HALEY WARD

ENGINEERING | ENVIRONMENTAL | SURVEYING

WATER PRODUCTION, TREATMENT AND STORAGE

ASSET MANAGEMENT PLAN

PREPARED FOR THE

The Natick Water Division and Natick Select Board

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1.0 EXECUTIVE SUMMARY

1.1 ACKNOWLEDGEMENTS

Haley Ward, Inc would like to thank Natick Water and Sewer Supervisor Anthony Comeau, Casey Ciapciak Natick Regulatory Compliance Coordinator and Water Treatment Plant Supervisor Steve Heffler for assisting Haley Ward in understanding Natick's existing infrastructure, identifying the needs of the water system and providing data to assist in preparation of this report.

1.2 WATER PRODUCTION CAPACITY

Natick owns and operates a water supply, distribution, treatment, and storage system that provides water to Natick customers and portions of surrounding towns. Natick owns and operates 11 gravel packed groundwater wells to produce water necessary to meet system demand including demand for firefighting. Rated water withdrawals total 13.22 million gallons per day (MGD), however actual average daily withdrawal volume is much less due to the Water Management Permit and Registration Statement limitations and in some cases well deficiencies. The actual authorized average daily withdrawal volume is 4.32 mgd for the Springvale, Evergreen, Morse Pond, and Pine Oaks water supplies and 1.31 mgd for the Elm Bank water supply. We reviewed Natick's water use over the last several years and determined that the existing water sources have adequate capacity to meet existing and future in-town water demand, provided all sources and water treatment plants (WTP) are operational, see Table *1* for historical water use patterns.

Table 1 Natick's Historical Water Use Pattern

Calendar Year	Total Pumped (MGY)	Average Daily Demand (MGD)	Maximum Daily Demand (MGD)
2021	1,048.85	2.874	4.231
2020	1,161.45	3.182	5.732
2019	1,171.28	3.209	5.21
2018	1,194.95	3.273	5.411
2017	1,168.48	3.201	4.7

The main deficiency in Natick's water supply is the ability to meet demand during the summer season where the Elm Bank WMA permit can require Elm Bank to be shut down for an extended period. In 2022 Elm Bank, per the permit, was required to be shut down in the spring and was not available until mid-November, due to low precipitation. Natick's WMA permit is presently held in an appeal process from 2010, and the withdrawal limit in the renewed permit may be 4.32 mgd. Also, the permit will include mandatory water use restrictions during any phase of drought. Department of Conservation and Recreation (DCR) conducted a water needs forecast for Natick as part of the Charles River basin 2020 permit renewal process. DCR forecasted Natick's average daily water use in 2023 at 3.86 mgd, 2028 3.92 mgd and 2033 4.12 mgd. There is very little vacant land available for new development in Natick, which is reflected in the DCR water needs forecast. Outside community requests for water should be carefully evaluated, as summertime restrictions hinder ability to produce water. In addition, the Elm Bank Tri-Town agreement should be reviewed for the outside community water sharing restrictions.

1.3 WATER TREATMENT CAPACITY

Natick owns and operates five Water Treatment Plants (WTP) that treat water from all 11 sources and discharge water to the distribution system. The Springvale and Evergreen water supplies are treated by the Tonka and H&T WTPs. The Tonka and H&T WTPs include iron, manganese and PFAS removal and chemical feed. The other plants include chemical feed. The Morse Pond plant and water supply have been offline for several years while a replacement well is located.

The H&T & Tonka plants treat water from the registered wells, Springvale #1,2,3,4 & 4A and Evergreen #1,3 & 3A. The Tonka and H&T plant capacities are approximately 3,200 gpm (4.61 mgd) and 1,500 gpm (2.16mgd) respectively. The Elm Bank plant capacity is approximately 2,600 gpm (3.74 mgd). The Pine Oaks plant capacity is approximately 300 gpm (0.432 mgd), limited by the well capacity. The Morse Pond plant capacity is approximately 600 gpm (0.864 mgd) if a replacement well can be developed. If ALL plants were operating at full capacity, total capacity would be approximately 11.81 mgd, far exceeding the maximum day demand of 6.0 mgd. If a plant is offline due to repairs and Elm Bank is offline due to WMA shutdown condition, then meeting maximum day demand could be an issue with remaining supplies.

1.4 WATER STORAGE TANK CAPACITY

Natick owns and operates two concrete water storage tanks, Broad Hill and Town Forest with full tank capacities of 4 mgd and 5 mgd respectively and were constructed in the1965 and 1966. The tanks provide continuous water pressure (hydraulic grade) to the water system as water supplies are turned on and off and provide additional capacity for fire protection if required.

The safe operating range for both tanks is approximately 5-7 feet, below 7 feet low water pressure in the system might occur. Therefore, the available capacity in Town Forest is 1.167 mg (7 feet of water) and Broad Hill available capacity is 0.933 mg (7 feet of water). When considering the capacity of water storage tanks, fire protection is a main factor. Natick's tanks have been able to maintain water pressure in the system under all scenarios to date. The Insurance Services Office, Inc. (ISO) evaluates hydrant testing in communities to rate communities structural fire suppression delivery system. ISO published a maximum fire flow rate of 6,500 gpm for the Route 9 corridor; however, the distribution system cannot deliver that maximum capacity.

We determined that Natick has available capacity from pumping and water storage tanks to meet the worst-case scenario, 6,500 gpm fire incident occurring during a peak day demand, even though the distribution system cannot deliver the water to the target area on Route 9. Therefore, we have determined that additional storage capacity is not required for the Natick water system.

1.5 NATICK WATER SUPPLY ASSET CAPITAL PLAN

Part of this report was to evaluate Natick's water assets that make up the water supplies, water pumping, water treatment and water storage.

The Natick Water Supply Assets were found to be generally in good to very good condition. The facilities ages range from the early 70's to new construction in 2022. Water supply assets include the following.

- 11 Gravel packed wells
- Pumping equipment for each gravel packed well
- 8 Water supply pump station buildings
- Electrical equipment

Natick has had a proactive funding program to renovate and construct new water pumping stations and wells, leaving their present condition in a good to very good status. All stations have either been rehabilitated or replaced within the last 10-15 years or funding is in place to rehabilitate or replace remaining stations.

We conducted an evaluation of each facility to provide an overview of present condition and needs, that was utilized in preparation of a 55-year Capital Improvement Plan (CIP) for Natick's Water Supply Assets. The rolled up 55-year CIP probable cost, if work was completed in 2022, to rehabilitate and replace water supply wells and pump stations is $38.52 million dollars. See Appendix A for the 20-year CIP plan for water supply and water pump station assets.

1.6 NATICK WATER TREATMENT ASSET CAPITAL PLAN

The Natick Water Treatment Plant assets were found to be generally in good to very good condition. The facilities ages range from the early 1900's to new construction in 2022. WTP assets include five facilities, Tonka, H&T, Elm Bank, Pine Oaks, and Morse Pond. Tonka and H&T include iron, manganese and PFAS removal where the other plants include chemical feed. H&T is the oldest building, early 1900's but was fully renovated in 1995 when the greensand plant was constructed inside the building.

Natick has had a proactive funding program to renovate and construct new water treatment plants, leaving their present condition in a good to very good status. All WTP have been built or rehabilitated within the last 10-15 years or funding is in place to rehabilitate the remaining buildings.

We conducted an evaluation of each facility to provide an overview of the present condition that was utilized in preparation of a 55-year Capital Improvement Plan (CIP) for Natick's Water Treatment Plants (WTP). The rolled up 55-year CIP probable cost, if work was completed in 2022, to rehabilitate and replace WTPs is $128.63 million dollars.

See Appendix A for the 20-year CIP plan for water treatment assets of existing In-town sources. Also included in Appendix A is a 20-year plan for water treatment assets including additional water treatment to address future regulated contaminants.

1.7 NATICK WATER STORAGE ASSET CAPITAL PLAN

The Natick Water Storage Tank assets were found to be generally in good to very good condition. The Town Forest tank was constructed in 1965 and the Broad Hill tank in 1966.

Natick has had a proactive funding program to rehabilitate the water storage tanks and replace the buildings, leaving their present condition in a good to very good status. The two reservoirs were rehabilitated in 2011 with minor interior and exterior repairs and coating installed on the roof. The Town Forest chemical feed and control buildings were installed in 2010. The Broad Hill control building was also installed in 2010. The Broad Hill chemical feed building was installed in the early 1980's, equipment upgrades in 2010 and scheduled for replacement in 2023.

We conducted an evaluation of each asset to provide an overview of the present condition that was utilized in preparation of a 55-year Capital Improvement Plan (CIP) for Natick's Water Storage Tanks . The rolled up 55-year CIP probable cost, if work was completed in 2022, to rehabilitate and replace the tanks and buildings is $22.11 million dollars. See Appendix A for a 20-year CIP plan for water storage assets.

1.8 ADDRESSING WATER CONTAMINANT REGULATIONS

The development of a Water Source Strategic Plan should address present water contaminant regulations, and potential water contaminant regulations, by the Massachusetts Department of Environmental Protection (MassDEP) and the Federal Environmental Protection Agency (EPA).

The most recent regulation issued by MassDEP was for per-and polyfluoroalkyl substances (PFAS), enacted in 2020. The regulation has had a profound impact on Natick and many water suppliers across Massachusetts and across the country. The PFAS regulation has required Natick to fund the emergency construction of two PFAS removal plants to treat H&T and Tonka water supplies.

Natick has addressed PFAS in the H&T water supplies and has installed a temporary PFAS removal system to treat a portion of Tonka water supplies, that leaves the remaining water supplies that have varying levels of PFAS contamination. Presently Morse Pond is the only supply besides H&T & Tonka water supply that is over the Massachusetts Maximum Contaminant Limit (MCL) of 20 ppt, Morse Pond is not operational. The remaining water supplies, Pine Oaks and Elm Bank have lower levels of PFAS, ranging from 13.72 to 19.97 for Pine Oaks and 5.23 to 12.54 for Elm Bank.

EPA has indicated they will issue a PFAS regulation in 2023 that may be much lower than the 20 ppt presently set in Massachusetts. Information to date indicates possibly

single digit regulation is strongly possible. If that is implemented, then Natick would be required to install PFAS removal plants at all water supply sources.

1.9 IN-TOWN WATER TREATMENT COST ANALYSIS

We prepared 55-year Probable Cost Plans for two In-Town options that include probable capital and operation and maintenance (O&M) costs to provide an overview of possible costs over 55 years. The 55-year cost plan is included in the water source option comparison section of this report.

Table 2 summarizes the total probable cost, over the 55-year period, to rehabilitate, construct and replace WTP's, water supply facilities and water storage tanks. No additional water supply wells are developed, and Tonka PFAS advanced water treatment plant would be constructed. Also included is the typical frequency for maintenance and replacement work for each asset.

Table 2 Probable Cost – In-Town Sources Known Contaminants Option 1a

Asset	Frequency of Maintenance (Years)	Frequency of Replacement (Years)	Probable Cost Rehabilitation/ Replacement/Construction (M$'s)
Springvale Existing WTP & Associated Buildings	25	75 (WTP) 2 (GAC)	$75.75
Tonka Advanced WTP (New)	25	75 (WTP) 2 (GAC)*	$28.54
Elm Bank WTP	25	75	$14.99
Water Supply Pump Stations	20	80	$22.24
Water Supply Wells	7	50	$16.29
Water Storage Tanks	25	80	$20.1
Water Storage Chemical Buildings	25	50	$2.01
SCADA Panels	__	15	$5.52
SCADA Radios	__	10	$1.34
55-Year Total Costs			**$186.78**

*- GAC replacement is for the PFAS removal in backwash water

We then looked at the option of addressing future regulated contaminants that may require advanced water treatment plants. This would include substantial lowering of PFAS MCL and the addition of other unknown contaminants to the State regulated contaminants list. Table 3 summarizes the probable costs over the 55-year period, to rehabilitate, construct and replace WTP's, water storage tanks, water supply wells including addition of Tonka, H&T & Pine Oaks advanced water treatment facilities. Also included is the typical frequency for maintenance and building replacement work for each asset.

Table 3 55-Year CIP Probable Cost Future Regulated Contaminants Option 1b

Asset	Frequency of Maintenance (Years)	Frequency of Replacement (Years)	Probable Cost Rehabilitation/ Replacement/Construction (M$'s)
H&T & Tonka Advanced WTP & Associated Buildings	25	75 (WTP) 2 (GAC)*	$111.29
Elm Bank & Pine Oaks Water Treatment Facilities	25	75	$37.24
Water Supply Pump Stations	20	80	$22.24
Water Supply Wells	7	50	$16.29
Water Storage Tanks	25	80	$20.1
Water Storage Chemical Buildings	25	50	$2.01
SCADA Panels	__	15	$5.52
SCADA Radios	__	10	$1.34
55- Year Total Costs			**$216.03**

*- GAC replacement is for the PFAS removal in backwash water

1.10 WATER SOURCE STRATEGIC PLAN

The main purpose of this study was to provide Natick with data and details to assist in their development of a Water Source Strategic Plan that will protect the public health of Natick water customers for the foreseeable future. The Strategic plan will include a decision-making process that will determine if Natick continues maintaining and operating their own water supply sources and treatment or switch to an outside source or a hybrid approach if costs and risks become too extreme to maintain safe drinking water.

We identified four primary water supply options for Natick to consider in their development of the Natick Water Source Strategic Plan, as summarized below.

OPTION 1. IN-TOWN SOURCE: Maintain all In-Town water sources and Water Treatment Plants (WTP).

OPTION 2. OUTSIDE SOURCE: Connect to an outside water source, such as the Massachusetts Water Resources Authority (MWRA) water system and abandon In-Town water sources and water treatment assets. Target 6.0 mgd maximum day from outside source.

a. There are multiple neighboring water systems, however most are MWRA water members. Therefore, we considered direct connections to the WWRA source, where Natick would own and operate the infrastructure without paying a neighboring community for water delivery.
b. We also looked at a combination scenario where Natick would construct one direct connection and utilize an indirect connection where a neighboring community delivers (Wheels) MWRA water to Natick.

OPTION 3. HYBRID SOURCES: Maintain specific existing in-town water source assets and water treatment assets and connect to an outside water source, such as MWRA, to provide the balance of required water supply. Target maximum day 4.0 mgd with in-town sources and 2.0 mgd from outside source.

OPTION 4. IN-TOWN WITH MWRA SUPPLEMENT: This option will utilize Natick's In-Town water sources and treatment plants and add a MWRA supplement connection.

There are variations of option #2, that impact the costs, such as teaming with Wayland and/or Wellesley to share the infrastructure cost of a MWRA connection that will serve both communities. Actual savings would be evaluated at a later date should that option be chosen.

We identified three major factors to be included in the decision-making process for selecting the option that best suites Natick's needs, present and future. They include the following.

- Long-Term Costs,
- Control over water supply and treatment decisions,
- Risk level the town is willing to take regarding maintaining safe drinking water.

1.11 55-YEAR COST ANALYSIS

We analyzed costs for the four water supply options over a 55-year life cycle that included capital costs, operating and maintenance costs, MWRA use fees and neighboring community delivery fees. The MWRA entrance fee was eliminated from the analysis, per the recent MWRA vote to waive the entrance fee for the period of 2022 to 2027.

In-Town Options 1a includes the addition of PFAS removal plants for Tonka water supplies only. In-Town Option 1b includes PFAS removal treatment for Tonka, Elm Bank, and Pine Oaks, but also includes advanced treatment for addressing future potential regulated contaminants. Option 1b added the PFAS removal plants early on, should MassDEP lower the PFAS MCL, possibly in the range of 5 to 10 ppt, in 2023 or 2024. A single digit MCL would require treatment at Elm Bank according to historical PFAS results.

We looked at the potential for a shared infrastructure system with Wayland and Wellesley where they construct the water booster station and transmission mains, and Natick shares the capital cost. This is similar to Option 2c where Wellesley constructs a booster station and transmission main and delivers (wheels) water to Natick. Most of the cost increase for Option 2c is O&M, MWRA user charges and Wellesley's pass-through charges (estimated) and they totaled the highest NPV. A Wayland and Wellesley shared system, both communities deliver water to Natick (no direct connections), would carry a much higher O&M costs than Option 2c, with the added O&M cost share Wayland would require. Therefore, we did not include that option in the evaluation.

We prepared probable capital costs and operation and maintenance (O&M) costs for each water supply option along with potential implementation schedules and applied them over 55-year life cycle. We provided the net present value (NPV) for comparison of each option. We utilize the following parameters/constraints when calculating the capital and O&M costs.

1. Capital borrowing: 20 years
2. Trigger amount for borrowing: > $250.000
3. Loan rate: 3%
4. Inflation rate for NPV: 2.5% (based on last 10 year average)
5. O&M costs increase per year: 4%
6. Utility costs increase per year: 2%
7. Removed existing Water debt service from O&M in 2025: Assume Tonka 2005 plant and other capital pay off that time.
8. Water system debt service remained in O&M total: Most of the existing debt service was for water system projects and will continue forward.
9. Projected Debt Service for this CIP: Included in capital costs.
10. MWRA entrance fee: $0 (waived if Natick joins MWRA by 2027)
11. MWRA water user rate per 1MG: $4,558.38 (2023 estimated)
12. MWRA water rate increase per year: 3.9%
13. Water volume for Full MWRA water option: 1,153 MG annual use (Natick Historical average usage)
14. MWRA Water volume for Option 3 Hybrid & 4b: 288 MG annual use (25% of Natick's total historical usage, equal to Elm Bank typical use)
15. MWRA water volume for Option4a: 145 MG annual use (estimated 13% of total use to supplement when there is a loss of In Town water source(s))
16. Indirect Connection to Wellesley Water Rate:
    a. 50% of Wellesley Water O&M cost
    b. 50/50 Shared capital costs of booster station and transmission main

Table 4 provides a comparison of probable capital and O&M NPV, in million dollars, for each option, exclusive of water use revenue needed to meet the costs for each option. Comparing Natick water rate adjustments can be a separate exercise once an option is selected. We did provide an indication of potential rate hikes for the MWRA options in Section 8.0.

If Natick continues to construct treatment plants to address present and future contaminants, Table 4 indicates that it has the least expensive NPV but the risk may be higher. The MWRA options have a substantial decrease in capital costs with only a minor decrease in Natick's O&M cost, however the MWRA user charges substantially elevates the options O&M costs and overall NPV. Natick should consider the costs and risks associated with maintaining its water source and treatment facilities when selecting the final option.

Table 4 55-Year NPV Water Source Option Comparison

WATER SOURCE OPTION	TOTAL COST (MILLION DOLLARS)	55-YEAR LIFE NET PRESENT VALUE (MILLION DOLLARS)			
		CAPITAL	O&M	MWRA USER FEE	TOTAL COST
1a. In-Town Water Source: Not addressing future contaminants	$1,359.3	$79.70	$499.6	$0	$579.3
1b. In-Town Sources: Address Future contaminants	$1,419.2	$120.9	$502.0	$0	$622.9
2a. Full MWRA: Direct Connect Shaft L & Shaft N	$2,172.9	$52.5	$481.3	$375.2	$909.0
2b. Full MWRA: Direct Connect Shaft L and Sudbury Aqueduct	$2,159.7	$43.2	$481.3	$375.2	$899.7
2c. Full MWRA: Direct to Shaft L & Indirect to Wellesley	$2,296.2	$45.8	$480.8	$454.6*	$980.7
3. Hybrid: 75% Springvale, 25% MWRA Shaft L & Rt 30, No Elm Bank	$1,644.5	$123.3	$500.5	$93.8	$717.60
4a. In-Town & MWRA RT 30: Future Contaminants & MWRA Supplemental	$1,550.6	$126.2	$503.2	$55.2**	$684.6
4b. In-Town & MWRA RT 30: Future Contaminants No Elm Bank	$1,622.1	$103.3	$499.4	$109.0***	$711.7

*- MWRA User Fee also includes Wellesley's user fee
** - MWRA water use 145.8MG (possibly 3 months use, 1,500 gpm, 18 hrs per day)
***-MWRA water use 288MG (approximately 25% of total water for town, typical for Elm Bank)

To provide a different vision of the option costs we prepared graphs of the 55-year CIP Debt, O&M and a combined graph. See Figure *1* for probable CIP debt over a 55-year period to allow a cost comparison for each water source option.

In the early years, 2022 to 2046, the In-Town source options were much higher than most of the MWRA options due to the extensive WTP construction. After 2046 the CIP debt costs were closer due to less capital outlays. The MWRA options carry a lower CIP debt due to a reduction in treatment and pumping stations that require periodic rehabilitation and replacement. The MWRA options having a much lower CIP debt service may be beneficial for a water community when addressing risk of future regulated contaminants and the costs that might carry.

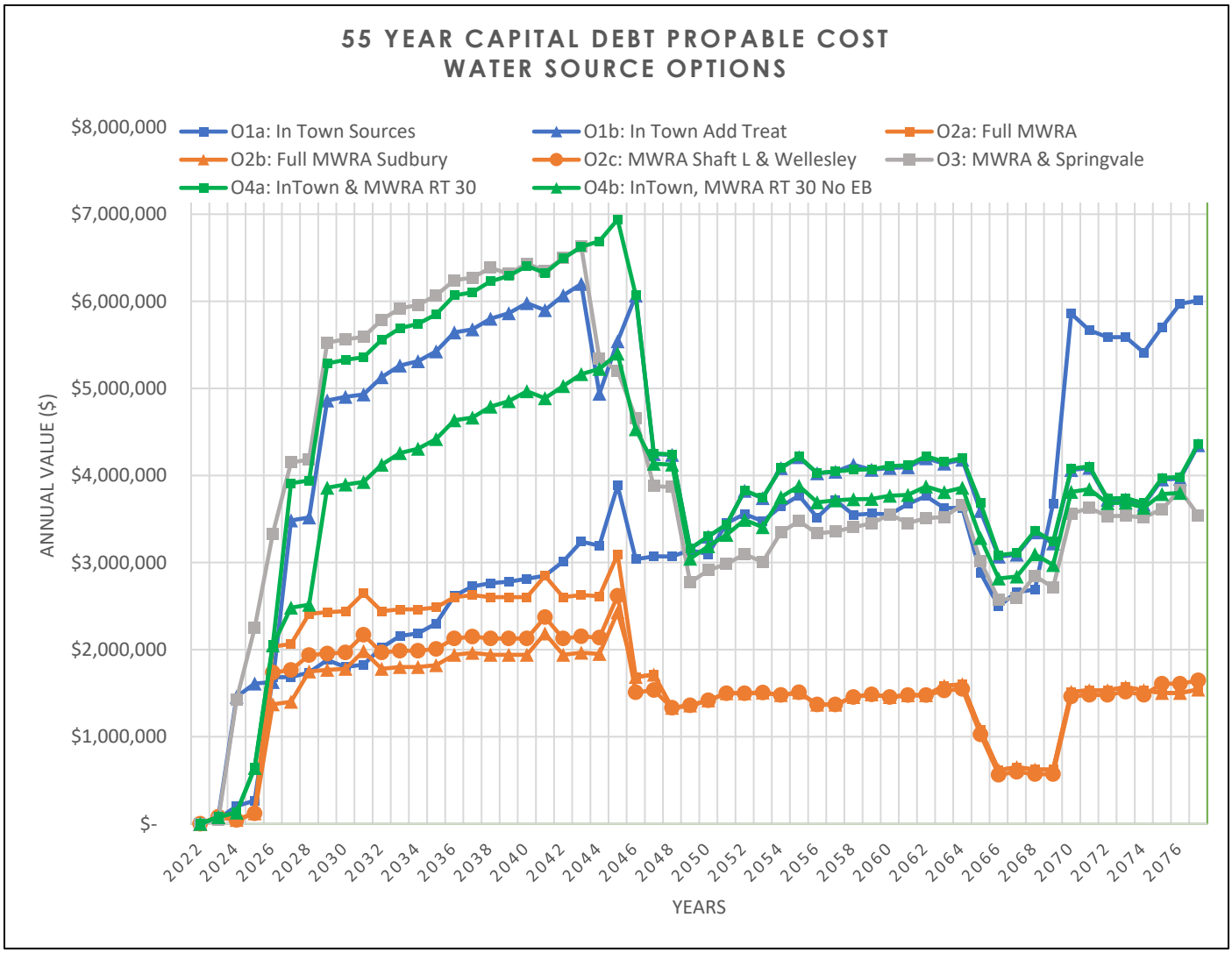

Figure 1 55 Year Options Capital Debt Probable Cost

See Figure 2 for probable O&M costs over a 55-year period to allow a cost comparison for each water source option. The MWRA options carry a higher O&M charge due to the MWRA water purchase cost, which is projected with a 3.9% increase per year. The MWRA user charge in 2029 for the full MWRA options, 2a and 2b, was scheduled at $6.6M and increasing to $41.5M in 2077. Natick's FY 2023 water related O&M cost is approximately $6.84M, which would only see a minor reduction with the full MWRA options with reduced utility and chemical costs. If Natick continued with their existing sources, Option 1b, probable O&M cost could be $50.5M in 2077, while a Full MWRA Option 2a O&M cost could be $90.5M in 2077, which includes the MWRA assessment for water use.

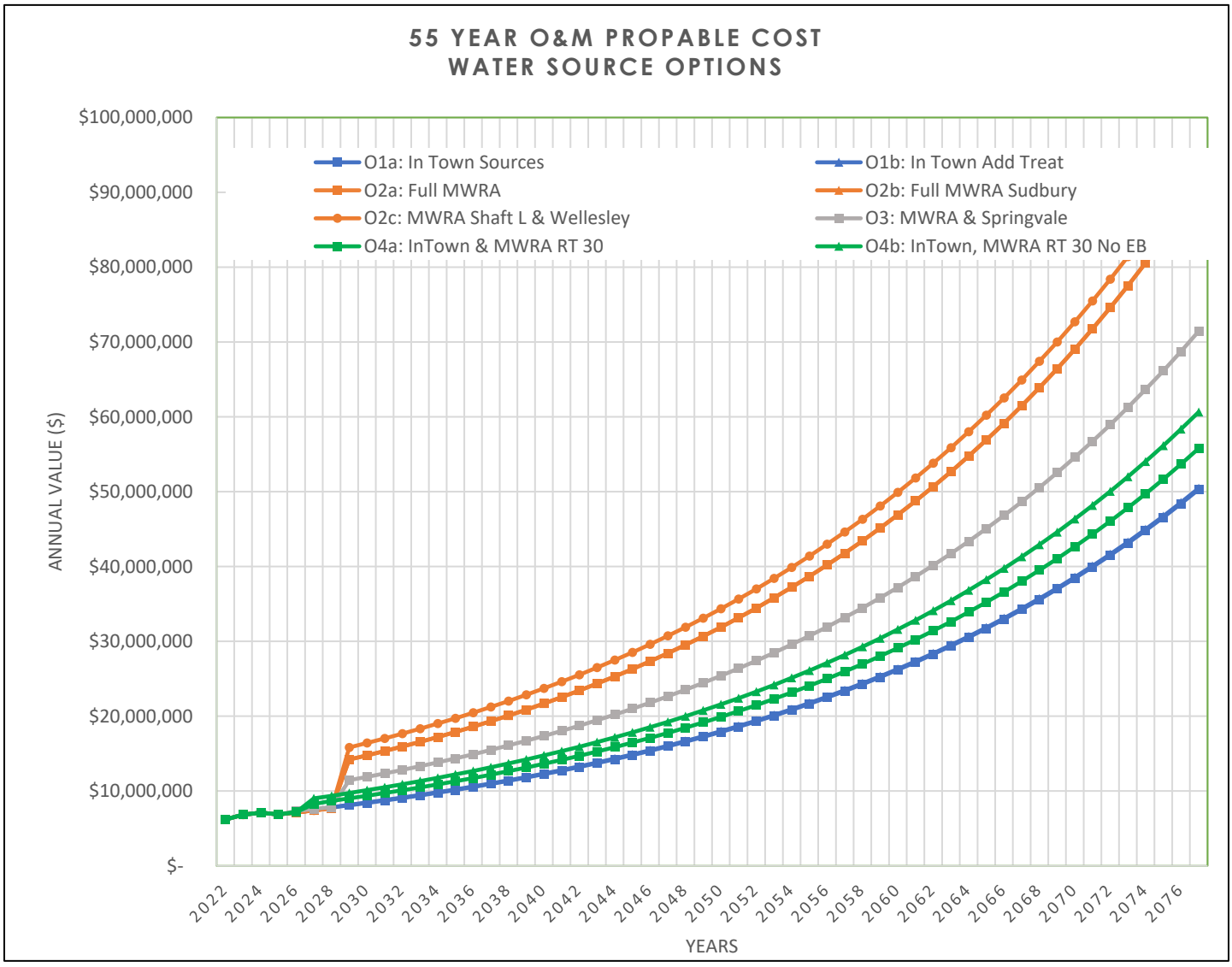

Figure 2 55 Year Options O&M Probable Costs

The O&M graph displays eight sets of data points, however due to similar data among several options, only 5 curves are visual. The bottom curve, blue line and blue squares represent Option 1a and 1b. The curve 2nd up from the bottom, green line and green square, represent Options 4a and 4b. The 2nd curve from the top, orange line and orange square, represent Options 2a and 2b.

See Figure 3 for probable CIP Debt and O&M costs over a 55-year period to allow a cost comparison for each water source option. The MWRA options carry higher costs due to the MWRA user fees. The O&M graph displays eight sets of data points, however due to similar data, only 6 curves are visual. The top curve, orange line and orange squares, represent Options 2a and 2b.

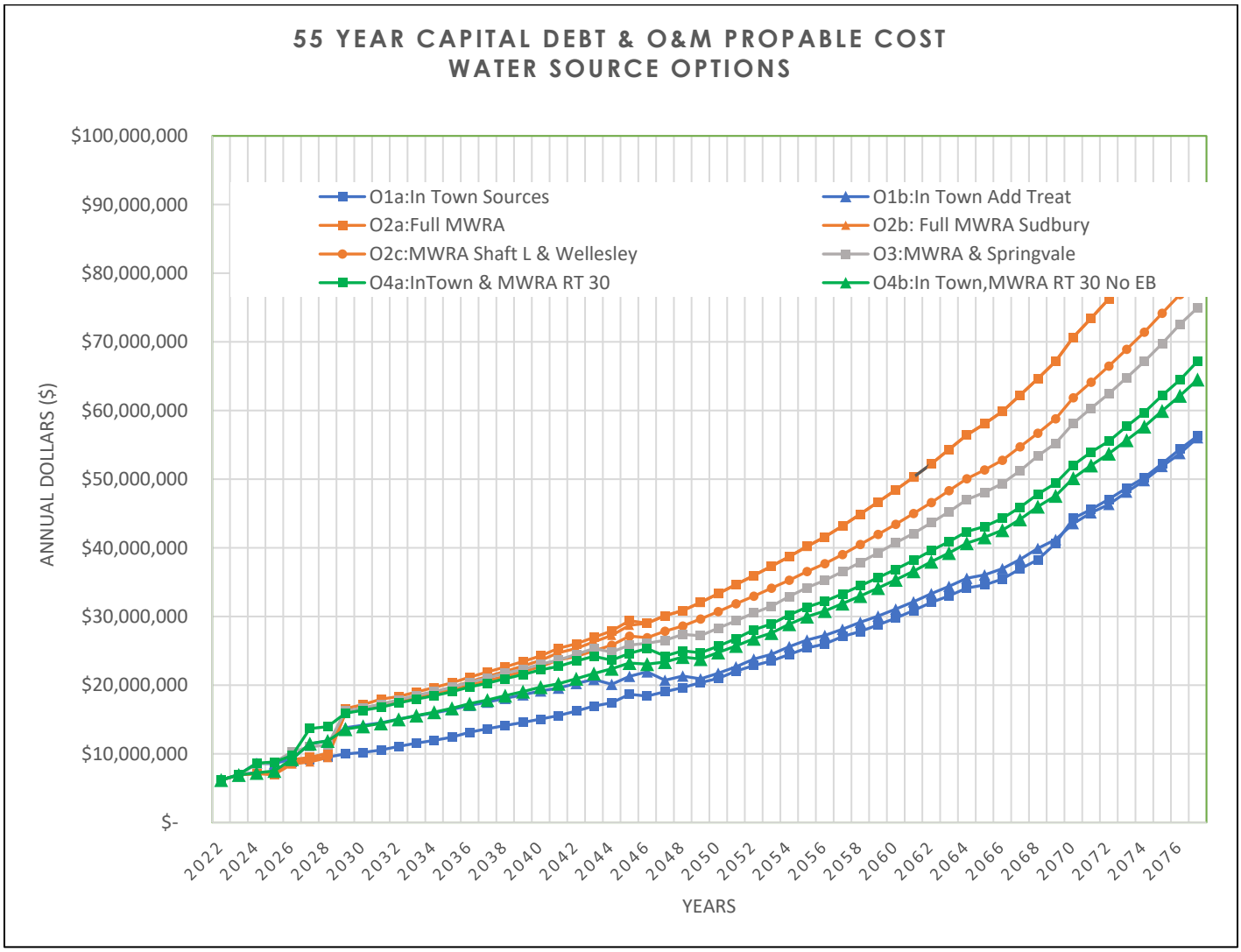

Figure 3 55 Year Options CIP & O&M

1.12 WATER SOURCE RISK ANALYSIS

The costs analysis provided a starting point for your decision-making process for selecting a water supply option. We recommend a holistic evaluation of options, considering cost and non-cost factors (risks). Non-cost factors are directed towards operational restraints, In-Town source water quality changes, regulatory changes impacting ability to produce water without additional treatment.

We selected supply options that address certain conditions/risks, however there is not one option that can alleviate all concerns. Table *5* provides Natick with a decision-making tool when developing a Water Source Strategic Plan.

It is worth noting that abandoning water sources would require MassDEP to declare that the source(s) are unfit for drinking water purposes and cannot be economically restored for drinking purposes. This decision should require consideration of the risk in maintaining the sources and treatment.

