PLAISTOW POTABLE WATER SUPPLY FEASIBILITY STUDY

PRESENTATION TO THE PLAISTOW BOARD OF SELECTMEN

JUNE 6, 2016

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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.

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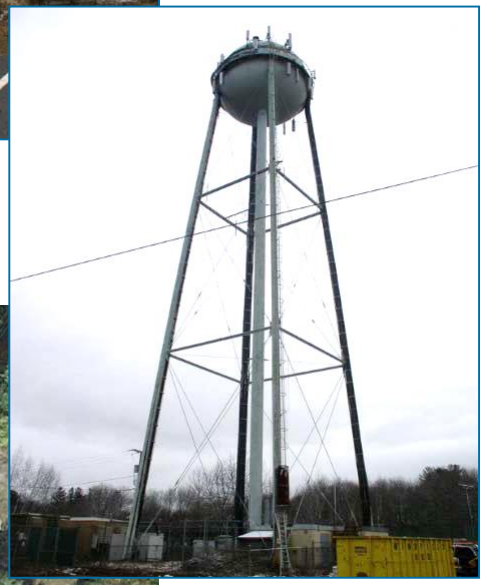
Development of Fire Suppression System (FSS)

- Original system serviced the Process Engineering and Pennsylvania Box and Lumber Company property off Main Street.
- ~1,300 feet of pipe; one main and two laterals with three hydrants.
- ~100,000 gallon elevated water storage tank and ~300,000 gallon open concrete reservoir
- Supplied by two (2) on-site water wells
- Expanded in 1970 to the south to serve Westville Homes facility on Westville Road including 9 additional hydrants.



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Expansion of System – Maple Avenue Pump Station

- Expansion in 1977 to serve area to south (Chadwick Avenue) and north (Maple Avenue).

- Maple Avenue pump station included:
  - 1,000,000 gallon open lined earthen reservoir,
  - a primary diesel fire pump and secondary electric fire pump (both 1,500 GPM at 125 PSI).
  - Supplied with water from trench drain system that is pumped into reservoir.

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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 would need to serve as both drinking water system and fire suppression system.**

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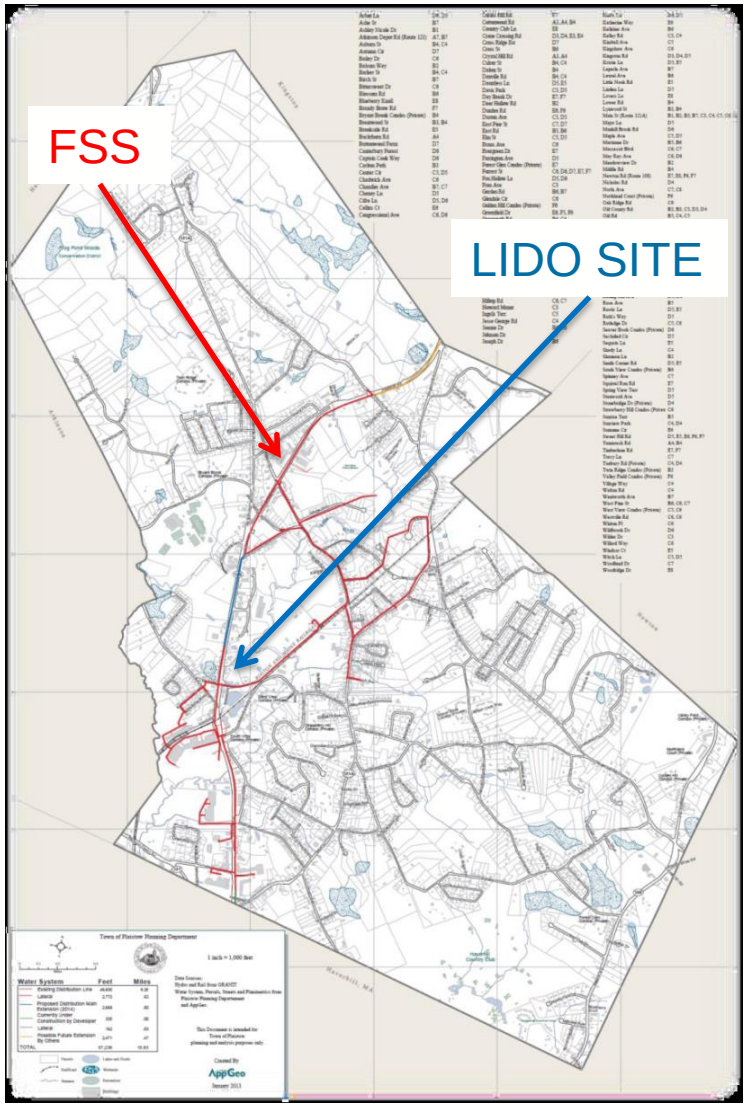
Objective of GREE Feasibility Study

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.

