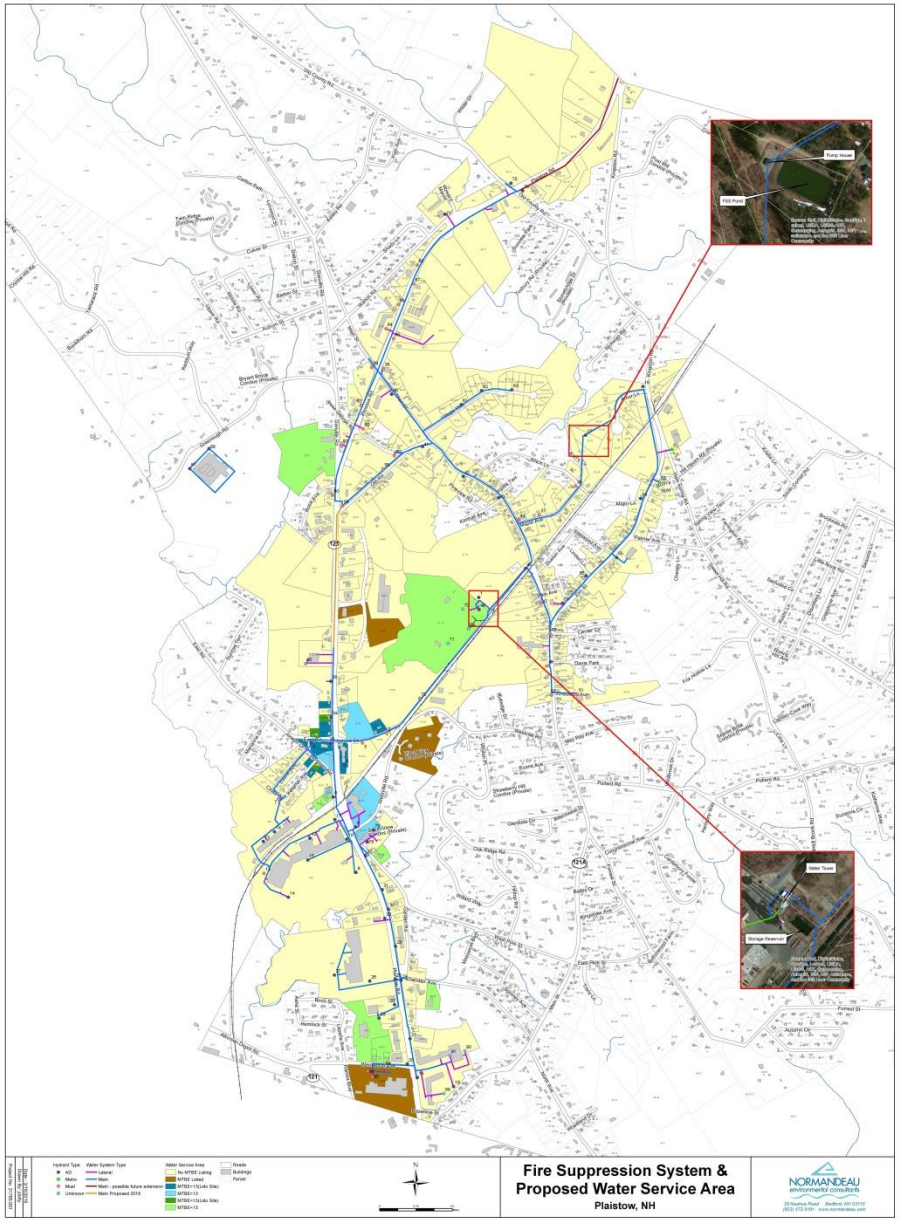


™ Project funding is limited to these three areas and not a system for the entire town. DES funding is for MtBE contaminated sites.

Identification of Water Service Area

- Investigation focused on groundwater-impacted areas
  - in the vicinity of the Lido site,
  - properties located adjacent to the existing FSS, and
  - properties located along a possible potable water supply route between a potential water supply source and the point of connection to the existing FSS (to be determined).
- A "preliminary" **water service area or WSA** was defined for properties in the vicinity of the Lido site and along the existing FSS
- Identified **MtBE-impacted sites** both in the Lido area and along the existing FSS.
- WSA will also include route connecting identified water source with the existing FSS.

Water Service Area – Where?



WSA includes 366 parcels

- ¾ Residential - 189
- ¾ Commercial - 115
- ¾ Industrial - 9
- ¾ Combined Mixed Uses - 5
- ¾ Others - 48

WSA includes 36 MtBE parcels

- ¾ Lido MtBE > 13 ppb - 9
- ¾ Lido MtBE < 13 ppb - 3
- ¾ Non Lido MtBE > 13 ppb - 7
- ¾ Non Lido MtBE < 13 ppb - 11
- ¾ Other Sites (no data) - 6

Estimated Water Demand – How Much?

- Determined the number of properties (residential, commercial, industrial, and institutional) located in the preliminary WSA.
- Calculated how much water they would use – the Demand!
  - Current day "average daily", "maximum daily" and "peak hour demand".