Table 5 Water Strategic Plan- Risk Assessment Tool

CONDITIONS	IN-TOWN SOURCES	MWRA FULL SUPPLY DIRECT CONNECT 2 LOCATIONS (6.0 MGD)	MWRA INDIRECT CONNECT 2 LOCATIONS (6.0 MGD)	MWRA HYBRID SUPPLY (MWRA 3.0 MGD) TONKA & H&T ABANDON PINE OAKS, MORSE POND & ELM BANK
Future Water Contaminant Regulations, including PFAS MCL lowered to somewhere between None Detect to 10 ppt	• Possible change in PFAS Removal Media • Possible change in Treatment Type • WTPs at Elm Bank and Pine Oaks	• Treatment, Existing & Future, Responsibility of MWRA • Future Capital Costs shared by all MWRA users • No change to Natick's Distribution & Storage Capital & O&M costs	• Treatment Existing & Future, Responsibility of MWRA • Cost shared by all MWRA users • No change to Natick's Distribution & Storage O&M costs	• Possible Change in type of PFAS Removal media (Tonka & H&T) • Possible change in type of Treatment for Tonka and H&T Water Supplies
Capital Cost	• Capital Costs for constructing new PFAS WTP (Tonka, Elm Bank, Pine Oaks) • Increasing maintenance costs for aging WTPs • Capital costs for WTP Building Replacement	• Capital Costs Limited to Distribution-Storage Assets and One MWRA Water Booster Station • Eliminates Capital Costs for 4 New Natick WTP's • Eliminates O&M costs for Natick WTP's	• Capital Costs for Distribution-Storage Assets and MWRA Water Booster Station • Capital costs for Delivery Community Assets • O&M Costs for Delivery Community • Eliminates Capital & O&M Costs for Natick WTP's	• Capital Cost for Distribution and Storage Assets, and MWRA booster station • Capital costs for constructing Tonka PFAS removal WTP • Increasing maintenance capital costs for Natick's aging WTPs • Capital costs for replacing Natick's Aging WTP's
Water Use Rates for Natick Water Customers	• Rates would increase substantially to meet Capital Costs to construct 4 new WTPs and Maintenance of Same	• Rate Increase to Meet MWRA User Charges • Some Rate Increase Offset by Natick's WTP's Capital & O&M Cost Elimination • More Uniform Rate Setting based on MWRA Rate History • Rate Setting Variability Limited to Distribution & Storage Costs • MWRA published 3.9% Rate Escalation, However Higher Increases Occurred in the Past	• Rate Increase to Meet MWRA User Charges • Rate Increase to Meet Delivery Community O&M Charges • Rate Increase for Delivery Community Capital Cost Share • Reduced Offset of Rate Increase with Elimination of Natick's Capital & O&M Costs • More Uniform Rate Setting based on MWRA Rate history • Rate Setting Variability limited to more stable Distribution & Storage Assets	• Rates Increase, but not to level of Full MWRA, for Tonka WTP and maintenance of same • Rate Increase to Meet MWRA User Charges • Reduced Offset of Rate Increase with Elimination of Natick's WTPs Capital & O&M costs • More Uniform Rate Setting with Reduced Intown WTPs. • Most of Rate Variability would be for Distribution and Storage Assets
Meeting System Demand Present and Future	• Limited Increase in Demand Expected due to low Volume of Vacant Land • Meeting Demand will be Dependent on Maintaining Existing Sources and WTPs to their Max Capacity	• Capacity limitations would only be Natick Distribution and Storage Assets • MWRA has > 6.0 mgd Available for Natick	• Capacity limitations would be Natick Distribution and Storage Assets • Limitations might be imposed by Delivery Community during Equipment Failure such as Booster Pumps	• Decrease in Tonka & H&T Water Supply Capacity would require Additional MWRA Water • If Tonka and H&T Water Supply Capacities Decrease over Time, MWRA Could Account for the Deficiency

CONSIDERATIONS	IN-TOWN SOURCES	MWRA FULL SUPPLY DIRECT CONNECT 2 LOCATIONS (6.0 MGD)	MWRA INDIRECT CONNECT 2 LOCATIONS (6.0 MGD)	MWRA HYBRID SUPPLY (MWRA 3.0 MGD) TONKA & H&T SOURCES ABANDON PINE OAKS, MORSE POND & ELM BANK
Water Management Act Restrictions; **Non-Essential Outdoor Water Use Restrictions** **Limit on Production Due to Basin Yield**	• Natick's WMA Permit Renewal Will Contain Several Restrictions Including Water Use Restriction, Water Basin Safe Yield Constraints, Among Others • Mitigation & Minimization Will be Required By Permit Renewal Could Limit Available Withdrawals • Natick will Need to Manage Sources when Elm Bank is Offline during Drought Conditions	• Natick's WMA Permit Would be Terminated, • Permit Conditions Eliminated • No Limit on Water Supply • No Minimization or Mitigation Efforts Required for Natick	• Natick's WMA Permit Would be Terminated • Water Use Restrictions May be Required by Water Delivery Community • No minimization or Mitigation Efforts Required for Natick	• Abandoning Elm Bank & Morse Pond sources would terminate the WMA Permit eliminating water use restriction until Registration statements are conditioned • If Registered Wells Are Conditioned, then Minimization and Mitigation Might be Required for Concord Sources • Reduction in Water Withdrawals are Possible With Permit and Registration Conditions
Operation of Advanced Water Treatment Plants Due to Future Regulated Contaminants	• Advanced Water Treatment Plants may Trigger Higher Level WTP License from Present requirement (T2) • Slight Increase in O&M Costs • Possible Combining of Treatment Processes into 1 or 2	• No need for Higher WTP Licenses • All Water Quality Testing by MWRA Laboratories • No Increase in Natick O&M • Elimination of O&M for Natick WTPs & Sources	• No need for Higher WTP Licenses • Possibly All Water Quality Testing by MWRA Laboratories • No Increase in Natick O&M • Elimination of O&M for Natick WTPs and Sources	• Future Regulated Contaminant Treatment Most Likely Require Advanced WTP • Advanced WTP may Trigger Higher Level WTP Licenses over Present (T2) • All Water Quality testing by MWRA Laboratories
Water Quality Changes	• No Anticipated Negative Changes in Water Quality • Advanced WTP may Improve Water Quality	• Water Quality Would Change but not Negatively, Higher pH and Chlorine • Reduction in Water Hardness - Positive Change	• Water Quality Would Change but not Negatively, Higher pH & Chorine • Possible Reduction in Water Hardness – Positive Change	• Fluctuation in Chlorine and pH Between MWRA and Natick Could Result in Water Quality Complaints – Taste & Odor • Corrosion Control Treatment May Require Change with Intermittent MWRA Use
Risk of Relying on 1 Source	• Natick has Several Sources and WTPs that Affords Redundancy to Manage Sources to Meet Demand During Various Seasons • WMA Permit May Reduce Capacity from The Sources	• Chances of MWRA Offline, Both Tunnel and Aqueduct, is Slight If at All • Connection Pipe and Booster Station Would be Failure Point • Recommend Two Direct Connections to Minimize Loss of Water Risk	• Chances of MWRA or Delivery Community Offline is Slight if at All • Transmission Main and Booster Stations Would be Failure Point • Recommend Two Indirect Connections to Minimize Loss of Water Risk	• Affords Natick Multiple Sources for Redundancy • If MWRA is Offline then Natick Sources to Meet Demand, Possible Water Use Restrictions if High demand • If Town Sources are Offline then MWRA can be Increased
Space for Future WTP & Wells	• Elm Bank WTP Land is Leased • MP & PO Land Limited for New Well & WTP • Springvale Site Limited for Add. WTPs	• Land Required for 1 Booster Station • No Add. Land Required for WTP's	• Land Required for 2 Booster Stations • No Add. Land Required for WTP's	• Land Required for 1 Booster Station • Springvale Site Limited for Add. WTP's

We recommend Natick consider the Risk Assessments tool to evaluate each Water Source option separately from the related costs. The Risk Assessment table provides pros and cons for each option that should be considered closely when forming a Water Supply strategy. We did not provide a ranking for the Risk Assessment table, mainly because water suppliers may have different levels of risk aversions and may weight certain risks lower or higher than other water suppliers.

We did not include Option 4, In-Town Sources MWRA Rt 30 Supplement, in Table *5* Water Strategic Plan- Risk Assessment Tool. Option 4 would have similar risk levels as Option 1b, In-Town Sources with Additional Treatment, with the additional benefit of having a supplemental source to activate under emergency scenarios, such as reduced ability to meet system demand due to WTP failures. The Rt 30 MWRA connection would not be considered a reliable option by MWRA as the Hultman aqueduct could be taken offline for repairs leaving no water available at the RT 30 connection.

1.13 ADMISSION TO THE MWRA

A water community outside the MWRA's water service area, as with Natick, seeking admission to the MWRA water system must follow the procedures in the MWRA Policy # OP.10 as set forth in section 8 of MWRA's Enabling Act (St. 1984, c.372). See Appendix C for a copy of MWRA's Policy# OP.10.

The policy has several steps before the connection can be made, as summarized below.

1. Enabling Act Criteria: Must meet 6 criteria
2. Other Criteria: Analysis of MWRA water system to strive for no negative impact on the interest of the current MWRA water customers, water quality, hydraulic performance of the MWRA water system. MWRA typically conducts this analysis.
3. Application Process: Application is submitted to the MWRA Executive Director for review, with copies to the MWRA Advisory Board.
4. Concurrent Reviews: Other regulatory approvals and permits may be required before MWRA grants approval to connect.
    a. Massachusetts Environmental Policy Act (MEPA)
        i. Review of Environmental impacts of projects, such as water main installation.
    b. Interbasin Transfer Act Water Resources Commission
        ii. Require with transfer of water from one basin to another greater than 1 mgd.

   c. Local water supply source feasibility: MassDEP review of reasons why existing sources can no longer be maintained.

5. Legislation: Legislation is required to extend the MWRA water system to a community not presently listed in section 8 (d) as a MWRA water community.
6. Water Supply Agreement: If MWRA approves the application they will issue a draft water supply agreement, with appropriate terms and conditions of service.
7. Entrance Fees
   a. Waived for a 5-year period (2022-2027) for PFAS related connections.

The MWRA Policy# OP.10 process can take 2-3 years especially for the MEPA and Interbasin Transfer act work, with certain items occurring concurrently such as Town Meeting and legislature voting. The MEPA timeline can be substantially reduced if the option selected does not involve extensive water main installation, such as Option 4a and 4b.

There is one Enabling Act Criteria that will require special attention during the process that will require MassDEP approval. The criteria requires that no existing or potential water supply source for the community has or will be abandoned to make the connection, unless MassDEP has declared that source unfit for drinking and cannot be economically restored for drinking purposes. We discussed this with MWRA staff, and they indicated the enabling act criteria for not abandoning sources was during the early period for MWRA where MWRA did not have substantial water reserves for additional customers. At this time MWRA has indicated they have substantial water reserves for new customers and would not hold that enabling criteria against a community requesting permission to join the MWRA water system.

In this report we evaluated MWRA options that include abandonment of Natick's water sources, due to a combination of costs and risk level. If Natick sources were maintained, a major cost increase would be required to meet future regulated contaminants with the construction and operation of additional water treatment plants. Additionally, the existing treatment plant sites have limited open space for the additional buildings, if required, possibly making the In-Town sources less feasible.

This is especially true for the Pine Oaks, H&T and Elm Bank sites. All three locations have limited land available for constructing a WTP, especially Elm Bank where the Town holds a lease for the land that the existing WTP is located. An advanced WTP at this site could take up to 2-3 times the space as the existing plant.

2.0 BACKGROUND

2.1 GENERAL

The Natick Department of Public Works (DPW, Town) requested Haley Ward, Inc. to complete a Water, Production, Treatment and Storage Asset Management Plan (asset management plan). The motivation for the asset management plan was to provide the town with the information necessary to make a strategic plan for the future of Natick's water supply and water treatment.

Water systems across the United States have seen a steady increase in regulations and restrictions on water supplies and water quality in general. The Federal government administers a program designed to monitor unregulated contaminants in drinking water. The program was authorized under the Unregulated Contaminant Monitoring rule (UCMR) in 1996 as an amendment to the Safe Drinking Water Act.

The purpose for the UCMR, as provided by the United Stated Environmental Protection Agency (EPA), is as follows.

> *"UCMR provides EPA and others with scientifically valid data on the occurrence of these contaminants in drinking water. This permits assessment of the population being exposed and the levels of exposure.*
>
> *UCMR data represents one of the primary sources of national occurrence data in drinking water that EPA uses to inform regulatory and other risk management decisions for drinking water contaminant candidates. This data will ensure science-based decision-making and help prioritize protection of disadvantaged communities."*

EPA continues to update the unregulated contaminants that must be sampled by the water supplies across the country every five (5) years. The data obtained in the UCMR sampling can drive new drinking water regulations that can negatively impact a water suppliers' ability to produce water due to additional treatment costs and lack of vacant land for treatment buildings.

In the 2001 to 2005 UCMR sampling period, perchlorate was detected in water supplies across the country, including Massachusetts. Natick did not detect perchlorate in their water supply samples, due to the laboratory detection levels at that time.

More recently, under UCMR 3, 2013 to 2015 sampling period, per-and polyfluoroalkyl substances (PFAS) were included in the UCMR testing. The results of the testing across the country revealed elevated levels of PFAS in many water supplies.

Natick was one of the many water supplies that detected PFAS in their drinking water wells. In fact, PFAS was detected in all 11 water supplies Natick owns. EPA created a PFAS-6 health advisory of 70 parts per trillion (ppt), then Massachusetts followed with a drinking water regulation with a limit of 20 ppt. EPA has indicated they intend to promulgate a Drinking Water PFAS regulation, with a level possibly as low as non-detect. EPA originally indicated they would publish a proposed regulation for comment in the fall of 2022, however, to date, that has not occurred. MassDEP will need to review their PFAs regulation and adjust to meet the EPA regulation.

The future of contaminants and required treatment played a large role in the preparation of this Asset Management plan, specifically with projecting water treatment costs. The uncertainty of future regulated water containments substantially impacts cost projections for future water treatment requirements and related operation and maintenance costs.

There are several significant benefits gained from following an asset management plan, most important is the difference between a reactive emergency repair or a planned rehabilitation based on an asset management plan. An emergency repair such as a water supply pump failure or filter component failure occurring during peak demand season could have been avoided and turned into a well-planned out and designed project that is advantageously bid (seasonal timing, available town resources, etc.). Additional benefits of proactive planning include:

- Avoiding unanticipated disruption in water service to residential, commercial, and industrial customers.
- Reducing the frequency of emergency repairs, which are significantly more expensive and are intensive strains on town personnel resources.
- Substantially increased knowledge of the treatment and storage infrastructure. This in turn will allow the Town to make better financial decisions due to better planning.
- Showing the Natick water customers that you are using their money effectively and efficiently to provide a safe and reliable drinking water infrastructure system.

The intent was to produce an asset management plan that identifies water treatment, production, and storage infrastructure deficiencies such as failing assets, inadequate or compromised equipment, end of useful life, and inability to meet current and future demands.

This asset management plan will not only serve to prioritize critical assets, and avoid emergency repairs, but also assist in making a strategic plan for the future of Natick's water sources and treatment.

2.2 SCOPE OF SERVICES

The Water Treatment, Production and Storage Asset Management plan scope of services centered around the following tasks.

Task 1: Evaluation

1. Evaluate and report on the condition and available capacity for the four (4) existing water treatment plants; Springvale H&T, Springvale Tonka, Elm Bank and Pine Oaks.
2. Evaluate and report on the condition and available capacity for the eleven (11) existing water supply pumping facilities.
3. Evaluate and report on the condition of the two (2) water storage facilities.

Task 2: Capacity

1. Determine Natick's present water demand patterns.
2. Determine Natick's future water demand patterns, based on population projection data available from the Department of Conservation and Recreation.
3. Evaluate Natick's capacity to meet water demands, including future demands, and available supply redundancy.
4. Identify potential impacts existing and potential regulations may have on meeting water demand.
5. Identify potential alternative water sources

Task 3: Recommendations

1. Provide recommended Capital Improvement Plans for upgrades, or replacement of Water Treatment plants, water pump stations, water supply wells and water storage tanks.
2. Provide recommendations for additional water treatment to meet present and future regulations, including potential changes to MassDEP PFAS regulation.
3. Provide a 55-year Capital improvement plan that can be used to form a Water Source Strategic Plan for the future of the Natick water source.

Distribution System Infrastructure Analysis

Haley Ward previously prepared a Water Distribution System Asset Management plan for the Natick distribution assets. The distribution analysis targeted the water distribution system pipe, specifically type of materials, break history, and historical information. The analysis was designed to answer the following questions: 1) is there is a pattern to pipe break history; 2) what pipe type requires replacement or rehabilitation; 3) are there system deficiencies (low pressure of low fire flow); and 4) are there feasible system improvements that will eliminate system deficiencies.

Water Storage Evaluation

Natick presently owns and operates two water storage reservoirs, located at Broad Hill and Town Forest. The Broad Hill reservoir is a pre-stressed concrete water storage tank with a precast dome constructed in 1967 by Natgun Corporation. It has an inside diameter of 150 feet, a sidewall depth of 30 feet, and water capacity of 4.0 MG. The Town Forest reservoir is a pre-stressed concrete water storage tank with a cast-in-place dome constructed in 1966 by Natgun Corporation. It has an inside diameter of 185 feet, a sidewall depth of 25 feet, and a water capacity of 5.0 MG.

Under this report, we utilized the hydraulic model to determine if there are deficiencies in available water storage as it relates to maintaining system pressure during fire flow conditions. Under the Water Distribution System Asset Management plan, we conducted additional hydraulic model scenarios testing for the under fire flow and peak flow demands to determine deficiencies in the system.

Water Supply Evaluation

Natick presently owns and operates ten active water supply wells and three water treatment plants. Natick water supplies are groundwater wells with discharge rates limited under the Water Management Act through a combination of a Permit and Registration Statements.

The present authorized average daily discharge limit is 5.63 MGD, however that rate may be reduced through the upcoming permit renewal process, possibly to 4.32 mgd.

Haley Ward will provide and evaluation of Natick's water supplies and treatment facilities to identify present capacity of each water supply facility; present capacity of each water treatment facility; water supply and water treatment facility conditions;

and improvements necessary to meet present and future water demands and regulated contaminants.

2.3 ELECTRONIC REPORT FUNCTIONS

The final report was provided to the Town with three (3) original copies. The report was also furnished in electronic format, PDF, for on-line use. Some features of the on-line version are quick links to document headers and links to Appendix documents.
To utilize the quick advance functions (Bookmarks), there are two options as follows.

1. In the Table of Contents, left click on the Section you would like to advance to.
2. On the left side of the page is the Navigation Pane for PDF writer software, click on the Bookmarks icon to open bookmarks in the document. These will display all Section headings. Click on the one that you want to advance to.
3. To access Appendix sections from within the document. Click on the appendix letter, which is bold and italics, and it will advance to the appropriate document in the appendix.

2.4 HYDRAULIC MODEL

The computer based hydraulic model was utilized in the Options analysis to determine required water transmission mains from the MWRA connections and system improvements necessary to receive outside water. The model also provided hydraulic grades required for confirming if a water booster station was required.

The computer software hydraulic model consists of pipes, junctions, tanks, pumps, and wells. Junctions can represent an endpoint in the system, a hydrant location, or a tee. The model software utilized for this report was InfoWater that runs as an extension in ESRI ArcMap GIS software.

The existing InfoWater hydraulic model was updated during the preparation of the Water Distribution System Asset Management plan and calibrated to reflect modern day conditions based on hydrant flow tests and town use metering data. Hydrant flow tests from Haley and Ward testing, proposed development testing, and ISO testing were utilized as a calibration tool for the model. We also obtained Natick's water use meter data and distributed the actual water use data throughout the system to provide a more accurate model.

The model was utilized in analyzing each MWRA direct and indirect connection option. The model provided the information necessary to determine what improvements would be needed to accept certain flow rates from the MWRA. For example, the Rt 30 connection required a booster station to push 1,500 gpm of water from MWRA into the Natick water system. The model indicated that the resulting pressure in Winter Street would be over 150 psi. We entered Winter Street and Oak Street system upgrades in the model until the resulting pressure was close to the typical pressure in the system.

The Shaft L MWRA connection in Framingham included a transmission main to the 12" water main in Rt 27 at the Pine Street intersection. The model was utilized to determine the quantity of water that could be delivered to that location with a booster station without excessive water pressures.

2.5 SYSTEM OPERATIONAL DETAIL

WATER SUPPLIES- The Town of Natick owns and operates their own water supply, water treatment, water storage and water distribution system. The water system provides potable water to almost 100% of the buildings in Natick with a very small number of private residential wells. Natick also wheels water to Wellesley and Dover.

Most of the water supply wells have an associated building to contain pumping, electrical, instrumentation, water treatment equipment and chemical feed equipment.

Natick owns and operates 11 gravel packed groundwater wells to produce water necessary to meet system demand including demand for firefighting. Table 6 summarizes Natick water supplies and applicable information pertaining to each.

Table 6 Water Supply Data

Treatment Plant	Well Name	Year Installed	Present Safe Yield (gpm)
Springvale H&T Fe & Mn Removal PFAS Removal	Springvale #3A	2012	615
	Springvale #4*	1955	440
	Springvale 4A	2019	800
Springvale Tonka Fe & Mn Removal PFAS Removal Corrosion Control	Springvale #1A	2013	600
	Springvale #2A	2005	512
	Evergreen #1	1972	1,000
	Evergreen #3	2000	1,800
Disinfection	Pine Oaks #1	1958	330
TBD	Morse Pond **	1956	0
Disinfection & Corrosion Control	Elm Bank #2	1995	1,800
	Elm Bank #4	1995	1,800
Total Available			9,257 (13.33MGD)

*: Springvale 4 & 4A total rate cannot exceed 900 gpm per MassDEP permit.

**: Morse Pond water supply is offline due to fuel contamination.

2.6 WATER TREATMENT PLANTS

All water from the groundwater wells is pumped through Water Treatment Plants that either include filtering, chemical feed, or both. In most cases water discharged from multiple wells is combined and treated by a common treatment plant. Table 6 summarizes which wells are treated by treatment plants and treatment plants that only include chemical feed.

2.7 WATER USE METERING

The Water Department maintains a water metering system that records water usage for each water service connection. Natick presently records water usage through an Automatic Meter Reading (AMR) system that collects water consumption from each meter using a radio-based system. Meters are typically read monthly and customers are billed quarterly. Natick has allocated funds to install an Advanced Metering Infrastructure (AMI) system that integrates the water meter radio with a fixed network that enables direct communications between the meter and meter collector stations. This will allow Natick to record water consumption on any frequency, even hourly.

Natick reports data for the water system in their Annual Statistical Report (ASR), that is required by Massachusetts Department of Environmental Protection (MassDEP). The ASR includes water use, water pumped, total water metered, total number of water services, water service population among other data.

Table *7* summarizes the water production and use related data that was submitted in the Natick 2021 ASR.

Table 7 2021 ASR Data

2021 ASR Data	
Water Service Population	37,006
# of Residential Water Services	10,330
# of Commercial Water Services	588
Total # of Water Services	11,166
Water Pumped	1,048,846,000
Water Metered	856,754,747
Unaccounted for Water	136,000,000
Residential Gallons per Capita Day	49*
Water Sold to Other Systems	12,689,273

**- MassDEP performance standard for GPCPD is 65*

2.8 REGISTRATION STATEMENTS & PERMITS

Table 7 identifies data that is regulated through Registration Statements and Water Management Act permit, both administered by MassDEP.

Currently Natick holds Registration Statements for Springvale 1,2,3,4 & 4A and Evergreen 1 & 3 and Pine Oaks 1 and Morse Pond. Natick also holds a WMA permit for Elm Bank wells # 2 & 4.

Pine Oaks and Morse Pond water supply well Registration Statement, Number 32019801, limits annual withdrawal volume to 80.3 million gallons with a daily average withdrawal volume of 0.220 million gallons.

Springvale and Evergreen water supply well Registration Statement, Number 31419801, limits the annual withdrawal volume to 1,496.5 million gallons with a daily average withdrawal volume of 4.1 million gallons.

The Elm Bank WMA permit was first issued on June 30, 1992, with a modification date of May 3, 2002 and an expiration date of February 28, 2009. The Elm Bank WMA permit limits annual withdrawal volume to 478.15 million gallons with an average daily withdrawal volume of 1.31 million gallons.

In 2010, Natick received a draft 20-year WMA permit renewal with a 21-day appeal period. Natick appealed the draft permit based on the restrictive nature of additional performance standards, mainly the average daily flow limit and performance standards. The performance standards were typical for Water Management Act permit holders and included restrictions such as water use restrictions and water use bans, both impact all Natick's water supplies, not just the Elm Bank permitted supplies.

The permit renewal is still in appeal, waiting for MassDEP to conduct a hearing on the appeal.

The Elm Bank active WMA permit contains performance standards for Elm Bank wells 2 &4 that require the wells to be shut down when the Charles River water flow drops below certain thresholds. The purpose for this standard is to protect the river's environment, including fish species and other inhabitants of the river.

The appealed permit also included a performance standard that requires residential gallons per capita day (RGPCPD) to be maintained at 65 or less. The 65 RGPCPD number was adopted by MassDEP as the maximum quantity of water a typical household should not exceed. This was intended to minimize non-essential outdoor water use, such as lawn irrigation systems. The reported RGPCPD in the 2021 ASR was 49.

The appealed permit also included a performance standard of 10% or less unaccounted for water (UAW). UAW is calculated by comparing the water pumped quantity to the water use recorded. UAW limit is intended to encourage water systems to minimize leaks and water main breaks through maintenance and maintain water use meters to ensure all water usage is accurately measured. The reported UAW in the 2021 ASR was 13.2%.

Currently, the Natick WMA permit is still in the appeal phase. Therefore, Natick is not required to meet the UAW or implement seasonal non-essential outdoor water use restrictions. Natick should anticipate that the WMA permit and Registration statements will be issued with the abovementioned standards, thus seasonal use restrictions would be the norm for Natick.

There are two possibilities that Natick should anticipate with a WMA permit renewal. The WMA permit may be issued with an average daily water withdrawal limit of 4.32 mg or a limit of 4.12 mgd. The 4.32 mgd is based on the Registration Statements limits, the 4.12 mgd was based on the Department of Conservation and Recreation (DCR) water needs forecast that was included in the MassDEP's 2020 Permit Renewal Summary Sheet. DCR projected Natick's population and related water demand for a 20-year period as part of the water needs forecast. DCR forecasted Natick's average daily water use in 2023 at 3.86 mgd, 2028 3.92 mgd and 2033 4.12 mgd.

It is important to consider the relationship between Natick's historical water use and withdrawal limitations when looking at preparing a Water Source Strategic Plan. Therefore, we will provide background data related to historical water use for Natick.

Table 8 summarizes the last 5 years of performance standards including average daily demand, maximum daily demand water use, unaccounted for water and residential gallons per capita day for Natick. This will provide insight into Natick's water needs when considering future water sources and costs.

Table 8 ADD & MDD Water Use

Calendar Year	Total Pumped (MGY)	Average Daily Demand (GPD)	Maximum Daily Demand (GPD)	UAW (%)/MGY	RGPCD
2021	1,048.85	2.874	4.231	13.1/136	49
2020	1,161.45	3.182	5.732	8.9/101.4	62
2019	1,171.28	3.209	5.21	12.1/139.8	53
2018	1,194.95	3.273	5.411	8.8/104.8	56
2017	1,168.48	3.201	4.7	12.1	556

Figure 4 provides a plot of Natick's ADD and MDD water use values from Table 1-3 for the past five years. The figure indicates that there was an upward trend in average and maximum daily demand until 2021when the use decreased substantially. In 2021, Natick filed an emergency declaration to MassDEP as a response to the regulated per-and-polyfluoroalkyl substances (PFAS) Maximum Contaminant Limit (MCL) exceedance in the first quarter of 2021 for the Springvale water sources. The declaration allowed operation of Elm Bank water supplies to meet system demand, during a low streamflow period, while the Springvale sources were taken offline. MassDEP required Natick to implement an outdoor non-essential water use ban during the emergency declaration period.

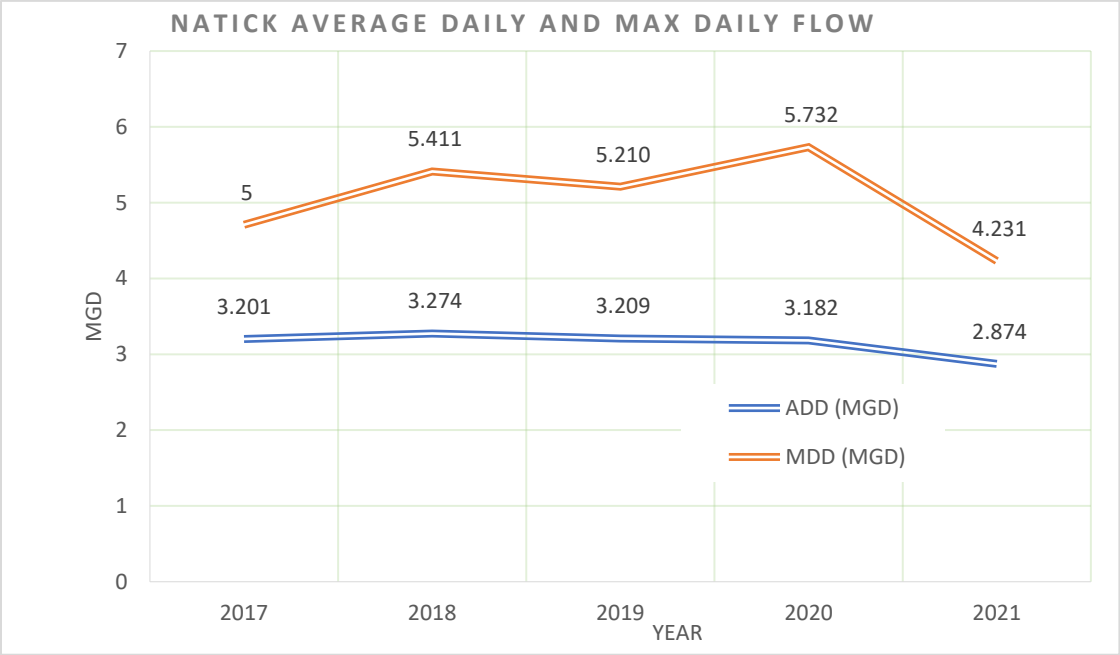

Figure 4 ADD & MDD

Other factors that can impact water use are low precipitation and water use restrictions during drought season. When looking at future demands and water supply options, water use restrictions might be the "norm" for Natick once their WMA permit is renewed. This will reduce total water withdrawal as seen by Figure 4 data in 2021.

Figure 5 provides a plot of Natick's unaccounted for water (UAW) and residential gallons per capita day (RGPCD) values from Table 7 for the past five years. The two variables tend to be inter-related with UAW increasing in years where the RGPCD decreases. A decrease in the RGPCD is typically an indicator that outdoor watering was minimized by a high precipitation year.

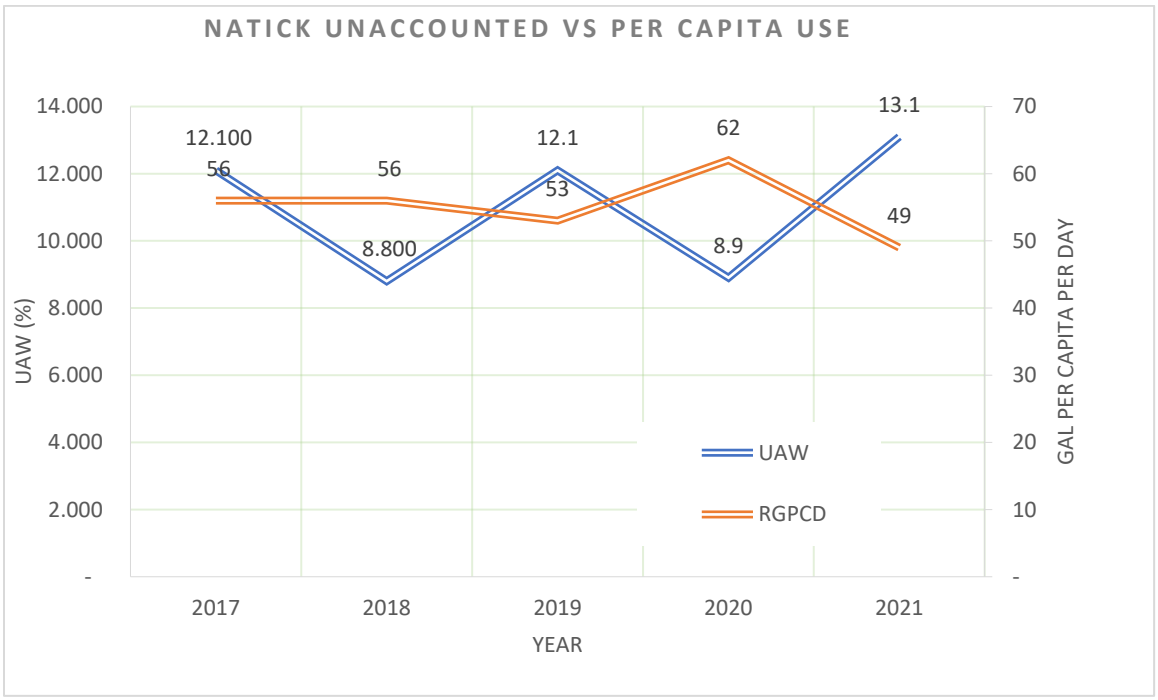

Figure 5 UAW & RCPCD

WATER DISTRIBUTION SYSTEM -The Natick water distribution system, owned and maintained by Natick, is designed to distribute water from the water supplies and water storage reservoirs to each water customer. It also provides water for firefighting. The Natick water system is a publicly owned water system that has been in existence since the 1800's. The Natick water system provides potable water to roughly 37,000 residents and numerous commercial and industrial facilities. The water administrative office building is located at 75 West Street with a separate office/facility for water treatment plant and sewer pump station staff at the Springvale Water Treatment plant site (1080 Worcester Road). The water system consists of approximately 198 miles of water mains, 1,400 hydrants, 11 water supply wells, 6 water treatment plants, approximately 11,166 water services and 2 water storage facilities.

A Water System Asset Management plan was completed in 2019 for the Natick water distribution system that includes conditional assessment and a capital improvement plan.

3.0 NATICK WATER SYSTEM

3.1 WATER SYSTEM BACKGROUND

The Natick water system is a publicly owned water system that has been in existence since the 1800's. The Natick water system provides potable water to roughly 33,000 residents and numerous commercial and industrial facilities. The water administrative office building is located at 75 West Street with a separate office/facility for water treatment plant and sewer pump station staff at the Springvale Water Treatment plant site (1080 Worcester Road). The water system consists of approximately 198 miles of water mains, 1,400 hydrants, 11 water supply wells, 5 water treatment plants, and 2 water storage facilities. See Appendix B for a complete Water Distribution System Map.

One of the first water supplies for Natick was the "dug" well located at the Springvale water supply site at 1080 Worcester Street. The "dug" well was a manmade well, approximately thirty (30) foot diameter by twenty-five (25) foot depth. A coal fired engine powered water pump was in the adjacent brick building, constructed in 1903 to discharge water into the Natick water distribution system. The other original water supply was located near the shores of Dug Pond.

The coal fired engine driven pump was replaced by two electric powered vertical turbine pumps, Springvale No.1 & 2. Springvale No.2 pump was removed with the installation of a separate gravel packed well in 2005 and the "dug" well was abandoned in 2013 when Springvale No.1 was replaced with the installation of Springvale No.1 gravel packed well.

Springvale site expanded with the installation of three additional gravel packed wells, Springvale No 3,4 &5. Natick continued to develop water supply sources as the Town grew in population, with the development of the Morse Pond and Pine Oaks water supplies. Morse Pond water supply was constructed in 1956, Pine Oaks #1 was constructed in 1958, Pine Oaks #2 was constructed in 1960 and Pine Oaks #3 was constructed in 1966. More recently, 1995, Natick developed a water supply in the Elm Bank reservation in Dover. The water supply development process was a multi-town effort involving Natick, Needham, and Dover, with only Natick activating two wells to date, Elm Bank #2 and #4.

There were two main purposes for preparing the Asset Management Plan as listed below.

1. Provide conditional assessment of the existing supplies, treatment pumping and storage assets and related capital improvement plan.
2. Provide water supply options for consideration by Natick in developing a Water Source Strategic Plan.

The following subsections provide the present condition of the water assets and related capital improvement plans if Natick chooses to maintain all or portions of their water assets in their Water Source Strategic Plan.

3.2 WATER SUPPLIES

The Natick water distribution system is supplied with water from 11 groundwater sources as summarized below.