Potable Water Supply Feasibility Study Presentation Summary

Key Components

- Evaluate existing fire suppression system infrastructure
- Estimate water supply demand scenarios
- Evaluate feasibility of water supply source alternatives
- Develop estimated costs
- Define future steps

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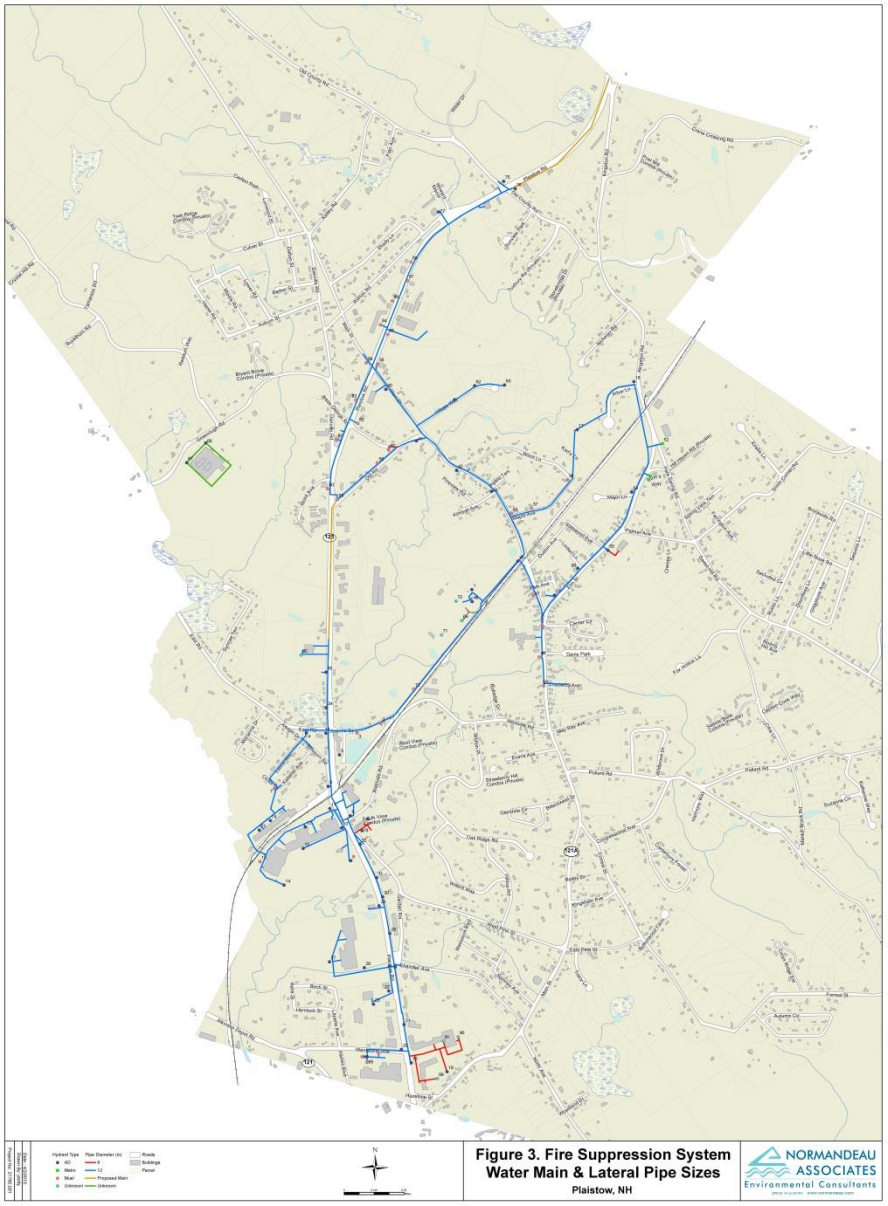
Inventory of Assets – FSS Pipe Sizes



- ~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)

Conclusion: Pipe sizes are adequate for use as a water supply system and for fire suppression.

Existing 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

Conclusion: *Tank rehabilitation would not be cost effective (on $/gallon basis relative to other storage and/or interconnection options due to low storage volume and disrepair)*

Water Loss Assessment

- **Weston and Sampson/Normandeau 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.**

Conclusion: ***System is reasonably water-tight for use as a potable water supply.***

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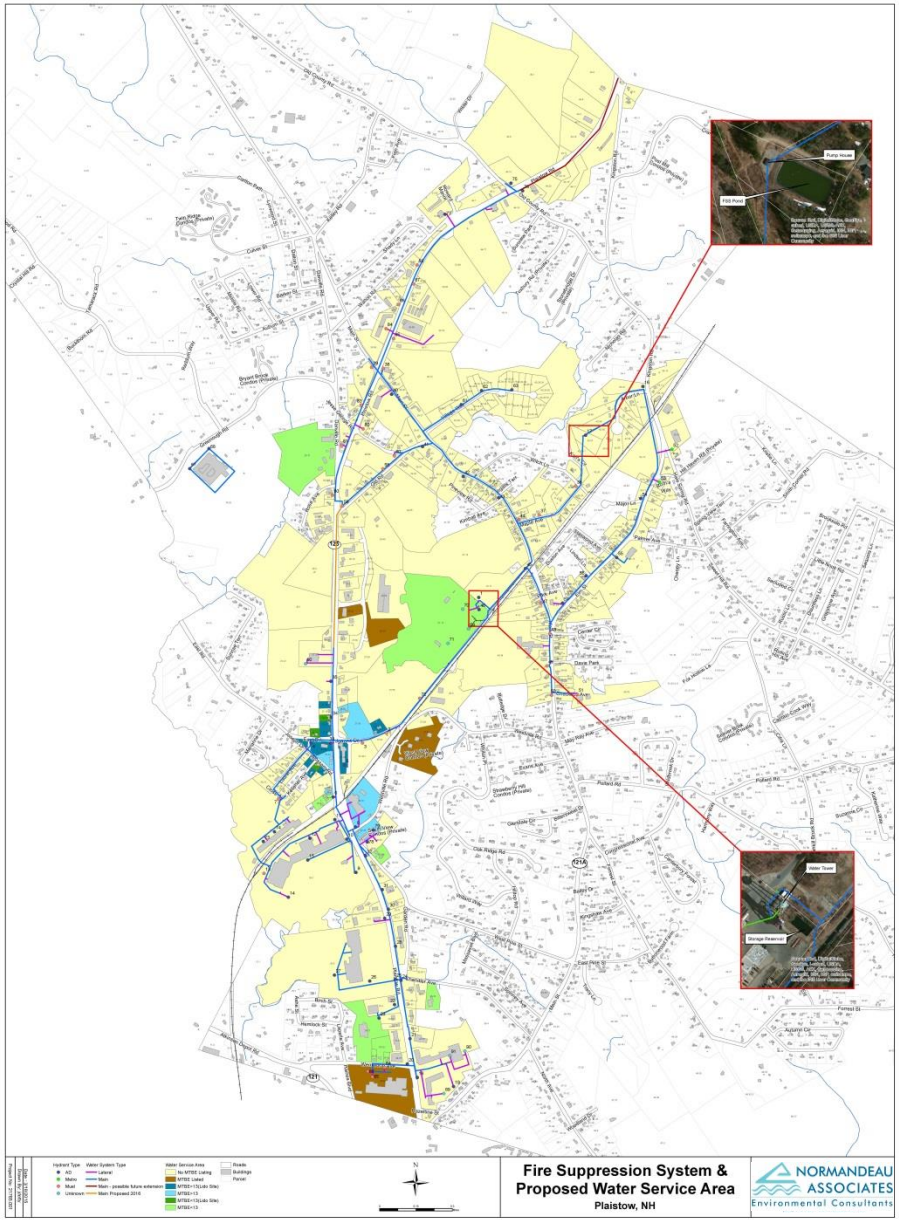
Water Service Area – Where?