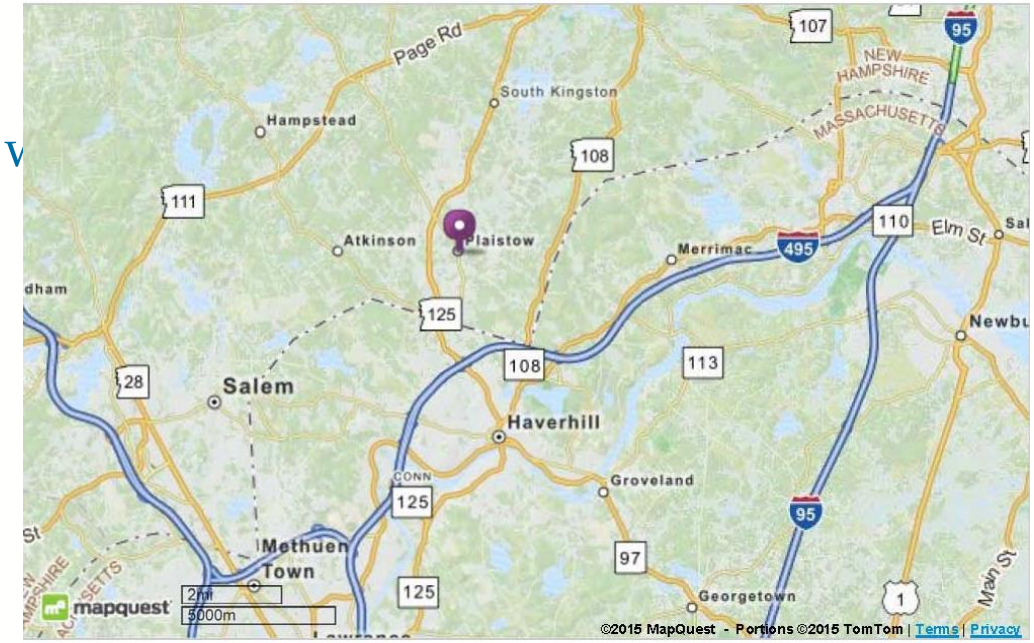
Type	Number of Parcels	Average Day Demand (gal/day)	Maximum Day Demand (gal/day)	Peak Hour Demand (gal/min)
Residential	189	120,750	217,350	335
Commercial	115	162,904	293,228	453
Industrial	9	7,330	13,195	20
Combined Mixed Use	5	3,275	5,895	9
Other	48	0	0	0
Total	366	294,260	529,668	817

Task 3 - What's the source?

Three types of sources:

- Development of a new groundwater well system within or in close proximity to the Town.

- Imported Water from adjacent tov
  - ¾Haverhill, MA
  - ¾Merrimac, MA
  - ¾Hampstead Area Water Co.
  - ¾Pennichuck East Utility



- Potential Interconnect Sources from existing wells in town.

What's the source? Local Groundwater

Groundwater resources reviewed during a Phase I Hydrological Evaluation conducted by Hydrosource Associates, Inc.

- Review of background information on local hydrology and previous work on the area groundwater resources.
- A lineament/ fracture trace analysis to evaluate bedrock water resources.
- Assessment of potential threats from contaminated sites.
- A water balance assessment and an evaluation of available groundwater recharge and storage.
- A site visit to potential areas within the Town.
- Preparation of a report that identified areas that may yield adequate amounts of groundwater for use as a potable water source potentially from both overburden and bedrock sources