- Springvale Well No. 1, 2, 3, 4 & 4A
- Evergreen Well No. 1 & 3
- Elm Bank Well No. 2 & 4
- Pine Oaks Well No. 1 (Pine Oaks 2 & 3 are offline)
- Morse Pond Well No.1 (offline for replacement)

Water is sourced from 11 groundwater wells in five locations: Springvale, Evergreen, Elm Bank, Morse Pond, and Pine Oaks. Water from the Springvale and Evergreen wells is treated at the two Springvale water treatment plants located on Worcester Road. Water from the Elm Bank wells, Pine Oaks and Morses Pond water supplies are treated by chemical treatment plants.

Natick has maintained the existing wells over the years through well redevelopment and well replacement programs. Recently the four Springvale wells have been replaced through the MassDEP well replacement program. Springvale No.4 well remained active following Springvale 4A installation. Either well can be operated provided the total rate does not exceed the registration statement.

The Natick Water Supply Assets are generally in good to very good condition. The facilities ages range from the early 70's to new construction in 2022. Water supply assets include the following.

- 11 Gravel packed wells
- Pumping equipment for each gravel packed well
- 8 Water pump station buildings

- Electrical equipment

Natick has had a proactive funding program to renovate and construct new water pumping stations, leaving their present condition in a good to very good status.

We conducted an evaluation of each facility to obtain an overview of each facility's present condition that was utilized in preparation of a 55-year Capital Improvement Plan (CIP) for Natick's Water Supply Assets. The evaluation included a site visit to each pump station to evaluate the structure, instrumentation, and electrical and mechanical equipment.

We prepared a Rubric analysis for pump stations and related water supply wells to provide a recommend priority list of capital needs to maintain the pump station assets. The Rubric includes ratings categories such as electrical, pump/motor, safety, etc.. We also included a Criticality rating item that ranked each asset based on their critically, how important, they are for the Natick water supply sustainability. The least important assets, such as Morse Pond received a rating of 10, whereas Tonka supplies were typically at 1 and 2. Table 9 summarizes the results of the Rubric analysis for the water supply well assets with Elm Bank 2&4 identified as priority #1. If you eliminate Criticality Morse Pond is #1, which is aligned with the need to replace the water supply well, should the town consider maintaining this source with the water quality concerns and water contamination in the ground and pond.

Table 9 Water Supply Well Rubric

Water Supply Wells Asset	Total	Total W/Out Criticality	Rehab Priority	Rehab Priority W/O Criticality Rating
Springvale #1A	7	8.7	8	10
Springvale #2A	6.8	8.4	7	9
Springvale #3A	6.3	7.8	5	7
Springvale #4	7.3	7.1	9	4
Springvale #4A	7.5	9.4	10	11
Evergreen #1	6.5	7.5	6	5
Evergreen #3	6.3	7.8	4	6
Pine Oaks #1	8.1	8.1	11	8
Morse Pond	5.8	4.6	3	1
Elm Bank #2	5.8	6.9	2	3
Elm Bank #4	5.8	6.9	1	2

The Rubric for the pump station assets indicated evergreen 1&2 pump stations were the top priorities with Morse Pond 3rd, see Table *10*. Once again if you remove Criticality rating then Morse Pond is #1. Natick has funded the replacement of Evergreen #3 well and electrical upgrades to station #2, which aligned with the Rubric results. Natick has also placed a hold on replacement of the Morse Pond water supply due to contamination.

Table 10 Water Pump Station Rubric Rating

Water Pumping Station Asset	Total	Total W/Out Criticality	Rehabilitation Priority	Rehabilitation Priority W/O Criticality Rating
Springvale #1&2	7.6	9	9	10
Springvale #3	7.2	7.2	7	8
Springvale #4	7.3	6.4	8	6
Springvale #4A	8.1	8.2	10	9
Evergreen #1	5.2	5.4	2	4
Evergreen #2	5.1	5.8	1	5
Pine Oaks	7.1	6.9	6	7
Morse Pond	5.1	3.3	3	1
Elm Bank #2 Vault	6	5	5	3
Elm Bank #4 Vault	6	5	4	2

Natick has a proactive approach to maintaining their pump station pumping equipment and structures. All stations have either been rehabilitated or replaced within the last 10-15 years or funding is in place for repair or replacement including Evergreen #3.

We assigned rehabilitation and replacement schedules to pump stations and wells, based upon historical work in Natick, that created a priority CIP plan. See Table *11* Probable Costs - Water Supply Assets for rehabilitation and replacement frequencies.

We then prepared a 55-year CIP for existing asset maintenance/rehabilitation and replacement to maintain existing water supplies and meet system demand. The costs were included in water source Option1a In-Town Water Sources.

Table *11* summarizes the probable costs to rehabilitate and replace (each time), if constructed in 2022, existing water supply assets. Also included is the frequency of rehabilitation and replacement work typical for each asset. Natick's pump stations are

constructed with brick or concrete masonry units with brick exteriors, both are very stable and could provide for a longer life than the conservative 80 years included in the capital plan.

Table 11 Probable Costs - Water Supply Assets

Asset	Frequency of Rehabilitation (Years)	Frequency of Replacement (Years)	Probable Rehabilitation Cost (M$'s)	Probable Replacement Cost (M$'s)
Springvale #1&2 PS	20	80	$0.30	$1.16
Springvale #1&2 Wells	7	50	$0.05	$0.66
Springvale #3 PS	20	80	$0.30	$1.16
Springvale #3 Well	7	50	$0.025	$0.33
Springvale #4 PS	20	80	$0.30	$1.16
Springvale #4 Well	7	50	$0.025	$0.33
Springvale #4A PS	20	80	$0.30	$1.16
Springvale #4A Well	7	50	$0.025	$0.33
Evergreen #1 PS	20	80	$0.30	$1.16
Evergreen #1 Well	7	50	$0.025	$0.33
Evergreen #2 PS	20	80	$0.30	$1.16
Evergreen #3 Well	7	50	$0.025	$0.33
Evergreen #3A Well	7	50	0.025	0.33
Elm Bank Vault	20	80	$0.25	$0.80
Elm Bank 2&4 Wells	7	50	$0.06	$0.66
Pine Oaks #1 PS	20	80	$0.30	$1.16
Pine Oaks #1 Well	7	50	$0.025	$0.33
Morse Pond Well	7	50	$0.100	$0.90

To prepare the 55-year CIP for water pump station assets, we assigned rehabilitation and replacement frequency for the assets based on present condition and type of assets as summarized in Table *11*. See Table *12* for a summary of the water pump station asset and expected rehabilitation and replacement dates.

Rehabilitation frequency for pump station was set at 20 years and replacement was set at 80 years. To provide a solid comparison base with other options considered in this report, we utilized a conservative replacement frequency for Natick's existing water pump stations.

Table 12 Water Pump Station Rehab & Replacement Schedule

Location	Pump Station Asset Schedule				
	Age as of 2022	Replace Year	Rehabilitate Year	Year	Year
SPRINGVALE					
Springvale #1&#2	120	2033	2053	2073	
Springvale #3	76	2032	2052	2072	
Springvale #4	67	2035	2055	2075	
Springvale #4A	3	2099	2042	2062	
EVERGREEN					
Evergreen #1	50	2052	2023	2043	2063
Evergreen #2	48	2054	2023	2043	2063
PINE OAKS					
Pine Oaks	64	2038	2058	2078	
ELM BANK					
Elm Bank #4 Vaults	27	2075	2042	2062	

To prepare the 55-year CIP for water supply wells, we assigned rehabilitation and replacement frequency for the assets based on present condition and type of assets. See Table *13* for a summary of the water supply well assets and expected rehabilitation and replacement dates.

Rehabilitation frequency for water supply wells was set at 7 years and replacement was set at 50 years. Some wells, such as Springvale #2, require rehabilitation every 3-4 years due to iron and manganese plugging in the pump, screen and surrounding formations.

Table 13 Water Supply Wells Rehab & Replace Frequency

Location	Well Asset Schedule									
	Age as of	Replace	Rehabilitate							
	2022	Year	Year	Year	Year	Year	Year	Year	Year	Year
Springvale #1	9	2063	2029	2036	2043	2050	2057	2064	2071	2078
Springvale #2	17	2055	2027	2034	2041	2048	2055	2062	2069	2076
Springvale #3	10	2062	2029	2036	2043	2050	2057	2064	2071	2078
Springvale #4	67	2028	2024	2035	2042	2049	2056	2063	2070	2077
Springvale #4A	3	2069	2029	2036	2043	2050	2057	2064	2071	2078
Evergreen #1	50	2025	2032	2039	2046	2053	2060	2067	2074	
Evergreen #3	22	2050	2025	2032	2039	2046	2053	2060	2067	2074
Evergreen #3A	0	2071	2029	2036	2043	2050	2057	2064	2071	2078
Pine Oaks #1	64	2025	2032	2039	2046	2053	2060	2067	2074	
Elm Bank #2	27	2045	2023	2030	2037	2044	2051	2058	2065	2072
Elm Bank #4	27	2045	2023	2030	2037	2044	2051	2058	2065	2072

3.3 WATER TREATMENT FACILITIES

Natick maintains two water treatment plants with filtering, Springvale H&T and Springvale Tonka plant that remove contaminants from the Springvale and Evergreen water supplies, The remaining water supplies have water treatment plants that include chemical injection; Elm Bank, Pine Oaks and Morse Pond, which discharge directly into the distribution system.

The Natick Water Treatment Plants are generally in good to very good condition. The original construction dates range from early 1900's buildings (H&T Plant) to new construction in 2022. Water Treatment Plants include the following.

- H&T Iron & Manganese Removal Plant - Constructed 1996
- H&T PFAS Removal plant – Constructed 2022
- Tonka Iron & Manganese Removal Plant – Constructed 2005
- Springvale high Lift Pump Building – Constructed 1996
- Elm Bank Chemical Feed Plant – Constructed 1995
- Pine Oaks Chemical Feed Plant – Constructed 2004
- Morse Pond Plant Chemical Feed Plant (offline for replacement) – Constructed 2003

Natick has had a proactive funding program to renovate and construct new water treatment plants, leaving their present condition in a good to very good status.

We conducted an evaluation of each facility to provide an overview of each facility's present condition that was utilized in preparation of a 55-year Capital Improvement Plan (CIP) for Natick's Water Treatment Plants (WTP). The evaluation included a site visit to each facility to evaluate the structure, chemical feed, instrumentation, and electrical and mechanical equipment.

We prepared a Rubric analysis for WTP to provide a recommended priority list of capital needs to maintain the assets. The result of the analysis, which included rankings for electrical, HVAC, chemical feed, safety among others, indicated Elm Bank was the priority for rehabilitation. Table *14* summarizes the Rubric rating for each WTPs, with Elm Bank listed as the priority, mainly due to the age of the building.

Table 14 WTPs & CFFs Rubric Analysis

Water Treatment Plant Asset	Total	Total W/Out Criticality	Rehabilitation Priority	Rehabilitation Priority W/O Criticality Rating
H&T Fe & Mn Greensand Plant	7.4	7	2	1
H&T GAC PFAS Plant	9.5	9.4	4	4
Tonka Fe & Mn Greensand Plant	8.3	8.1	3	3
Elm Bank Plant	7.3	7.3	1	3

Natick has a proactive approach to rehabilitating their WTP facilities and each has been rehabilitated or replaced within the last 10-15 years. In review of the overall condition of each facility there were no distinct standouts that require rehabilitation or replacement prior to others. Therefore, for this report and related CIP, we assigned standard rehabilitation and replacement schedules to WTPs to create a priority CIP plan.

We prepared 55-year CIPs for the two In-Town Water Sources Options 1a and 1b. Option1a In-Town Water Sources assumes maintaining existing Natick water sources and providing treatment of known regulated contaminants including water sources with PFAS6 above 20 ppt. Option1b In-Town Water Sources with Additional Treatment assumes maintaining existing water sources and constructing advanced water treatment plants to address future regulated contaminants, including PFAS if the regulation is set well below 20 ppt.

We prepared probable frequency for rehabilitating and replacing WTP's based on our experience with various WTP's. We then prepared probable costs for replacement of existing WTP's, construction of a Tonka PFAS removal plant and rehabilitation of WTP's.

Table *15* summarizes the probable cost to rehabilitate, replace and construct water treatment assets (each time), if constructed in 2022, which includes a new Tonka PFAS removal plant, possibly advanced WTP. Also included is the frequency of rehabilitation and replacement work typical for each asset.

Natick's existing WTPs are constructed with brick or concrete masonry units with brick exteriors, both are very stable and could provide for a longer life than the conservative 75 years included in the capital plan.

Table 15 Probable Cost - Water Treatment Assets Option 1a

Asset	Frequency of Rehabilitation (Years)	Frequency of Replacement (Years)	Probable Rehabilitation Cost (M$'s)	Probable Replacement Cost (M$'s)
H&T Iron & Manganese Removal Facility	25	75	$0.8	$8
H&T PFAS Removal Facility	25	75	$1.76	$18
H&T PFAS GAC Media Replacement	2	__	$0	$0.25
Tonka Iron & Manganese Removal	25	75	$1.26	$10
Springvale Highlift Pump Building	25	75	$1.0	$6
H&T Air Tower #4	10	50	$0.15	$0.45
Office/Garage	25	75	$0.15	$2.5
Aboveground Back Wash Tanks (2)	15	50	$0.2	$1.08
Tonka Air Tower #1-3	10	50	$0.50	$1.25
Elm Bank WTP	25	75	$0.7	$6
Tonka PFAS Removal Facility	25	75	$1.76	$18
Tonka PFAS GAC Media Replacement *	5	__	$0	$0.147

*- GAC replacement is for the PFAS removal in backwash water

To prepare the 55-year CIP for WTP assets, we assigned rehabilitation and replacement frequency for the assets based on present condition and type of assets. See Table *16* for a summary of the WTP asset and expected rehabilitation and replacement dates.

Rehabilitation frequency for WTP was set at 25 years and replacement was set at 75 years. To provide a solid comparison base with other options considered in this report, we utilized a conservative replacement frequency for Natick's existing WTPs.

Table 16 WTP Rehabilitation & Replace Schedule Option 1a

	Water Treatment Asset Schedule										
	Age as of	Replacement Schedule				Rehabilitation Schedule					
Asset	2022	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year
SPRINGVALE											
H&T Greensand Plant	27	2070				2036	2061				
Tonka Greensand Plant	17	2080				2043	2068				
Tonka Advanced WTP PFAS removal New		2026	2101			2051	2076				
Air Stripping Towers 1-3	27	2045	2095			2032	2042	2052	2062	2072	
Air Stripping Towers 4	17	2055	2075			2032	2042	2052	2062	2072	
H&T PFAS Building	0	2097				2047	2072				
GAC H&T Replacement	0	2024	2026	2028	Every 2 yrs						
GAC Tonka Replacement	0	2023	2025	2031	Every 6 yrs						
High Lift Building	27	2070				2025	2050	2075			
Backwash Tank #1	17	2055				2024	2039	2054	2069		
Backwash Tank #2	4	2068				2033	2048	2063	2078		
Office/Garage	17	2080				2030	2055				
High Lift Generator	27	2024	2044	2064		2024	2044	2064			
Pump Station Generator	32	2024	2044	2064		2024	2044	2064	2084		
ELM BANK											
Elm Bank Water Treatment Plant	28	2069				2043					

We then looked at an option where future regulated contaminants would require additional treatment, Option 1b In-Town Water Sources W/Additional Treatment. We assigned work under Option 1b with the assumption MassDEP will lower the 20 ppt limit to single digits or even none detect. Therefore, requiring PFAS removal at all Natick sources. We included construction of advanced WTPs at each water source. We included advanced WTP at this time because it is unknown what will be regulated. Environmental Protection Agency and MassDEP are always expanding drinking water testing to determine if there are other contaminants that pose a health risk and should be regulated. This was the case recently with perchlorate and PFAS to name a couple.

Table *17* summarizes the probable cost to rehabilitate, construct new and replace (each time), if constructed in 2022, existing and proposed water treatment assets. Also included is the frequency of rehabilitation and replacement work typical for each asset. Natick's WTPs are constructed with brick or concrete masonry units with brick exterior, both are very stable and could provide for a longer life than the conservative 75 years included in the capital plan.

Table 17 Probable Cost - WTP Additional Treatment Option1b

Asset	Frequency of Rehabilitation (Years)	Frequency of Replacement (Years)	Probable Rehabilitation Cost (M$'s)	Probable Replacement Cost (M$'s)
H&T Advanced WTP	25	75	$1.32	$16
H&T PFAS GAC Media Replacement *	5	__	___	$0.150
Tonka Advanced WTP	25	75	$1.76	$18
Tonka PFAS GAC Media Replacement *	5	__	___	$0.150
Tonka Greensand Plant (Existing) **	25	75	1.263	$10.0
Springvale Highlift Pump Building	25	75	$1	$6
H&T Air Tower #4	10	50	$0.055	$0.50
H&T Air Tower #1-3	10	50	$0.055	$0.80
Elm Bank Advanced WTP	25	75	$1.76	$18
Elm Bank PFAS GAC Media Replacement	5	__	___	$0.150
Pine Oaks Advanced WTP	25	75	$0.5	$5
Pine Oaks PFAS GAC Media Replacement	5	__	___	$0.150

*-GAC for Advanced WTP backwash water treatment

**-Tonka greensand plant maintained due to very high manganese levels compared to H&T water sources

To prepare the 55-year CIP for WTP plant assets, we assigned rehabilitation and replacement frequency for the assets based on present condition and type of assets. See Table *18* for a summary of the WTP asset and expected rehabilitation and replacement dates. Rehabilitation frequency for WTP was set at 25 years and replacement was set at 75 years. To provide a solid comparison base with other options considered in this report we set a conservative replacement frequency for Natick's existing water treatment plants.

Table 18 WTP W/Additional Treatment Rehab & Replace Schedule Option 1b

	ASSET SCHEDULE										
	Age as of	Replacement Schedule				Rehabilitation Schedule					
Asset	2022	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year
SPRINGVALE											
H&T Greensand Plant	27										
New H&T Advanced WTP	0	2029				2054	2079				
Tonka Greensand Plant	17	2080				2043	2068				
New Tonka Advanced WTP	0	2024	2099			2049	2074				
Air Stripping Towers 1-3	27	2045	2095			2022	2032	2042	2052	2062	2072
Air Stripping Towers 4	17	2055	2075			2022	2032	2042	2052	2062	2072
GAC Elm Bank Replacement	0	2032	2037	2042	Every 5 yrs						
GAC H&T Replacement	0	2023	2025	2027	Every 7 yrs						
GAC Tonka Replacement	0	2023	2029	2034	Every 5 yrs						
High Lift Building	27	2070				2025	2050	2075			
Backwash Tank #1	17	2055	2105			2024	2039	2054	2069		
Backwash Tank #2	4	2068				2033	2048	2063	2078		
Office/Garage	17	2080				2030	2055	2080			
High Lift Generator	27	2024	2044	2064		2024	2044	2064	2084		
Pump Station Generator	32	2024	2044	2064		2024	2044	2064	2084		
ELM BANK											
Elm Bank WTP	28										
New Elm Bank PFAS, Fe&MN Advance WTP	0	2027				2052	2077				
GAC Elm Bank Replacement	0	2032	2037	2042	Every 5 yrs						
NEW PINE OAKS											
PFAS & Other Advanced WTP	0	2027				2052	2077				
GAC Pine Oaks Replacement	0	2027	2032	2037	2042						

3.4 WATER STORAGE FACILITIES – ALL OPTIONS

The Natick water distribution system includes two water storage tanks designed to furnish water to customers and deliver water for fire protection in addition to the water supply wells. The tanks provide continuous water pressure, hydraulic grade, to the system as water supplies are turned on and off throughout the day.

The Broad Hill and Town forest tank capacities are 4 MG and 5 MG respectively and were constructed in the1966 and 1965 respectively. The tank floor to overflow for Town Forest tank is 25 feet and Broad Hill is 30 feet. The safe approximate operating range for both tanks is approximately 5-7 feet, below 7 feet low water pressure in the system might occur. Therefore, the available capacity for Town Forest and Broad Hill is 1.167 mg and 0.933 mg respectively. When considering the capacity of water storage tanks, fire protection is a main factor. Natick's tanks have been able to maintain water pressure in the system under all scenarios to date, including several major firefighting incidents.

The Insurance Services Office, Inc. (ISO) typically analyzes hydrant testing in communities to rate the communities structural fire suppression delivery system. ISO has published a maximum fire flow rate of 6,500 gpm for the Route 9 corridor for Natick. We reviewed Natick's available water capacity from pumping and water tanks to determine if they can meet the worst-case scenario, fire incident occurring during a peak day demand. The following was the results.

- Needed fire flow: 6,500 gpm
- Duration of fire flow: 4 hours
- Total needed water for firefighting: 1.56 mg (6,500 gpm x 4 hrs)
- Pumping capacity: 7,600 gpm (without Morse Pond)
- Storage tank capacity: 1.666 mg (5 foot range).
- Peak day demand: 5 mgd (3,500 gpm)
- Resulting capacity for firefighting: 4,100 gpm (7,600 gpm-3,500 gpm)
- Deficit in firefighting capacity: 2,400 gpm (4,100 gpm-6,500 gpm)
- Tank level decrease in 4 hrs at 2,400 gpm: 0.576 mg (0.288 mg per tank)

The 2,400gpm firefighting deficit would be met by the water storage tanks, where the tank levels would drop less than one foot to assist in the firefighting and meeting system demand. Therefore, we have determined that additional storage capacity is not required for the Natick water system.

The two reservoirs were rehabilitated in 2011 with minor interior and exterior repairs and coating installed on the roof. The Town Forest chemical feed and control buildings were installed in 2010. The Broad Hill control building was also installed in 2010. The Broad Hill chemical feed building was installed in the early 1980's and equipment upgrades in 2010.

The Natick Water Storage Assets are generally in good condition. Both water reservoirs include two buildings for chemical feed and instrumentation, which were included in this analysis.

Natick has had a proactive funding program to rehabilitate the reservoirs when required, leaving their present condition in a good status.

We conducted an evaluation of each reservoir and remote buildings to provide an overview of each facility's present condition that was utilized in preparation of a 55-year Capital Improvement Plan (CIP) for Natick's Water Storage Assets. The evaluation included a site visit to each facility to evaluate the structure, chemical feed, instrumentation and electrical and mechanical equipment.

We typically prepare a Rubric analysis for water storage tanks to provide a recommend priority list of capital needs to maintain the assets. Natick has a proactive approach to rehabilitating/replacement of their water storage tanks and related control and chemical feed buildings. The control and chemical feed buildings have been rehabilitated or replaced within the last 10-15 years and are in very good condition except for the Broad Hill chemical feed building. Therefore, for this report and related CIP, we assigned standard rehabilitation and replacement schedules to water storage tanks and related chemical and control buildings to create a priority CIP plan.

Table 19 summarizes the probable costs to rehabilitate, construct new and replace (each time), if constructed in 2022, water storage assets. Also included is the frequency of rehabilitation and replacement work typical for each asset. The water tanks are concrete constructed and if maintained properly may be able to continue their useful life beyond 80 years, however as a conservative approach we held the replacement at 80 years. The control and chemical buildings are also constructed of concrete and could provide additional life beyond 50 years if properly maintained.

Table 19 Probable Costs - Water Storage Assets

Asset	Frequency of Rehabilitation (Years)	Frequency of Replacement (Years)	Probable Rehabilitation Cost	Probable Replacement Cost
Broad Hill Reservoir	25	80	$0.477 M	$4.5 M
Broad Hill Chemical Building	25	50	$0.075 M	$0.214 M
Broad Hill Instrumentation Building	25	50	$0.075 M	$0.214 M
Town Forest Reservoir	25	80	$0.477 M	$5.0 M
Town Forest Chemical Building	25	50	$0.075 M	$0.214 M
Town Forest Instrumentation Building	25	50	$0.075 M	$0.214 M

To prepare the 55-year CIP for water storage tank assets, we assigned rehabilitation and replacement frequency for the assets based on present condition and type of assets. See Table *20* for a summary of the water storage tank assets and expected rehabilitation and replacement dates.

Rehabilitation frequency for water storage tanks was set at 25 years and includes concrete repairs, hatch replacements and interior coating repairs. Water storage tank replacement was set at 80 years, based on industry standards for concrete tanks.

Rehabilitation frequency for water storage tank outbuildings was set at 25 years and includes interior equipment replacement, coatings rehabilitation and fence replacement. Outbuilding replacement was set at 50 years, based on industry standards for precast concrete buildings. Table *20* summarizes the replacement schedule for the water storage tanks and associated buildings.

Table 20 Water Storage Tank Replacement Schedule

Asset	ASSET SCHEDULE				
	Age as of	Replacement Schedule		Rehabilitation Schedule	
	2022	Year	Year	Year	Year
Town Forest Reservoir	57	2045	2125	2036	2070
Town Forest Chemical Feed Bld'g	14	2058	2108	2033	2083
Town Forest Control Building	14	2058	2108	2033	2083
Town Forest Mixer	3	2025	6 years		
Broad Hill Reservoir	56	2046	2126	2036	2071
Broad Hill Chemical Feed Building	42	2030	2080	2055	
Broad Hill Control Building	14	2058	2108	2033	2083
Broad Hill Mixer	5	2023	6 years		

The water storage reservoirs would be required for any option selected for the Water Source Strategic Plan. Natick's water storage reservoirs are required to supply water for general use and fire protection when pump stations are in their off cycle. An off cycle occurs when the storage tanks reach full water height, which shuts off the supply and allows the tanks to drain to meet system demand. Once the tanks reach the lower level the pump is turned back on to meet system demand and fill the tanks.

This would be the same requirement should Natick select a full MWRA connection where the booster station provides water to meet system demand and fill the storage tanks. The tanks would provide the added water quantity to meet fire protection requirements and maintain hydraulic pressure in the water distribution system when the booster station is in the off cycle.

3.5 WATER DISTRIBUTION SYSTEM

The Natick water distribution system includes water storage tanks, water mains, water services, hydrants, and gate valves, which are maintained by the Natick Water Department. The Natick water system provides water to all residential, commercial, and industrial buildings in Natick, except for approximately 22 properties that have private wells for potable water use.

Natick maintains a Geographic Information System (GIS) based water distribution system map that identifies water mains, hydrants, gate valves, and service line locations and most types and sizes. The GIS map has been updated over the years as work on

the utilities has been completed and sizes and type of materials are confirmed. See Appendix B for a copy of the GIS based water distribution system map. According to the Natick GIS database, the water distribution system includes the following:

- Approximately 197.9 miles of water mains
- Approximately 1,426 hydrants
- Approximately 4,072 gate valves
- 11,013 metered service connections

Haley Ward, Inc. maintains a computer based hydraulic model of the distribution system piping, storage, and water production assets. The hydraulic model is a major tool in simulating existing conditions of the Natick water system for analysis of fire flow capacities, identification of low-pressure areas, storage capacities, among others. The model also provides the ability to analyze potential system modifications including water pipe replacement/upsizing, system expansions, and storage needs.

The model was created in 2011 based on town GIS files and record drawings and calibrated utilizing hydrant flow tests. During the preparation of the 2021 Distribution System Asset Management plan, Haley Ward re-calibrated the model with recent field hydrant flow test results.

The distribution system infrastructure is in relatively good condition with a relatively limited number of water main leaks and break occurrences. Natick contracts with a leak detection company to perform leak detection annually on the entire water distribution list, typically half the system in both the spring and fall. The DPW is responsible for all aspects of the distribution system piping operation and maintenance, including but not limited to leak repairs, piping replacement, service pipe replacement, water distribution system flushing annually, use meter maintenance and replacement, inspecting for hazardous cross-connections, and testing backflow prevention devices.

Distribution capital projects in recent history have included rehabilitation of major transmission mains, almost exclusively cleaning and lining structurally sound unlined cast iron pipe. While this strategy addressed the major transmission main conditions, the Town's attention should be directed toward addressing poor condition pipes, undersized pipes, and low fire flow capacity areas. The town has made the progressive planning decision to create a Water Distribution System Asset Management Plan to move away from reactive to proactive maintenance. The plan was completed in 2019.

4.0 IN-TOWN WATER SUPPLY OPTION 1A & 1B

4.1 EXISTING TREATMENT

Natick presently maintains water treatment plants and chemical feed facilities to meet water quality standards and water regulations, including but not limited to the following.

- Volatile organic compound removal
- Manganese removal
- Disinfection
- Corrosion control
- Fluoridation
- PFAS removal

Natick's existing treatment and chemical feed systems meet all present water quality standards and water regulations, except for the PFAS regulation. Tonka water supplies have a temporary PFAS removal system, while a permanent solution is developed.

4.2 IN-TOWN WATER TREATMENT OPTION 1A

In-Town Water Supply Option 1a, does not include advanced water treatment plants that would address future regulated water contaminants except for Tonka water supplies. The Tonka treatment plant is proposed with possible membrane technology that has a wider range of treatment capabilities that might address future regulated contaminants. The reason for carrying advance treatment for Tonka that existing contaminants and water quality may not allow effective PFAS removal with granular activated carbon (GAC) or resins.

Tonka granular activated carbon (GAC) PFAS removal demonstration study is ongoing, with the results of the demonstration study determining if GAC can effectively and efficiently remove PFAS. If GAC is proven not to be efficient and effective, then an advanced water treatment plant will be required. For this report it is assumed that the GAC will not be efficient enough and that an advanced water treatment plant will be required.

EPA and MassDEP are routinely evaluating contaminants to determine if they are a health risk and if a regulation is required. For that reason, this option is meant to provide a base line for the Water Source Strategic Plan discussion. Membrane technology is not typically considered for treatment of basic contaminants such as iron and manganese or even PFAS in groundwater, due to its elevated capital costs. Additionally, the treatment operation is a more complicated process compared to what is presently utilized in Natick.

Option 1a is a reactive process, where Natick would address new regulations as they are proposed by EPA and MassDEP. This is how the H&T PFAS treatment plant was realized. It is very difficult to determine what advanced treatment could be installed today or planned for in the future without knowing what the contaminant might be or if there will be additional contaminants that would not be removed by present treatment. Therefore, Option 1a includes capital cost for rehabilitation and replacement of existing facilities and installation of a PFAS removal plant for Tonka water supplies. Morse Pond was original a candidate for an advanced water supply, however due to water quality concerns for the site and other related contamination, it was removed from the asset plan at this time.

Tonka PFAS removal plant is planned as an advanced water treatment plant with possible membrane technology, due to the possible inefficiency of the granular activated carbon (GAC) treatment.

Morse Pond was considered for advanced water treatment plant with possible membrane technology due to PFAS and other contaminants. We discussed the outlook for Morse Pond with Natick Department of Public Works Director and Water and Sewer Supervisor, and the consensus was to remove Morse Pond water source from all options in the asset management plan, due to the known contaminants, including fuel, in the ground water and adjacent surface water.

Elm Bank is presently well under the MassDEP PFAS6 MCL of 20-ppt, ranging from 5.23 to 12.54. Therefore, we did not include a PFAS removal plant in this option.

We presented the CIPs for each asset and related schedule for Option1a in Section 3.0.

4.3 IN-TOWN WATER TREATMENT OPTION 1B

In-Town Water Supply Option 1b, includes advanced water treatment plants that would address future regulated water contaminants. Advanced water treatment plants may include membrane technology that has a wide range of treatment capabilities that might address future regulated contaminants.

As discussed in Option 1a, EPA and MassDEP are routinely evaluating contaminants to determine if they are a health risk and if a regulation is required. For that reason, this option is meant to provide a base line for the Water Source Strategic Plan discussion.

Option 1b is also a reactive process, where Natick would address new regulations as they are proposed by EPA and MassDEP. It is very difficult to determine what advanced treatment could be installed today or planned for in the future without knowing what the contaminant might be or if there will be additional contaminants that would not be removed by present treatment. We assumed iron and manganese removal plants would remain at Tonka and H&T, when an advanced water treatment plant is constructed. Iron and manganese may be an issue with advanced water treatment plants. Therefore, it is a conservative approach to maintain the plants when the advanced WTPs are constructed.

Tonka PFAS removal plant is planned as an advanced water treatment plant possibly membrane technology, due to the known inefficiency of the granular activated carbon (GAC) treatment. A pilot would be required for PFAS removal treatment that can determine the most effective means of PFAS and other contaminant removal.

Elm Bank is presently well under the MassDEP PFAS6 MCL of 20-ppt, ranging from 5.23 to 12.54. The Environmental Protection Agency (EPA) has signaled that they will promulgate a nationwide PFAS regulation by the end of 2023, that might be single digits or possibly "non-detect". Presently EPA has a health advisory for PFAS6 of 70 ppt and MassDEP enforces a Mass PFAS regulation of 20 ppt. MassDEP will review their PFAS6 regulation in 2023 and there is a strong chance that they will lower the MCL if EPA sets their level lower than 20 ppt.

Therefore, we included a PFAS removal plant for Elm Bank in this option. The manganese levels have been increasing over the years, which would be an issue for a GAC plant at that location. We took a conservative approach for Elm Bank and planned for the construction of an iron and manganese removal plant in addition to an advanced water treatment plant to remove future contaminants in addition to PFAS6.

4.4 CAPITAL COSTS OPTION 1 IN-TOWN SOURCES

In-Town Water Supplies Option 1a and 1b maintain Natick's present water supplies to meet present and future water demands. It requires capital outlays to maintain facilities, construct new treatment facilities and replace facilities when required. We prepared a 55-year probable cost plan for Option 1a and 1b that includes supply, storage, pumping and treatment upgrades and replacement to provide a basis for comparison to other water supply options. The difference between the 2 options is the addition of advanced water treatment plants for all water sources to address future regulated contaminants. Rehabilitation and replacement costs and schedules were presented in Section 3.0 of this report.

When preparing probable costs for rehabilitation and replacement of assets, utilizing 2022 as a baseline for industry trends related to costs. Water projects in 2022 have been impacted by supply chain issues and inflationary pressure. We carried today's cost trends in the probable cost estimates as a conservative approach. Capital cost summary is included later in this section.

Projection of costs to future years requires assumptions and constraints to provide reasonable probable cost for the analysis. The following is a summary of the parameters/constraints when projecting capital probable costs.

1. Capital borrowing: 20 years
2. Trigger amount for borrowing: > $250,000
3. Loan rate: 3%
4. Inflation rate for NPV: 2.5% (based on last 10-year average)
5. Projected Debt Service for CIP: Included in capital cost item

4.5 OPERATION AND MAINTENANCE COSTS OPTION 1 IN-TOWN SOURCES

To maintain a water supply, storage and treatment system, there are required operation and maintenance costs in addition to the capital costs for projects. We reviewed Natick's historical water related O&M costs and projected the present O&M costs for a 55-year period. Natick's O&M costs annually over the last 5 years had an average increase of 4.4%, however year over year was not always tending up. Therefore, we utilized 4% in the O&M projections for each option. Additional discussion regarding O&M analysis is included in Section 9 of this report. Table 21 provides a

summary of the historical water related O&M costs for Natick utilized in the options analysis.

Projection of costs to future years requires assumptions and constraints to provide reasonable probable cost for the analysis. The following is a summary of the parameters/constraints when calculating the O&M probable costs.

1. Inflation rate for NPV : 2.5% (based on last 10 year average)
2. O&M costs increase per year: 4%
3. Utility costs increase per year: 2%
4. Removed $500K from Water Debt service from O&M in 2025: Assume Tonka 2005 plant and other capital pay off that time.
5. Water System debt service remained in O&M total: Majority of the historical debt service was for water distribution and that would continue forward.
6. Projected Debt Service for this CIP: Included in capital cost item.

