2024 Water System Master Plan and Capital Improvement Plan Update

Town of Medfield

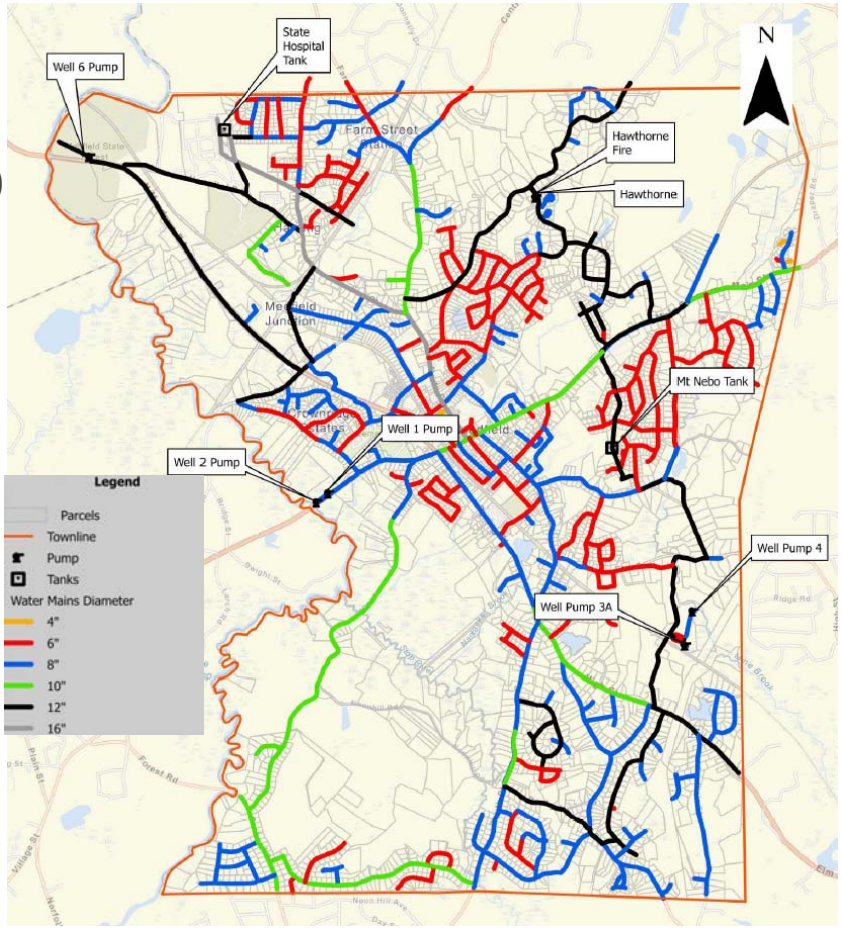
Board of Water and Sewerage Presentation