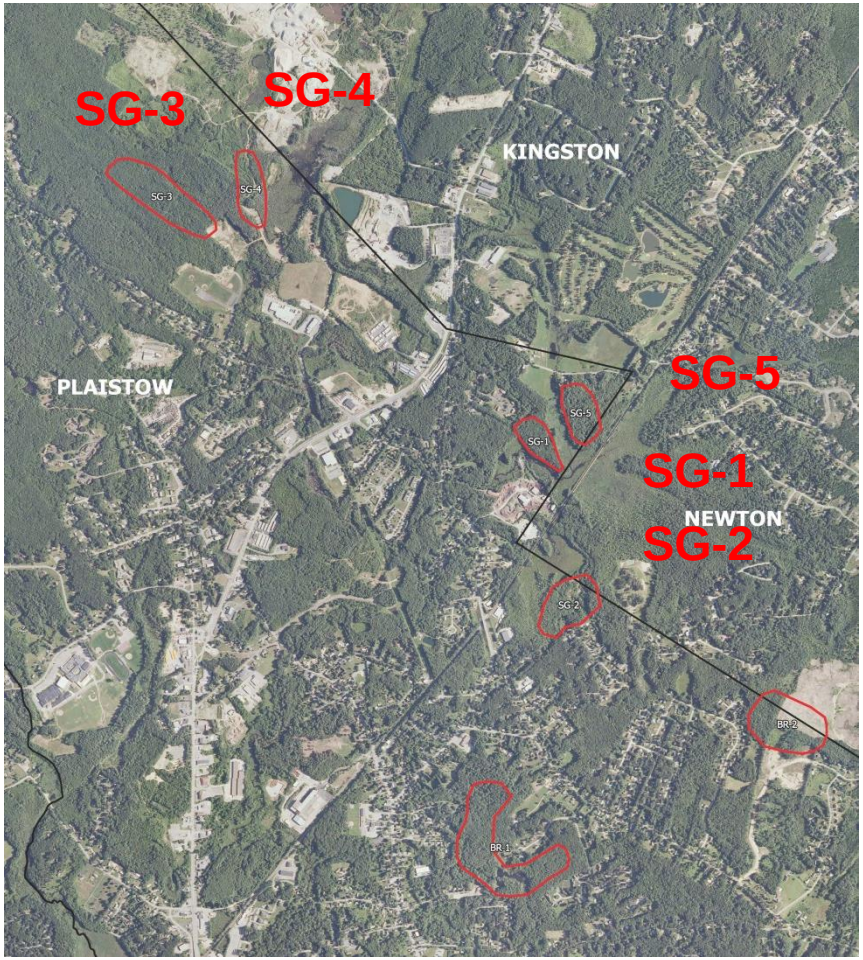
Groundwater Resources – Sand and Gravel

- Five (5) Potential Sand and Gravel sites:
  - **SG-1**: near Crane Crossing Rd.
  - **SG-2:** extension of SG-1
  - **SG-5**: across Little River from SG-1.
  - **SG-3 and SG-4**: NW of landfill and PARC fields.

- Generally occur along the Little River and the lowermost reaches of Kelly, Seaver, and Bryant Brooks.

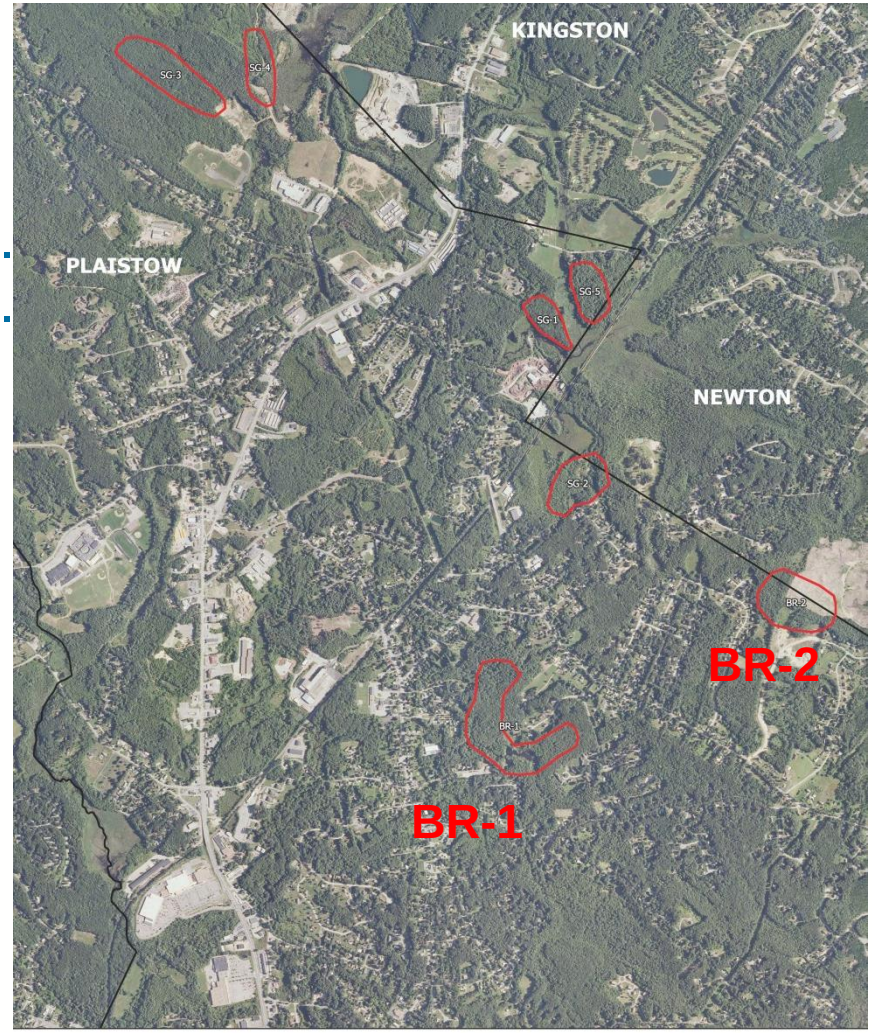
- Sites with sizeable S&G deposits, visible on surface as “esker” deposits, and good potential saturated thickness.

- Phase II will assess overburden sediments and identify locations likely to have sufficiently thick, saturated deposits.