Table 21 Natick O&M Historical Cost

Item	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Total O&M Costs	$5,800,676	$6,312,726	$5,935,753	$ 6,193,048	$6,839,956
% Change Year over Year	——	8.8%	-6.0%	4.3%	10.4%

Option 1a operating costs were increased slightly for the additional PFAS removal plants, Tonka, Pine Oaks, and Elm Bank. The increase represented the additional electrical, gas and chemicals. We did not anticipate additional WTP operator positions would be required for this option. Maintenance costs for rehabilitation and replacement work were included in the CIP costs.

Option 1b operating costs were increased for the additional advanced water treatment plants, Tonka, H&T, Pine Oaks, and Elm Bank. The increase represented the additional electrical, gas and chemicals required for the new plants. We did not anticipate additional WTP operator positions would be required to operate the additional plants under this option, provided the existing operators obtain the required treatment licenses. The additional maintenance work required by the new and existing plants may require 1 or 2 more operators, however the added cost for the additional operators will not measurably change the costs for the option comparison. Probable costs for rehabilitation and replacement projects were included in the capital cost

item. See Table 22 for option 1a O&M projection and Table 23 for Option1b O&M projection into various years over the 55-year CIP.

Table 22 Option 1a In-Town O&M Projection

Year	O&M * (Million dollars)	Utility & Chemicals (Million Dollars)
2027	$7.446	$0.6334
2028	$7.797	$0.713
2029	$8.095	$0.727
2050	$17.892	$1.102
2077	$50.294	$1.880

*- Includes Salaries, Benefits, Reserve Fund, Indirect Expenses, Debt Service

Table 23 Option 1b In-Town W/ Add Treatment O&M Projection

Year	O&M * (Million dollars)	Utility & Chemicals (Million Dollars)
2027	$7.460	$0.648
2028	$7.835	$0.750
2029	$8.160	$0.792
2050	$17.991	$1.200
2077	$50.462	$2.049

*- Includes Salaries, Benefits, Reserve Fund, Indirect Expenses, Debt Service

We are including Figure 6 to show the entire 55-year projection of O&M costs for Options 1a and 1b. The trends are very similar with the difference resulting from the added capital debt and O&M costs for the additional WTPs.

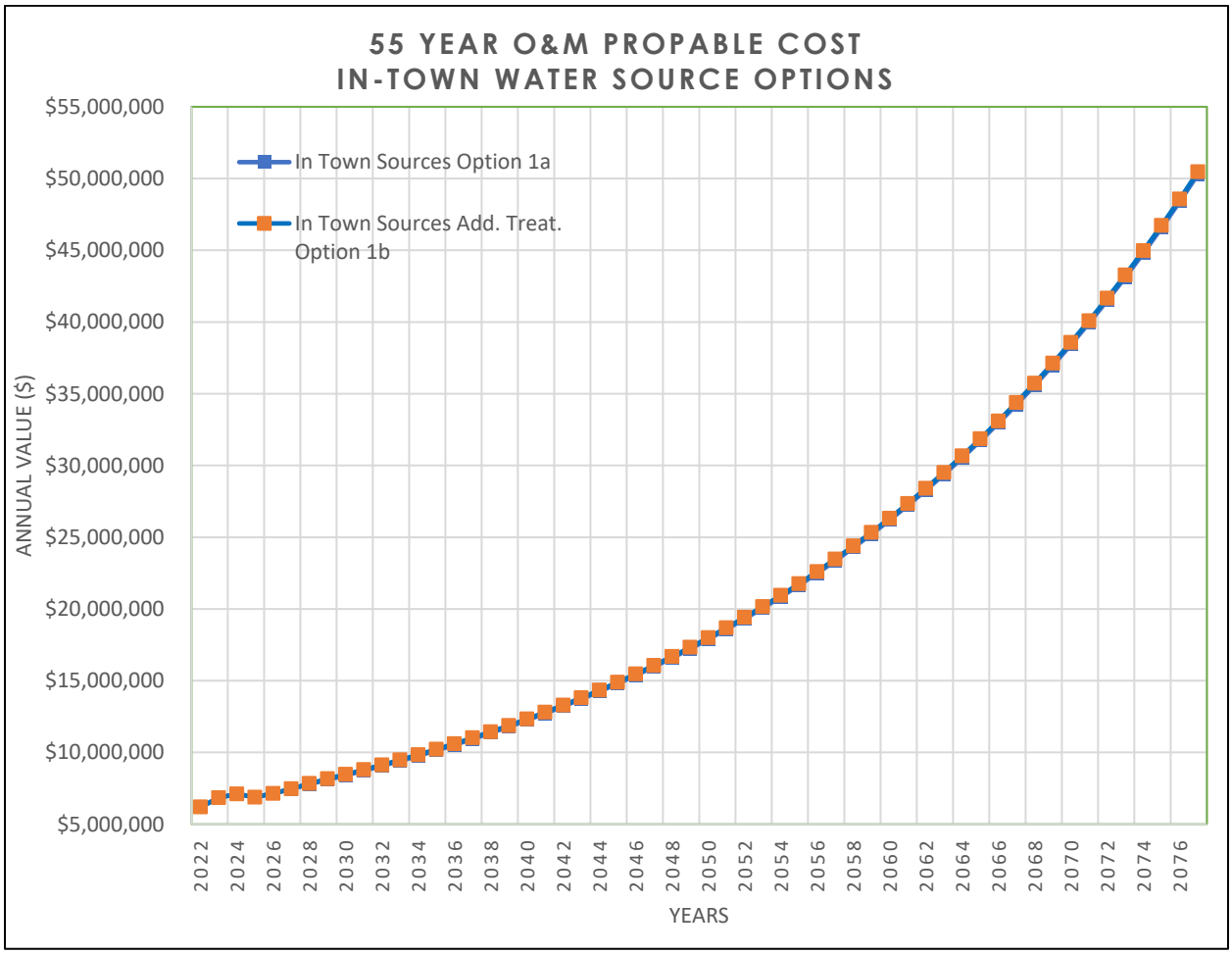

Figure 6 Option1 In-Town Sources O&M Projection

4.6 55- YEAR CAPITAL IMPROVEMENT PLANS

We prepared 55-year Capital improvement Plans (CIP) for the two In-Town Water Source options 1a and 1b. The CIP included the probable cost to construct and maintain the Water Treatment Plants, Water Storage Tanks and Water Supply assets. The 55-year CIP provides data to assist Natick with planning, but also assists Natick with their decision process for preparing a Water Supply and Treatment Strategic plan.

- OPTION 1a. IN-TOWN SOURCE: Maintain all In-Town existing water sources and Water Treatment Plants (WTP).
- OPTION 1b. IN-TOWN SOURCE ADDITIONAL TREATMENT: Maintain all existing In-Town water sources and WTPs and construct advanced water treatment plants to address future regulated contaminants.

The CIP for Option 1a In-Town Sources includes probable costs for operating and maintaining all existing water sources and treatment plants, with expansion of treatment for future regulated PFAS.

We prepared the same CIP for Option 1b, In-Town Water Source with Additional Treatment. Option 1b CIP included cost for committing to maintaining all existing In-Town water sources and treatment plants, with construction of advanced water treatment plants for Springvale H&T, Springvale Tonka, Pine Oaks, and Elm Bank water sources. Advanced water treatment plants may be required to address future regulated water contaminants beyond PFAS and could be a membrane technology plant.

A full breakdown of rehabilitation and replacement cost and schedule for Option 1a and 1b was included in Section 3.0 of this report. For all options considered in this report the water storage tanks must be maintained along with associated costs. A 20-year CIP for Option1a and 1b are included in Appendix A. The 55-year plans reflect the costs and schedules presented in section 3.0 for maintaining existing water supply assets.

We set rehabilitation and replacement schedules for each asset and applied the probable costs over a 55-year life cycle for each option. There are several ways to compare costs for each option, including annual costs, total costs, and net present value. We are providing data for all three comparisons for a full understanding of the related costs.

Projection of costs to future years requires assumptions and constraints to provide reasonable probable cost for the analysis. The following is a summary of the parameters/constraints when calculating the capital and O&M probable costs.

1. Capital borrowing: 20 years
2. Trigger amount for borrowing: > $250,000
3. Loan rate: 3%
4. Inflation rate for NPV : 2.5% (based on last 10 year average)
5. O&M costs increase per year: 4%
6. Utility costs increase per year: 2%
7. Removed $500K from Water Debt service from O&M in 2025: Assume Tonka 2005 plant and other capital pay off that time.
8. Water system debt service remained in O&M total: Majority of the debt service was for water distribution and that would continue forward.
9. Projected Debt Service for CIP: Included in the capital cost item.

Table 24 identifies the Total Cost and Net Present Value (NPV), 2022 to 2077 period, for Water Source Option 1a and 1b. Total Cost column is a simple sum of all O&M and Capital Debt probable cost for the 55-year period. The NPV columns utilizes the estimated annual costs and translates them to a present value for option comparison. Interest rate is the main variable in the NPV calculation that allows the representation of the option cost in today's dollars. The 2 options are close in value even with the additional advanced water treatment plants required under Option 1b.

Table 24 55 Year Net Present Value In-Town Options

WATER SOURCE OPTION	TOTAL COST (MILLION DOLLARS)	55-YEAR LIFE NET PRESENT VALUE (MILLION DOLLARS)		
		CAPITAL	O&M	TOTAL COST
1a. In-Town Water Source: Not Addressing Future	$1,359.3	$79.7	$499.6	$579.3
1b. In-Town Sources: Address Future Contaminants	$1,419.2	$120.9	$502.0	$622.9

See Figure 7 for Option 1a and 1b O&M & capital debt probable costs over the 55-year period, 2022 to 2077. The 55-year projection indicates the two probable cost graphs track each other after Option 1b debt (advanced WTP construction cost) is paid off around 2050, leaving rehabilitation and O&M costs remaining.

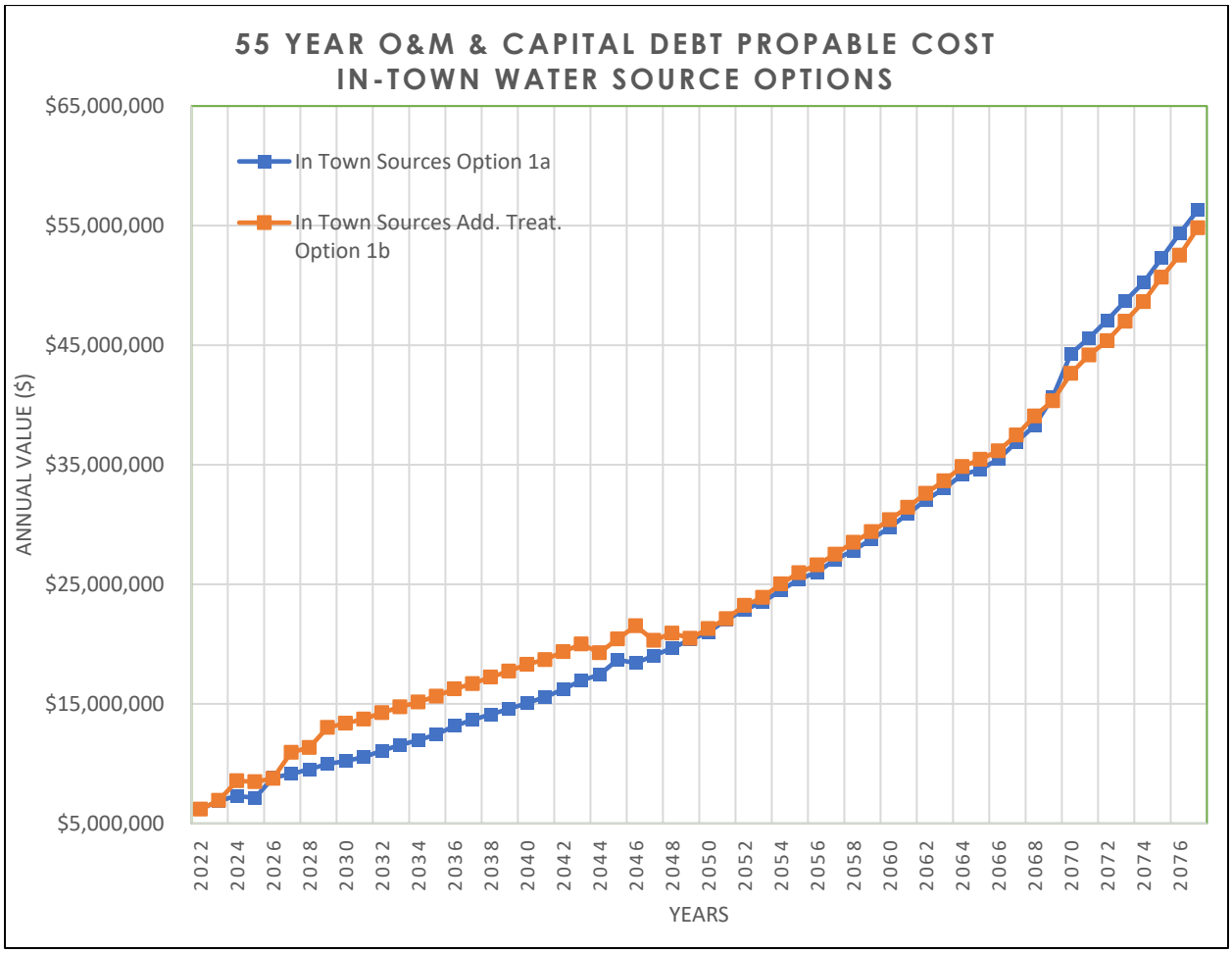

Figure 7 55- Year O&M & CIP Debt In-Town Option 1 & 1b

5.0 NEIGHBORING WATER SYSTEMS

5.1 EMERGENCY INTERCONNECTIONS – NEIGHBORING WATER SYSTEMS

Natick has several emergency water interconnections with neighboring water systems and the MWRA water system, that can provide a limited amount of water during an extreme water supply emergency. Table 25 identifies the location and size for each connection.

Table 25 Emergency Water Connections

Water Systems	Streets	Connection type
Framingham Water System	Speen Street (10" N, 12"F Howe Street (6"N, 6"F), Hartford Street (6"N, 6" F) Kendall Lane (6"N, 6"F)	Speen Street: hydrant to hydrant, Howe Street: Underground piping Hartford: Underground piping Kendall: Underground piping
Weston Water System	Route 30 (8")	Underground connection
Wellesley Water System	Eliot Street (10") Route 9 (6")	Eliot Street: Underground connection
Wayland Water System	North Main Street (8")	Underground connection
MWRA	Commonwealth Road (Route 30) @ Indian Rock Road	12" Diameter piping connection to 12' diameter Aqueduct

Table 25 provides a summary of connections that can be activated under short term emergency conditions, and each would require a pump station to booster the water pressure from the neighboring system to allow water to flow into Natick's system. The emergency connections would provide a fraction of Natick's overall demand, ranging from 200 to 500 gpm, except for the Framingham Speen Street connections. The Speen Street connection may provide additional water flow, possibly 750 to 1,000 gpm, due to the larger sized water mains in each system, however locating a booster pump station would be difficult in the congested Speen Street area. Confirmation of the actual water

quantity would require a flow test in Framingham and engineering review of their water system to determine their available capacity in that pressure zone.

We reviewed each of the connections and prepared Table 26 to summarize the pros and cons for each connection.

Table 26 Water Inter Connections Pros & Cons

Water System	Location	Pros	Cons
Framingham Water System	Speen Street (10" Nat, 12" Fra.)	Could provide the most water quantity for Natick as it connects to the 10" water main in Speen Street	Temp piping if installed would be in high traffic area, same if pump is required. Water quality may be an issue.
Framingham Water System	Howe Street (6"Nat, 6" Fram),	Provides water to West Natick neighborhood	Connects to a 6" water main, reducing the overall capacity available. Water quality may be an issue.
Framingham Water System	Kendall Lane (6"N, 6"F)	Near the 10" water main in HF Brown Way for higher capacity for Natick	Requires long run of temp piping to get to 10" water main. Water quality may be an issue.
Weston Water System	Route 30 (8")	Provide water to north east section of the system	Minimal capacity may be available from Weston's water system.
Wellesley Water System	Eliot Street (10") Route 9 (6")	Could provide large quantity of water since it connects to Natick 10" water main (depends on Wellesley's system).	Connects near Elm Bank, which should still be running thus impacted by system pressures. Water quality may be an issue.
Wayland Water System	North Main Street (8")	Serves North Natick, could be high capacity available, may be similar water quality.	Wayland tested PFAs in their wells, capacity from the water supplies might be an issue.
MWRA	Commonwealth Road (Route 30) @ Indian Rock Road	Large amount of available water	Quantity limited by Natick's 6" water mains Water quality may be an issue

The MWRA RT 30 connection would be limited, possibly around 500 gpm, due to the location of the connection point, extreme northeast section of Natick water system. The Natick water piping is unlined cast iron 6" and 8" pipe in this area and would limit how much water can be pumped into Natick without system improvements. We reviewed this connection under Option 4 In-Town Water Source With MWRA Supplement. The hydraulic model was utilized to estimate the quantity of water that could be drawn from the Rt 30 MWRA connection, utilizing a booster pump. The model indicated that approximately 1,500 gpm could be expected from this location, with infrastructure improvements. This is well below what Natick would need for a permanent connection but could serve as a supplemental source should an In Town source be offline for an extended period. If this connection was considered, the pressure in the Winter Street area would exceed 100 psi and water flow direction would be reversed. The water main replacement in Oak Street, Winter Street and Bradford Road would be recommended.

Looking at the existing neighboring water system connections we can confidently say that none of the connections would be a viable permanent connection to meet all of Natick's demand or a major portion of the demand, without major infrastructure improvements. Therefore, we turned our attention to the MWRA water system and potential direct and indirect connections to the Natick system.

6.0 MWRA DIRECT CONNECTION OPTIONS

6.1 MWRA WATER SYSTEM DESCRIPTION

MWRA water system consists of two reservoirs, Quabbin and Wachusett, treatment facilities, tunnels and aqueducts that carry water from the reservoirs to eastern Massachusetts communities as far as Boston. Figure *8* is a map from the MWRA website that provides a general overview of the MWRA water system. The Hultman and MetroWest Tunnel are the two water supply locations in consideration for Natick.

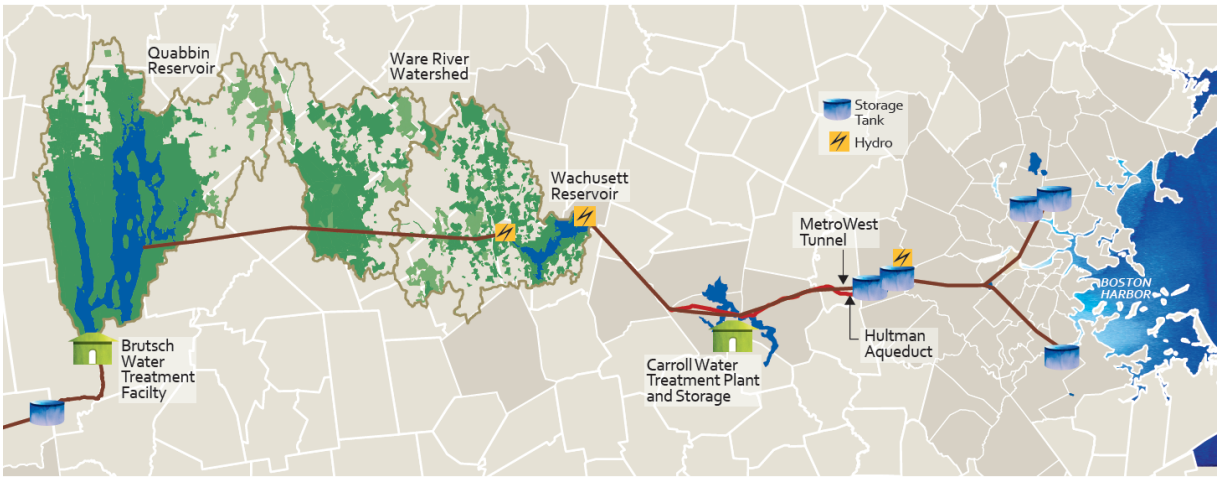

Figure 8 MWRA System Map

Source: MWRA Website

Natick attended several meetings for preliminary discussions with MWRA regarding temporary and permanent connections to the MWRA water system. Unfortunately, MWRA does not have an active aqueduct within Natick town borders, that could meet Natick's water demand. The aqueduct that crosses Route 30, Hultman, is in a location where MWRA strongly recommends not making a permanent connection that requires continuous use. MWRA indicated that the Hultman, from time to time, may be shut down for repairs, leaving no water service at the connection. MWRA did not elaborate on how often or for what duration this could occur.

MWRA recommended Natick connect into the MWRA system at the existing Shaft L near Elm Street in Framingham. MWRA preferred this location for two reasons; there is an existing valved connection, and Shaft L is connected to both MetroWest Tunnel and Hultman Aqueduct that would provide redundancy for a Natick water connection.

The MetroWest tunnel aqueduct was constructed in the early 2000's for the main purpose of providing redundancy to the MWRA system. The redundancy allows MWRA to take 1 of the 2 aqueducts offline for maintenance while still maintaining service to the connected customers.

It is also worth noting that MWRA has an offline aqueduct, Sudbury Aqueduct, that runs through the southern portion of Natick. See Figure 9, taken from Natick's map, for an approximate location. The Town of Wellesley is looking for another MWRA connection for additional capacity and has reached out to Natick about a regional approach that could trigger the activation of the Sudbury Aqueduct. A regional approach might include Natick, Wellesley, Needham, Sherborn and Framingham. The Sudbury aqueduct was constructed in 1875, consisting of horseshoe brick lining that is 8.5 feet in diameter and 7.6 feet high. The aqueduct was taken out of service in 1978 and is part of MWRA's emergency backup system. Information regarding the aqueduct indicated that the last time the aqueduct was activated was in May 2010 during a main break. The Sudbury Aqueduct pulled water from Framingham Reservoir No.3 in Framingham.

The Sudbury Aqueduct would be a more reasonable connection for Natick, with its proximity inside Natick, however that connection would afford Natick no redundancy in the MWRA water system. Additionally, the water source, Framingham Reservoir No.3 is not approved as a water source. Therefore, it would be a major capital expense for MWRA to extend the aqueduct in Framingham to make a connection from the Sudbury Aqueduct to their other active aqueduct. We recommend consideration for this connection only if Natick made a second connection to a separate MWRA direct connection such as at Shaft L in Framingham to provide redundancy, unless it was considered in a supplemental source option.

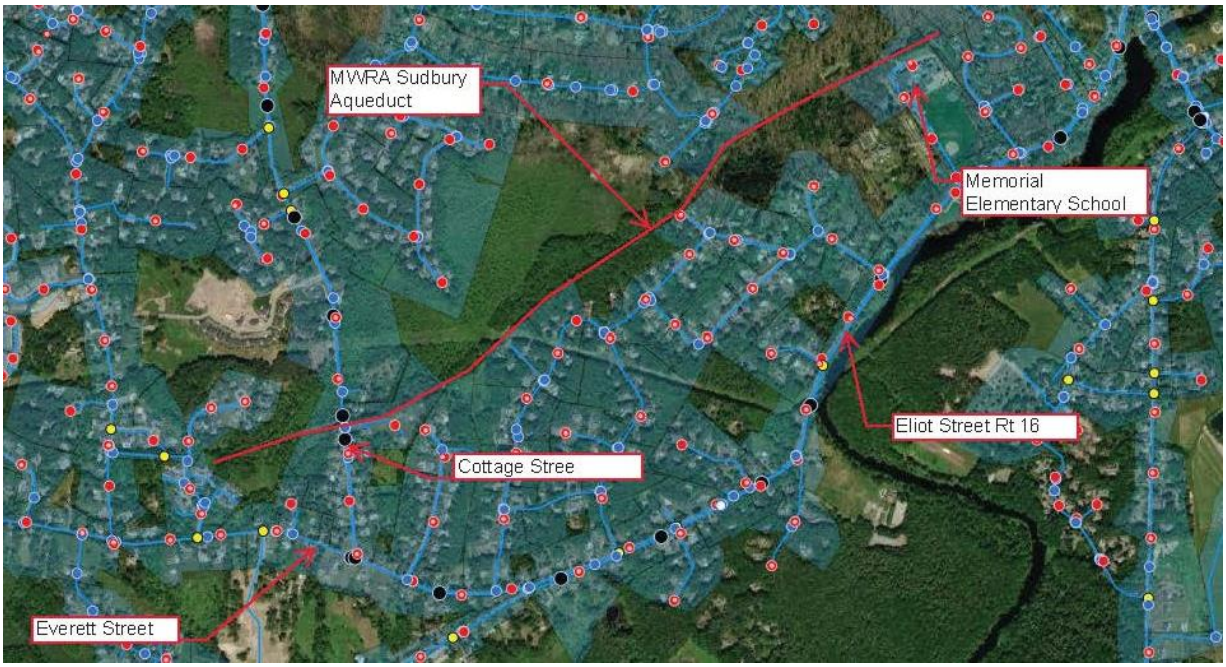

Figure 9 Sudbury Aqueduct *Source: Natick GIS data*

6.2 MWRA WATER SYSTEM DIRECT CONNECTION OPTIONS

We reviewed several options for MWRA water source, including a full MWRA water source (abandon In-Town water sources) to a Hybrid option (In-Town sources and MWRA connection) and a Combination option (MWRA direct plus neighboring community indirect connection).

OPTION 2. OUTSIDE SOURCE: Connect to an outside water source, such as the Massachusetts Water Resources Authority (MWRA) water system and abandon In-Town water supplies and water treatment assets. Target 6.0 mgd maximum day from outside source, approximately 3.0 mgd from each connection.

2a. There are multiple Outside Source options, however most of the neighboring water systems are MWRA members. Therefore, we considered direct connection to the WWRA source, Natick would own and operate the infrastructure. In this option there will be 2 direct connections to MWRA, Framingham Shaft L and Weston Shaft N. The Shaft L connection would be a low-pressure connection with Shaft N requiring a water booster station and Shaft L as a low-pressure connection feeding MWRA water to the existing Springvale clear well. The existing high lift pumps will discharge MWRA water into the Natick distribution system. A 3rd direct connection was analyzed, Sudbury Aqueduct, which is in Natick. This connection has a low feasibility,

due to the condition of the aqueduct and required aqueduct extension work by MWRA to connect to the MWRA's existing active tunnel and aqueducts.

2b. We also looked at a combination scenario where Natick constructs one direct connection and utilizes an indirect connection where a neighboring community transports (wheels) MWRA water to Natick.

OPTION 3. HYBRID SOURCES: Maintain specific existing in-town water supply assets and water treatment assets and connect to the MWRA water system, to provide the balance of required water supply. Target 4.0 mgd with in-town sources and 2.0 mgd from outside source.

3a. This option maintains the Springvale water sources, Springvale #1,2, 3 & 4 and Evergreen water sources #1, 3 & 3A. The H&T and Tonka WTPs that treat the water sources would be upgraded with advanced WTPs for future regulated contaminants. The MWRA direct connection would be Shaft L with a water booster station that discharges water to the 12" water main in Route 27 at the Pine Street intersection. Additionally, a 2nd MWRA connection would be made at the Rt 30 location with a booster station that could produce up to 1,500 gpm.

3b. We also considered an option where the town maintains the Elm Bank water sources, #2 & 4 and connects to MWRA at shaft L. The Elm Bank WTP that treats the Elm Bank water sources would be upgraded with advanced WTP for future regulated contaminants. Through meeting with the Town, this option was eliminated due to the water management act permit standard restraints that prohibit elm Bank water use during low flow conditions in the Charles River. Additional, obtaining additional Division of Conservation and Recreation land for the construction of new WTP could be difficult.

OPTION 4. IN-TOWN WITH MWRA SUPPLEMENT: Maintain specific existing in-town water supply assets and water treatment assets and connect to the MWRA water system, to supplement water supply when required. Target 4.0 mgd with In-Town sources and up to 2.0 mgd from outside source.

4a. This option maintains the Springvale water sources, Springvale #1,2, 3 & 4 and Evergreen water sources #1, 3 & 3A. The H&T and Tonka WTPs that treat the water sources would be upgraded with advanced WTPs for future regulated contaminants. Pine Oaks and Elm Bank water sources will be maintained with advanced water treatment plants constructed. The MWRA direct connection would be at Rt 30 on the Hultman aqueduct, with a water booster station that discharges water to the 12" water main in Pine Street at the Oak Street intersection. The Rt 30 MWRA connection would be considered a supplemental source, only utilized when

intown sources may not be available. The Rt 30 connection could produce up to 1,500 gpm with some water main replacement. The Hultman Aqueduct does not have a redundant pipe, as Shaft L. Therefore, if the Hultman is down for repairs, the RT 30 connection would not be available.

There are variations of option #2 & 3, that impact the costs, such as teaming with Wayland and/or Wellesley to share the infrastructure cost of a MWRA connection that will serve both communities.

Additionally for a hybrid option, shaft N could be substituted for Shaft L, with a small decrease in capital costs for a reduced transmission main.

Table 27 provides a description of each MWRA option analyzed under this report and major details in each option.

Table 27 MWRA Connection Option

Option No.	Option Description
2a	Full MWRA Water Source MWRA Direct Connections Shaft L Framingham MWRA Direct Connection Shaft N Weston
2b	Full MWRA Water Source MWRA Direct Connections Shaft L Framingham MWRA Direct Connection Sudbury Aqueduct Natick
2c	Full MWRA Water Source MWRA Direct Connections Shaft L Framingham MWRA In-Direct Connection Wellesley
3a	In-Town Springvale Water Sources w/advanced WTPs MWRA Direct Connection shaft L Framingham MWRA connection Rt 30
3b	In-Town Elm Bank Water Sources w/advanced WTP MWRA Direct Connection shaft L Framingham
4a	Maintain all In-Town Wat Sources w/advanced WTPs Except MP MWRA Direct Connection RT 30
4b	Maintain In-Town Wat Sources w/advanced WTPs except EB & MP MWRA Direct Connection RT 30

6.3 MWRA CONNECTION WATER QUALITY CONCERN

We also looked at water compatibility between MWRA and Natick and identified 2 major water quality concerns, water corrosiveness and disinfection byproducts.

Natick's water entering the water system has a ph in the range of high 7's to low 8's to minimize the corrosiveness of the water. MWRA water is treated to a ph above 9 to minimize the corrosiveness of the MWRA water. MWRA Hybrid option, where Natick and MWRA water will mix, carries a water corrosiveness concern when the WMRA water connection is turned off and Natick water fills that area of the distribution system.

If the MWRA interconnection was only opened for a week or a month or two, the Natick corrosion control effectiveness could be hindered when Natick's water reenters the area of the distribution system that WMRA reached. Natick relies on phosphate lining of the plumbing system as its primary corrosion control technique. Phosphate is fed at their WTPs and forms a thin coating on the interior of the pipes in the plumbing system. The coating prevents lead leaching from possible lead containing solder and prevents copper from leaching into the customer's water. Phosphate is injected at the WTP's continuously because the phosphate lining dissolves after a time period if phosphate feed is offline. The time required for the phosphate lining to dissolve is not known for Natick's water system, but it might be after several days. Therefore, if MWRA water is discharging into Natick's water system for weeks or months, without phosphate, the phosphate lining can be assumed to have dissolved in the reaches of the MWRA water. It can be anticipated that several days may be required for the phosphate lining to re-establish in the customer's plumbing system when Natick water reenters the house plumbing system. Until that occurs, there is a chance that lead and copper can leach from the solder and/or copper pipes. The addition of a phosphate feed system at the MWRA connection will keep the lining in place in the plumbing system when MWRA water connection is in use.

High ph and other constituents in WMRA water may cause "water-color" complaints because, more likely in dead-ends or low flow areas of the distribution system. MWRA water pH and overall corrosive indices may lead to dissolving of existing mineral deposits from the interior of the Natick water mains. Discussions with other MetroWest communities, including Wellesley, using partial MWRA source water have noted water quality issues, such as "water color" change in dead-ends and low flow areas. The system operators would need to monitor the timing and careful location of water

quality complaints to allow for source adjustment and targeted hydrant flushing when necessary.

The next concern is water quality due to a change in disinfection chemicals, MWRA water is disinfected with alternate approaches to Natick. Natick sources are treated to a free chlorine residual with a hypochlorite solution. This approach provides an immediate level of active disinfectant appropriate to the groundwater source. MWRA's approach is to feed chloramines to reach farther into their expansive distribution systems. They are also more suitable for application to a surface water source. Surface waters may contain higher levels of organics that would react with hypochlorite to form disinfection byproducts, some of which are carcinogenic. The mixing of the surface water from the MWRA source with the hypochlorite-based disinfectants from the Natick sources should be further evaluated to determine if a change in disinfection by Natick should be realized.

6.4 ADMISSION TO THE MWRA

A water community outside the MWRA's water service area seeking admission to the MWRA water system must follow the procedures in the MWRA Policy # OP.10 as set forth in section 8 of MWRA's Enabling Act (St. 1984, c.372). See Appendix C for a copy of MWRA's Policy# OP.10.

The policy has several steps before the connection can be made, as summarized below.

1. Admission Criteria
    a. Enabling Act Criteria: 6 Criteria; safe yield of MWRA system, no existing or potential water supply has been abandoned within community, water management plan, demand management measures in place, no additional feasible local sources available, water use survey.
    b. Admission of the applicant has received approval from MWRA Advisory Board, the General Court, and the Governor.
    c. The applicant community has accepted the extension of MWRA's water system to the community by majority vote of the town meeting.
2. Other Criteria: Analysis of MWRA water system to strive for no negative impact on the interest of the current MWRA water customers, water quality, hydraulic performance of the MWRA water system. MWRA typically conducts this analysis.
3. Application Process: Application is submitted to the MWRA Executive Director for review, with copies to the MWRA Advisory Board.

a. Findings Required by Statute

b. Additional Requirements

c. MWRA Review of Application

4. Concurrent Reviews: Other regulatory approvals and permits may be required before MWRA grants approval to connect.

    a. Massachusetts Environmental Policy Act (MEPA)

        iii. Review of Environmental impacts of projects, such as water main installation.

    b. Interbasin Transfer Act Water Resources Commission

        iv. Require with transfer of water from one basin to another greater than 1 mgd.

    b. Local water supply source feasibility: MassDEP review of reasons why existing sources can no longer be maintained.

5. Legislation: Legislation is required to extend the MWRA water system to a community not presently listed in section 8 (d) as a MWRA water community.

6. Water Supply Agreement: If MWRA approves the application they will issue a draft water supply agreement, with appropriate terms and conditions of service.

7. Entrance Fees

    a. Waived for a 5-year period (2022-2027) for PFAS related connections.

The MWRA Policy# OP.10 process can take 2-3 years to execute, especially MEPA and Interbasin Transfer Act, with certain items occurring concurrently such as Town Meeting and legislature voting. The MEPA process can require 1-2 years if the project involves environmental sensitive areas or involves installation of pipelines off paved roadways or requires easements. This would be the case for all of the MWRA options except Option 4a and 4b, where the RT 30 MWRA connection will only require a short water main, less than 100 feet and a prefabricated water booster station. Natick could still submit their OP-10 with the full 6 mgd of water withdrawal, but only install the RT 30 connection initially. Then at a later date make the other connection(s) when funding is available.