WSA includes 366 parcels

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

WSA includes 36 MtBE parcels

- Lido MtBE > 13 ppb - 9
- Lido MtBE < 13 ppb - 3
- Non Lido MtBE > 13 ppb - 7
- Non Lido MtBE < 13 ppb - 11
- 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

Possible Water Supply Sources

- Potential interconnection to existing water systems with wells in town.
- Development of a new groundwater well system within or in close proximity to the Town.

- Imported water from adjacent towns.
  - Haverhill, MA
  - Merrimac, MA
  - Hampstead Area Water Co.
  - Pennichuck East Utility
  - Other

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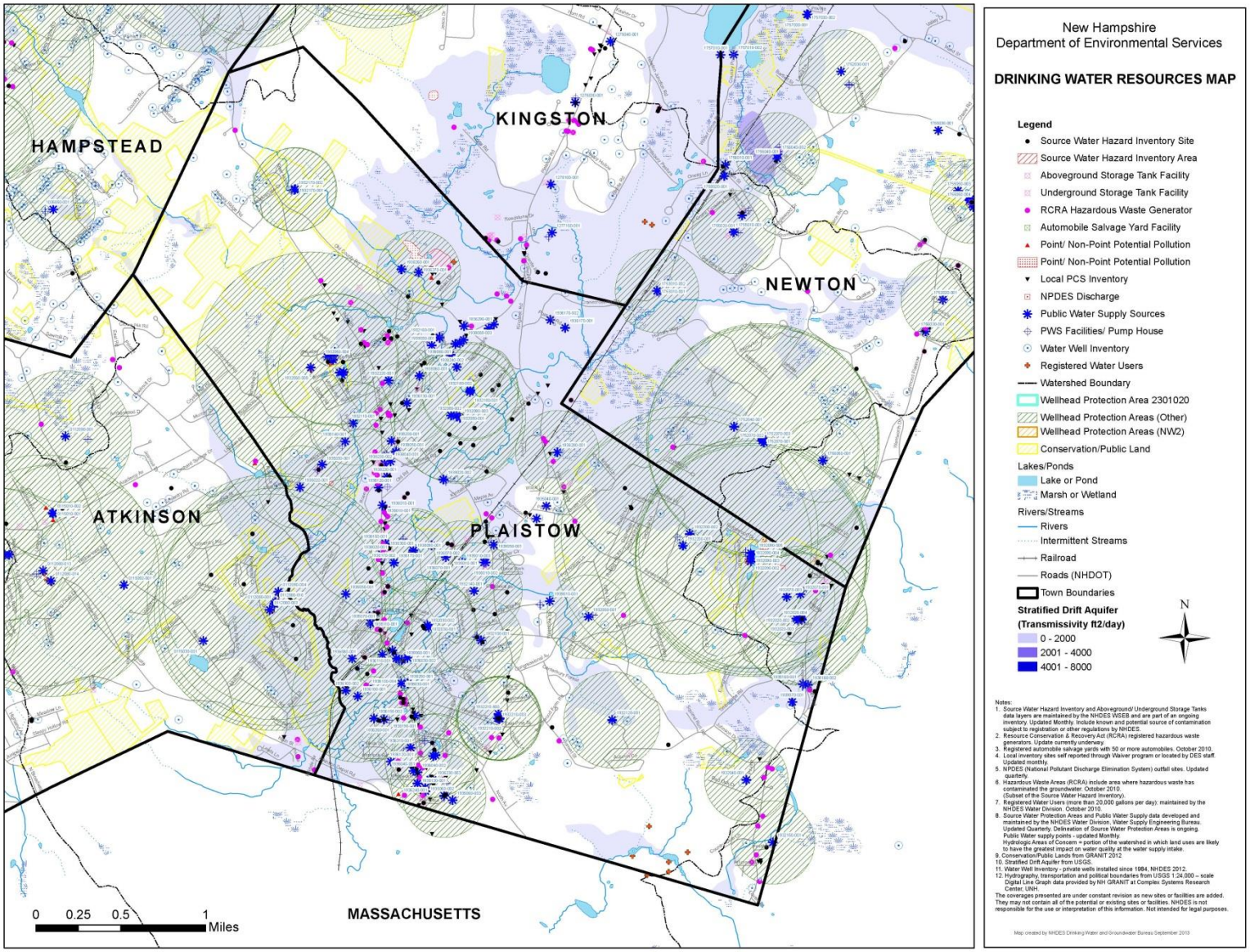
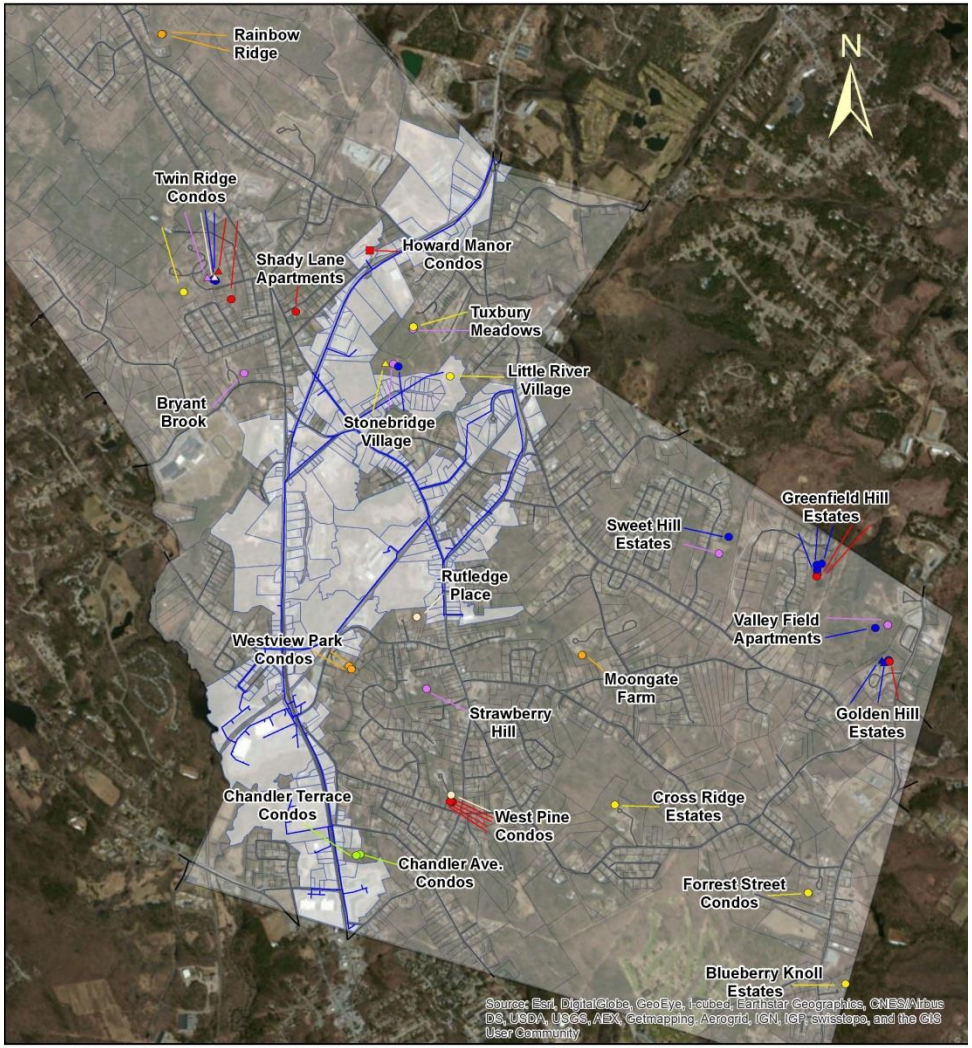
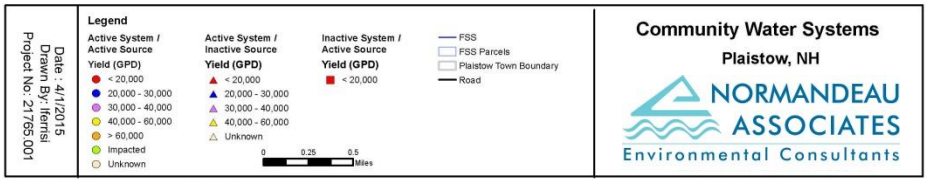
Public Water Systems and Aquifer Protection Areas (55 active public water supplies)



Potential Intra-town Interconnections





- Reviewed potential yields of existing community water supply wells (~46) to assess them as a supplemental source.
- Assessment limited to wells that have at least 25% of expected WSA demand (50-75,000 gpd).

Conclusion: Not enough extra water supply in these systems to use for Plaistow FSS.