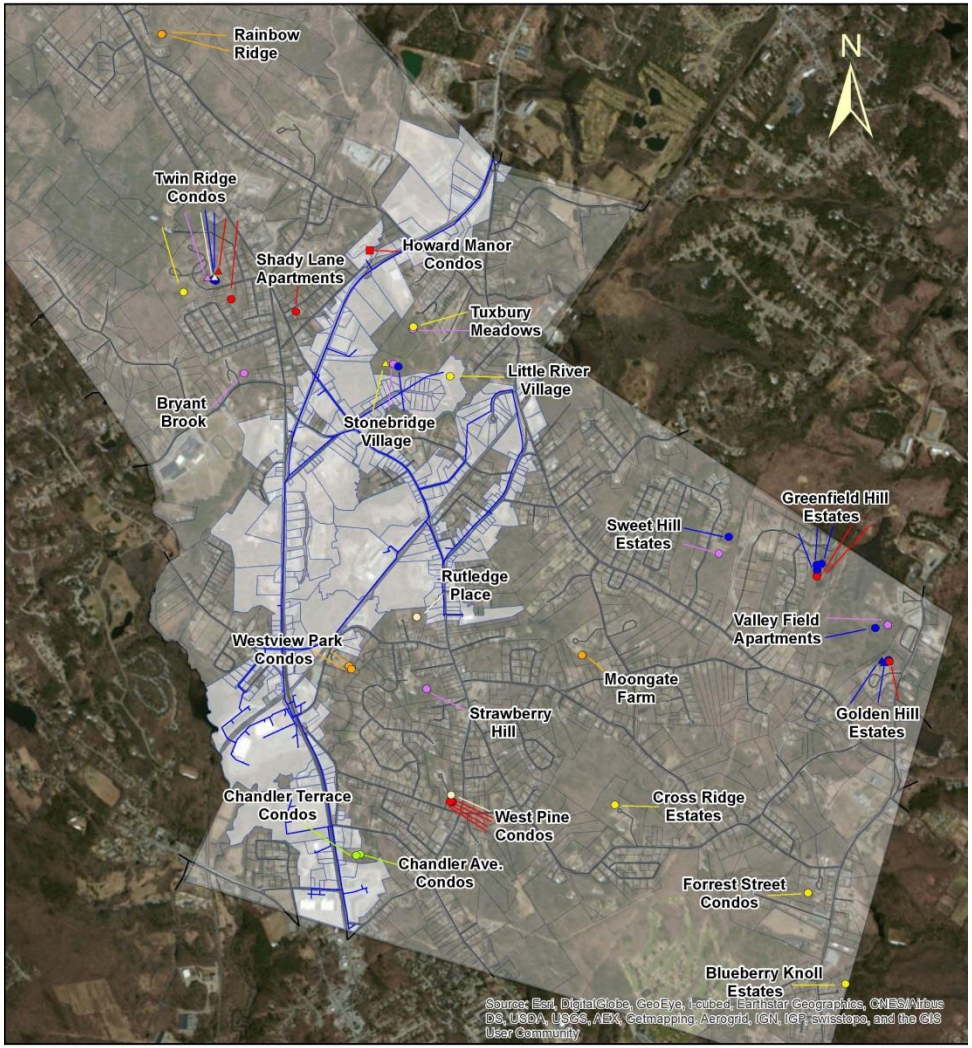


Groundwater Resources - Bedrock

- Two (2) Potential bedrock sites:
  - **BR-1** – southeast portion of Town.
  - **BR-2** – southeast portion of Town.
  - Located along fracture zones in bedrock.
  - Also areas with other wells with sizeable yields (80-100 gpm).
  - Need sizeable upgradient watershed to supply recharge.
- Phase II evaluation will assess and identify likely locations of underlying bedrock structural features and fracture networks via electromagnetic surveys.