There is one Enabling Act Criteria that will require special attention during the process that will require MassDEP approval. The criteria requires that no existing or potential water supply source for the community has or will be abandoned with the MWRA connection, unless MassDEP has declared that source unfit for drinking and cannot be economically restored for drinking purposes. We discussed this with MWRA staff, and they indicated the enabling act criteria for not abandoning sources was during the early period for MWRA

where MWRA did not have substantial water reserves for additional customers. At this time MWRA has indicated they have substantial water reserves for new customers and would not hold that enabling criteria against a community requesting permission to join the MWRA water system.

In this report we evaluated MWRA options that include abandonment of Natick's water sources, due to a combined costs and risk-based decision.

7.0 MWRA DIRECT CONNECTION OPTION 2

7.1 MWRA CONNECTION LOCATION SHAFT L & N

MWRA recommended Natick connect into the MWRA system at the existing Shaft L near Elm Street in Framingham or Shaft N in Weston. MWRA preferred these locations for two reasons; there is an existing valved connection, and both are connected to the MetroWest Tunnel and Hultman Aqueduct that would provide redundancy for a Natick water connection.

Shaft L, where MWRA recommends Natick make a water connection, is north of Oxbow Road in Framingham. Wayland is also considering an MWRA connection at this location as indicated in their 2022 Wayland Long Term Water Supply Alternatives Analysis Report. Framingham also operates a water booster station on Elm Street that draws water from Shaft L.

There is vulnerability with having only one MWRA connection point for a full MWRA water scenario. Therefore, the full MWRA Option included 2 direct connection points to the MWRA water system. This would address the possibility of an issue occurring with the transmission main from the MWRA connection or the booster pump station, that could eliminate all water or substantially reduce the available water to Natick. A hybrid or multiple MWRA connections would substantially reduce the risk of Natick not meeting system demand.

Our analysis turned to identifying a second MWRA connection point. The MWRA Shaft L in Framingham can be considered a primary connection, with potential costs sharing with Wayland. Wellesley is connected to a shaft near the Newton town line, which carries a cost to construct a dedicated transmission water main through Wellesley and into Natick. We reached out to MWRA regarding a second viable connection point, and they identified Shaft N in Weston on Wellesley Street. Wellesley is also investigating the possibility of installing a direct connection to MWRA's Shaft N. There might be possible cost sharing for the transmission main or booster station construction. The MWRA hydraulic grade (water pressure) at Shaft L and Shaft N is not adequate to provide water directly into the Natick distribution system. Therefore, water booster stations would be required to increase the MWRA hydraulic grade (pressure) over the typical Natick water pressure.

Natick should resume talks with Wayland during the development of its Water Source Strategic Plan to determine if a partnership is feasible for a combined MWRA connection and possible construction of water transmission mains at the same time.

The analysis under this section is for a direct connection to MWRA, paid in full by Natick. A partnership with Wayland could be in two forms, shared capital cost for installing separate transmission mains in Framingham and Wayland under one construction contract or shared costs for Wayland to construct the required transmission mains and booster station that can serve both Natick's water needs and Wayland water needs. In the latter scenario, Natick would pay Wayland for added O&M costs to operate the booster station and portion of their distribution O&M costs. At this time the Wayland costs are unknown until detailed discussions are held between the two communities.

Wellesley has indicated they were evaluating a new connection to MWRA at Shaft N, located on Weston Road. Wellesley showed interest in potential cost sharing with Natick if there is a viable connection point for Natick. There could be an opportunity to share the cost of the transmission main and or booster station.

7.2 HYDRAULIC GRADES – MWRA SHAFT L & N

Water systems utilize pumps and storage tanks to maintain water pressure in the water pipes and house plumbing. This can be translated into hydraulic grade when considering elevations. Natick's water storage tanks have an overflow elevation of 330 feet, which is the highest hydraulic grade at the tanks. The water pumps in Natick systems must overcome the water level in the tanks to continue pumping water in the system, thus hydraulic grade of the water leaving the pump stations and treatment plants must be slightly higher.

A Shaft L connection coupled with the abandonment of the Springvale water sources would eliminate the requirement of a water booster station. The existing clear well and high lift pumps at the Springvale treatment plant site would be repurposed to receive MWRA water, gravity fed from Shaft L to the clear well. The water would travel through a new transmission main that would run from Shaft L to the existing 20" raw water main in North Main Street at Evergreen Road intersection.

The 20" raw water main presently carries water from the evergreen water supplies to the Springvale clear well.

MWRA provided hydraulic grade readings for August through October 2022 near Shaft L that ranged from 272 to 275 feet (NAVD88). Given that Springvale clear well #1 has a high-water elevation of 145 feet, we analyzed the hydraulics and determine that the

available hydraulic grade (water pressure) is more than sufficient to deliver the targeted 3.0 mgd and as high as the 6 mgd peak flow of water from Shaft L to the existing Springvale clear well. The Springvale high lift pumps are capable of discharging the 6.0 mgd peak flow into the town water system, utilizing both clearwells and related high lift pumps.

Once the MWRA water enters the two clear wells, the existing high lift pumps would be utilized to boost the water pressure and discharge water into the distribution system. The location of water entering Natick's distribution system would not change from the existing where approximately 75% of Natick water is discharged from the Springvale site. This can eliminate concerns with reverse water flow direction, lack of fire protection in areas, lack of adequate water pressure that can be possible with a change in water sources.

The second direct connection to MWRA would include a transmission main installed from Shaft N in Weston to the 12" water main in Pine Street at the Oak Street intersection, a water booster pump station would be required to boost the water pressure above Natick's typical hydraulic grade. Natick's hydraulic grade at the Oak and Pine intersection is approximated at 350 feet. The required boost would be approximately 40 psi for 2,083 gpm (3mgd) and 60 psi for 4,170 gpm (6 mgd) to pump water into the 12" water main in Pine Street. This would allow the booster station to fill the 2 Natick water storage facilities to their overflow elevation.

7.3 INFRASTRUCTURE IMPROVEMENTS OPTION 2A,2B, 2C & 3B - SHAFT L

A MWRA direct connection option requires extensive infrastructure costs to transport the water from the MWRA connection points, Shaft L & Shaft N, through neighboring towns and connect into the appropriate location in the Natick water distribution system. Additionally, all options require a water booster station at the Shaft N connection to increase water pressure above Natick's hydraulic grade. There are several routes to be considered for the installation of a transmission main from Shaft L to the Natick water system. At this time there is not sufficient information available to provide an opinion that a transmission main could be constructed along the selected routes, such as geotechnical, existing utilities, permitting requirements and willingness of the neighboring community to allow the construction activities in their community. We have prepared probable project costs for the options based on available information at this time.

Options 2a, 2b, 2c and 3 include repurposing of the 20" raw water main, Springvale clear wells and high lift pumps for a Shaft L direct connection. Operating this low-pressure direct connection has several benefits, including but not limited to the following.

- Reduced footprint and cost for the proposed connection at Shaft L,
- Utilizing existing high lift pumps to distribute water into the Natick system maintains present flow patterns and water pressure gradients throughout the Natick water system,
- Eliminates the high capital costs to construct a large water booster station at Shaft L,
- Repurposing the 20" raw water main in Natick reduces approximately 4,900 linear feet of new transmission water main construction.

The Springvale water supplies would be abandoned, including removal of the pump stations. The Springvale H&T & Tonka WTP buildings, reuse tanks and four air towers would be removed. The office/garage and high lift building would remain active for the operation and maintenance related duties for the high lift pumps, clear well and sewer pump stations.

We reviewed possible routes for a water transmission main from Shaft L and regardless of scenario, a water transmission main would be installed in Framingham as the Shaft L connection is in Framingham. Wayland had a similar report completed in 2022, titled "Wayland Long Term Water Supply Alternatives Analysis". In that report an analysis was done on various water connections to the MWRA, specifically Shaft L. The Wayland report included several route options for a MWRA water connection that we considered in our analysis in case there was an overlap in construction projects that might benefit both communities through an economy of scale.

Our analysis revealed 3 potential routes for a transmission main from Shaft L.

1. Framingham – Wayland Route
2. Framingham Route
3. MWRA Easement – Wayland Route

FRAMINGHAM-WAYLAND ROUTE: This route passes through Framingham and Wayland to North Main Street and onto the Springvale clear well on Route 9, see Figure *10* for a route map. This route was also analyzed in the Wayland report and presented in their Figure 5. This route includes work in several major roadways, crossing under the Massachusetts Turnpike and under the Charles River, all which will include extensive permitting. If Wayland is considering this route, there could be economy of scale savings, if two transmission mains were installed under one contract. This route would

include installation of approximately 19,900 linear feet of 20" diameter water transmission main. The construction would occur in Framingham (Elm Street, Danforth Street, Old Connecticut Path (Rt 126)) and in Wayland (W. Plain Street and Main Street (Rt 27) and in Natick (Rt 27 to Evergreen Road Intersection).

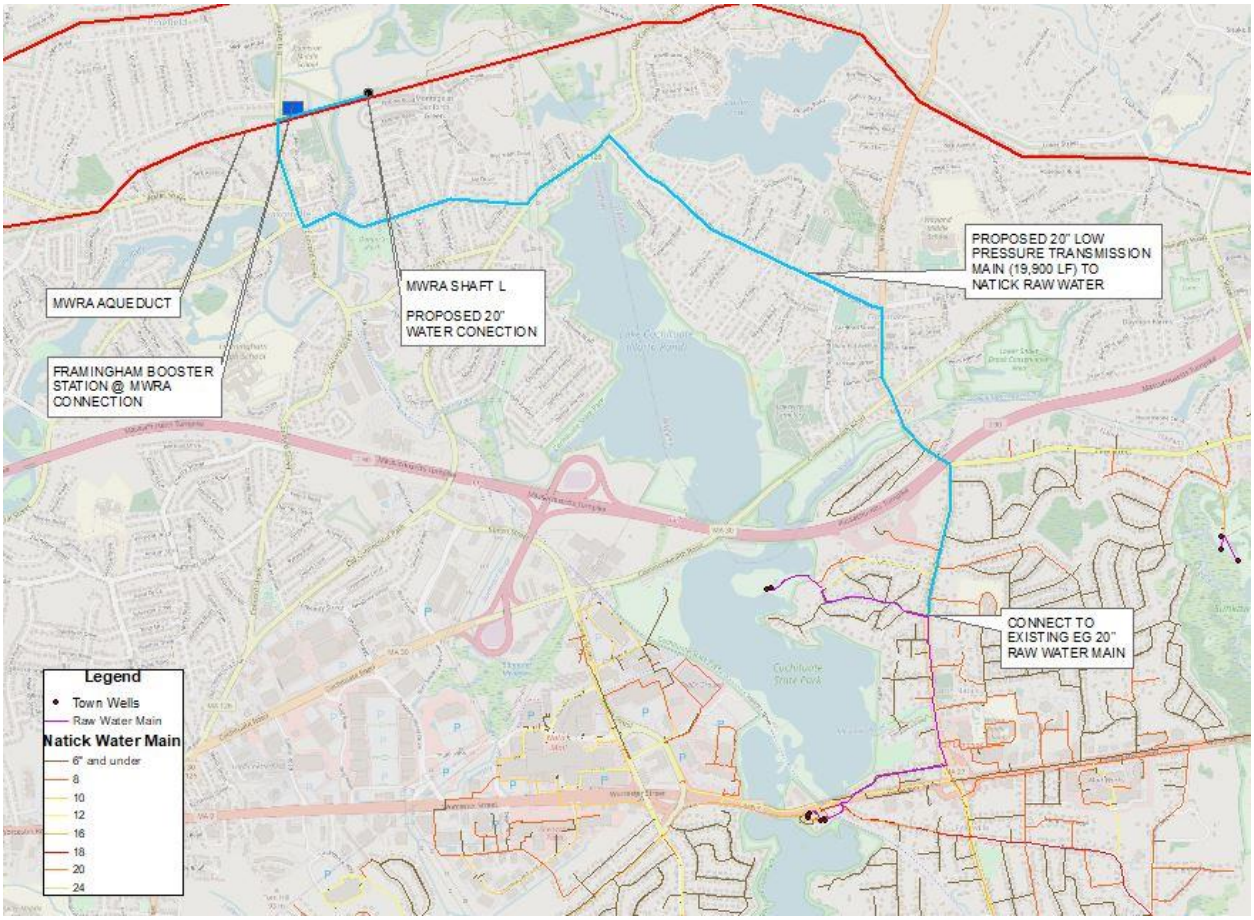

Figure 10 MWRA Shaft L Framingham-Wayland Route

FRAMINGHAM ROUTE: This route passes only through Framingham onto the Springvale clear well via Route 9, see Figure 11 for a route map. This route would include work in several major roadways, including crossing under the Massachusetts Turnpike, the Route 9 and crossing under the Charles River, which may prove to be "non-constructible" due to permitting roadblocks.

This route was analyzed in the Wayland report and presented in report Figure 5. This route includes several major roadway routes, crossing under the Massachusetts Turnpike and under the Charles River, all which will include extensive permitting. If Wayland is

considering this route, there could be economy of scale savings, if two transmission mains were installed under one contract. This route would include installation of approximately 18,650 linear feet of 20" diameter water transmission mains. Construction would occur in Framingham (Elm Street, Concord (Elm) Street, Hamilton Street, Old Connecticut Path (Rt 126), Speen Street) and in Natick (Speen Street and Roue 9). The transmission main would continue in Natick, in Route 9, until it reaches the existing Springvale Water Treatment Plant site.

The Framingham route was not included in the cost analysis for Option 2, due to the high level of possible "road-blocks" to the constructability of the project. This includes crossing under the Charles River, crossing under the Mass Turnpike, crossing under route 9 and installing a 20" water main along route 9.

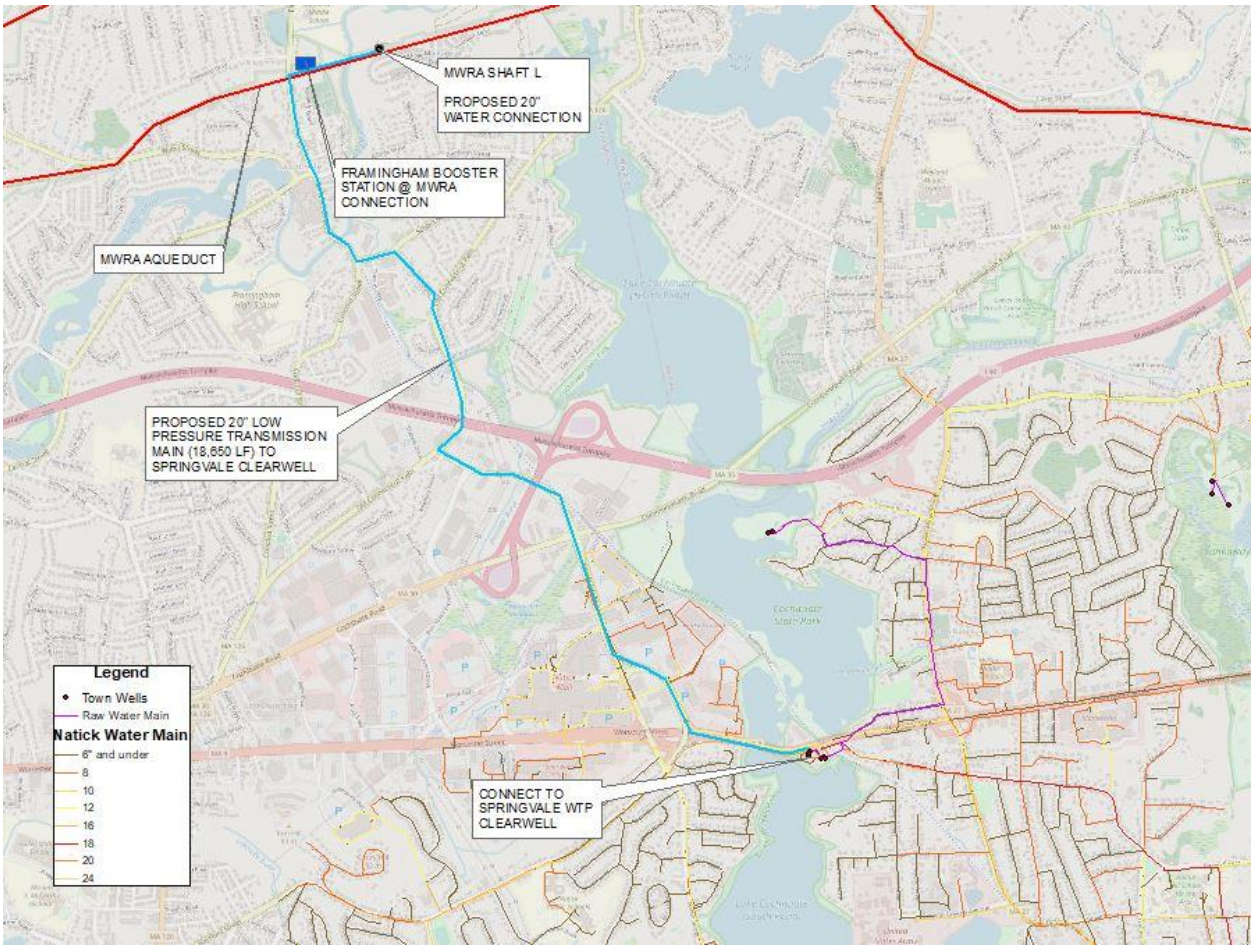

Figure 11 MWRA Shaft L Framingham Route

MWRA EASEMENT-WAYLAND ROUTE: This final route travels along the MWRA Hultman Aqueduct and into Wayland onto Natick via Rt 27, see Figure *12* for a route map. The Wayland report analyzed this potential route along the Hultman aqueduct, as presented in their Figure 6, and then entering Wayland along Old CT Path and down Pequot Road to Rt 27. The use of the Hultman corridor would need approval from the MWRA and an easement. If Wayland is considering this route, there could be economy of scale savings, if two transmission mains were installed under one contract. This route would include installation of approximately 18,200 linear feet of 20" diameter water transmission main. The construction would occur in Framingham (Hultman Aqueduct easement, Old Connecticut Path (Rt 126), Pequot Road, Main Street (Rt 27)). The transmission main would continue into Natick in North Main Street until it reaches the existing 20" raw water main at the intersection of Evergreen Road.

The MWRA Easement-Wayland route appears to be the most feasible route for a Natick direct connection with potential for cost share with Wayland. Therefore, we utilized this route for the cost estimate and inclusion in the 55-year CIP for the MWRA options. The probable costs for the water transmission main is $14.4 M if it was constructed in 2022. The CIP schedule placed the water transmission construction in 2026 to 2027.

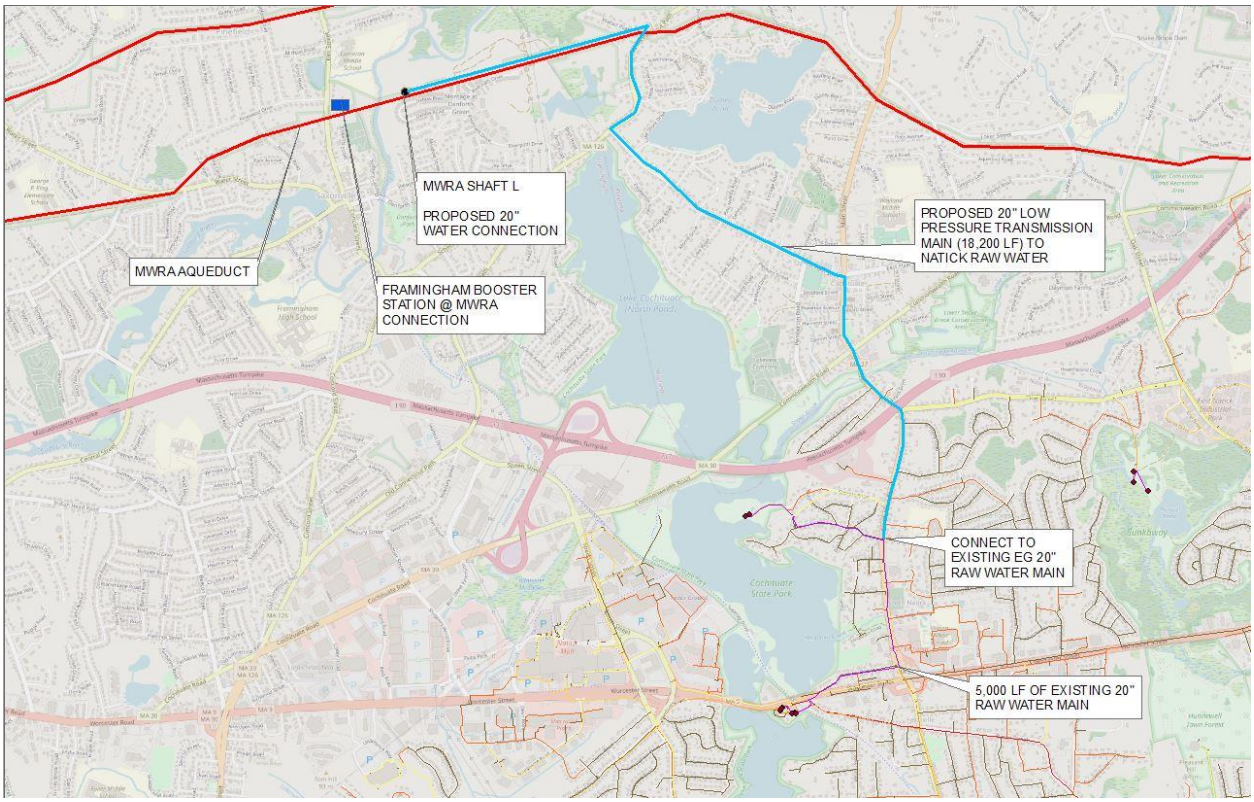

Figure 12 MWRA Shaft L MWRA Easement - Wayland

The water system computer modeling indicated a 20" diameter water transmission main would be sufficient for direct connection to Shaft L in Framingham. This route will provide the targeted 3.0 mgd (2,083 gpm) and up to 6 mgd (4,170 gpm) for Option 2 gravity flow. The route will also provide Option 3, with a water booster station, up to 3.0 mgd to keep the size of the booster pumps and motors down to a realistic size.

7.4 INFRASTRUCTURE IMPROVEMENTS OPTION 2A SHAFT N

A MWRA direct connection scenario will require extensive infrastructure costs to transport the water from the MWRA connection point, at Shaft N, through a neighboring town and connect into the appropriate location in the Natick water distribution system.

There were limited route options to be considered for the installation of a transmission main from Shaft N to the Natick water system. At this time there is not sufficient information available to provide an opinion that a transmission main could be constructed along the selected route, such as geotechnical, existing utilities, permitting requirements and neighboring communities' willingness to allow the construction within

their borders. We have prepared probable project costs for the options based on available information at this time.

A direct connection to Shaft N in Weston would require a water booster station to boost the water pressure above Natick typical distribution pressure. A booster station could be constructed anywhere along the new water transmission main, between the Weston connection to the Natick distribution system connection.

We reviewed possible routes for a water transmission main from Shaft N and the apparent most feasible route would be to the Winter Street water main in Natick. Wellesley is also looking at Weston Shaft N for an additional connection to their system. There may be a benefit of a cost share for both communities if a common transmission main was constructed and/or a common water booster station. We did not consider a cost share in our analysis as there has not been detailed discussion regarding this currently.

The selected route passes through Weston prior to entering Natick on Winter Street, see Figure *13* for the route map. This route would include installation of approximately 9,000 linear feet of 18" diameter water transmission main in Weston (Wellesley Street, Radcliffe Road and Winter Street) and 5,600 linear feet of 18" diameter water transmission main Natick (Winter Street and Oak Street). The probable cost for the water transmission main is $10.3 M if it was constructed in 2022. The CIP schedule placed the water transmission main constructed in 2026 to 2027. The booster station probable cost is $4.59 M if it was constructed in 2022. The CIP schedule placed the water booster station construction in 2028.

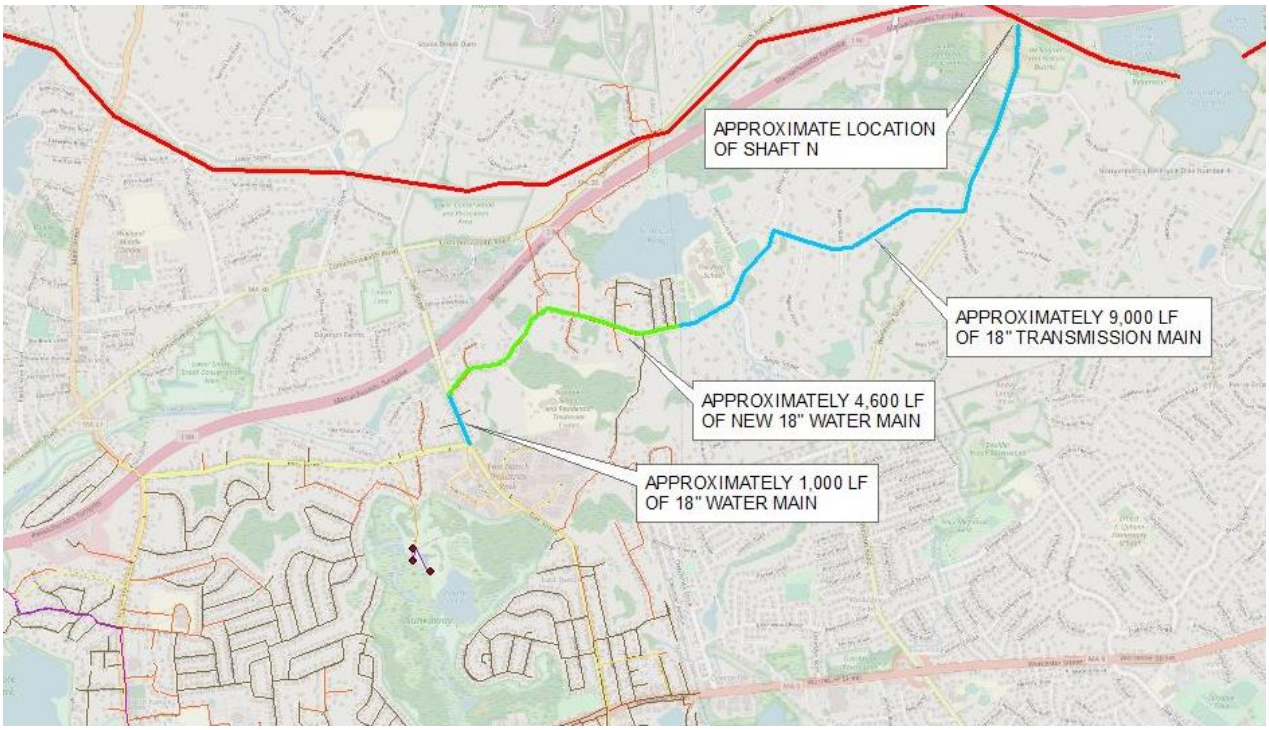

Figure 13 MWRA Weston Shaft N Map

The computer modeling indicated an 18" diameter water transmission main would be sufficient for direct connection to Shaft N in Weston. This connection will provide the targeted 3 mgd (2,083 gpm) maximum day with a booster station. The balance of the 6.0 mgd target would be drawn from the Shaft L connection.

7.5 INFRASTRUCTURE IMPROVEMENTS OPTION 2B SUDBURY AQUEDUCT

Reactivation of the Sudbury aqueduct has not been fully discussed with MWRA. The potential for reactivation has been raised at meetings with MWRA by Wellesley. At this time MWRA has not verbally committed to a potential reactivation of this aqueduct. If it was considered there would be extensive capital projects required to connect the aqueduct to MWRA's aqueducts in Framingham. In additional the Sudbury aqueduct would require lining and repairs.

We included the Sudbury aqueduct in this report to provide a possible option in case MWRA should consider the reactivation of the aqueduct.

A direct connection to the Sudbury aqueduct would require a water booster station to boost the water pressure above Natick typical distribution pressure. A booster station could be constructed anywhere along the new water transmission main, between the Sudbury aqueduct connection to the Natick distribution system connection.

We identified a preferred location behind Memorial elementary school. This location provides for a short water transmission main in the MWRA easement down the Memorial School driveway and connection into the existing 16" diameter water main in Elliot Street, see Figure *14* for the route map. Additional discussions are required with MWRA to confirm an appropriate connection point. This route would include installation of approximately 2,300 linear feet of 18" diameter water transmission main in the easement and Memorial School driveway to Eliot Street with probable costs of $1.72 M, if ti was constructed in 2022. The booster probable cost is $4.59 M, if it was constructed in 2022.

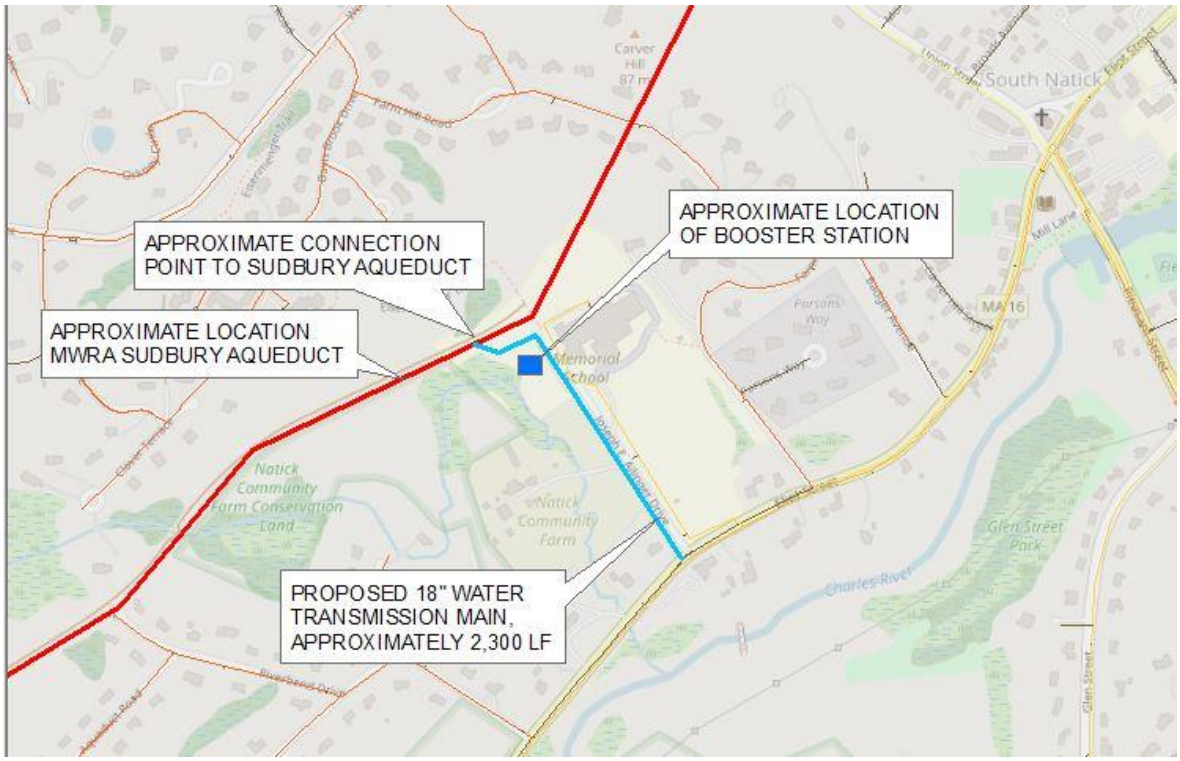

Figure 14 MWRA Sudbury Route Option2b

This connection would be designed to provide the targeted 3 mgd (2,083 gpm) maximum day with a booster station. The balance of the target 6.0 mgd would be drawn from the Shaft L connection.

7.6 INFRASTRUCTURE IMPROVEMENTS OPTION 3 - SHAFT L

This option utilized Springvale water sources and a direct connection to Shaft L at the MWRA system. Route options were previously discussed for Option 2 where a preferred route was through MWRA easement and through Wayland to Route 27. We utilized that same route for Option 3 with the 20" water transmission main connecting to the Natick water distribution system in Route 27 at Pine Street intersection. This option would require a water booster station somewhere along that route.

MWRA EASEMENT-WAYLAND ROUTE: This route travels along the MWRA Hultman Aqueduct and into Wayland onto Natick via Rt 27, see Figure *15* for a route map. This route would include installation of approximately 15,700 linear feet of 20" diameter water transmission main. The construction would occur in Framingham (Hultman Aqueduct easement, Old Connecticut Path (Rt 126), Pequot Road, Main Street (Rt 27)). The transmission main would continue into Natick in North Main Street until it reaches the existing 12" water main at the intersection of Pine Street.

The MWRA Easement-Wayland route appears to be the most feasible route for a Natick direct connection with potential for cost share with Wayland. We utilized this route for the probable cost estimate and inclusion in the 55-year CIP for the MWRA options. The probable costs for the water transmission main is $13.8 M and $4.59 M for the booster station, if they were constructed in 2022. The CIP schedule placed the water transmission main construction in 2026 and 2027 and booster station online in 2028.

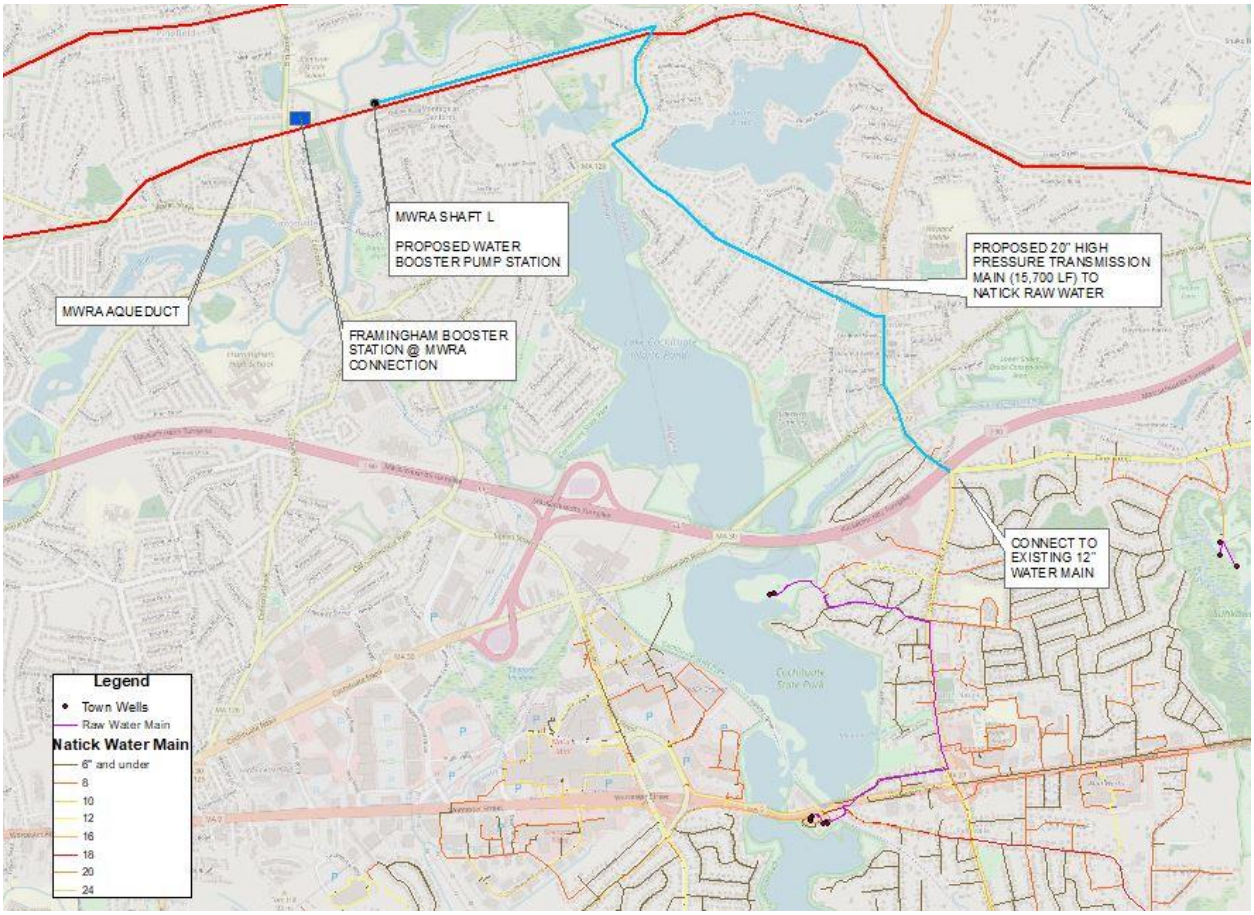

Figure 15 MWRA Shaft L W/Booster Station

The water system computer modeling indicated a 20" diameter water transmission main would be sufficient for direct connection to Shaft L in Framingham. This option will provide the targeted 3 mgd (2,083 gpm). The In Town sources would make up the difference to the 6.0 mgd target.