New Groundwater Supply in Plaistow

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

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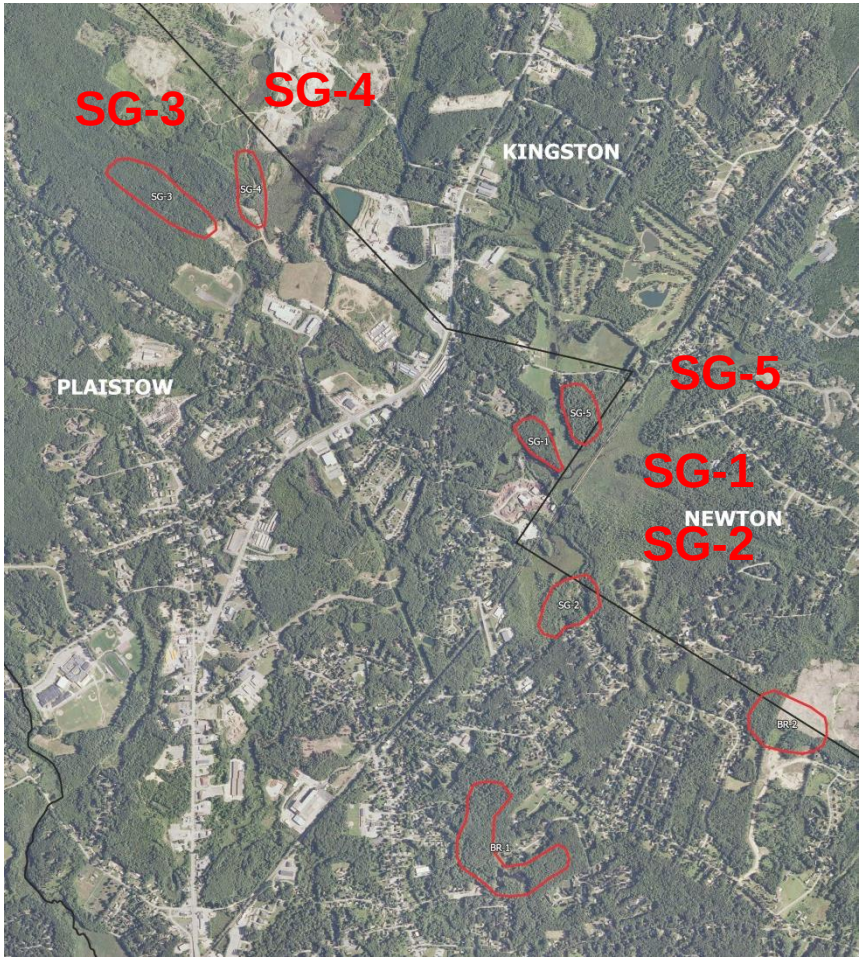
Groundwater Resources – Sand and Gravel

- 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.

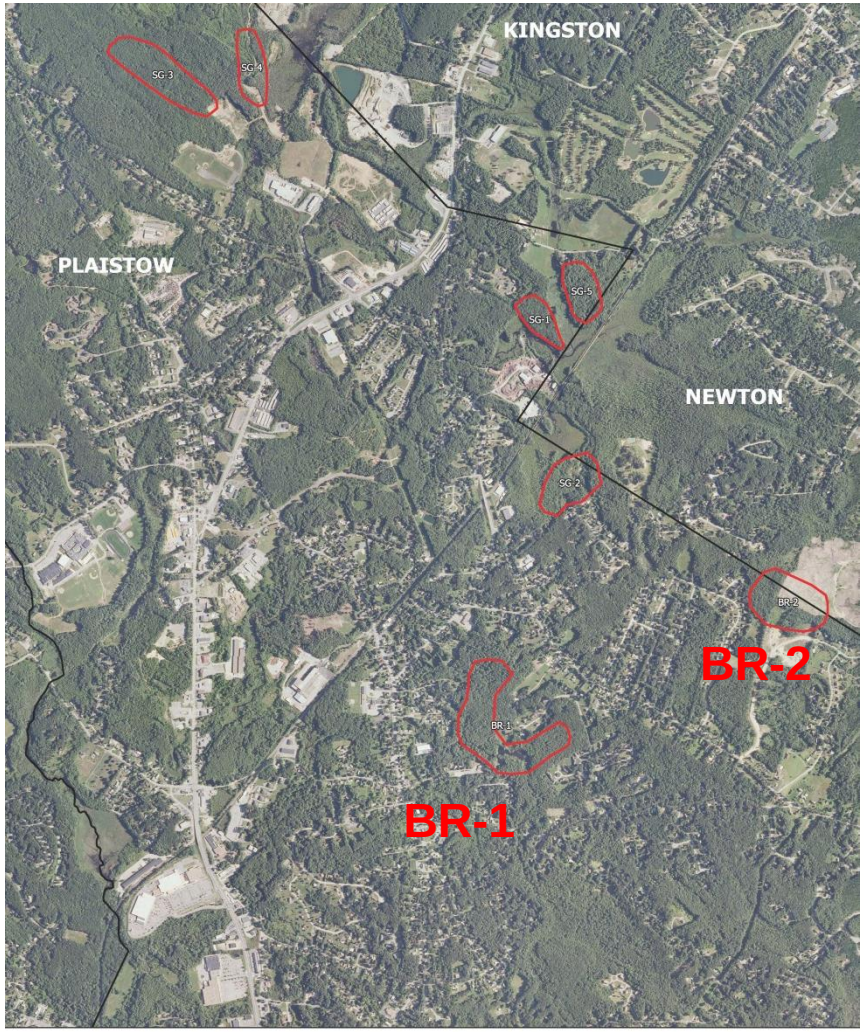
- Sites with sizeable S&G deposits, visible on surface as “esker” deposits, and good potential saturated thickness.