Potential Interconnection Sources

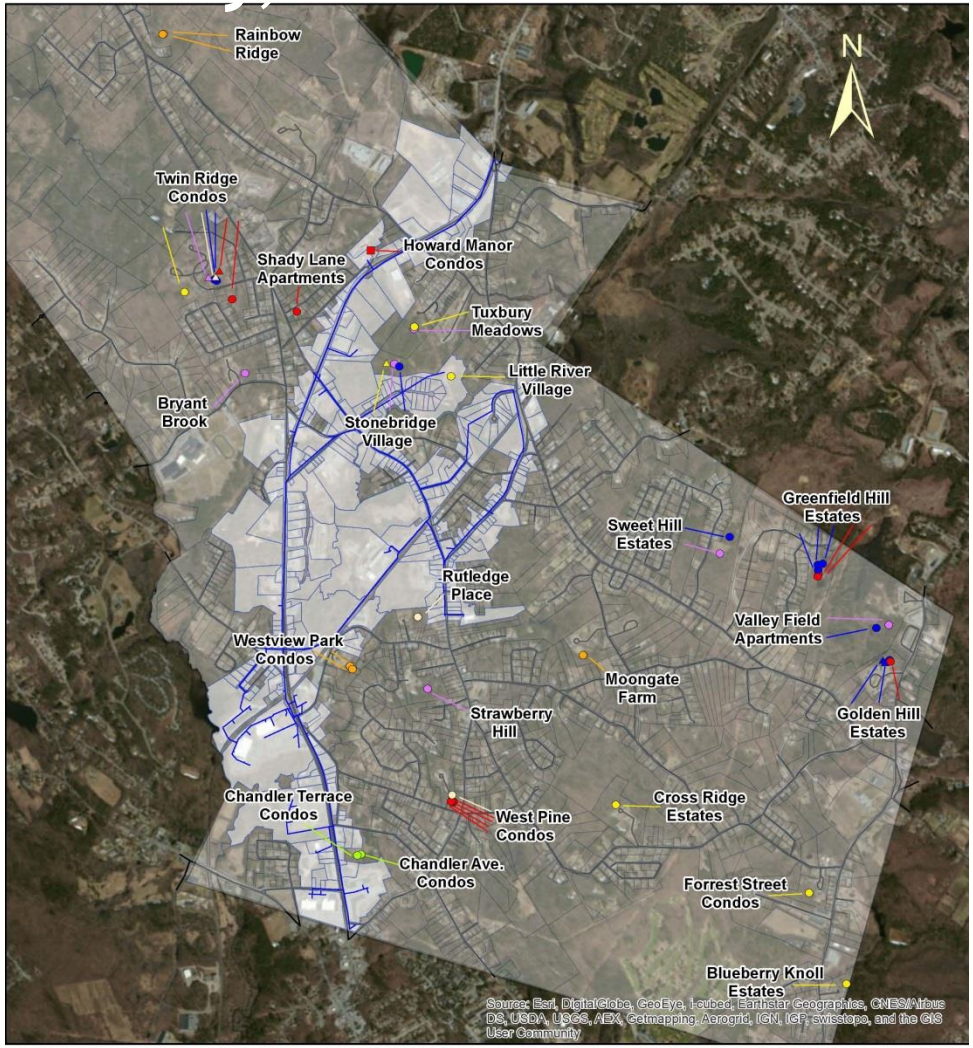


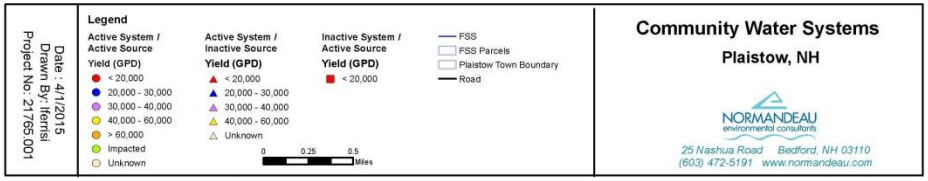
- Reviewed potential yields of existing community water supply wells (~46) to assess them as a supplemental source.
- Limited wells that have at least 25% of expected WSA demand (50-75,000 gpd).
- Further evaluation needs to be performed during next phase to determine actual excess capacity.
- Some wells with larger yields are available but would not meet current CWS requirements.

Imported Water Sources Requirements

- Identify **external source(s) of water** and assess feasibility of purchasing water from that source.
- Identify **the capacity** of feasible water sources;
- Identify **current and future demand** at all feasible water sources;
- Determine if potential water suppliers would need to **develop additional source capacity** to meet the added demand of the Plaistow service area.
- The following communities were identified as having substantial existing infrastructure :
  - Haverhill, Massachusetts;
  - Merrimac, Massachusetts;
  - Hampstead Area Water Company (Atkinson, NH);
  - Pennichuck East Utility, Inc. (Plaistow area).

Imported Water Sources - Pennichuck East Utility, Inc.





- **Twin Ridge Water Supply** - Four bedrock wells located off Culver Street;
- **Sweet Hill Water Supply** - Two bedrock wells located off Partridge Lane off of Sweet Hill Road;
- **Valley Field Water Supply** - Two bedrock wells located west of NH Route 108 in the southeast portion of town.
- **Beede Waste Oil Water Supply System**

Imported Water Sources – Merrimac, MA

- **Merrimac Water Company**
  - Water supplied by two wells with 1,827 connections and 19 miles of water main
  - Two water supply tanks with capacity of 1.65 million gallons
  - Average day demand of ~350,000 gallons per day (~28 million gallons per year) in 2013
  - Approved water withdrawal of 360,000 GPD.
  - Would not have capacity to support additional demand from proposed Plaistow system unless additional well(s) was added.
  - Previous groundwater investigation identified potential well site with estimated safe yield of 500 gallon per minute on a town-owned property located east of Bear Hill Road in Newton, New Hampshire.
  - The development of a third well has not been pursued as of this time.

Imported Water Sources – Hampstead Area Water Company

- **Hampstead Area Water Company**
  - Total of 20 water systems with ~50 miles of pipe, 56 wells, and 2,800 customers.
  - Two core systems in Hampstead and Atkinson with 32 bedrock wells and 2,300 customers.
  - Operated with a series of pumps and storage tanks to provide needed pressure to systems.
  - Wells have an average pumping rate of 350 GPM or ~500,000 GPD
  - Sustainable demand of 500,000 to 750,000 GPD.
  - Currently would not have capacity to meet additional demand.
  - Possible options:
    - Additional well sources in their service area to increase capacity
    - Connection to Pennichuck Water System in Derry or Salem; supplied by Manchester.