ENVIRONMENTAL PARTNERS

— An Apex Company —

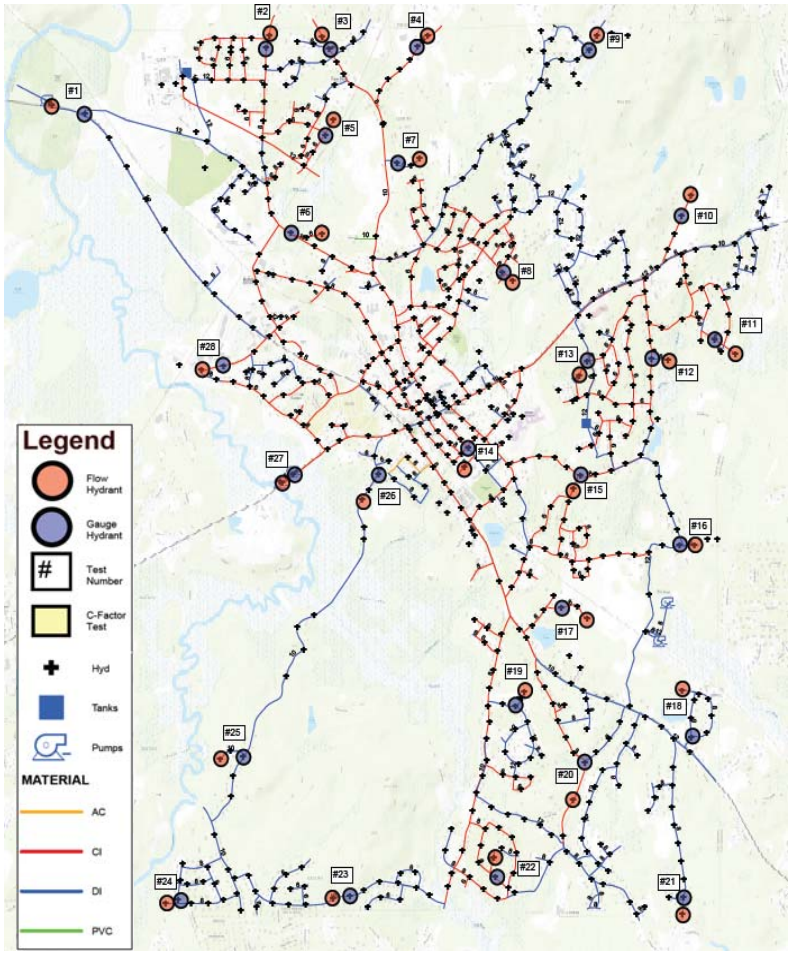
Water System Overview

- Sources
  - Five Active Groundwater Wells (Wells 1, 2, 3A, 4, 6)
- Treatment Facilities
  - One Iron and Manganese WTP
- Storage Facilities
  - Two Elevated Water Storage Tanks
- Pressure Zones
  - One Main Pressure Zone
  - One Boosted Pressure Zone (Hawthorne BPS)
- Distribution Piping
  - 83 Miles of Water Main
  - Pipe Diameters: 4” to 16”
  - Piping Materials: CI, DI, PVC, and AC



Distribution System Assessment

- Hydraulic Model Creation and Calibration
  - Pipe size, material, and location
  - Hydrant flow testing
  - Town SCADA data
  - Demands Conditions
    - Current Demands (2023)
    - Future Demands (2030)
- Hydraulic Analysis Criteria
  - System Pressures
    - Normal Operations: ≥ 35 psi; ≤ 100 psi
    - Fire Flow: ≥ 20 psi
  - Fire Flow Needs
    - ISO Requirements
  - Water Age
    - MassDEP guidelines: 3 – 5 days



Distribution System Assessment (Cont.)

- Assessment Findings
  - System Pressures
    - Areas ≤ 35 psi: Monhave Road and Main Street (NE Corner)
    - Areas ≥ 100 psi: Main Street near Well 1& 2, Causeway Street at Stop River, and North Meadows Road near Well 6
  - Fire Flow Needs
    - 2017 ISO report fire flow deficiencies
      - 5 locations showed deficient fire flows based on ISO needed fire flows and available fire flows from model (see table on next slide)
    - ISO house spacing guidelines fire flow deficiencies
      - 5 locations showed deficient fire flows based on ISO recommended house spacing fire flows and available fire flows from model (see figure on next slide)
  - Water Age
    - Current Demand Conditions: 4.5 days
    - Future Demand Conditions: 3.1 days