- ***Phase II would be required to 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 would be required to assess and identify likely locations of underlying bedrock structural features and fracture networks via electromagnetic surveys.***



Potential Imported Water Sources

- The following systems were identified:
  - Merrimac, Massachusetts
  - Hampstead Area Water Company (Atkinson, NH)
  - Pennichuck East Utility, Inc. (Plaistow, NH area)
  - Haverhill, Massachusetts
  - Southern NH “Regional” Water Supply
- Identified **the current and future capacity** of potential water sources to supply Plaistow.
- Assessed technical feasibility of importing water to Plaistow.

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Potentially Viable Water Supply Options

- Identified the following as viable water supply options.
  - –Groundwater development
  - –City of Haverhill interconnection
  - –Southern New Hampshire “Regional” Water Supply

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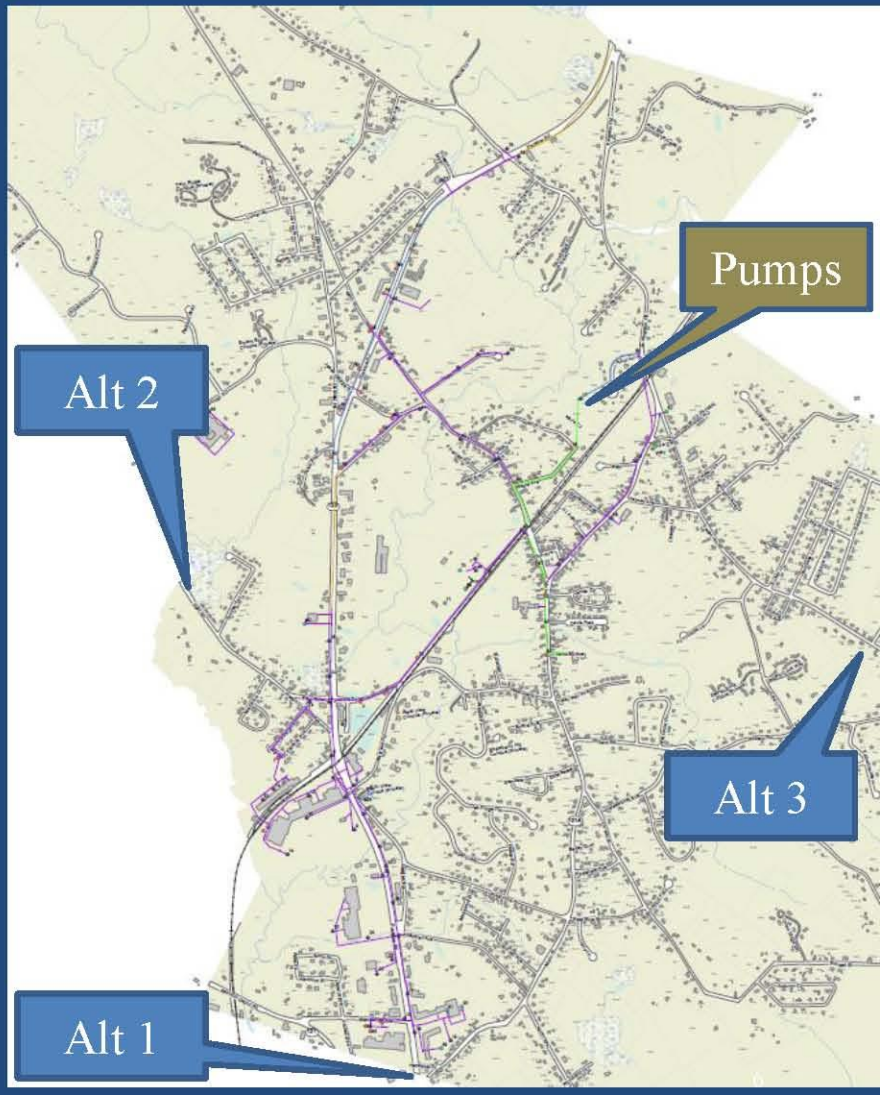
Hydraulic Grade Line (HGL) Evaluation

- Determine the hydraulic effects of converting the FSS into a domestic system
- Assess operating pressures and available fire flows.
  - 1 - Haverhill (HGL = 320')
  - 2 - Regional (HGL = 326' – 359')
  - 3 - Plaistow Tank (HGL = 320')