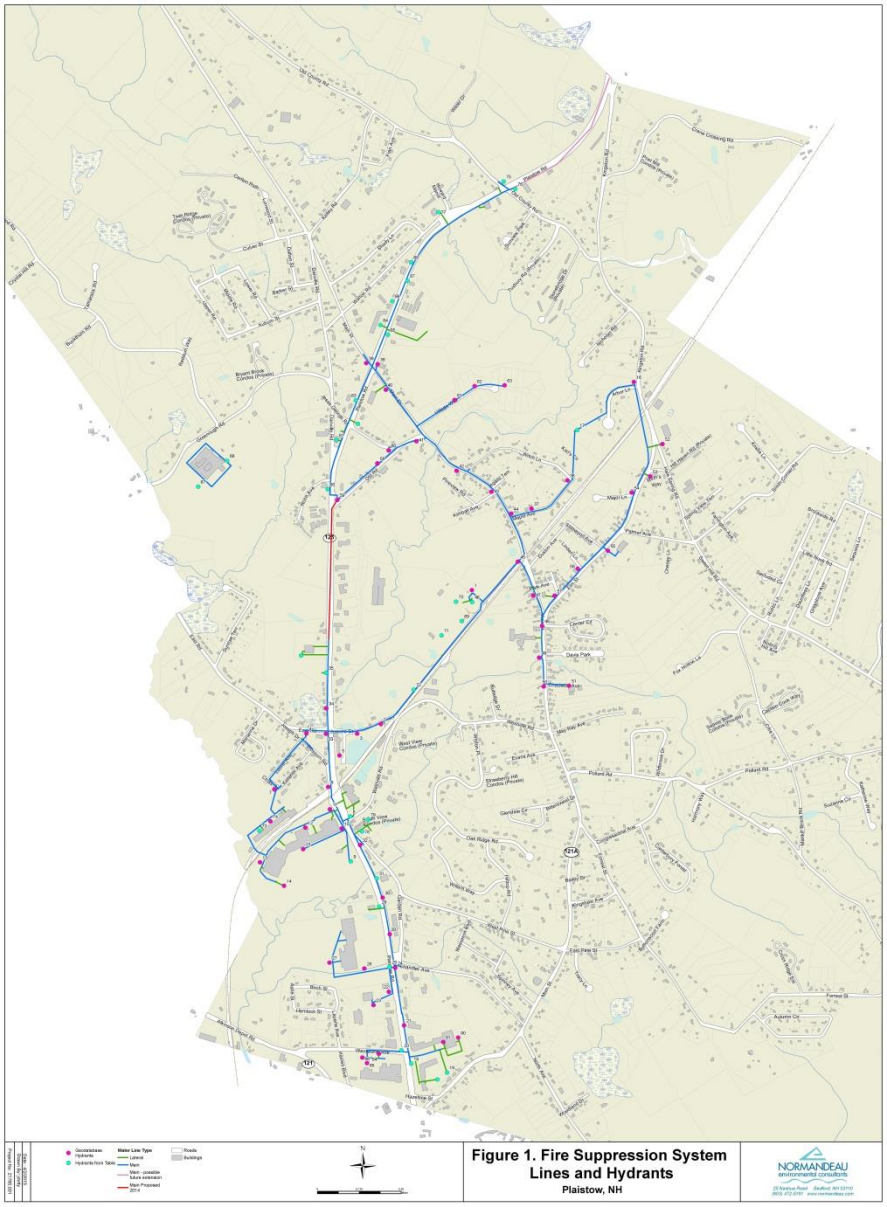
Imported Water Sources – Haverhill, MA

- Supplied by several lakes and ponds; water treated prior to distribution. Treatment plant has maximum day demand of 13 million gallons per day MGD).
- Gale Hill reservoir - 10 million gallon storage reservoir
- Average Day Demand is 5.5-6.0 MGD - Total safe yield is ~7.1 MGD
- Haverhill has capacity to meet demand of proposed Plaistow system (295,000 gallons per day or ~6% of Haverhill ADD)
- Water mains along Plaistow town boundary:
  - 8-inch main on Route 125 up to State Line Plaza
  - 12-inch main on Hilldale Avenue ~ 4,000 feet west of Route 125
  - 12-inch main on North Avenue ~ 4,500 feet east of Route 125
- Initial review of elevations of Haverhill system components and elevations in the Plaistow WSA generally indicate that a pressure of 70-80 pounds per square inch (PSI) could be obtained for drinking water purposes throughout the system.
- Additional assessment of the impacts on existing fire suppression system including sprinkler systems and fire hydrant requirements is needed to ensure adequate fire flows and determine if any other improvements or retrofits would be required.

Inventory of Assets

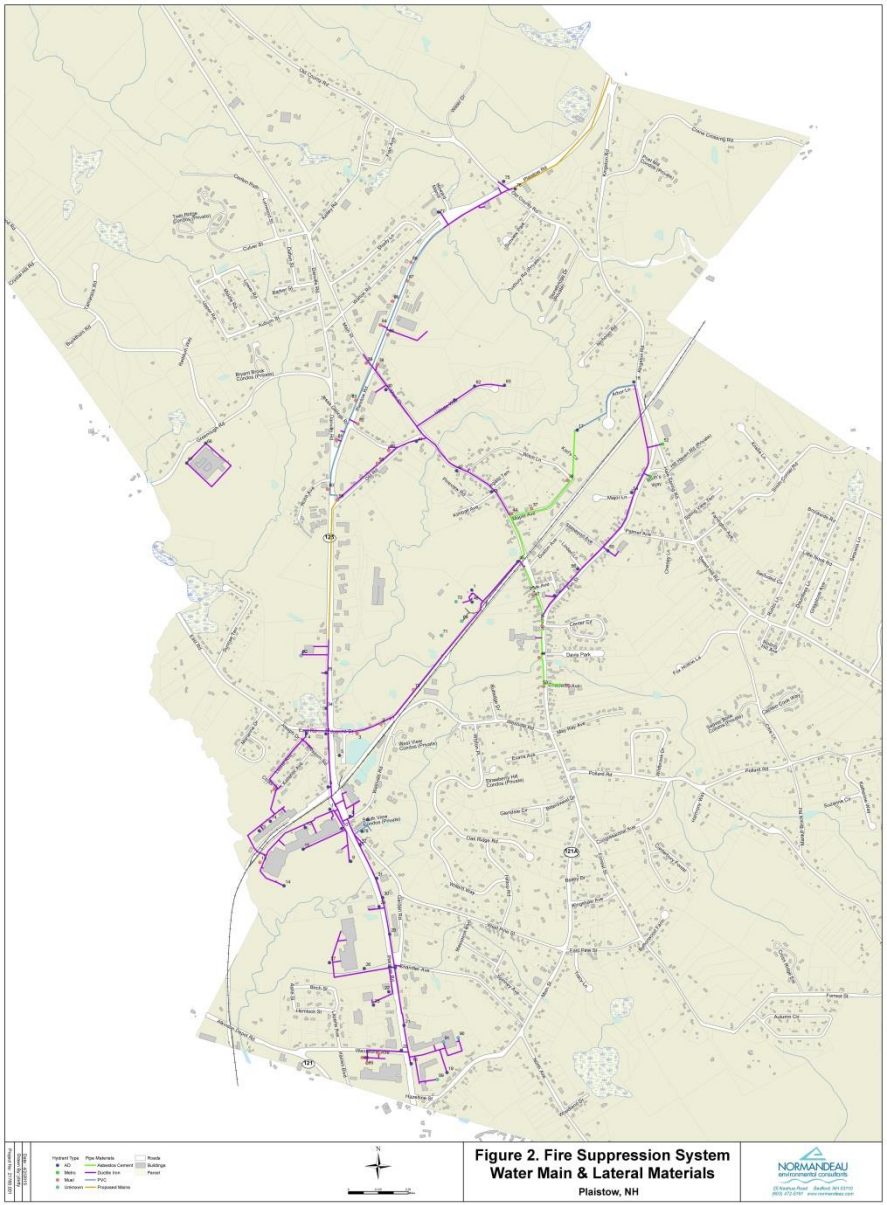
- Expansion of system continued in 1980s and 1990s
- Late 1990s; Main Street water tank and pump system disconnected from system (tank, reservoir, and pump station by-passed/ isolated).
- Entire FSS supplied with water from Maple Avenue pump station.
- Current system has approximately 12 miles of pipe and 92 hydrants.