7.7 INFRASTRUCTURE IMPROVEMENTS OPTION 4 – RT 30 SUPPLEMENT

This option utilized all Natick water sources and WTPs with the addition of a direct connection to the MWRA system at the RT 30 connection, in Natick, on the Hultman aqueduct. Option 4 would involve the installation of a water booster station at the RT 30 connection point and a water main connection to the Natick water system. The water main connection would be approximately 50 feet from the water booster station to the existing water main in Rt 30.

ROUTE 30 MWRA – WINTER STREET ROUTE: The installation of a booster station at the Rt 30 Indian Rock intersection will require upgrades to the Natick water distribution system, including upsizing water mains to reach the necessary capacity of 1,500 gpm. The water from the booster station would cross the Mass Turnpike through two existing water mains, one through Indian Rock Road and one through Frost Street and then connecting into Winter Street. Winter Street water main connects to the Rathbun Road 6" water main and Oak Street 8" water main. The hydraulic model scenarios indicate water system pressure, not including water surges, could exceed 100 psi in Winter Street when the booster station was online, which is not recommended for Natick's water system. Typical pressures in Winter Street were in the mid 80's. The hydraulic model indicated that upsizing Winter Street and Oaks Street 8" water main to 12" and upsizing Rathbun 6" water main to 8" water main reduced the system pressure in Winter Street below 90 psi.

The probable cost for the water main upgrades is $3.615 M, and water booster station is $1.171M, if they were constructed in 2022. The booster station costs is exclusive of land purchase if required. The CIP schedule placed the water main upgrade completion in 2025 with the water booster station online in 2026. See Figure *16* for the route and upgrade locations.

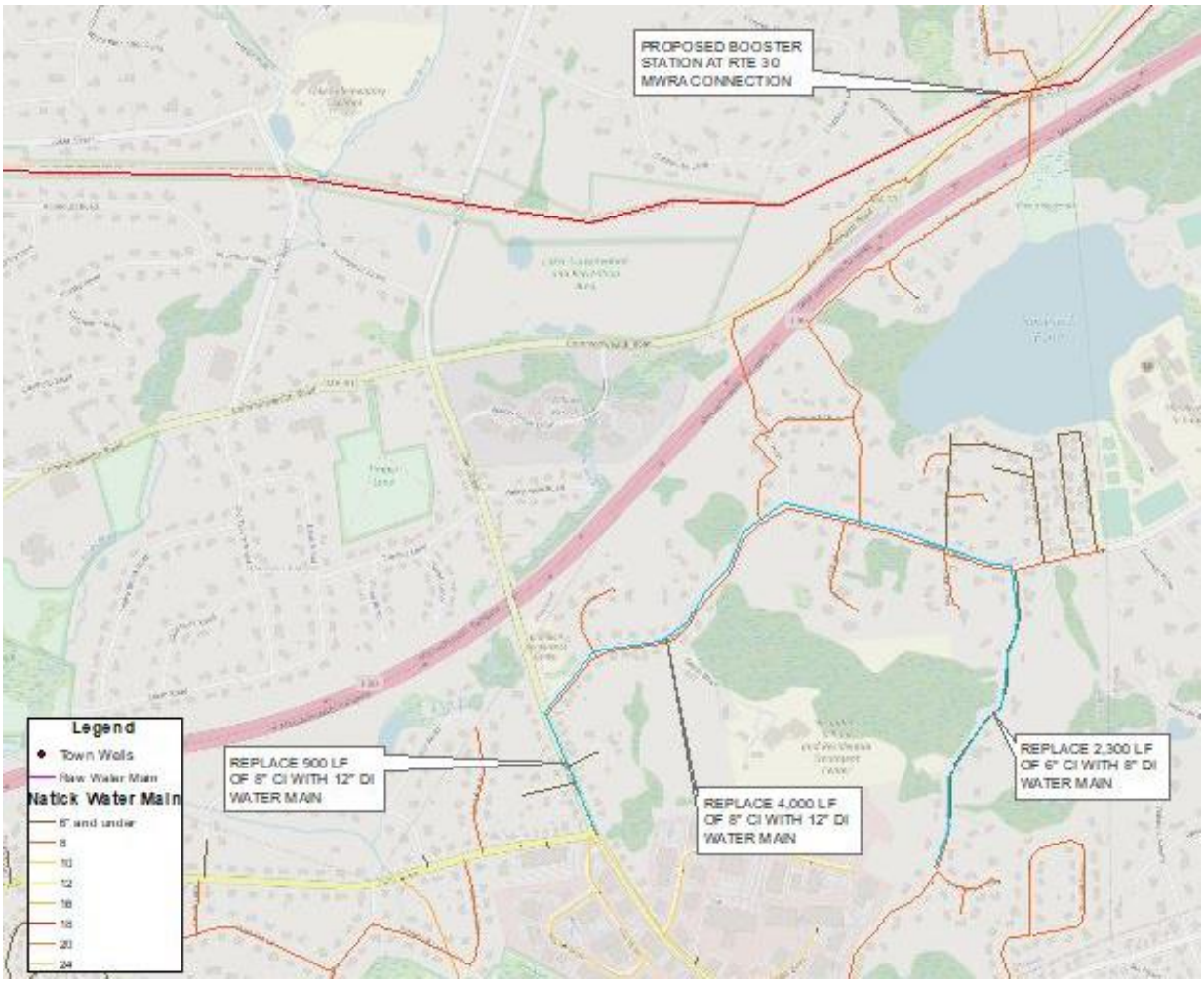

Figure 16 Option 4 RT MWRA Supplement

The water system computer hydraulic modeling confirmed required water pipe upsizing in Winter Street, Oak Street and Rathbun Road to allow a 1,500 gpm water booster station at the Rt 30 MWRA connection. This option could provide up to 2.16 mgd (1,500 gpm). The balance of the 6.0 mgd max day target would be provided by the In-Town water sources.

7.8 WATER BOOSTER STATION OPTION 2,3 & 4

Each MWRA option requires a booster station at one of the direct connection points. We utilize three different sized water booster stations, large to produce up to 6 mgd (4,170 gpm), a medium sized station to produce 3 mgd (2,100 gpm) and a small station 2.16 mgd (1,500 gpm) for Rt 30 connection. The large station was included in Option 3 at Shaft L connection to produce up to 6.0 mgd maximum day, in case the other direct connection is down for repair.

The large and medium sized booster stations would be installed inside a building constructed onsite with possible motors sizes in the range of 40 hp to 75 hp. The small size station, Rt 30 connection, would be a skid-mounted station installed inside a prefabricated building to provide a low profile for the area. The motors in the small station may be in the range of 20 to 35 hp.

We do not anticipate chemical feed in the booster stations except for the Hybrid options, where a phosphate feed is required due to corrosion control conditions required by MassDEP and EPA.

8.0 55- YEAR CAPITAL IMPROVEMENT PLANS

8.1 SUMMARY OF OPTIONS

The report identified several options for Natick to consider when determining their Water Source Strategic plan. We have provided details for each option, associated costs for major components required by each option and now this section will provide cost comparison tools including Net Present Value and total option costs.

The following is a list of the options and related details.

- OPTION 1. IN-TOWN SOURCE: Maintain all existing water supply sources and Water Treatment Plants (WTP).
- OPTION 2. OUTSIDE SOURCE: Connect to an outside water source, such as the Massachusetts Water Resources Authority (MWRA) water system and abandon In-Town water supplies and water treatment assets. Target 6.0 mgd from outside source.
    - There are multiple Outside Source options, however most of the neighboring water systems are MWRA members. Therefore, we considered direct connection to the WWRA source, Natick would own and operate the infrastructure.
    - We also looked at a combination scenario where Natick would construct one direct connection and utilize an indirect connection where a neighboring community transports MWRA water to Natick.
- OPTION 3. HYBRID SOURCES: Maintain specific existing in-town water supply assets and water treatment assets and direct connection to MWRA, to provide the balance of required water supply. Target 4.0 mgd with in-town sources and 2.0 mgd from outside source.
- OPTION 4. IN-TOWN WITH MWRA SUPPLEMENT: This option will utilize most of Natick's existing water sources and treatment plants and add a MWRA Supplement connection at RT 30 location.
- There are variations of option #2, 3 & 4, that impact the costs, such as teaming with Wayland and/or Wellesley to share the infrastructure cost of a MWRA connection that will serve both communities or eliminating certain In Town sources and treatment plants.

8.2 CAPITAL COSTS

Once we identified the options and the assets needed for each, we then looked at probable costs for each asset for construction, rehabilitation, and replacement. We include capital costs for existing assets that will remain in each option. Existing asset probable costs were included in Section 3.0 in the discussion of Option 1a and 1b In-Town Water Sources.

Projection of capital costs to future years requires assumptions and constraints to provide reasonable probable cost for the analysis. The following is a summary of the parameters/constraints when calculating the capital probable costs.

1. Capital borrowing: 20 years
2. Trigger amount for borrowing: > $250,000
3. Loan rate: 3%
4. Inflation rate for NPV: 2.5% (based on last 10-year average)
5. Water system debt service remained in O&M total: Majority of the debt service was for water distribution and that would continue forward.
6. Projected Debt Service for CIP: Included in the capital cost item.

When preparing probable costs for rehabilitation and replacement of assets, we utilize 2022 as a baseline for industry trends related to costs. Water main projects in 2022 have been bidding close to a third higher than cost typically seen only a couple of years ago. This is mainly due to supply chain issues and inflationary pressure. We carried today's cost trends in the probable cost estimates as a conservative approach.

Table *28* summarizes the capital costs, if constructed in 2022, for new major assets required for each water source option.

Table 28 CIP Costs all Options

Option	Asset Description	Capital Cost (Million Dollars)
1a In-Town Sources	Tonka Advanced WTP	$18
1b In-Town Sources W/Additional Treatment	Tonka Advanced WTP	$18
	H&T Advanced WTP	$16
	Elm bank Advanced WTP	$18
	Pine Oaks Advanced WTP	$5
2a Full MWRA Water Source Shaft L & N	20" Transmission Main Shaft L Fra to Springvale	$14.4
	18" Transmission Main Shaft N Weston to Oak St	$10.3
	Water Booster Station Shaft N	$4.59
2b Full MWRA Water Source Shaft L & Sudbury	20" Transmission Main Shaft L Fra to Springvale	$14.4
	18" Transmission Main Sudbury Aqueduct Natick	$1.72
	Water Booster Station Sudbury	$4.59
2c Full MWRA Water Source Saft L & Wellesley In-Direct	20" Transmission Main Shaft L Fra to Springvale	$14.4
	Estimated Shaft N Cost Share W/ Wellesley	$5.14
	Rt 16 Water Main Wellesley to Natick	$1.3
	Estimated Booster station Share W/Wellesley	$5.14
3 Hybrid Water In-Town Springvale & Shaft L	20" Transmission Main Shaft L Fra to Rt 27	$13.8
	Water Booster Station	$4.59
	Tonka Advanced WTP	$18
	H&T Advanced WTP	$16
4a In-Town, and MWRA RT 30 Supplement	Water Booster Station & Water Mains	$4.8
	Tonka Advanced WTP	$18
	H&T Advanced WTP	$16
	Pine Oaks Advanced WTP	$5
4b In-Town, No Elm Bank, and MWRA RT 30 Supplement	Tonka Advanced WTP	$18
	H&T Advanced WTP	$16
	Pine Oaks Advanced WTP	$5
	Water booster Station & Water Mains	$4.8

8.3 O&M COSTS OPTION 2 MWRA FULL SOURCE

To maintain a water supply, storage and distribution system, there are required operation and maintenance costs in addition to the capital costs for projects. As discussed in Section 3, we adjusted Natick's O&M costs to reflect water only services, eliminated sewer related O&M costs. We then adjusted the O&M costs to reflect the changes associated with Option 2a, 2b and 2c, where all Natick's' water supply and treatment buildings were taken offline, and related O&M removed from the overall O&M cost.

Natick's historical water related O&M costs over the last 5 years had an average increase of 4.4%. We utilized 4% in the 55-year O&M projections for each option. Additional discussion regarding O&M analysis is included in Section 9 of this report.

Projection of costs to future years requires assumptions and constraints to provide reasonable cost for the analysis. The following is a summary of the parameters/constraints when calculating the O&M probable costs.

1. Inflation rate for NPV: 2.5% (based on last 10-year average)
2. O&M costs increase per year: 4%
3. Utility costs increase per year: 2%
4. Removed $500K from Water Debt service from O&M in 2025: Assume Tonka 2005 plant and other capital pay off that time.
5. Water System debt service remained in O&M total: Majority of the historical debt service was for water distribution and that would continue forward.
6. Projected Debt Service for this CIP: Included in capital cost item.

The addition of MWRA direct connections under Option 2a, 2b and 2 c would result in a decrease in operating expenses with the removal of Natick water sources and water treatment plants. The decrease represented a reduction in electrical, gas and chemicals for running the water pump station and WTPs. There would be an added electrical cost for the water booster station and maintenance costs for the booster station. These options would require the existing Springvale high lift pump building for discharging water into the system and the Springvale office/garage for operations. Therefore, historical O&M costs were maintained for those buildings. We did not carry chemicals in the O&M costs for these options as MWRA furnishes water with the required water quality adjustment including disinfection, pH adjustment and fluoride addition. Natick may be required to feed chlorine or chloramines at the two reservoirs; however the cost was not included in the cost analysis. The cost of the reservoir's chemicals

would be a very small cost when considering the entire O&M cost and would not impact the cost analysis.

We did not anticipate a reduction in WTP operator positions. The WTP operators are tasked with sewer pump station O&M duties that will continue under these options. WTP operators will continue with high lift pump building and reservoir O&M duties along with O&M duties related to the new water booster station for the Shaft N connection. Costs for rehabilitation and replacement projects for existing buildings and the water booster station were included in the capital cost item.

A major increase in the O&M cost would be the addition of the MWRA assessment for water use. Please refer to Section 9 where we detail the MWRA user charge system.

We prepared Table 29 to summarize the O&M cost projections for Natick prior to the MWRA direct connection activation and after the activation of the connection. The table represents the resulting O&M costs for options, 2a and 2b, as the O&M expenses are similar for both. The table includes three columns, O&M (all O&M costs except utilities & chemicals); Chemicals/Utilities and MWRA assessment. The volume used for the MWRA assessment was 1,153 MG, which was based on Natick's historical water use projected to 2029. It is important to note that the MWRA assessment is projected with the MWRA reported 3.9% annual rate increase. There is always a possibility that from time to time, depending on MWRA capital projects, that a larger annual increase may be required. We discussed this in more detail in Section 9 of this report.

Table 29 O&M Projections MWRA Option 2a

Year	Total O&M (Million Dollars)	O&M * (Million Dollars)	Utility & Chemicals (Million Dollars)	MWRA Assessment (Million Dollars)
2027	$7.412	$6.812	$0.600	$0.00
2028	$7.697	$7.084	$0.612	$0.00
2029	$14.203	$7.368	$0.220	$6.615
2050	$31.896	$16.791	$0.334	$14.772
2077	$90.485	$48.414	$0.570	$41.501

*- Includes Salaries, Benefits, Reserve Fund, Indirect Expenses, Debt Service

Option 2c includes a direct connection to shaft L & indirect connection through Wellesley. Wellesley would provide the distribution of MWRA water through Wellesley into Natick. An indirect connection reduces capital costs for constructing a water transmission main through other communities. The indirect connection does include additional O&M related cost in the form of "wheeling water" expenses. The actual cost of wheeling water is not available for this report, as that would be a negotiated agreement between the two communities. The town of Ashland constructed an indirect connection and entered into an agreement with Southborough for wheeling water. That agreement included fees for water use based on a percentage of Southborough's O&M costs. To calculate approximate wheeling cost for this option we approximated Wellesley's O&M costs, based on Natick's O&M and then applied a user charge based on percent use of Natick water versus Wellesley's total water use.

We prepared Table 30 to summarize the O&M cost projections for Natick prior to the MWRA direction connection activation and after the connection activation. The table includes three columns, O&M (all O&M costs except utilities & chemicals); Chemicals/Utilities, MWRA assessment and Wellesley assessment. The water volume used for the assessment, 1,153 MG, was split in half for the two connections. It is important to note that the MWRA assessment was projected with the MWRA reported 3.9% annual increase. There is a possibility there may additional increase depending on MWRA capital projects, that a larger annual increase may be required. We discussed this in more detail in Section 9 of this report.

Table 30 O&M Projections MWRA Option 2c

Year	Total O&M (Million Dollars)	O&M * (Million Dollars)	Utility & Chemicals (Million Dollars)	MWRA Assessment (Million Dollars)	Wellesley Assessment (Million Dollars)
2027	$7.413	$6.812	$0.600	$0.00	$0.00
2028	$7.697	$7.085	$0.612	$0.00	$0.00
2029	$15.828	$7.368	$0.191	$6.615	$1.654
2050	$34.358	$16.791	$0.289	$14.772	$2.506
2077	$94.687	$48.414	$0.494	$41.501	$4.278

*- Includes Salaries, Benefits, Reserve Fund, Indirect Expenses and Debt Service

8.4 O&M COSTS OPTION 3 MWRA HYBRID SOURCE

Option 3 is a hybrid approach where a MWRA direct connection to shaft L is constructed and certain Natick water sources are maintained. Two options were analyzed, Option 3a maintains only the Tonka and H&T water supplies, Option 3b maintains only the Elm Bank water supplies. Following conversations with the Town, the decision was made to eliminate Option 3b, Elm Bank. The main driving force for that decision was the need to obtain a large land area from the Department of Conservation and Recreation (DCR). The existing wells and WTP are located on DCR land through a long-term lease. Elm bank under Option 3b would require additional WTP buildings to remove iron, manganese and PFAS and possibly other contaminants. This would require a building possibly 3 times larger than the existing WTP. It may be unlikely that DCR would allow the construction of the additional WTP buildings that will eliminate a large amount of forest area. Additionally, the use of Elm Bank is controlled by a WMA permit that includes well shut down requirements during low flow periods for the Charles River. Therefore, the use of Elm Bank could be eliminated during the summer season, depending on snow and rain fall quantities.

As discussed in Section 3, we first adjusted Natick's historical O&M costs to reflect water only services, eliminated sewer related O&M costs. We then adjusted the O&M costs to reflect the changes associated with the two Options. Refer to the O&M cost allocation discussion for Option 2 for additional details.

The addition of the MWRA direct connection under Option 3 would result in a decrease in operating expenses with the removal of certain Natick water sources and water treatment plants. The decrease represented a reduction in electrical, gas and chemicals for running the water pump station and WTP's. There would be an added electrical cost for the water booster station under Option 3 and maintenance costs for the booster station.

We did carry corrosion control chemicals (phosphate) in the O&M costs for the MWRA water booster station.

We did not anticipate a reduction in WTP operator positions due to the required O&M for the in-town water sources, WTP's and the sewer pump stations that will remain. Costs for rehabilitation and replacement projects for existing buildings and the water booster station were included in the capital cost item.

A major increase in the O&M cost would be the addition of the MWRA assessment for water use. The cost projections utilized a 1,153 MG In Town water versus 288 MG MWRA water use. This is similar to Natick's historical water use if you compare Springvale versus Elm Bank water production. We discussed the MWRA user charge in Section 9 of this report.

We prepared Table *31* to summarize the O&M probable cost projections for Natick prior to the MWRA direct connection activation and after the connection activation. It is important to note that the MWRA assessment is projected with the MWRA reported 3.9% annual increase. There is a possibility that there may be additional increase depending on MWRA capital projects, that a larger annual increase may be required. We discussed this in more detail in Section 9 of this report.

Table 31 O&M Projections MWRA Option 3 Springvale

Year	Total O&M (Million Dollars)	O&M * (Million Dollars)	Utility & Chemicals (Million Dollars)	MWRA Assessment (Million Dollars)
2027	$7.559	$6.812	$0.746	$0.00
2028	$7.851	$7.085	$0.767	$0.00
2029	$9.797	$7.368	$0.775	$1.654
2050	$21.612	$16.790	$1.128	$3.693
2077	$60.715	$48.414	$1.926	$10.375

*- Includes Salaries, Benefits, Reserve Fund, Indirect Expenses and Debt Service

8.5 O&M COSTS OPTION 4 MWRA SUPPLIMENT SOURCE

Option 4 is an In-Town water source with a supplemental MWRA water from a direct connection to Rt 30 on the Hultman aqueduct. Option 4 was split into two options, Option 4a that maintains In-Town water sources and treatment plants except Morse Pond, with installation of WTP's to address future regulated contaminants. Option 4b maintains all In Town sources except Elm Bank and Morse Pond, with installation of WTP's to address future regulated contaminants.

The connection to the Hultman aqueduct would require a water booster pump station to deliver water into the Natick water distribution system. As discussed in Section 3, we adjusted Natick's O&M costs to reflect water only services, eliminated sewer related O&M costs. We then adjusted the O&M costs to reflect the changes associated with each Option. Refer to the O&M cost allocation discussion for Option 2 for additional details.

The addition of the MWRA direct connection under Option 4a would result in a slight increase in operating expenses with the electrical, gas and chemicals for running the water booster pump station and the advanced WTPs. Under Option 4b there would be a reduction in operating expenses with the elimination of electrical and chemicals cost related to the Elm Bank WTP and Elm Bank wells.

All existing operator positions would be required for the O&M related to the remaining water supplies, WTP's and wastewater pump stations. Costs for rehabilitation and replacement projects for existing and new buildings and the water booster station were included in the capital cost item.

A substantial increase in O&M cost would be the addition of the MWRA assessment for water use. Option 4a included the MWRA use on a limited basis, 145 MG for the year, approximately 13% of total water supplied, to supplement water should there be a loss of In Town water source(s). Option 4b, where Elm Bank was eliminated, MWRA water use was set at 288 MG for the year, approximately 25% of total water supplied, which is approximately the historical Elm Bank usage. We discussed the MWRA user charge in Section 9 of this report.

We prepared *Table 32* and Table 33 to summarize the O&M probable cost projections for Natick prior to the MWRA direction connection activation and following the activation of the connection. It is important to note that the MWRA assessment was projected with the MWRA reported 3.9% annual increase. There is the possibility that a larger annual increase may be required to pay for large MWRA capital projects. We discussed this in more detail in Section 9 of this report.

Table 32 O&M Projections In-Town & MWRA Supplement Option 4a

Year	Total O&M * (Million dollars)	Utility & Chemicals (Million Dollars)	MWRA Assessment (Million Dollars)
2026	$7.171	$0.620	$0.00
2027	$8.275	$0.689	$0.775
2028	$8.675	$0.785	$0.804
2029	$9.027	$0.822	$0.836
2050	$19.904	$1.247	$1.867
2077	$55.787	$2.128	$5.246

*- Includes Salaries, Benefits, Reserve Fund, Indirect Expenses and Debt Service

Table 33 O&M Projections In-Town & MWRA RT 30 Option 4b

Year	Total O&M * (Million dollars)	Utility & Chemicals (Million Dollars)	MWRA Assessment (Million Dollars)
2026	$7.171	$0.621	$0.00
2027	$9.021	$0.678	$1.530
2028	$9.358	$0.683	$1.590
2029	$9.740	$0.721	$1.652
2050	$21.571	$1.092	$3.688
2077	$60.640	$1.864	$10.362

*- Includes Salaries, Benefits, Reserve Fund, Indirect Expenses and Debt Service

8.6 55-YEAR CAPITAL IMPROVEMENT PLAN MWRA OPTION 2,3 & 4

The CIP included the probable cost to construct and maintain new Water Treatment Plants (WTP) and booster station and maintain and replace existing WTPs, Water Storage Tanks and Water Supply assets. The 55-year CIP provides data to assist Natick with their decision process for preparing a Water Supply and Treatment Strategic plan.

We set rehabilitation and replacement schedules for each asset and applied the probable costs over a 55-year life cycle for each option. There are several ways to compare costs for each option, including annual costs, total costs, and net present value. We are providing data for all three comparisons for a full understanding of the related costs.

Table *34* identifies the Total Cost and Net Present Value (NPV), 2022 to 2077 period, for each MWRA Water Source Option 2,3 & 4. Total Cost column is a simple sum of all O&M and Capital Debt probable cost for the 55-year period. The NPV columns utilizes the estimated annual costs and translates them to a present value for option comparison. Interest rate is the main variable in the NPV calculation that allows the representation of the option cost in today's dollars. The two lowest options when considering total cost and NPV are options 4a and 4b, both include the RT 30 MWRA direct connection as supplement to all In-Town sources. The MWRA use assessment is the driving force for total cost of each option.

Table 34 MWRA Options 55-Year Cost Summary

WATER SOURCE OPTION	TOTAL COST (MILLION DOLLARS)	55-YEAR LIFE NET PRESENT VALUE (MILLION DOLLARS)			
		CAPITAL	O&M	MWRA USER FEE	TOTAL COST
2a. Full MWRA: Direct Connection to Shaft L & Shaft N	$2,172.9	$52.5	$481.3	$375.2	$909.0
2b. Full MWRA: Direct Connection to Shaft L and Sudbury Aqueduct	$2,159.7	$43.2	$481.3	$375.2	$899.7
2c. Full MWRA: Direct Connection to Shaft L & Indirect Connection to Wellesley	$2,296.2	$45.8	$480.8	$454.6*	$980.7
3 Hybrid: 3.0 mgd (Springvale Sources) In-Town, 3.0 mgd MWRA Direct Connection Shaft L W/Booster	$1,644.5	$123.3	$500.5	$93.8	$717.60
4a. In-Town & MWRA RT 30: Address Future Contaminants and MWRA as Supplemental Source	$1,550.6	$126.2	$503.2	$55.2**	$684.6
4b. In-Town & MWRA RT 30: Address Future Contaminants and MWRA as Replacement Source for Elm Bank	$1,622.1	$103.3	$499.4	$109.00***	$711.7

*- MWRA User Fee also includes Wellesley's user fee
** - MWRA water use 145.8MG (possibly 3 months use, 1,500 gpm, 18 hrs per day)
***-MWRA water use 288MG (approximately 25% of total water for town, typical for Elm Bank)

See Figure *17* for O&M and capital debt probable costs for MWRA Options 2,3 & 4 over a 55-year period, 2022 to 2077. The projections indicate the Hybrid option, and the two MWRA Rt 30 supplement water options are lower than the full MWRA water options. The main driving force for the high full MWRA options costs is the water user assessment for

the water purchase. That indicates the capital costs are not a main factor in cost comparison between the 3 options categories. As a clarification for Figure *17* , the graph appears to only show four (4) lines, however Option 2 a and 2b values are very close and appear to be one line and Option 3 and 4b values are very close and appear as one line.

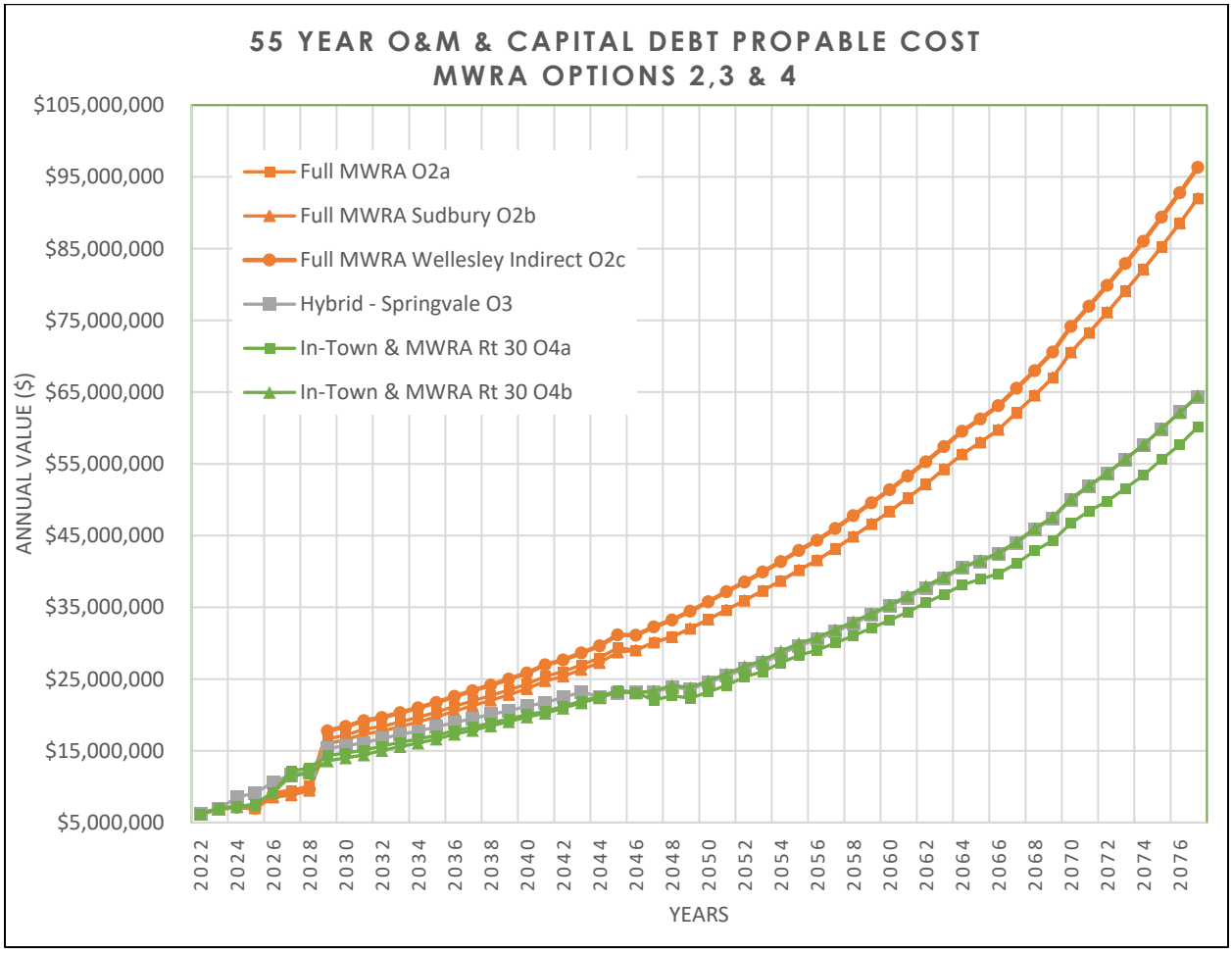

Figure 17 O&M & Capital Costs-Option 2, 3 & 4

9.0 USER RATE COMPARISON

9.1 NATICK RATES

Water rates are set by the Select Board and serve three primary goals: promote water conservation, fund water system operation and maintenance, and fund capital projects. Natick utilizes a Water and Sewer Enterprise Fund, established under Mass General Law c.44 SS 53F1/2, which allows for separate accounting of costs directly related to the operation of providing water and sewer service to its customers.

Natick completed a rate study in 2022 that analyzed historical use patterns for various types of customers, summarized all related water and sewer costs and projected future costs. The May 26, 2022, document was prepared to allow the Select Board to set new rates that will address present costs and short-term capital expenses. The document also analyzed impacts of use restrictions on revenue that we will discuss further in this section.

As a result of the rate study Natick Select Board set the water rate schedule for 2023 as summarized in Table 35. The water rate has four tiers that promote water conservation, with a higher rate for the higher usage tiers. The rate schedule is based on 1 unit which equates to 100 cubic feet or 748 gallons of water. If a customer uses 11 units in their billing cycle, they would be charged 10 units at $2.42 and 1 unit at $3.70. Table 35 summarizes the FY 2023 water rate schedule.

Table 35 Natick Water Rates

Usage Tier	Rate per 100 CF
0-10	$ 2.42
11-20	$ 3.70
21-40	$ 5.48
40+	$ 8.50

The variability in the individual user charges, based on each tier, makes it complicated for a comparison of Natick water rates to an Outside water source such as the MWWRA. Therefore, we looked at the cost to produce and deliver Natick water to their customers and compared that to MWRA charges for the same volume. Natick's water pumped volume is higher than metered water use, in the range 8.8% and 13% over the last 4 years. The difference is called Unaccounted for Water (UAW) and is due to system leaks, use meter errors, unmetered use (firefighting, hydrant flushing winter bleeders, etc..). The UAW will remain regardless of the option.

The obtain an approximate water related operation and maintenance cost including capital and debt service, we utilized the FY 2023 Operating & Capital budget table in the May 26, 2022, rate setting document. We eliminated sewer only related cost and prepared Table 36. Additionally. We reduced combined water/sewer line items to only reflect water related expenses, based on discussions with Natick DPW officials. The following are adjustments made to the O&M cost summary.

1. W/S Shared Salaries: split 50% for water and 50% for sewer
2. W/S Expenses: split 50% for water and 50% for sewer
3. Employee Benefits: allocate costs based on 17 water employees and 11 sewer employees
4. Reserve Fund: split 50% water and 50% sewer
5. Indirect Expenses: split 50% for water and 50% for sewer
6. Capital Improvements: Split 50% for water and 50% for sewer
7. Water related Debt Service: Historically Natick spent the majority on the water distribution system. Breakdown approximately 70% for water and 30% for sewer
8. Existing Debt Service remained in O&M total: Majority of the debt service was for water distribution and that would continue forward.

Table 36 Natick Historical O&M Costs

Item	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Water Salaries	$ 1,230,404	$ 1,276,455	$ 1,303,969	$ 1,311,299	$ 1,379,125
Water Expenses	$ 996,132	$ 1,171,780	$ 862,893	$ 987,778	$ 1,350,681
Water Salaries	$ 39,895	$ 46,029	$ 28,787	$ 53,249	$ 53,249
Water Shared Expenses	$ 29,161	$ 21,947	$ 34,271	$ 37,000	$ 37,000
Employee Benefits	$ 491,602	$ 525,574	$ 565,754	$ 584,702	$ 547,107
Reserve Fund	$ 52,631	$ 100,000	$ 100,000	$ 100,000	$ 100,000
Indirect Expenses	$ 1,109,075	$ 1,266,650	$ 1,348,748	$ 1,424,040	$1,530,480
Capital improvement	$ 141,750	$ 195,000	$ 182,500	$ 186,150	$ -
Debt Service	$ 1,710,027	$ 1,709,292	$ 1,508,831	$ 1,508,831	$ 1,842,314
Total Costs	**$5,800,676**	**$6,312,726**	**$5,935,753**	**$ 6,193,048**	**$6,839,956**
Water Pumped MG	1,165	1,137	1,136	1,171	TBD
Est. Cost of Water Per 1MG	**$4,977.52**	**$5,550.32**	**$5,227.04**	**$5,286.64**	**TBD**

The table indicates that Natick's Operation and Maintenance (O&M) costs averaged $5,260.38 for the period of FY 2019 to FY 2022, to produce 1 million gallons of water. MWRA user charge for FY 2022 is $4,387.28 per 1 million gallons of water.