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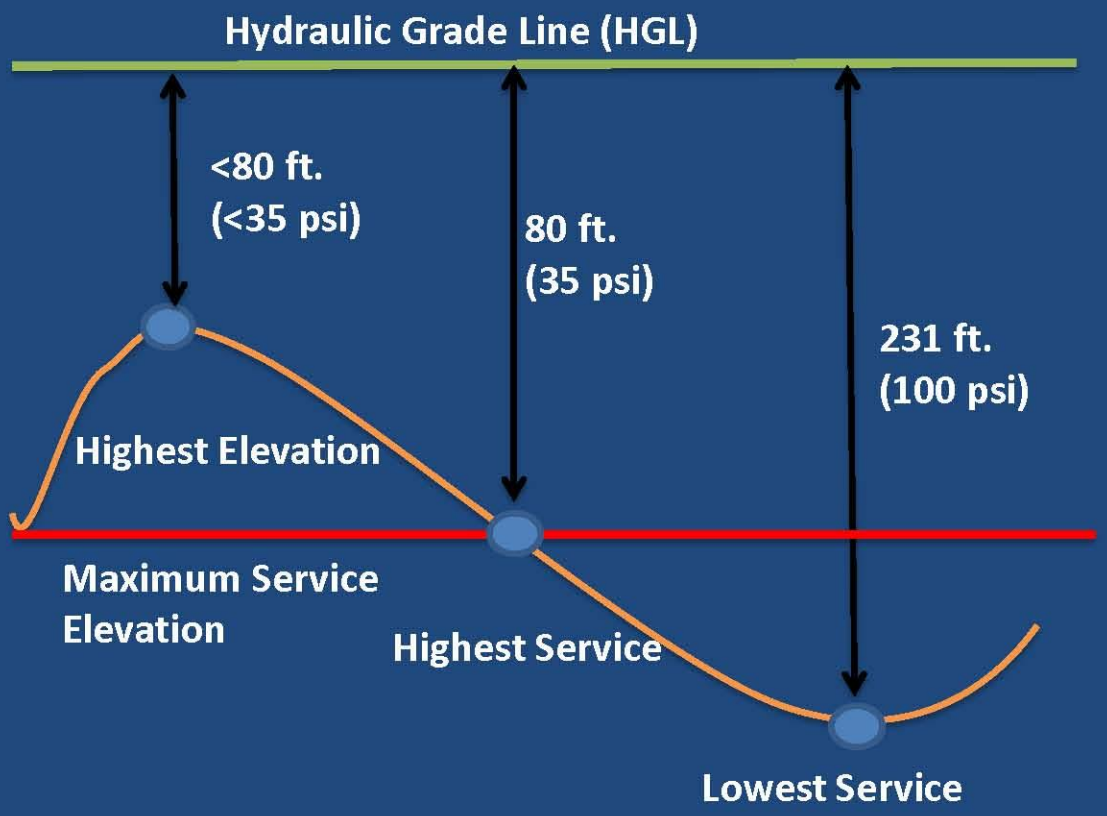
DESIGN APPROACH

Hydraulic Standards

- 20 psi minimum under fire flow conditions.
- Average of 35 psi for static pressure.
- 60 to 80 psi range recommended.
- Meet sprinkler needs and fire flow needs



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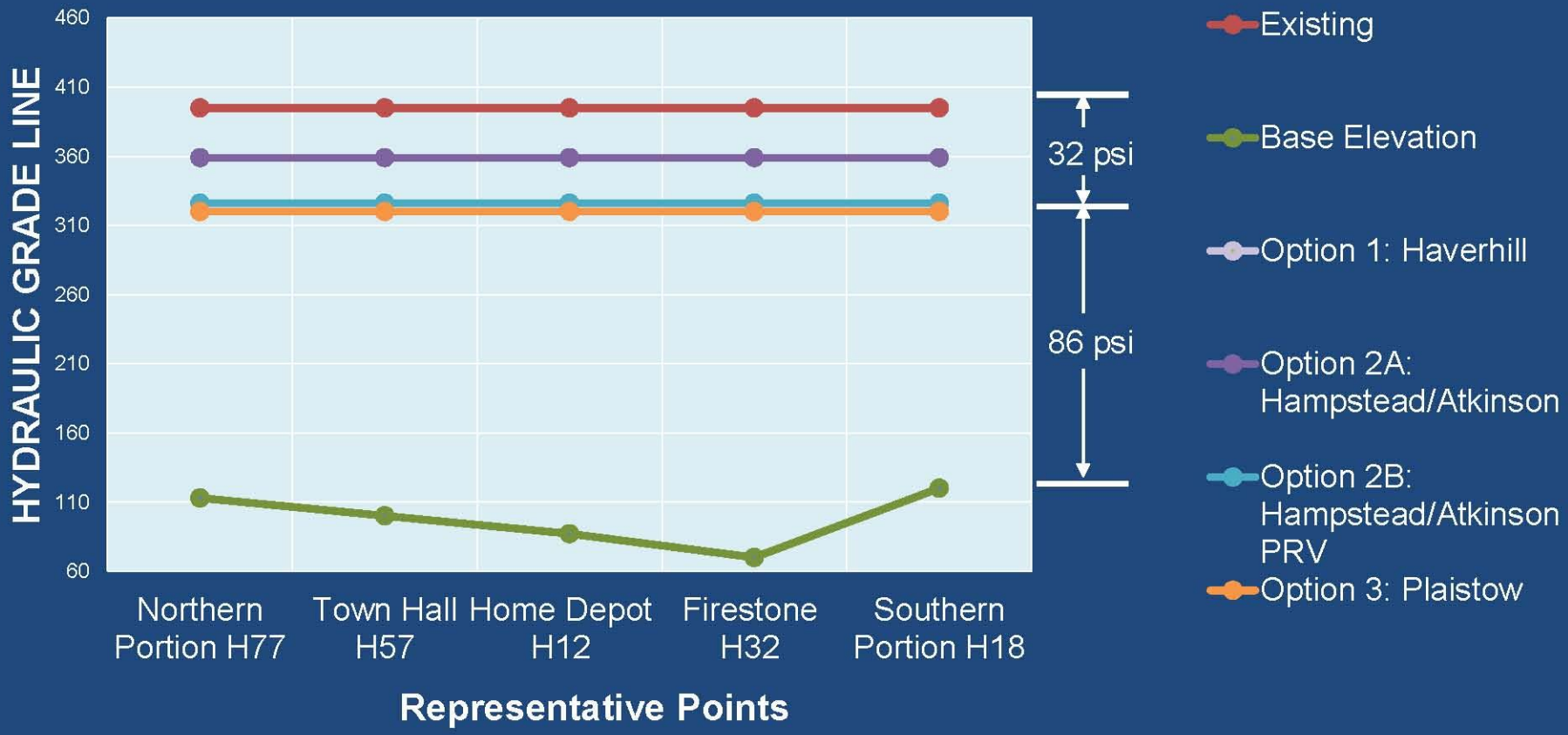
Static Pressures