Inventory of Assets – FSS Pipe Type



- ~9.7 miles or 79% consists of existing water mains
- ~1.7 miles or 14% consists of laterals feeding into buildings.
- ~0.5 miles or 4% consists of proposed main to be completed in 2015 along Route 125 south of Old Road
- ~0.5 mile or 4% consist of possible future expansion along Route 125 on the north end of Town.

Inventory of Assets – FSS Pipe Material

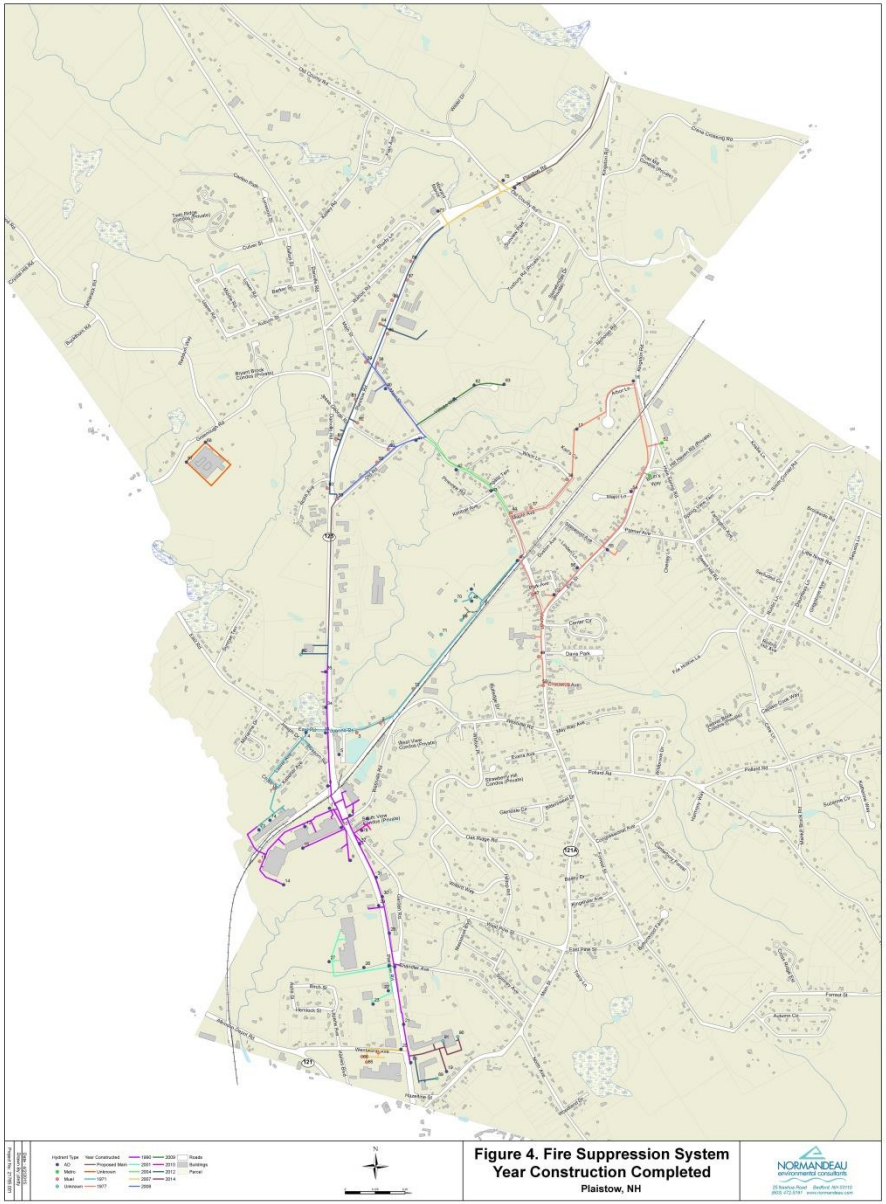


- ~7.8 miles or 63% consists of ductile iron (DI) pipe
- ~2.3 miles or 19% of asbestos concrete (AC) pipe.
- ~1.3 miles or 10% of poly vinyl chloride (PVC) pipe.
- Mixture of pipe material and size due to system being developed over several different periods