9.2 ELECTRICAL, NATURAL GAS & CHEMICAL OPERATING EXPENSES

Natick utilizes electrical power from Eversource Electric to power their water treatment plants and water pump stations. These expenses are included in the Water Expenses line item in the O&M schedule.

We have received historical electrical costs for the last 3 years for the Natick water facilities, as summarized in Table 37. We utilized the costs under location "Springvale, NEW PMP" for electrical costs required for a new water treatment plant.

Table 37 Existing Facilities Electrical Cost

Locations - Electrical Usage	FY2020	FY2021	FY2022
Springvale, NEW PMP	$186,279.37	$190,452.32	$135,439.99
Elm Bank, TURTLE LN PMP	$62,276.00	$48,067.00	$69,210.00
Morse Pond, COLLEGE RD P9	$4,731.00	$6,738.00	$6,537.00
Springvale, 1076 WOR ST	$38,877.00	$39,867.00	$48,925.00
Captain Toms booster station	$2,861.00	$3,087.00	$3,716.00

Eversource Gas provides natural gas for heating systems at the Springvale water treatment plant site. We received historical natural gas costs for the last 3 years for the Natick Springvale water facilities, as summarized in Table 38. We utilized the costs under location "Springvale, Filter Building" for natural gas costs related to a new water treatment plant.

Table 38 Natural Gas Cost Existing Facilities

Location - Gas Usage	FY2020	FY2021	FY2022
Springvale Treatment Facilities,	$20,968.00	$17,303.00	$9,404.00
various Locations North Main	$358.00	$303.00	$395.00

When we compared the water utility costs to the total O&M costs for Natick, over the past three fiscal years, the utility costs were in the range of 4.8 to 5.8% of total O&M costs, see *Table 39*. The amount of this percentage justified the inclusion of projected utility costs for future treatment plants in the O&M cost analysis.

Table 39 Utility Cost Vs Total O&M

	Utility Costs $'s		Water Utility
Fiscal Year	Water O&M	Water Utility	% of Total
FY 2020	$6,312,726	$346,743.37	5.5%
FY 2021	$5,935,753	$344,740.32	5.8%
FY 2022	$6,193,048	$297,210.99	4.8%

Chemical costs for the WTPs have averaged $206,700.00 over the period from FY 2019 to FY 2023 with FY 2023 set at $240,000. We utilized the $240,000 to project chemical costs for existing and proposed facilities.

We looked at projecting O&M cost for the 55-year CIP, however there was no clear increase in O&M cost over the last 5 years, with some years showing a negative drop. The 5-year average indicated an increase of 4.4%. The variability could be related to weather conditions and reduction in water production in 2021, and the sole use of Elm Bank water supply during the H&T shutdown due to PFAS. Elm Bank has reduced chemical and electrical use compared to H&T and Tonka plants. Without a clear increase we utilized an annual 4% increase in O&M for each option.

9.3 MWRA WATER RATES

The Massachusetts Water Resources Authority is a water "wholesaler" to its member communities. According to MWRA's website they sell water to approximately 2.5 million people and 5,500 industrial users in eastern Massachusetts.

According to MWRA's website, MWRA typically raises rates by 3.9% per year, except the FY 2011 rates were increased by only 1.49%, which was the smallest rate increase since 1996. Their reason for this was related to the extraordinary economic difficulties that its member communities faced during that time.

MWRA sets water rates like a municipality, by identifying the total revenue that must be raised to cover all operating, maintenance and capital costs to run the water system. According to MWRA's website, they calculate user charges using a flat rate per million gallons. The FY 2020 rate was $4,021.42 per million gallons, in FY 2021 it was $4,320.63 and FY 2022 it was $4,387.28. MWRA is projecting a 3.9% increase for FY 2023 rate resulting in $4,558.39 Per million gallons.

For this report we utilized the 3.9% rate increase for probable cost projections under each of the MWRA options.

9.4 NATICK PRODUCTION COSTS VS MWRA RATES (FULL MWRA USE)

We conducted a cost comparison of MWRA water rates versus Natick costs to provide water to its customers if Natick went for a full MWRA use and abandoning In-Town water sources. Natick's total annual water pumped for the last 4 years (2019 to 2022), averaged 1,152 million gallons (mg). Using the FY 2022 MWRA rate of $4,387.28 per mg would have yielded an assessment of $5,056,097. Natick's cost to provide 1 million gallons of water in FY 2022 was $5,286.64, with a total annual O&M cost of $6,193,048, see Table 36 for cost breakdown. This is not an even comparison because the Natick O&M costs include distribution system related O&M and capital debt costs that cannot be eliminated with a full MWRA option. Therefore, it is important to look at all future costs related to capital improvements, utility and chemicals as new treatment plants are required to treat future regulated contaminants.

If Natick was to connect to MWRA and abandon in-town water sources and treatment plants, Option 2a, O&M costs would be reduced for elimination of WTPs and pump station utility and chemical costs. The MWRA water booster station O&M and MWRA assessment costs would be added. The projected FY 2029 total O&M probable cost is $14.203M, with $6.615M representing MWRA water assessment based on 1,153 mg usage for the year. The projected FY 2029 total O&M probable costs for the In-Town Source with Additional Treatment, Option1b, is $8.160M for the same 1,153 MG of water use.

Looking at the end of the 55-year projection, the projected FY 2077 total O&M probable cost, Option 2a full MWRA, is $90.485M, with $41.50M representing MWRA water assessment based on 1,153 mg usage for the year. The projected FY 2077 O&M probable total cost for the In-Town Source with Additional Treatment, Option1b, is $50.462M for the same 1,153 mg of water use.

The elimination of Natick's water treatment plants and water supplies, Option 2, has a reduction in in-town O&M costs due to a less costly MWRA water booster station compared to Natick's water treatment and supply buildings, however the MWRA assessment increases the O&M cost well over the Option 1b In-Town Sources. A major increase in Natick rates would occur in 2029, (start MWRA use), possibly 40% increase in rates to start paying the MWRA assessment. This is in addition to a 24% rate increase projected in 2026 to start paying the debt for the capital projects required for the MWRA connections. The rate increases beyond that will reflect the typical Natick 4% O&M increase plus the 4.9% increase in MWRA assessment.

9.5 NATICK PRODUCTION VS MWRA RATES (HYBRID MWRA USE)

We compared MWRA water rates versus Natick costs to provide water to its customers if Natick utilized a Hybrid approach, Option 3, maintains Springvale water sources and eliminates Elm Bank water sources. Natick's total annual water pumped for the last 4 years (2019 to 2022), averaged 1,152 million gallons (mg). Assuming 25% of the water use is drawn from MWRA, using the FY 2022 MWRA rate of $4,387.28 per mg, would yield an MWRA assessment of $1,264,024. Natick's cost to provide 1 million gallons of water in FY 2022 was $5,286.64, with a total annual O&M cost of $6,193,048.00, see Table 36 for cost breakdown. The hybrid option will have a small reduction in O&M with the elimination of Elm Bank, however nothing close to the added MWRA assessment. Additionally, the MWRA connection would require chemical feed for corrosion control, thus offsetting the reduction for Elm Bank. Therefore, it is important to look at all future costs related to capital improvements, utility and chemicals as new treatment plants are required to treat future regulated contaminants.

If Natick was to connect to MWRA and abandon Elm Bank water sources and treatment plant, Option 3, O&M costs would be reduced for elimination of WTPs and related pump station utility and chemical costs. MWRA water booster station O&M costs, including chemical feed and MWRA assessment would be added. The projected FY 2029 O&M probable total cost for Option 3 is $9.797M with $1.654M of that representing MWRA water assessment based on 288 mg usage for the year, which is 25% of the total town water usage. The projected FY 2029 O&M probable total costs for the In-Town Sources with Additional Treatment, Option1b, is $8.16M for the same 1,153 million gallons of water usage.

Looking at the end of the 55-year projection, the projected FY 2077 O&M probable cost for option 3 is $60.714M, with $10.375M as the MWRA water assessment based on 288 mg water usage for the year. The projected FY 2077 O&M probable total costs for the In-Town Sources with Additional Treatment, Option1b, is $50.462M for the same 1,153 mg of water usage. A major increase in Natick rates would occur in 2029, (start MWRA use), possibly 20% increase in rates to start paying the MWRA assessment. This is in addition to double-digit (19%&14%) rate increases projected leading up to 2029 to start paying the debt for the capital projects required for the new WTP and MWRA connections. The rate increases beyond that will reflect the typical Natick 4% O&M increase plus the 4.9% increase in MWRA assessment.

9.6 NATICK PRODUCTION COSTS VS MWRA RATES (RT 30 MWRA SUPPLEMENT)

We compared MWRA water rates versus Natick costs to provide water to its customers if Natick utilized a MWRA RT 30 Direct Connection, Option 4, as a supplement source when needed. Option 4a would maintain all in-town water sources and construct advanced WTPs for future contaminants. Option 4b would be the same except elimination of Elm Bank water supply and treatment. Natick's total annual water pumped for the last 4 years (2019 to 2022), averaged 1,152 million gallons (mg). Assuming 145mg of the water use is drawn from MWRA, using the FY 2022 MWRA rate of $4,387.28 per mg, would yield an MWRA assessment of $636,156. Natick's cost to provide 1 million gallons of water in FY 2022 was $5,286.64, with a total annual O&M cost of $6,193,048.00, see Table 36 for cost breakdown. This is not an even comparison because the Natick O&M costs include distribution system related O&M and capital debt costs that cannot be eliminated with a supplemental MWRA water use option. Therefore, it is important to look at all future costs related to capital improvements, utility and chemicals as new treatment plants are required to treat future regulated contaminants.

If Natick was to connect to MWRA at the Rt 30 and utilize as a supplemental source Option 4a, there would be an increase in O&M costs with the addition of the water booster station and MWRA assessment. The projected FY 2027 O&M probable cost for Option 4a is $8.275 with $0.775M of that representing MWRA water assessment based on 145.8 mg usage for the year, which represent operating for 3 months, 18 hours per day, and 1,500 gpm. This represents approximately 13% of total water use for Natick. The projected FY 2027 O&M probable cost for Option 4b is $9.021 with $0.1.530M of that representing MWRA water assessment based on 288mg usage for the year, which replaces Elm Bank usage, approximately 25% of total water use for Natick.

Looking at the end of the 55-year projection, the projected FY 2077 O&M probable cost for Option 4a is $55.787M, with $5.246M of that representing MWRA water assessment based on 145.8 mg usage for the year. Large increases in Natick rates may be required in 2026 thru 2029 (start MWRA use), possibly 18%,24%,3%, and 12% to start paying the new WTP related capital costs and MWRA assessment. The rate increases beyond that will reflect the typical Natick 4% O&M increase plus the 4.9% increase in MWRA assessment.

Looking at the end of the 55-year projection, the projected FY 2077 O&M probable cost for Option 4b, no Elm Bank, is $60.640M, with $10.362M of that representing MWRA water assessment based on 288 mg usage for the year. Increases in Natick rates would occur

in 2026 thru 2029 (start MWRA use), possibly 18%,20%,3%, and 13% to start paying the new WTP and MWRA infrastructure related capital costs and MWRA assessment. The rate increases beyond that will reflect the typical Natick 4% O&M increase plus the 4.9% increase in MWRA assessment.

END OF REPORT

APPENDIX

A *20-Year Capital Plan Existing Facilities*

WATER STORAGE CAPITAL PLAN 2023-2027

WATER STORAGE ASSET NAME	ESTIMATED COST		CALENDER YEAR										TOTALS
			2023		2024		2025		2026		2027		
	Rehabilitation	Replacement	Rehab	Replace	Rehab	Replace	Rehab	Replace	Rehab	Replace	Rehab	Replace	
Town Forest Reservoir	$ 477,000.00	$ 5,000,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Town Forest Reservoir Chemical Feed Building	$ 75,000.00	$ 214,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Town Forest Reservoir Control Building	$ 75,000.00	$ 214,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Town Forest Reservoir Mixer	$ -	$ 15,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 17,021.12	$ -	$ -	$ 17,021
	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
Broad Hill Reservoir	$ 477,000.00	$ 4,500,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Broad Hill Reservoir Chemical Feed Building	$ 75,000.00	$ 214,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Broad Hill Reservoir Control Building	$ 75,000.00	$ 214,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Broad Hill Reservoir Mixer	$ -	$ 15,000.00	$ -	$ -	$ -	$ 16,219.63	$ -	$ -	$ -	$ -	$ -	$ -	$ 16,220
TOTALS	**$ 1,254,000.00**	**$ 10,386,000.00**	**$ -**	**$ -**	**$ -**	**$ 16,220**	**$ -**	**$ -**	**$ -**	**$ 17,021**	**$ -**	**$ -**	**$ 33,241**

WATER STORAGE CAPITAL PLAN 2028-2032

WATER STORAGE ASSET NAME	ESTIMATED COST		2028		2029		2030		2031		2032		TOTALS
	Rehabilitation	Replacement	Rehab	Replace	Rehab	Replace	Rehab	Replace	Rehab	Replace	Rehab	Replace	
Town Forest Reservoir	$ 477,000.00	$ 5,000,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Town Forest Reservoir Chemical Feed Building	$ 75,000.00	$ 214,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Town Forest Reservoir Control Building	$ 75,000.00	$ 214,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Town Forest Reservoir Mixer	$ -	$ 15,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 19,425.58	$ -	$ -	$ 19,426
	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
Broad Hill Reservoir	$ 477,000.00	$ 4,500,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Broad Hill Reservoir Chemical Feed Building	$ 75,000.00	$ 214,000.00	$ -	$ -	$ -	$ -	$ -	$ 271,421.01	$ -	$ -	$ -	$ -	$ 271,421
Broad Hill Reservoir Control Building	$ 75,000.00	$ 214,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Broad Hill Reservoir Mixer	$ -	$ 15,000.00	$ -	$ -	$ -	$ 18,624.09	$ -	$ -	$ -	$ -	$ -	$ -	$ 18,624
TOTALS	**$ 1,254,000**	**$ 10,386,000**	**$ -**	**$ -**	**$ -**	**$ 18,624**	**$ -**	**$ 271,421**	**$ -**	**$ 19,426**	**$ -**	**$ -**	**$ 309,471**

WATER STORAGE CAPITAL PLAN 2033-2037

WATER STORAGE ASSET NAME	ESTIMATED COST		CALENDER YEAR 2033		2034		2035		2036		2037		TOTALS
	Rehabilitation	Replacement	Rehab	Replace	Rehab	Replace	Rehab	Replace	Rehab	Replace	Rehab	Replace	
Town Forest Reservoir	$ 477,000.00	$ 5,000,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ 681,451.64	$ -	$ -	$ -	**$ 681,451.64**
Town Forest Reservoir Chemical Feed Building	$ 75,000.00	$ 214,000.00	$ 101,135.34	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ 101,135.34**
Town Forest Reservoir Control Building	$ 75,000.00	$ 214,000.00	$ 101,135.34	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ 101,135**
Town Forest Reservoir Mixer	$ -	$ 15,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 21,830.04	**$ 21,830**
	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
Broad Hill Reservoir	$ 477,000.00	$ 4,500,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ 681,451.64	$ -	$ -	$ -	**$ 681,452**
Broad Hill Reservoir Chemical Feed Building	$ 75,000.00	$ 214,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Broad Hill Reservoir Control Building	$ 75,000.00	$ 214,000.00	$ 101,135.34	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ 101,135**
Broad Hill Reservoir Mixer	$ -	$ 15,000.00	$ -	$ -	$ -	$ -	$ -	$ 21,028.55	$ -	$ -	$ -	$ -	**$ 21,029**
TOTALS	**$ 1,254,000.00**	**$ 10,386,000.00**	**$ 303,406**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 21,029**	**$ 1,362,903**	**$ -**	**$ -**	**$ 21,830**	**$ 1,709,168**

WATER STORAGE CAPITAL PLAN 2038-2042

WATER STORAGE ASSET NAME	ESTIMATED COST		2038		2039		2040		2041		2042		TOTALS
	Rehabilitation	Replacement	Rehab	Replace	Rehab	Replace	Rehab	Replace	Rehab	Replace	Rehab	Replace	
Town Forest Reservoir	$ 477,000.00	$ 5,000,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Town Forest Reservoir Chemical Feed Building	$ 75,000.00	$ 214,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Town Forest Reservoir Control Building	$ 75,000.00	$ 214,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Town Forest Reservoir Mixer	$ -	$ 15,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Broad Hill Reservoir	$ 477,000.00	$ 4,500,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Broad Hill Reservoir Chemical Feed Building	$ 75,000.00	$ 214,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Broad Hill Reservoir Control Building	$ 75,000.00	$ 214,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Broad Hill Reservoir Mixer	$ -	$ 15,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 23,433.01	$ -	$ -	**$ 23,433**
TOTALS	**$ 1,254,000**	**$ 10,386,000**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 23,433**	**$ -**	**$ -**	**$ 23,433**

WATER SUPPLY CAPITAL PLAN 2023-2027

WATER SUPPLY ASSET NAME	ESTIMATED COST		CALENDER YEAR										TOTALS
			2023		2024		2025		2026		2027		
	Rehabilitation	Replacement	Rehab	Replace	Rehab	Replace	Rehab	Replace	Rehab	Replace	Rehab	Replace	
Springvale #1 Well	$ 25,000	$ 330,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Springvale #2 Well	$ 25,000	$ 330,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 29,704	$ -	$ 29,704
Springvale #1&#2 PS	$ 300,000	$ 1,161,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Springvale #3 Well	$ 25,000	$ 330,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Springvale #3 PS	$ 300,000	$ 1,161,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Springvale #4 Well	$ 25,000	$ 330,000	$ -	$ -	$ 27,701	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 27,701
Springvale #4 PS	$ 300,000	$ 1,161,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Springvale #4A Well	$ 25,000	$ 330,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Springvale #4A PS	$ 300,000	$ 1,161,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Evergreen #1 Well	$ 25,000	$ 330,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Evergreen #1 PS	$ 300,000	$ 1,161,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Evergreen #2 PS	$ 300,000	$ 1,161,000	$ -	$ -	$ -	$ -	$ -	$ 374,465	$ -	$ -	$ -	$ -	$ 374,465
Evergreen #3 Well	$ 25,000	$ 330,000	$ 324,393	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 324,393
Evergreen #3A Well	$ 25,000	$ 330,000	$ 324,393	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 324,393
Pine Oaks #1 Well	$ 25,000	$ 330,000	$ -	$ -	$ -	$ -	$ 28,369	$ -	$ -	$ -	$ -	$ -	$ 28,369
Pine Oaks PS	$ 300,000	$ 1,161,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Morse Pond #1 Well	$ 25,000	$ 330,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Morse Pond #1A Well	$ 100,000	$ 900,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Elm Bank #2 Well	$ 30,000	$ 330,000	$ -	$ -	$ -	$ -	$ -	$ 374,465	$ -	$ -	$ -	$ -	$ 374,465
Elm Bank #4 Well	$ 30,000	$ 330,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Elm Bank #4 Vaults	$ 250,000	$ 800,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total	**$ 2,760,000**	**$ 13,787,000**	**$ 648,785**	**$ -**	**$ 27,701**	**$ -**	**$ 28,369**	**$ 748,929**	**$ -**	**$ -**	**$ 29,704**	**$ -**	**$ 1,483,488**

WATER SUPPLY CAPITAL PLAN 2028-2032

WATER SUPPLY ASSET NAME	ESTIMATED COST		CALENDER YEAR										TOTALS
			2028		2029		2030		2031		2032		
	Rehabilitation	Replacement	Rehab	Replace	Rehab	Replace	Rehab	Replace	Rehab	Replace	Rehab	Replace	
Springvale #1 Well	$ 25,000	$ 330,000	$ -	$ -	$ 31,040	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 31,040
Springvale #2 Well	$ 25,000	$ 330,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Springvale #1&#2 PS	$ 300,000	$ 1,161,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Springvale #3 Well	$ 25,000	$ 330,000	$ -	$ -	$ 31,040	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 31,040
Springvale #3 PS	$ 300,000	$ 1,161,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,534,557	$ 1,534,557
Springvale #4 Well	$ 25,000	$ 330,000	$ -	$ 400,914	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 400,914
Springvale #4 PS	$ 300,000	$ 1,161,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Springvale #4A Well	$ 25,000	$ 330,000	$ -	$ -	$ 31,040	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 31,040
Springvale #4A PS	$ 300,000	$ 1,161,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Evergreen #1 Well	$ 25,000	$ 330,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Evergreen #1 PS	$ 300,000	$ 1,161,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Evergreen #2 PS	$ 300,000	$ 1,161,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 33,044	$ -	$ 33,044
Evergreen #3 Well	$ 25,000	$ 330,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Evergreen #3A Well	$ 25,000	$ 330,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pine Oaks #1 Well	$ 25,000	$ 330,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 33,044	$ -	$ 33,044
Pine Oaks PS	$ 300,000	$ 1,161,000	$ -	$ -	$ 31,040	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 31,040
Morse Pond #1 Well	$ 25,000	$ 330,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Morse Pond #1A Well	$ 100,000	$ 900,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Elm Bank #2 Well	$ 30,000	$ 330,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 33,044	$ -	$ 33,044
Elm Bank #4 Well	$ 30,000	$ 330,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Elm Bank #4 Vaults	$ 250,000	$ 800,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total	**$ 2,760,000**	**$ 13,787,000**	**$ -**	**$ 400,914**	**$ 124,161**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 99,132**	**$ 1,534,557**	**$ 2,158,763**

WATER SUPPLY CAPITAL PLAN 2033-2037

WATER SUPPLY ASSET NAME	ESTIMATED COST		CALENDER YEAR										TOTALS
			2033		2034		2035		2036		2037		
	Rehabilitation	Replacement	Rehab	Replace	Rehab	Replace	Rehab	Replace	Rehab	Replace	Rehab	Replace	
Springvale #1 Well	$ 25,000	$ 330,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 35,715	$ -	$ -	$ -	**$ 35,715**
Springvale #2 Well	$ 25,000	$ 330,000	$ -	$ -	$ 34,380	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ 34,380**
Springvale #1&#2 PS	$ 300,000	$ 1,161,000	$ -	$ 1,565,575	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ 1,565,575**
Springvale #3 Well	$ 25,000	$ 330,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 35,715	$ -	$ -	$ -	**$ 35,715**
Springvale #3 PS	$ 300,000	$ 1,161,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Springvale #4 Well	$ 25,000	$ 330,000	$ -	$ -	$ -	$ -	$ 35,048	$ -	$ -	$ -	$ -	$ -	**$ 35,048**
Springvale #4 PS	$ 300,000	$ 1,161,000	$ -	$ -	$ -	$ -	$ -	$ 1,627,610	$ -	$ -	$ -	$ -	**$ 1,627,610**
Springvale #4A Well	$ 25,000	$ 330,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 35,715	$ -	$ -	$ -	**$ 35,715**
Springvale #4A PS	$ 300,000	$ 1,161,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Evergreen #1 Well	$ 25,000	$ 330,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Evergreen #1 PS	$ 300,000	$ 1,161,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Evergreen #2 PS	$ 300,000	$ 1,161,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Evergreen #3 Well	$ 25,000	$ 330,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Evergreen #3A Well	$ 25,000	$ 330,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Pine Oaks #1 Well	$ 25,000	$ 330,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Pine Oaks PS	$ 300,000	$ 1,161,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 35,715	$ -	$ -	$ -	**$ 35,715**
Morse Pond #1 Well	$ 25,000	$ 330,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Morse Pond #1A Well	$ 100,000	$ 900,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Elm Bank #2 Well	$ 30,000	$ 330,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Elm Bank #4 Well	$ 30,000	$ 330,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Elm Bank #4 Vaults	$ 250,000	$ 800,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Total	**$ 2,760,000**	**$ 13,787,000**	**$ -**	**$ 1,565,575**	**$ 34,380**	**$ -**	**$ 35,048**	**$ 1,627,610**	**$ 142,862**	**$ -**	**$ -**	**$ -**	**$ 3,405,474**

WATER SUPPLY CAPITAL PLAN 2038-2042

WATER SUPPLY ASSET NAME	ESTIMATED COST		CALENDER YEAR										TOTALS
			2038		2039		2040		2041		2042		
	Rehabilitation	Replacement	Rehab	Replace	Rehab	Replace	Rehab	Replace	Rehab	Replace	Rehab	Replace	
Springvale #1 Well	$ 25,000	$ 330,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Springvale #2 Well	$ 25,000	$ 330,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 39,055	$ -	$ -	$ -	**$ 39,055**
Springvale #1&#2 PS	$ 300,000	$ 1,161,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Springvale #3 Well	$ 25,000	$ 330,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Springvale #3 PS	$ 300,000	$ 1,161,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Springvale #4 Well	$ 25,000	$ 330,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 39,723	$ -	**$ 39,723**
Springvale #4 PS	$ 300,000	$ 1,161,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Springvale #4A Well	$ 25,000	$ 330,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Springvale #4A PS	$ 300,000	$ 1,161,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 476,675	$ -	**$ 476,675**
Evergreen #1 Well	$ 25,000	$ 330,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Evergreen #1 PS	$ 300,000	$ 1,161,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Evergreen #2 PS	$ 300,000	$ 1,161,000	$ -	$ -	$ 37,719	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ 37,719**
Evergreen #3 Well	$ 25,000	$ 330,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Evergreen #3A Well	$ 25,000	$ 330,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Pine Oaks #1 Well	$ 25,000	$ 330,000	$ -	$ -	$ 37,719	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ 37,719**
Pine Oaks PS	$ 300,000	$ 1,161,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Morse Pond #1 Well	$ 25,000	$ 330,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Morse Pond #1A Well	$ 100,000	$ 900,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Elm Bank #2 Well	$ 30,000	$ 330,000	$ -	$ -	$ 37,719	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ 37,719**
Elm Bank #4 Well	$ 30,000	$ 330,000	$ -	$ 1,720,663	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ 1,720,663**
Elm Bank #4 Vaults	$ 250,000	$ 800,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Total	**$ 2,760,000**	**$ 13,787,000**	**$ -**	**$ 1,720,663**	**$ 113,158**	**$ -**	**$ -**	**$ -**	**$ 39,055**	**$ -**	**$ 516,398**	**$ -**	**$ 2,389,273**

WATER TREATMENT CAPITAL PLAN 2023-2027

WATER TREATMENT ASSET NAME	ESTIMATED COST		CALENDER YEAR 2023		2024		2025		2026		2027		TOTALS
	Rehabilitation	Replacement	Rehab	Replace	Rehab	Replace	Rehab	Replace	Rehab	Replace	Rehab	Replace	
H&T Greensand Plant	$ 800,000.00	$ 8,000,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tonka Greensand Plant	$ 1,263,000.00	$ 10,000,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tonka Membrane Plant PFAs removal New	$ 1,764,000.00	$ 18,000,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 20,906,237	$ -	$ -	$ 20,906,237
Air Stripping Towers 1-3	$ 500,000.00	$ 1,125,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Air Stripping Towers 4	$ 150,000.00	$ 450,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
H&T PFAS Building	$ 300,000.00	$ 4,000,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
GAC H&T Replacement	$ 249,500.00	$ 249,500.00	$ -	$ -	$ -	$ 276,452	$ -	$ -	$ -	$ 289,784	$ -	$ -	$ 566,236
GAC Tonka Replacement	$ 147,250.00	$ 147,250.00	$ -	$ 159,223	$ -	$ -	$ -	$ 167,091	$ -	$ -	$ -	$ -	$ 326,313
High Lift Building	$ 1,000,000.00	$ 6,000,000.00	$ -	$ -	$ 1,108,025	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,108,025
Backwash Tank #1	$ 100,000.00	$ 504,000.00	$ -	$ -	$ 110,803	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 110,803
Backwash Tank #2	$ 100,000.00	$ 504,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
WTP General Town Maintenenace	$ 75,000.00	$ -	$ -	$ -	$ 83,102	$ -	$ -	$ -	$ 87,109	$ -	$ -	$ -	$ 170,211
Office/Garage	$ 150,000.00	$ 2,500,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Highlift Generator	$ -	$ 300,000.00	$ -	$ -	$ -	$ 332,408	$ -	$ -	$ -	$ -	$ -	$ -	$ 332,408
Pump Station Generator	$ -	$ 200,000.00	$ -	$ -	$ -	$ 221,605	$ -	$ -	$ -	$ -	$ -	$ -	$ 221,605
Elm Bank Water Treatment Plant	$ 700,000.00	$ 6,000,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Morse Pond Water Treatment Plant	$ 800,000.00	$ 5,000,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
TOTALS	**$ 8,098,750.00**	**$ 62,979,750.00**	**$ -**	**$ 159,223**	**$ 1,301,930**	**$ 830,465**	**$ -**	**$ 167,091**	**$ 87,109**	**$ 21,196,021**	**$ -**	**$ -**	**$ 23,741,838**

WATER TREATMENT CAPITAL PLAN 2028-2032

WATER TREATMENT ASSET NAME	ESTIMATED COST		2028		2029		2030		2031		2032		TOTALS
	Rehabilitation	Replacement	Rehab	Replace	Rehab	Replace	Rehab	Replace	Rehab	Replace	Rehab	Replace	
H&T Greensand Plant	$ 800,000.00	$ 8,000,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tonka Greensand Plant	$ 1,263,000.00	$ 10,000,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tonka Membrane Plant PFAS removal New	$ 1,764,000.00	$ 18,000,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Air Stripping Towers 1-3	$ 500,000.00	$ 1,125,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 958,272	$ 329,778	$ 1,288,050
Air Stripping Towers 4	$ 150,000.00	$ 450,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
H&T PFAS Building	$ 300,000.00	$ 4,000,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
GAC H&T Replacement	$ 249,500.00	$ 249,500.00	$ -	$ 303,115	$ -	$ -	$ -	$ 316,446	$ -	$ -	$ -	$ -	$ 619,562
GAC Tonka Replacement	$ 147,250.00	$ 147,250.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 190,694	$ 2,032	$ -	$ 192,726
High Lift Building	$ 1,000,000.00	$ 6,000,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	Rehab	Replace	$ -
Backwash Tank #1	$ 100,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backwash Tank #2	$ 100,000.00	$ 504,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
WTP General Town Maintenance	$ 75,000.00	$ 504,000.00	$ 91,117	$ -	$ -	$ -	$ 95,124	$ -	$ -	$ -	$ -	$ -	$ 186,241
Office/Garage	$ 150,000.00	$ -	$ -	$ -	$ -	$ -	$ 190,248	$ -	$ -	$ -	$ -	$ -	$ 190,248
Highlift Generator	$ -	$ 2,500,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pump Station Generator	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Elm Bank Water Treatment Plant	$ 700,000.00	$ 300,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Morse Pond Water Treatment Plant	$ 800,000.00	$ 200,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
TOTALS	**$ 8,098,750.00**	**$ 51,979,750.00**	**$ 91,117**	**$ 303,115**	**$ -**	**$ -**	**$ 285,373**	**$ 316,446**	**$ -**	**$ 190,694**	**$ 960,304**	**$ 329,778**	**$ 2,476,827**

WATER TREATMENT 20-YEAR CAPITAL PLAN 2033-2037

WATER TREATMENT ASSET NAME	ESTIMATED COST		CALENDER YEAR 2033		2034		2035		2036		2037		TOTALS
	Rehabilitation	Replacement	Rehab	Replace	Rehab	Replace	Rehab	Replace	Rehab	Replace	Rehab	Replace	
H&T Greensand Plant	$ 800,000.00	$ 8,000,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,142,896	$ -	$ -	$ -	**$ 1,142,896**
Tonka Greensand Plant	$ 1,263,000.00	$ 10,000,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Tonka Membrane Plant PFAs removal New	$ 1,764,000.00	$ 18,000,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Air Stripping Towers 1-3	$ 500,000.00	$ 1,125,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Air Stripping Towers 4	$ 150,000.00	$ 450,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
H&T PFAS Building	$ 300,000.00	$ 4,000,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
GAC H&T Replacement	$ 249,500.00	$ 249,500.00	$ -	$ -	$ -	$ 343,109	$ -	$ -	$ -	$ 356,441	$ -	$ -	**$ 699,550**
GAC Tonka Replacement	$ 147,250.00	$ 147,250.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 210,364	$ -	$ -	**$ 210,364**
High Lift Building	$ 1,000,000.00	$ 6,000,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Backwash Tank #1	$ 100,000.00	$ 504,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Backwash Tank #2	$ 100,000.00	$ 504,000.00	$ 134,847	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ 134,847**
WTP General Town Maintenenace	$ 75,000.00	$ -	$ -	$ -	$ 103,139	$ -	$ -	$ -	$ 107,146	$ -	$ -	$ -	**$ 210,286**
Office/Garage	$ 150,000.00	$ 2,500,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Highlift Generator	$ -	$ 300,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Pump Station Generator	$ -	$ 200,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Elm Bank Water Treatment Plant	$ 700,000.00	$ 6,000,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Morse Pond Water Treatment Plant	$ 800,000.00	$ 5,000,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
TOTALS	**$ 8,098,750.00**	**$ 62,979,750.00**	**$ 134,847**	**$ -**	**$ 103,139**	**$ 343,109**	**$ -**	**$ -**	**$ 1,250,042**	**$ 566,805**	**$ -**	**$ -**	**$ 2,397,943**

WATER TREATMENT CAPITAL PLAN 2038-2042

WATER TREATMENT ASSET NAME	ESTIMATED COST		2038		2039		2040		2041		2042		TOTALS
	Rehabilitation	Replacement	Rehab	Replace	Rehab	Replace	Rehab	Replace	Rehab	Replace	Rehab	Replace	
H&T Greensand Plant	$ 800,000.00	$ 8,000,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Tonka Greensand Plant	$ 1,263,000.00	$ 10,000,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Tonka Membrane Plant PFAS removal New	$ 1,764,000.00	$ 18,000,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Air Stripping Towers 1-3	$ 500,000.00	$ 1,125,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 794,459	$ -	**$ 794,459**
Air Stripping Towers 4	$ 150,000.00	$ 450,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 238,338	$ -	**$ 238,338**
H&T PFAS Building	$ 300,000.00	$ 4,000,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
GAC H&T Replacement	$ 249,500.00	$ 249,500.00	$ -	$ 369,772	$ -	$ -	$ -	$ 383,103	$ -	$ -	$ -	$ 396,435	**$ 1,149,310**
GAC Tonka Replacement	$ 147,250.00	$ 147,250.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 230,034	$ -	$ -	**$ 230,034**
High Lift Building	$ 1,000,000.00	$ 6,000,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Backwash Tank #1	$ 100,000.00	$ -	$ -	$ -	$ 150,877	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ 150,877**
Backwash Tank #2	$ 100,000.00	$ 504,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
WTP General Town Maintenance	$ 75,000.00	$ 504,000.00	$ 111,154	$ -	$ -	$ -	$ 115,161	$ -	$ -	$ -	$ 119,169	$ -	**$ 345,484**
Office/Garage	$ 150,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Highlift Generator	$ -	$ 2,500,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Pump Station Generator	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Elm Bank Water Treatment Plant	$ 700,000.00	$ 300,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Morse Pond Water Treatment Plant	$ 800,000.00	$ 200,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
TOTALS	**$ 8,098,750.00**	**$ 51,979,750.00**	**$ 111,154**	**$ 369,772**	**$ 150,877**	**$ -**	**$ 115,161**	**$ 383,103**	**$ -**	**$ 230,034**	**$ 1,151,965**	**$ 396,435**	**$ 2,908,501**