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Evaluation Points

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FIRE FLOWS – SPRINKLER

	FSS Available Fire Flow (gpm) w/ Route 125 Loop	Option 1 Available Fire Flow (gpm)	Option 2A Available Fire Flow (gpm)	Option 2B Available Fire Flow (gpm)	Option 3 Available Fire Flow (gpm)
Northern Point (H77)	3,500	2,484	2,911	2,597	3,177
Town Hall (H57)	3,500	3,163	3,500	3,308	3,500
Wal Mart (H12)	3,500	3,500	3,500	3,500	3,500
Firestone Tires (H32)	3,500	3,500	3,500	3,500	3,500
Southern Point (H18)	3,459	3,500	2,885	2,605	2,722

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Conclusions

Existing System

- Existing FSS generally has 3,500 gpm available fire flow 2 pumps.
- One fire pump is electric
- Fire pumps are near the end of their useful life.

Supply Options

- Each Alternative would have a lower HGL.
- Each Alternative provides 3,000 to 3,500 gpm fire flows in most commercial locations, except extremities of system are lower.
- Sprinkler needs were met for 5 locations with each alternative.
- Service lines may need to be evaluated.

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Recommendations

- Potable System is Possible
- Further evaluations needed:
  - Plaistow storage tank needs
  - Hydraulic limitations from outside supply
  - Water quality of each source
- Evaluate pressure reducing valves for high domestic pressure areas.
- Develop costs.

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Plaistow Groundwater Development

- Uncertain without further exploration including drilling test wells, assessing water quality, etc.
- Relatively expensive field work required for further assessment
- Estimated cost: $4.7-$5.4 million (source development, water lines, pump house and water storage)

Recommendation: Put groundwater exploration "on hold" while interconnection options are further explored

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City of 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.
- Gale Hill reservoir - 10 million gallon concrete storage reservoir
- Average Day Demand is 5.5-6.0 MGD - Total safe yield is ~7.1 MGD and other additional source being considered
- Water mains exist near 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
- Estimated cost:
  - $0.9 – 1.0 million (direct connection with no storage in Plaistow)
  - $3.5-$4.7 million (independent pressure zone with 1 MG storage on Sweet Hill)
- ***Conclusions:***
  - ***City of Haverhill has potential source capacity and water storage to meet demand of proposed Plaistow system (about 6% of Haverhill ADD).***
  - ***Technically feasible with adequate state funding and negotiated user fees if affordable for Plaistow households***
  - ***Hydraulic analysis of City system is required in next work phase.***

So. NH Regional Water Supply Interconnection

- Several routes starting in Derry are possible:
  - Derry through Windham to Salem to Hampstead to Plaistow
  - Derry through East Derry to Hampstead to Plaistow
- Possible because:
  - City of Manchester Water Works could be "ultimate" guaranteed high quality water supply source
  - Public water supplies are within "regional range" of each other for interconnection with appropriate funding
  - Other potential regional economic, public health and environmental benefits could be realized
  - Potential availability of state funding

- Estimated costs: $9.8 to $13.9 million depending on route and pumping requirements.
- **Conclusion: Technically feasible with adequate state funding and if negotiated user fees are affordable for Plaistow households**

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Public Water System Start up Considerations

Plaistow would need a management and operations structure to meet state and federal requirements under Safe Drinking Water Act including:

- Detailed plan to safely convert nonpotable fire system to potable water supply (flushing, disinfection, system and user connections, etc.)
- Management and operations structure to meet state and federal requirements under Safe Drinking Water Act
- User fees to make operation sustainable (and pay water supplier if water is imported)
- Water quality monitoring and emergency action programs
- Certified water system operator
- Water use ordinance
- Backflow prevention program
- Maintenance program under an asset management plan
- Meter reading

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Summary

- Plaistow's water system's pipe sizes are adequate for use as a water supply system and for fire suppression.
- Plaistow's system is reasonably water-tight for use as a potable water supply.
- Groundwater exploration should be put "on hold" while interconnection options are further explored.
- City of Haverhill has potential source capacity and water storage to meet demand of proposed Plaistow system.
- This proposed system should be technically feasible with adequate state funding and negotiated user fees, if affordable for Plaistow households.
- Hydraulic analysis of the City's system is required in next work phase.

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Water Supply System Financing Possibilities

- GREE funds (limited to MtBE problems)
- NH Drinking Water and Groundwater Trust Fund (new in 2016): Grant funding to solve MtBE and probably other water quality/supply problems.
- Drinking Water State Revolving Fund
- Town of Plaistow
- User charges to system users (user affordability is obviously critical)

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Next Steps:

- Interconnection feasibility discussions/negotiations:
  - City of Haverhill (first)
  - Regional water suppliers (second- if necessary)
- More detailed technical analysis:
  - Hydraulic analysis of Haverhill system with Plaistow connected (by Haverhill)
  - Regional water supply assessment (second-if necessary)
  - Groundwater exploration (third-if necessary)
- Water quality evaluation/considerations
- Fire protection system operations
  - System pressures; sprinkler systems and fire protections (hydrants)
  - Additional components (backflow prevention devices, pressure reducing valves, fire department operational issues)

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Next Steps (Continued)

- Funding analysis - starting with NH MtBE funds and discussions with NHDES
- User Rates (User fees for water supply plus local share of capital costs must be affordable)
- Evaluation of current FSS cost rate and impacts of combined system on fees/funding
- Final decision

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