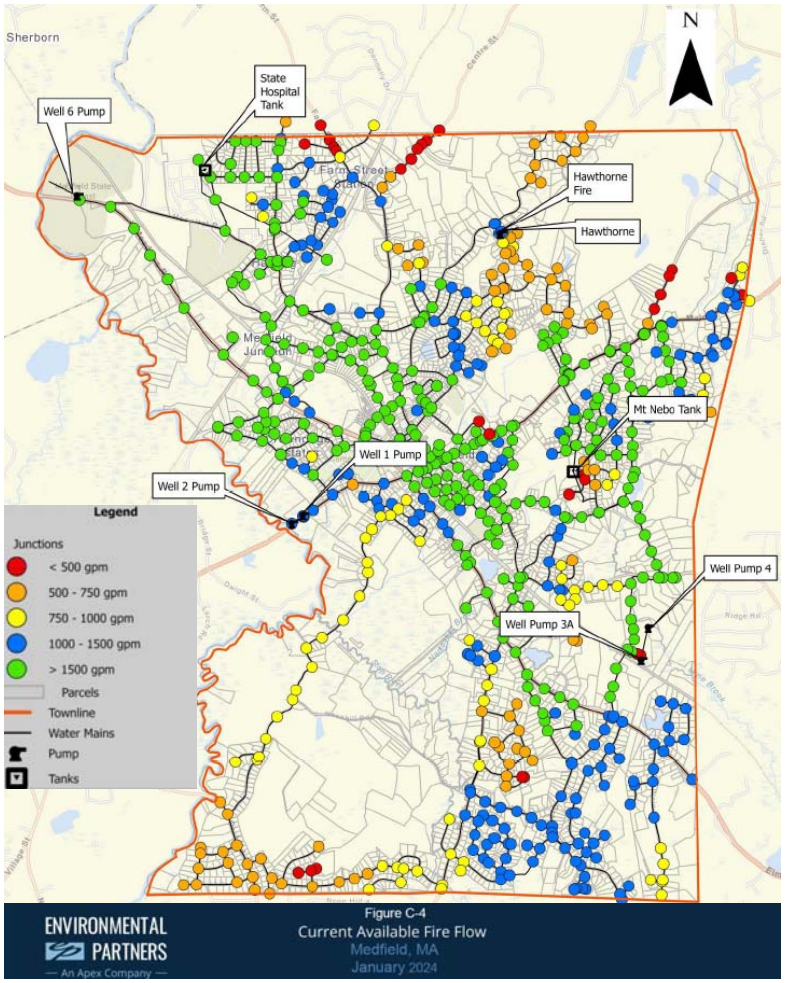
Distribution System Assessment (Co

- ISO Fire Flow Charts and Figures

Table 3-3: ISO Fire Flow Analysis

Test Location	Test Number	NFF	AFF (ISO)	AFF (Model)	Difference
Farm St @ Donnelly Dr	#1	500	650	1,032	532
Nebo & Main	#2	2,500	4,600	2,236	**-264**
South & Metacomet	#3	4,500	600	3,165	**-335**[1]
Elm & Steven Ln	#4	3,000	1,200	1,082	**-1918**
Ridge Rd @ Snyder Rd	#5	500	1,500	1,180	680
Onondaga Ln & Indian Hill Rd	#6	500	450	782	282
Pine Street @ Hawthorne Dr	#7	500	2,000	1,533	1033
West & No. Meadows	#8	1,750	2,500	4,500	2,751
Adams & W. Mill St	#9	1,500	2,200	4,500	3,002
Adams & Dale St	#10	2,250	2,500	3,727	1,477
Frairy & Dale	#11	4,500	1,900	3,723	**0**[1]
Main & Spring	#12	3,000	2,600	2,881	**-119**
Main & Hatters Hill Rd #1	#13	4,000	3,900	2,663	**-837**[1]
Main & Hatters Hill Rd #2	#14	2,250	3,900	2,663	413

1. Needed fire flows greater than 3,500 gpm are not considered in determining the classification of the municipality when using ISO's fire suppression rating system. For areas with an NFF above 3,500 gpm, the resulting surplus or deficiency has been adjusted to reflect the maximum requirement of 3,500 gpm.



Water Main Improvements Recommendations

- Deficient Area Improvement Recommendations
  - Main Street and Bridge Street at Well Station 1 & 2 (High Pressures)
  - Elm Street near Wheelock Elementary School (Fire Flow)
  - Nebo Street (Fire Flow)
  - North Street and Farm Street (Fire Flow)
  - Hartford Street (Fire Flow)
  - Westview Road and Philip Street (Fire Flow)

Table 5-2: Water Main OPPCs for Deficient Areas

Project Area	New Pipe Diameter	Pipe Length	Cost ($/LF)	Construction Cost	Engineering and Contingency (67%)	Total Project Cost
Main St	12	1,250	$375	$469,000	$315,000	$784,000
	12	4,725	$375	$1,772,000	$1,188,000	$2,960,000
					Project Total	**$3,744,000**
Elm St	12	3,575	$375	$1,341,000	$899,000	$2,240,000
	8	1,400	$325	$455,000	$305,000	$760,000
					Project Total	**$3,000,000**
Nebo St	12	4,025	$375	$1,510,000	$1,012,000	$2,522,000
					Project Total	**$2,522,000**
North St	8	3,075	$325	$1,000,000	$670,000	$1,670,000
	12	4,225	$375	$1,585,000	$1,062,000	$2,647,000
					Project Total	**$4,317,000**
Farm St	8	3,175	$325	$1,032,000	$692,000	$1,724,000
					Project Total	**$1,724,000**
Hartford St	8	2,225	$325	$724,000	$486,000	$1,210,000
					Project Total	**$1,210,000**
Westview Rd	8	2,550	$325	$829,000	$556,000	$1,385,000
					Project Total	**$1,385,000**

Water Main Improvements Recommendations (Cont.)

- Cast Iron Pipe Replacement
  - Approximately 51% of water mains are cast iron
  - Prioritization of cast iron pipe replacement
    - History of documented breaks/leaks
    - Proximity to water bodies
    - History of water quality complaints
    - Average service pressure observed in the model
    - Low C-factor from calibration (a proxy for interior condition)
- Trenchless pipe rehabilitation options
  - Pipe lining
  - Slip lining
  - Pipe bursting

Table 5-3: Phase 1 CI Replacement

Diameter	Total Length (mi)	OPPC	Contingency and Engineering (67%)	Subtotal
8"	4.25	$7,295,300	$4,887,900	$12,183,200
12"	0.43	$850,500	$569,900	$1,420,400
16"	0.15	$362,700	$243,100	$605,800
Total	**4.83**	**$8,508,500**	**$5,700,900**	**$14,209,400**

Table 5-4: Phase 2 CI Replacement

Diameter	Total Length (mi)	OPPC	Contingency and Engineering (67%)	Subtotal
8"	**4.54**	**$7,795,200**	**$5,222,800**	**$13,018,000**

Additional Water Infrastructure Capital Improvements

- Water Storage Tank Rehabilitations
- Hawthorn Booster Pump Station Improvements
- Meter Replacement Program
- Well rehabilitation and pump replacements

Questions and Open Discussion