Inventory of Assets – FSS Pipe Sizes

- ~10.4 miles or 84% consists of 12-inch diameter pipe
- ~0.7 miles or 6% consists of 8-inch diameter pipe
- ~0.9 miles or 7% are unknown (proposed mains on Rte 125).
- ~0.4 miles or 3% is unknown (Timberlane Regional High School; not connected to existing FSS but a stand alone)
- Pipe is more than adequate for usage as a water supply system.

Inventory of Assets – FSS Year Constructed



Year Constructed	Miles	Percentage
1967	0.26	2%
1971	1.16	9%
1977	1.01	8%
1987-1992	4.06	33%
2001-2004	0.90	7.31%
2007-2010	1.79	15%
2012-2014	1.86	15%
Unknown (Timberlane Regional HS)	0.38	3%
Proposed Mains	0.90	7%
Total	12.31	100%

Water Storage Tank Assessment

- Inspection of water tank and pump house at Main Street pump station by Utility Services Group.
- Inspect interior/exterior of tank and pump house for the following conditions:
  - Sanitary,
  - Safety,
  - Structural,
  - Security,
  - Coatings.

Water Storage Tank Assessment

- Findings:
  - Interior and exterior paint showing areas of corrosion and rust.
  - Recommend abrasive blast and re-finishing (3 coats) for both interior and exterior.
  - Presence of lead will require encapsulation.
  - Would need to remove cellular telephone equipment to a temporary tower.
  - Additional structural, sanitary, and safety/security issues:
    - Roof ladder, roof hatch handle, riser manhole.
    - Finial vent and overflow pipe
    - Safety climb equipment, handrails/grate for interior riser opening, balcony handrail, FAA lighting, replace ladder cage.

Water Storage Tank Renovation Costs

Item	Estimated Cost
Exterior Coating Renovation	$406,500
Interior Coating Renovation	$110,500
Repairs (safety, structure, sanitary, security)	$27,500
PAX 100 Active Mixer	$15,500
Retrofit Cell Corral with Messenger Pipe	$130,500
Riser Lead Coatings	$21,500
	$711,850

Water Loss Assessment

- Weston & Sampson conducted study to assess current water loss from the FSS.
- Performed water loss assessment incorporating the Town's information on the system pipe diameter and lengths as well as jockey pump cycle frequency to determine approximate water loss.
- Compared allowable water loss (in gallons per hour) to actual water loss from jockey pump cycle frequency data.
- Allowable water loss for a newly constructed system is ~ 67 gallons per hour or ~585,000 gallons per year..

Water Loss Assessment

- Evaluated pump data for period of June 2013 to January 2015.
  - Average estimated water loss of 120 GPH or 1,050, 000 gallons annually.
  - Higher estimate water loss in winter, lower in summer.
- Compared average estimated water loss of 120 GPH (2,880 GPD) to Normandeau Average Daily Demand Estimate of 295,000 GPD (~1.0% unaccounted-for by water loss).
- NHDES threshold of 15% water loss for potable water supply water before leak detection evaluation is required.
- System is generally water-tight and experiences an actual water loss less than the NHDES threshold of 15%.

FSS Desktop Assessment

- Desktop review of available information. Facets of water services operation include the following issues:
  - Construction,
  - Operation and maintenance,
  - Health and safety, and
  - Business operations.

Preliminary Cost Estimate for Conversion of FSS to Combined FSS/Drinking Water System

- Meet with the Town and NHDES to present feasible options for the potable water supply with the intent of identifying preferred alternatives.
- NHDES requested cost estimates be developed for no more than three feasible alternatives; two imported water alternatives and one groundwater alternative.
- Expect to meet with Town and DES in late July to review and prepare preliminary cost estimates in August
- Cost estimates will include elements required to increase capacity (both source and service) for neighboring water systems to meet the additional estimated water demand (with capacity for expansion) for the preliminary WSA.

Deliverables

- Preparation of a summary report including summaries for various tasks:
  - Water Demand and Service Area Study Report;
  - Phase I Groundwater Investigation Report;
  - Imported Water and Interconnection Investigation Report;
  - Inventory of Assets Map;
  - Water Tank Assessment Report;
  - Water Loss Calculation Report;
  - FSS Assessment (Desktop Study) Report; and
  - Preliminary Cost Estimate.
- Summary report expected to be submitted in August

Next Steps for Feasibility Study

- Additional assessment of the impacts on existing fire suppression system including sprinkler systems and fire hydrant requirements to ensure adequate fire flows and determine if any other improvements or retrofits would be required to system (July 2015).
- Additional discussion with representatives regional or abutting water supply sources (July 2015).
- FSS Desktop Evaluation (July 2015)
- Meet with Town and DES to discuss preferred alternatives (late July 2015).
- Prepare preliminary cost estimates (July/August 2015).
- Prepare draft report (August 2015)

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