B Water Distribution Map

WATER DISTRIBUTION 2019

Weston Route 30 Connection Natick 8"

MWRA Supplemental Water Connection Option 4

Full MWRA Water Connection Option 2a

Wayland North Main Street Connection Natick 8"

Evergreen Water Supply Sources #1,#3 & #3A

Hybrid MWRA Water Connection Option 3a with Springvale Sources

Pine Oaks Water Supply Well and Pump Station

Full MWRA Water Connection Option 2a, 2b,2c & 3b

Framingham Speen Street Connection Natick 10"

Springvale Water Site Tonka & H&T WTP Springvale Sources 1,2,3,4&4A

Springvale WTP

Wellesley Route 9 Connection Natick 6"

Indirect MWRA Connection Option 2c

Framingham Hartford Street Connection Natick 6"

Morse Pond Water Supply Well and Pump Station

Framingham Howe Street Connection Natick 6"

Elm bank Water Supply Wells #2 & #4

Wellesley Eliot Street Connection Natick 10"

Elm bank Water Chemical Feed Plant

Framingham Kendall Lane Connection Natick 6"

Approximately Location of MWRA Sudbury Water Connection Option 2b

N NE E SE S SW W NW

0 0.5 1 Miles

1:10,000

NAME	SHT	NAME	SHT	NAME	SHT	NAME	SHT	NAME	SHT	NAME	SHT	NAME	SHT	NAME	SHT	NAME	SHT
ABBOTT RD	15	BROOK HOLLOW RD	54	COURSE BROOK LN	58	FARM HILL RD	63	HARRISON ST	43	KINSMAN PL	35	MARSHALL RD	29	OLIVER ST	51	RETROP RD	37	STILLMAN CIR	56	WALNUT ST	2
ADAMS ST	44	BROOK ST	54	COURT ST	44	FARRANT RD	13	HARTFORD ST	24	KNOX CT	51	MARSTON LN	69	OLIVIER ST	31	REYNOLDS AVE	43	STILLMAN ST	56	WARING RD	1
ALDEN ST	4	BROOKDALE RD	31	CRAFT RD	14	FARWELL ST	52	HARVARD ST	36	KYLIE LN	58	MASS. TPK	12	ORCHARD RD	21	RHODE ISLAND AVE	21	STILLWATER CIR	37	WARREN RD	6
ALGER ST	54	BROWNING RD	21	CRAIGIE ST	52	FAY WAY	52	HARVARD ST EXT	36	LACONIA RD	21	MASSACHUSETTS AVE	21	OTIS ST	15	RICE ST	36	STONE TER	31	WASHBURN CT	5
ALGONQUIAN DR	45	BUCKINGHAM RD	32	CRESCENT ST	33	FELCH CT	12	HARVEST MOON DR	61	LACOSTA DR	40	MATHEW CT	54	OVERBROOK TER	21	RICHARD RD	13	STONEBRIDGE CIR	40	WASHINGTON AVE	4
ALLEN CT	43	BUENA VISTA RD	21	CROSS ST	51	FERN ST	58	HARWOOD RD	14	LAKE ST	35	MEADOW POND LN	58	OVERHILL RD	27	RICHMOND RD	21	STONES END RD	60	WASHINGTON ST	3
ALLEN ST	44	BUNKER LN	58	CURTIS RD	32	FERNDALE RD	7	HAWTHORNE ST	27	LAKESHORE RD	18	MEADOW ST	26	OVERLOOK RD	29	RIDGE AVE	25	STRATFORD RD	6	WATER ST	5
ALLISON WAY	66	BURNING TREE RD	40	CURVE ST	51	FERRIN CT	43	HAYES ST	44	LAKESIDE AVE	4	MEETING HOUSE LN	27	OXBOW RD	39	RIVER ST	55	STRATHMORE RD	68	WATERVIEW LN	6
AMBLER CT	51	BURNING TREE TER	40	CYPRESS RD	12	FIELDSTONE LN	71	HEARTHSTONE CIR	7	LAKEVIEW AVE	49	MECHANIC ST	35	OXFORD ST	15	RIVERBEND DR	68	STRAWBERRY HILL RD	37	WATSON ST	4
ANDREW CIR	4	BYRON DR	21	D ST	31	FIFTH ST	26	HEATHER WAY	60	LAKEWOOD RD	26	MELODY WAY	40	PALMER AVE	43	ROBERT SPROULE	63	SUMMER ST	43	WAYSIDE RD	6
APPLE RIDGE DR	78	CABOT ST	4	DARBY CT	7	FIRST ST	26	HEIDI LN	18	LAMPLIGHT CIR	31	MELVIN RD	21	PAMELA RD	8	ROBINWOOD RD	25	SUMMIT RD	36	WEBSTER ST	5
APPLETON RD	13	CAMPUS DR	50	DARTMOUTH ST	12	FISHER ST	26	HEMLOCK DR	31	LANES END	57	MERCER RD	24	PARK AVE	19	ROCKLAND ST	60	SUNDANCE WAY	52	WEDGEWOOD RD	1
APPLETREE LN	12	CAPE ST	64	DAVID DR	36	FISKE LN	49	HERBERT RD	49	LANGDON RD	8	MEREDITH PATH	30	PARK ST	44	ROCKLAND TER	66	SUNNYSIDE RD	18	WELLESLEY AVE	4
AQUEDUCT RD	68	CARLISLE TER	28	DAVIS BROOK DR	62	FISKE ST	49	HERITAGE LN	34	LANTERN LN	77	MERIFIELD LN	72	PARKMAN ST	35	ROCKRIDGE RD	68	SUNSET PATH	12	WELLESLEY RD	1
ARBOR CIR	37	CARLSON CIR	58	DEAN ST	24	FLORAL AVE	51	HF BROWN WAY	47	LARCHWOOD LN	39	MERRILL RD	63	PARKVIEW ST	52	ROCKWOOD RD	53	SUNSHINE AVE	15	WELLESLEY RD EXT	1
ARCADIA RD	26	CARSHA DR	66	DEEPWOODS DR	68	FLORAL AVE EXT	51	HICKORY RD	8	LARKSPUR WAY	48	MICHAEL TER	60	PARSONS WAY	63	ROCKY HILL RD	52	SUPERIOR DR	11	WELLS ST	2
ARCHER DR	25	CARTER DR	37	DEER PATH	61	FLORENCE ST	36	HIGH ST	43	LAURIE LN	7	MICHIGAN DR	9	PATTON RD	29	ROLLING LN	30	SURREY LN	32	WENTWORTH RD	1
ARLINGTON CIR	20	CARVER HILL ST	63	DEERFIELD LN	27	FLYNN ST	19	HIGH ST EXT	51	LEACH LN	46	MIDDLE ST	36	PAUL ST	20	ROSEWOOD LN	8	SYLVESTER RD	58	WEST CENTRAL ST	3
ARLINGTON RD	14	CASWELL ST	55	DEVIN DR	8	FOLEY DR	26	HIGHLAND ST	35	LEAVITT ST	27	MIDDLESEX AVE	43	PAULINE DR	37	ROXBURY AVE	43	TAMARACK RD	39	WEST ST	5
ARROW PATH	53	CECIL RD	44	DEWEY ST	44	FORD CT	51	HILL ST	18	LEDGE LN	60	MILFORD AVE	4	PAYSON RD	35	RUNNINGBROOK CIR	18	TAYLOR AVE	43	WESTERN AVE	4
ARTHUR ST	27	CEDAR AVE	51	DIAMOND ST	43	FOREST AVE	43	HILLCREST AVE	51	LEIGHTON ST	13	MILK ST	44	PEARL ST	43	RUSSELL CIR	18	TECH CIR	8	WESTFIELD RD	4
ASH ST	12	CEDAR ST	54	DIGREN RD	28	FOREST AVE EXT	51	HILLSIDE RD	36	LELAND RD	14	MILL LN	63	PEGAN LN	75	RUTLEDGE LN	18	TEMPLE ST	43	WESTLAKE AVE	1
ATHERTON ST	51	CEDAR TER	60	DONCASTER DR	33	FOREST ST	43	HOFFMAN CT	43	LENA RD	49	MILL ST	32	PELHAM RD	31	RUTLEDGE RD	18	TERRACE RD	28	WESTVIEW RD	4
AUBURN ST	54	CEMETERY ST	42	DONOVAN LN	36	FOSKETT CT	35	HOME AVE	40	LENOX ST	12	MILLBROOK RD	31	PENACOOK LN	45	SADDLEBROOK RD	2	TERRAINE AVE	19	WESTVIEW TER	4
AUSTIN WAY	28	CENTRE ST	37	DORSET LN	47	FOXHILL DR	9	HOMEWARD LN	47	LIBBY RD	53	PENCOSCOT DR	53	PENNACOOK RD	45	SAMUEL PATH	57	THERESA LN	57	WESTWOOD RD	1
AUTUMN LN	48	CHALCOM CIR	68	DOTTIES CT	7	FRANCES AVE	33	HOMEWARD RD	39	LIBERTY ST	8	MOHEGAN TRL	47	PERRY RD	18	SANCTUARY BLVD	61	THIRD ST	26	WETHERSFIELD RD	1
AVON LN	25	CHARLES ST	27	DOUGLAS AVE	70	FRANCONIA AVE	27	HOPEWELL FARM RD	71	LINCOLN CIR	52	MOORE ST	58	PETERSON RD	15	SASSAMON RD	78	THOMPSON CT	43	WHALEN LN	4
AVON ST	44	CHERYL RD	25	DOVER RD	64	FRANKLIN ST	36	HOVEY AVE	4	LINCOLN PL	44	MORAN CT	35	PHEASANT HOLLOW RD	48	SAWIN ST	36	THOREAU CT	48	WHEELER LN	1
AZALEA CIR	52	CHESTER ST	44	DRAPER ST	49	FRONT ST	54	HOWE ST	31	LINCOLN ST	44	MORENCY ST	39	PHILLIPS POND RD	74	SCARDALE RD	53	TIBBETTS ST	36	WHISPERING LN	6
BACON ST	26	CHESTNUT ST	27	DRURY LN	13	FROST ST	3	HUDSON ST	49	LINCOLN ST EXT	44	MORGAN DR	60	PHILLIPS ST	64	SCHALLER ST	55	TIMBER LN	25	WHITCOMB ST	4
BADGER AVE	63	CHIEFTAIN LN	53	DURANT RD	50	GANNETT RD	21	HUNTERS HILL CT	43	LINDEN ST	19	MORNINGSIDE AVE	61	PICKEREL RD	15	SCHOOL ST	44	TOURNAMENT RD	40	WHITNEY CIR	1
BAILEY HILL RD	63	CHRISLIN WAY	6	DWIGHT AVE	13	GARDEN RD	39	HUNTERS LN	60	LINWOOD RD	39	MORSE LN	54	PILGRIM RD	32	SCHOOL ST EXT	52	TOWER CT	27	WHITRIDGE RD	7
BARCHSTEAD PL	50	CHRYSLER RD	16	DWIGHT AVE EXT	13	GARFIELD ST	44	HUNTINGTON ST	14	LODGE LN	33	MORSE ST	44	PINE ST	6	SECOND ST	26	TOWNSEND CIR	49	WHITTIER RD	1
BARNESDALE RD	24	CHURCH ST	44	EAST CENTRAL ST	30	GENERAL GREENE AV	34	HUNTON DR	8	LODGE RD	41	MOSHER ST	44	PINEHURST AVE	49	SHADY OAK LN	31	TRAVERSE RD	21	WHITTIER RD EXT	1
BASS RD	21	CIDER MILL LN	66	EAST EVERGREEN RD	12	GIBBS ST	20	ICE HOUSE LN	59	LOIS ST	27	MURDOCK RD	37	PINERIDGE RD	21	SHATTUCK ST	35	TRAVIS RD	24	WIGHT FARM RD	2
BASS TER	21	CIRCULAR AVE	51	EAST ST	44	GIBSON RD	31	INDIAN RIDGE RD	78	LOKER ST	26	NANCY RD	3	PINEWOOD AVE	51	SHEFFIELD RD	13	TUCKER ST	42	WILDMEADOW LN	6
BAY STATE RD	28	CLARENDON ST	44	EASTLEIGH LN	59	GILBERT ST	35	INDIAN RIDGE WAY	78	LONGFELLOW RD	14	NAPLES RD	21	PITTS ST	43	SHERIDAN ST	44	TYLER ST	26	WILDWOOD PL	3
BAYBERRY RD	12	CLARKS CT	43	EDEN ST	40	GILMORE AVE	55	INDIAN ROCK RD	2	LONGVIEW ST	31	NASHOBAH CIR	26	PLAIN ST	43	SHERMAN ST	44	UNION CT	43	WILLOW ST	3
BEACON ST	27	CLAYBROOK RD	70	EDGEWOOD AVE	52	GLEN ST	63	INDIAN SPRINGS RD	78	LOOKOUT AVE	49	NEIL CIR	26	PLEASANT ST	63	SHERMAN TER	44	UNION ST	44	WILOGREEN RD	3
BEACONSFIELD DR	27	CLEARVIEW DR	52	EDSON RD	69	GLENWOOD ST	69	INGLESIDE RD	15	LOOKOUT FARM RD	70	NELSON CT	51	PLEASANT VIEW RD	21	SHERWOOD RD	25	UNIVERSITY DR	37	WILSON ST	4
BEAR HILL RD	60	CLIFTON RD	25	EDWARDS RD	41	GORDON RD	12	IRVING RD	13	LOTUS PATH	12	NELSON ST	51	POINT ST	49	SHORE RD	21	UPLAND RD	15	WINCH WAY	3
BEAVER DAM RD	32	CLOVER LN	62	EISENHOWER AVE	29	GRACE CIR	51	IVY LN	31	LOWELL RD	18	NERN ST	36	POND RIDGE RD	61	SHORE TER	21	VALE ST	36	WINDSOR AVE	5
BEE ST	44	CLOVER TER	62	ELIOT HILL RD	68	GRANBY RD	33	JACK PATRICK LN	67	LUPINE ST	13	NEW HAMPSHIRE AVE	21	POND ST	60	SIENNA LN	60	VALLEY RD	35	WINNEMAY ST	3
BELLEVUE RD	43	CLUBHOUSE LN	2	ELIOT ST	54	GRANDVIEW ST	52	JACKSON CT	26	LYMAN ST	13	NEW RD	18	POND VIEW CIR	4	SILVERHILL LN	48	VERMONT AVE	21	WINSLOW RD	2
BELMORE RD	41	COACHMAN LN	31	ELM ST	43	GRANT ST	44	JACQUELINE CIR	19	LYNN ST	25	NEWFIELD DR	40	PORTER RD	23	SKOHEGAN WAY	45	VERNON RD	32	WINTER ST	7
BELVIDERE ST	35	COBBLESTONE DR	67	ELMWOOD AVE	51	GREAT ROCK CIR	48	JAMESON ST	60	MACARTHUR RD	21	NEWMAN CIR	9	POSSUM HOLLOW LN	25	SOUTH AVE	44	VESTA RD	18	WOLFE TER	6
BENNETT ST	51	COCHITUATE ST	43	ELWIN RD	31	GREEN ST	49	JEFFERSON ST	52	MADISON ST	52	NIMITZ CIR	29	POST OAK LN	48	SOUTH LINCOLN ST	55	VICTORIA CIR	49	WOODBINE RD	4
BERKELEY RD	62	COHNS ST	64	EMERSON ST	13	GREENLEAF ST	31	JENNIFER CIR	49	MADONNA ST	31	NOBBY LN	43	PREBLE ST	51	SOUTH MAIN ST	51	VILLAGE BROOK LN	47	WOODBURY LN	6
BEVERLY RD	14	COLBURN ST	52	ENGLAND RD	58	GREENWOOD RD	24	JENNINGS POND RD	21	MAGNOLIA RD	12	NOKOMIS WAY	53	PRESBREY PL	60	SOUTH ST	68	VILLAGE GREEN A	74	WOODCOCK PATH	6
BIGELOW AVE	35	COLEMAN CT	26	ERIE DR	8	GRISTMILL LN	73	JENNISON CIR	4	MAIN ST	44	NOLIN ST	39	PRESCOTT AVE	48	SPEEN ST	10	VILLAGE GREEN B	74	WOODLAND HTS	6
BIRCH RD	12	COLLEGE RD	30	ERLANDSON RD	21	GROVE RD	21	JOSHUA PATH	60	MAINE AVE	21	NONESUCH DR	4	PRINCETON RD	21	SPOONER AVE	49	VILLAGE GREEN LN	39	WOODLAND ST	5
BISHOP ST	31	COLLINS AVE	50	ERNEST DR	62	GROVE ST	35	JUDITH RD	26	MAINSTONE RD	2	NORTH AVE	36	PROCTOR ST	49	SPRING ST	43	VILLAGE HILL LN	47	WOODLEIGH RD	6
BLOSSOM CIR	18	COLUMBIA AVE	25	ESSEX RD	23	GROVE TER	21	JUNIPER LN	52	MAPLE ST	43	NORTH MAIN ST	6	PROSPECT ST	40	SPRING VALLEY RD	13	VILLAGE ROCK LN	47	WOODS CT	3
BLUEBERRY HILL RD	31	COMMON ST	44	EUCLID AVE	14	GUYS WAY	37	JUSTIN RD	68	MANCHESTER PL	45	NORTH PLEASANT ST	26	PRYOR RD	7	SPRUCE LN	48	VILLAGE WAY	47	WORCESTER ST	1
BLUESTONE WAY	67	COMMONWEALTH RD	11	EUCLID CIR	14	HALSEY WAY	29	KAPRELIAN CT	18	MANOR AVE	20	NORTHWOOD LN	2	PUMPKIN PINE RD	39	SQUIRE CT	48	VIRGINIA RD	32	WORONOCO DR	4
BODEN LN	31	CONCORD PL	43	EVANS DR	6	HAMMOND AVE	6	KAREN LN	57	MANSFIELD ST	44	NOTTINGHAM DR	25	PURRINGTON AVE	25	ST MARYS DR	54	VISION DR	19	YORKSHIRE DR	1
BOLSER AVE	49	CONCORD ST	43	EVERETT ST	71	HAMMOND RD	6	KATIE PATH	57	MAPLE AVE	50	OAK HILL RD	4	QUINCE ST	51	ST THOMAS AVE	64	WABAN ST	43	YUBA PL	3
BORDER RD	29	CONNECTICUT AVE	21	EVERETT TER	72	HAMMOND RD EXT	6	KEANE RD	21	MAPLE ST	43	OAK KNOLL RD	6	RABBIT RUN RD	25	STACEY ST	51	WALCOTT ST	40	ZOAR ST	3
BRADFORD RD	13	COOLIDGE AVE	52	EVERGREEN RD	11	HAMPSHIRE DR	19	KEANE TER	21	MARIE PATH	57	OAK ST	57	RANDALL CT	8	STAGG DR	43	WALDEN DR	48		
BRAEMORE RD	40	COOPER RD	21	FAIRBANKS PL	27	HAMPTON RD	25	KELLEY WAY	27	MARION ST	36	OAKLAND ST	51	RANGER RD	32	STANLEY ST	19	WALKUP CT	45		
BRIAR LN	4	CORDIAL WAY	69	FAIRS LN	69	HARDING RD	56	KELSEY RD	33	MARJORIE LN	49	OAKLAND ST EXT	51	RATHBUN RD	4	STEPPING STONE LN	69	WALNUT AVE	19		
BRIGHAM CT	45	COTTAGE ST	52	FAIRVIEW AVE	50	HARDWICK RD	23	KENDALL LN	39	MARK ST	7	OAKLAND TER	50	RAY ST	4	STETSON RD	24	WALNUT HILL DR	36		
BROADS AVE	54	COUNTRYSIDE RD	60	FAIRWAY CIR	33	HARP CT	54	KIMBALL CT	43	MARSHALL AVE	48	OAKRIDGE AVE	29	REDMEN DR	59	STEVEN CIR	37	WALNUT PARK RD	20		

Legend

- TOWN WELL
- BFLY-VALVE
- GATE
- TAPGATE
- HYDRANT (Hyd. Gates not shown)

WATER MAIN

- 1" - 8" Potable Water
- 10" - 18" Potable Water
- 20" - 24" Potable Water
- Raw Water
- Treated Water

Town of Natick GIS Geographic Information System

GIS Division
Dept. of Public Works
75 West Street
Natick, Mass. 01760
February 25, 2019

DISCLAIMER: The information depicted on this map is for planning purposes only. It may not be adequate for legal boundary definition, regulatory interpretation or conveyancing purposes.

C MWRA's Policy # OP.10

Admission of New Community to MWRA Water System

Policy #: OP.10

Effective Date: November 12, 2014	**Last Revised:** 11/12/2014
Contact: Planning Department, Operations	**Former Policy #:** OP.10
Reviewed by Chief Operating Officer: Michael J. Hornbrook	**Date:** 11/12/2014
Reviewed by Internal Audit: John A. Mahoney	**Date:** 11/12/2014
Approved by Executive Director: Frederick A. Laskey	**Date:** 11/12/2014

Purpose

This policy explains the criteria and process the MWRA will use to evaluate a request for admission of a new community to the MWRA water system and requests from state, county, institutional and federal facilities for water service to locations in communities not included in section 8 (d) of MWRA's Enabling Act (St.1984, c.372).

Eligibility

This policy applies to communities seeking admission to the MWRA water system, and to state, county, institutional, and federal facilities seeking MWRA water for a location outside MWRA's water service area as set forth in section 8 (d) of MWRA's Enabling Act (St.1984, c.372).

Continued on next page

In this Policy This policy contains the following parts:

Continued on next page

Admission of New Community to MWRA Water System (OP.10), Continued

Admission Criteria

In evaluating whether to permit the admission of new communities to the MWRA waterworks system, the MWRA must evaluate the following two groups of criteria:

A. Enabling Act Criteria

- The MWRA must, in accordance with Section 8 (d) of Chapter 372 of the Acts of 1984, find that the following six criteria are met:
  - The safe yield of the watershed system, on the advice of the MDC, is sufficient to meet the new community's demand.
  - No existing or potential water supply source for the community has been abandoned, unless the Department of Environmental Protection (DEP) has declared that the source is unfit for drinking and cannot be economically restored for drinking purposes.
  - A water management plan has been adopted by the community and approved by the Water Resources Commission.
  - Effective demand management measures have been developed by the community, including the establishment of leak detection and other appropriate system rehabilitation programs.
  - A local water supply source feasible for development has not been identified by the community or DEP.
  - A water use survey has been completed which identifies all users within the community that consume in excess of twenty million gallons a year.
- Admission of the applicant community into the MWRA has received approval from the MWRA Advisory Board, the General Court, and the Governor.
- An applicant community has accepted the extension of MWRA's water system to the community by majority vote of the city council if a city or a majority vote of the town meeting if a town.

Continued on next page

Admission of New Community to MWRA Water System (OP.10),
Continued

Admission Criteria continued

- Providing water service to a state, county, institutional or federal facility outside MWRA's water service area has received approval from the MWRA Advisory Board.

B. Other Criteria

- Any expansion of the MWRA water service system shall strive for no negative impact on the interests of the current MWRA water communities, water quality, hydraulic performance of the MWRA water system, the environment, or on the interests of the watershed communities; shall attempt to achieve economic benefit for existing user communities; and shall preserve the rights of the existing member communities. Any evaluation of the impacts of new communities shall clearly evaluate all changes to system reliability.

- The applicant community has met all legal requirements for admission; and

- Upon admission, the applicant community will pay fair compensation for past investment in the MWRA waterworks system by existing user communities.

Application Process

A. Application

An applicant shall submit three copies of a completed application to the MWRA Executive Director for review. A copy shall also be submitted to the MWRA Advisory Board. MWRA staff will review and evaluate the completed application to determine whether the requirements of the Enabling Act and additional requirements can be met, and whether water service can be provided by MWRA without jeopardizing standards and requirements set forth in this policy.

Continued on next page

Admission of New Community to MWRA Water System (OP.10),
Continued

Application Process, continued

B. Requirements

- In a formal application for entrance to the MWRA waterworks system, an applicant community must provide detailed documentation to enable MWRA to make the necessary findings required by MWRA's Enabling Act (Section 8 (d) of St.1984, c.372).

In addition to providing documentation for the Section 8 (d) findings above, the applicant must provide the following.

- Documentation of approvals from the Secretary of Environmental Affairs in the MEPA process, the Water Resources Commission in the Interbasin Transfer Act process, the MWRA Advisory Board, the DEP on local source feasibility, the General Court, and the Governor. Prior to a formal application to MWRA, MWRA will strive to streamline the approval process, by review of application material concurrently with other approval processes, and by coordination with state agencies to document environmental and hydraulic impacts on MWRA's system.

- A detailed description of the water conservation and water accountability programs undertaken by the community and other entities including: leak detection and repair, commercial and industrial water conservation, residential water conservation efforts, large meter downsizing, meter replacement, municipal facility conservation, unaccounted-for water analysis (present data for UAW levels in last 3 years), true cost pricing and conservation based pricing for water and sewer service.

- Communities shall provide a plan for water conservation. MWRA encourages communities to have a plan that adheres to the Commonwealth's water conservation standards, including guidelines for lawn and landscapes. (Enforcement shall be the responsibility of the Water Resources Commission (WRC), Department of Environmental Protection (DEP) and other Commonwealth agencies.)

- A description (and copy) of municipal zoning and non-zoning measures designed to protect local sources of supply with a comparison showing how they meet DEP's regulations and policies for adequate water supply protection measures.

Continued on next page

Application Process, continued

- Copies of any studies conducted on existing and potential local water source safe yield, protection needs, contamination threats, and water demand forecasts. If no studies are available on a potential local source known to the community or DEP, then the applicant should prepare documentation on estimated safe yield, protection needs and contamination threats, even for those sources previously determined to be infeasible to develop.

- A disaggregation of the community's total water consumption by customer class: residential, industrial, commercial, municipal facilities, unaccounted-for, other, and agricultural. A listing of large customers using over one million gallons a year should be provided.

- A Local Water Supply Management Plan if the applicant is a community. For a plan contents, refer to Attachment A. A Water Management Plan approved by the Water Resources Commission will also satisfy MWRA's Local Water Supply Management Plan requirement. A community's application must address how the requested connection is consistent with the stated objectives of the community's Local Water Supply Management Plan.

  All other applicants (*i.e.*, state, county, institutional, and federal facilities) must address how the proposed water connection/water use is consistent with a Local Water Supply Management Plan, if it exists. MWRA also reserves the right to reject applications for those cases in which the community does not have a Local Water Supply Management Plan.

Continued on next page

Application Process, continued

C. MWRA Review of Application

Upon receipt of an application for admission to the waterworks system the MWRA will:

- Review the application's documentation on the necessary findings required by the MWRA's Enabling Act, and other criteria listed in the Admission Criteria.
- Review documentation submitted pursuant to the Requirements section of this Policy (Section B.) to help determine if MWRA can make the findings required listed in Admission Criteria.
- Analyze the applicant's demand impact on the MWRA waterworks system and consider the projected long-term demand of the system with the new community and contrast it to the MWRA's operations through average, wet and drought scenarios. The analysis must include the possibility of increased usage of MWRA supplies by partially supplied and non-MWRA communities due to drought conditions. Impacts on service to other community connections under various hydraulic conditions and to reservoir and watershed conditions must also be evaluated.
- Upon the request of the applicant, and subsequent to the completion of application review by MWRA staff and following consultation with the Advisory Board, submit a status report to the Board of Directors to inform it of the request, staffs' review and the status of other pending permits or approvals.

Continued on next page

Application Process, continued

D. Concurrent Reviews

Other regulatory approvals or permits may be required before a request for service may be approved. It is the responsibility of the applicant to obtain all such approvals. Copies of all applications or requests for regulatory approval shall be submitted to the MWRA as early as practicable to facilitate MWRA review of the request. MWRA will cooperate with other regulatory agencies to coordinate its review where possible, and will review and comment in other regulatory processes as appropriate. Final action by MWRA cannot be taken until the following regulatory approvals, where required, have been obtained.

- Massachusetts Environmental Policy Act – Executive Office of Environmental Affairs
- Interbasin Transfer Act - Water Resources Commission
- Local water supply source feasibility - Massachusetts Department of Environmental Protection

E. Legislation

Legislation is required to extend MWRA's water system to a local body not listed in Section 8 (d). Proposed legislation should be submitted to MWRA for review before filing. MWRA may require that certain conditions be included in the proposed legislation.

Continued on next page

Admission of New Community to MWRA Water System (OP.10), Continued

Water Supply Agreement

If MWRA approves the request for new service, it will establish appropriate terms and conditions of service in the form of a water supply agreement for an initial term of five years. The agreement will be consistent with MWRA's Continuation of Contract Water Supply regulations (360 CMR 11.00). Before contract renewal, MWRA will reevaluate and assess the status of the community's demand management efforts.

The agreement will set forth as appropriate:

- Firm limits on usage, including average and maximum daily use of MWRA water and a stipulation that any increase beyond the stated amounts would require a contract revision and recalculation of the entrance fee. Any significant increase will also require new approval by the MWRA Advisory Board and MWRA Board of Directors.

- A requirement that the applicant assume all costs of connection and pay an entrance fee.

- A requirement that the applicant continue to use all local non-MWRA sources of water to the maximum feasible extent.

- A requirement that the applicant continue to implement all practicable conservation measures. Communities shall be encouraged to adhere to the Commonwealth's water conservation standards, including guidelines for lawn and landscapes, and follow the MWRA's regulations for Leak Detection (360 C.M.R. 12.00).

- A requirement that the community protect local sources of supply in accordance with DEP's guidelines for water supply protection measures.

- Other conditions as may be appropriate.

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Waivers The MWRA may, in its discretion, waive any of the conditions or requirements set forth in this Policy and Procedure, not otherwise mandated by law or regulation, if it finds that the community has demonstrated unusual factors or extraordinary circumstances which would make imposition of the condition or requirement upon that community unfair or inappropriate and finds that the proposed action will not jeopardize the MWRA's ability to supply its water communities.

Connection Costs and Entrance Fees outlined in the following sections shall not be waived.

Entrance Fees

The MWRA will charge an entrance fee to cover the new community's fair share of the costs of the waterworks system in place at the time user joins. The entrance fee may be paid in one lump sum, or may be paid pursuant to up to a 25-year, interest-free payment plan with a grace period for the first three years, with payments to be made in years 4-25. The 25-year, interest-free payment plan shall be subject to review by the Board of Directors every five years. To be eligible for this multi-year, interest-free payment plan, a new community must take substantive steps toward admission to the MWRA prior to the adoption of any revised policy by the Board of Directors. Substantive steps include any of the following: affirmative vote to join MWRA by Town Meeting, City Council or Board of Directors, or submission of MEPA documentation indicating MWRA is the preferred option and subsequent completion of MEPA process in a timely manner.

New communities joining the MWRA waterworks system as well as communities admitted to the MWRA since 2002 who desire to increase their MWRA-approved withdrawal shall be eligible for the interest-free payment plan. The entrance fee recovers the new user's proportional share of the waterworks system's asset base, which has already been paid for by the existing users of the system. The net asset value charge will be determined through allocating 25% of the net asset value to peak use and the remaining 75% to average use.

MWRA system average annual use and peak six-month average use will be based upon the prior five calendar years of average of water consumption. The user's projected need for MWRA water will be based upon a detailed analysis of local supplies and shortfalls. Its average annual use and peak six-month average use may be based upon its projected need, but in no case shall the projected need be more than the amount approved under MEPA and the Interbasin Transfer Act. Firm contract limits will be established based upon the usage volumes used in the entrance fee calculation.

The formula is as follows:

75% of NAV Allocated to Average Use +25% of NAV Allocated to Peak Six-month system use = Total Entrance Fee

Average Use

$$\frac{\text{New user's projected MWRA "average use" needs}}{\text{System "average use"}} \times \text{NAV of of Total Waterworks System}$$

Peak Use

$$\frac{\text{New user's projected MWRA "peak use" needs}}{\text{System "peak use"}} \times \text{NAV of Total Waterworks System}$$

Continued on next page

Admission of New Community to MWRA Water System (OP.10), Continued

Entrance Fees, continued	If the applicant community has purchased MWRA water under an emergency supply agreement and has paid charges, which include asset value contributions, then those contributions will be treated as credits against the total entrance fee. Payments of premium charges under an emergency supply agreement are not credited against the entrance fee.
Connections and Connection Costs	All new community water system connections shall be made directly to the MWRA transmission system wherever practical. The applicant community must pay all the costs of providing the connection. The MWRA will charge the costs to the new user as they are incurred, and as well as expenditures by MWRA for outside services necessary to make the connection. These costs may include, but are not limited to, costs of preliminary and final design, land acquisition, environmental review, pumping and storage facilities, and actual construction including construction services and resident inspection. The new user will pay only the connection cost incurred to serve its own needs. If other existing users will benefit from the new pipelines and facilities, the MWRA will assume an appropriate portion of the connection costs that will be added to the overall capital costs for water.
Application of Individual Users	The MWRA Enabling Act allows for arrangements involving the extension of the waterworks system to any local body, institution, agency or facility of the commonwealth or federal government if MWRA finds that the additional demand will not jeopardize the delivery of water to existing users and the MWRA Advisory Board approves arrangements beyond six months in length. All requests from state, county, institutional, and federal facilities outside the water service area will be subject to the policies and procedures outlined above, including the payment of entrance fees and connection costs. Connections and withdrawals by private entities outside the water service area shall remain prohibited. In the event exceptions arise to this prohibition, the applicant will be subject to the policies and procedures outlined above and shall obtain approval from: the receiving community; the transporting community; regulatory bodies, where required; the MWRA Advisory Board; the MWRA Board of Directors; and the Governor and General Court.

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Admission of New Community to MWRA Water System (OP.10), Continued

Annual Update

MWRA staff shall provide an annual update to the MWRA Board of Directors on the status of any new connections (connections approved within the preceding five years) into the MWRA system. This annual update shall at a minimum include information regarding the proponent entity's compliance with the conditions of approvals as stipulated within the water supply agreement and/or other affiliated contractual arrangements with the MWRA; and the status of payments due to either the MWRA or the proponent entity.

Attachment A

Local Water Supply Management Plan Outline

Water Supply

- Identify existing and potential water supplies in the community, zone II delineations, Interim Wellhead Protection Zones, and/or Zones A and B delineations for surface water sources, and watershed boundaries.
- Describe source water protection program, including compliance with DEP source water protection regulations.
- Identification of all water supply options, including compliance with DEP water protection regulations.
- Identification of all water supply options, including local, regional and conservation options.

Regional Plans

- Describe any existing regional or watershed plans and how these plans relate to the plans of the local community. Refer to reports and plans developed by regional planning agencies, local watershed associations, and other appropriate regional and/or non-governmental agencies.

Future Plans

- Analysis of existing zoning and master plan, including EOEA build-out analyses available from Massachusetts GIS.
- Identification of future water and wastewater needs and various alternatives for meeting these needs.
- Summary and evaluation of water infrastructure plans based on build-out and future needs.
- Overall summary based on above information.

Analysis and Conclusions

- An action plan, with timetables for implementation of the recommendations of the plan, a budget, and identification of people responsible for implementation.